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ROYAL ASIATIC SOCIETY CHINA
SHANGHAI
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JOURNAL

OF THE

NORTH-CHINA BRANCH

OF THE

ROYAL ASIATIC SOCIETY.

NEW SERIES No. X.

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On behalf of the Society, the Council tenders its best thanks to H. G. Hollingworth, Esq. for his generous gift of five hundred copies of the paper which forms Appendix I, to the Journal.

REPORT

OF THE

COUNCIL OF THE NORTH-CHINA BRANCH

OF THE

Royal Asiatic Society,

For the Year 1875.

THE following gentlemen were elected office-bearers at the annual meeting held in the early part of the year:—

W. H. MEDHURST, Esq., *President.*
ALEX. WYLIE, Esq., GEO. F. SEWARD, Esq., } *Vice-Presidents.*
T. G. SMITH, Esq., *Secretary.*
J. E. REDING, Esq., *Treasurer.*
H. CORDIER, Esq., *Librarian.*
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Rev. J. THOMAS, D. J. MACGOWAN, M.D., T. W. KINGSMILL, Esq., A. J. LITTLE, Esq., E. C. TAINTOR, Esq., F. B. JOHNSON, Esq., } *Councillors.*

During the year only four meetings have been held; at which the following papers were read:—

"Elucidations of Marco Polo's Travels in North-China, drawn from Chinese sources,"—by Rev. Archimandrite Palladius.

"Notes made on a tour through Shan-hsi and Shen-hsi,"—by Rev. C. Holcombe.

"Short notes on the identification of the Yuè-ti and Kiang tribes of Ancient Chinese History,"—by T. W. Kingsmill, Esq.

"Notices of the Mediæval Geography and History of Central and Western Asia; drawn from Chinese and Mongol writings, and compared with the observations of Western authors in the Middle ages,"—by E. Bretschneider, Esq. M.D.

Three members have joined the Society;—five have resigned. The Treasurer also reports a falling off in the aggregate yearly subscriptions.

The present list of members consists of thirteen honorary—thirty-four corresponding—sixty-six resident—and seventy-six non-resident.

A list of the members is herewith attached.

For contributions to the Library, see the Librarian's Report. Appended also are the Curator's and Treasurer's Reports, the latter shewing a balance in hand of $258.16.

The retiring officers recommend that some effort should be made during the ensuing year, to secure an accession of subscribers; there being many residents who would undoubtedly join the Institution, if made fully aware of its purposes and generally useful character.

Librarian's Report.

I have to mention the important addition to the Library of a collection of the *Journal Asiatique*,—of a file, nearly complete, of the *Shanghai Evening Courier* and the *Shanghai Weekly Budget*,—and a set of the publications of the Shanghai General Chamber of Commerce. These valuable donations, the contributions of a few generous authors, and the Transactions of learned Societies, are almost all we have to mention in the list of additions appended to these remarks.

During the last five years, the Society has endeavoured to enlist public sympathy and patronage to a greater extent, pointing out the wants of the Library in its annual reports; but the various appeals made have not fully realized the looked-for result. Unremitting attention and care have been bestowed upon the Library of the Asiatic Society; but the time thus spent, if not responded to on the part of the community, by a show of interest in its only literary and scientific institution, is up.hill work, and naturally becomes disheartening.

That the Library meets a real want is proved by the great increase in the number of works consulted or lent out, as shown by the register kept for the purpose.

HENRI CORDIER,

Hon. Librarian N.-C.B.R.A.S.

List of Works presented to the Library of the North-China Branch of the Royal Asiatic Society, during the year 1875.

I. *Transactions of Learned Societies, etc.*

BERLIN.

Verhandlungen der Gesellschaft für Erdkunde zu Berlin. 1874, Nos. 2, 3. By the Society.

Monatsbericht der Königlich Preussischen Akademie der Wissenschaften zu Berlin. 1874, Nov. Dec.; 1875, Januar, Feb., März, April, Mai, Juni, Juli und August. By the Society.

Register für die Monatsberichte der Königl. Preuss. Akademie der Wissenschaften zu Berlin, vom Jahre 1859 bis 1873. Berlin, 1875, ppt. 8vo. By the Society.

EDINBURGH.

Proceedings of the Royal Society of Edinburgh. Sessions 1873—1874.

LONDON.

Journal of the Statistical Society. Published Quarterly. Vol. XXXVI, pt. 4 (1873); Vol. XXXVII, pts. 1/4 (1874); Vol. XXXVIII, pt. 1 (1875). By the Society.

Statistical Society Almanack for 1875. By the Society.

Proceedings of the Scientific Meetings of the Zoological Society of London. 1873, pts. 1, 2, 3; 1874, pts. 1, 2, 3. By the Society.

The Quarterly Journal of the Geological Society. Nos. 116/122 (May 1, 1875). By the Society.

Proceedings of the Royal Society. Vol. XXI (146/7); Vol. XXII (148/150). By the Society.

The Journal of the Royal Geographical Society. Vol. XLII, 1872; Vol. XLIII, 1873. By the Society.

Proceedings of the Royal Geographical Society. Vol. XVIII, Nos. 1/5 (1874); Vol. XIX, Nos. 1/4 (1875). By the Society.

Journal of the East-India Association, No. 3, 1875, 8vo. By the Association.

MUNICH.

Sitzungberichte.....der K. C. Akademie der Wissenschaften zu München.
Literary. 1873, Nos. 1/6; 1874, Nos. 1/2.
Scientific. 1873, Nos. 1/3; 1874, No. 1.

PARIS.

Bulletin mensuel de la Société d'Acclimatation. 1875, Janvier, Fév., Mars, Juillet, Septembre, Octobre. By the Society.

Bulletin de la Société de Géographie, 1875. By the Society.

Nouveau Journal Asiatique. Vols. III—XVI (1829—1835).

Journal Asiatique. IIIe Série, Vols. I—XIV (1836—1842). IVe Série, Vols. I—VIII, XI—XX (1843—1852). Ve Série, Vols. I—XX (1853—1862). VIe Série, Vols. I—XX (1863—1872). By the Société Asiatique.

Mémoires de la Société d'Ethnographie.....publiés par Ed. Madier de Montjau. 12e vol., 2e partre (1873). By the Society.

THE HAGUE.

Bijdragen tot de Taal, Land, en Volkenkunde van Nederlandsch Indië. 1873, Nos. 1/2; 1874, Nos. 1/4 (published at S'Gravenhage).

WIEN.

Oesterreichische Monatsschrift für den Orient. Nos. 1/11 (15 Jan. 1875—15 Nov. 2875). By the Orientalischen Museum.

Mittheilungun der kais. und könig. geographischen gesellschaft in Wien. 1873—1874. Vols. XVI—XVII. By the Geographical Society of Vienna.

YOKOHAMA.

Transactions of the Asiatic Society of Japan. Vol. III. Part i, from 14th October, 1874, to 23rd December, 1874. 8vo. Part ii, from 13th January, 1875, to 30th June, 1875. 8vo. By the Society.

Mittheilungen der Deutschen Gesellschaft für Natur und Völkerkunde Ostasien's. Herausgegeben von dem Vorstande. No. 7 (June, 1875). No. 8 (September, 1875). By the Society.

II. *Miscellaneous Periodicals.*

Cosmos. Comunicazioni sui progressi più recenti e notevoli della Geografia e Scienze affini di Guido Cora. Torino. Vol. II, 1874, pts. iv, v (12 Dic.); 1875, pt. vi (17 Marz.); pts. vii, viii, ix (29 Aprile); pts. x, xi, xii (12 Nov.). Vol. III, 1875, pt. i (28 Luglio). By the Editor.

Trübner's American and Oriental Literary Record. 104/5, 106/7 (1874); 108, 109/110, 111 (1875). By the Editor.

Trübner's Catalogue of Books, Nos. 8 & 10. By Messrs. Trübner & Co.

The Oriental. A Monthly Magazine, edited by J. H. Stocqueler.....Vol. ii, No. 12, June, 1874. By the Editor.

Repertorium der Naturwissenschaften.....1875 (I. Jahrg.), Nos. 1/6 (Januar-Juni). By the Editor.

The Friend of China. Vol. XXIII, Shanghai, 1865. Purchased.

The Canton Register. Odd volumes and numbers.

The Chinese Recorder and Missionary Journal. Vol. VI, Shanghai, 1875. From the Publisher.

The North-China Daily News. folio. Vols. X, XI, XII, XIII, XIV (July 1st, 1872—December 31st, 1874). Purchased.

The Shanghai Evening Courier. 1868: odd numbers (December). 1869, January—April (1 vol.)—odd numbers. 1870, 1871, 1872, 1873 and 1874 (20 vols. complete). Purchased.

The Shanghai Weekly Budget. 1871—1874 (8 vols. complete). Purchased.

III. *Miscellaneous Works.*

Journal de mon troisième voyage d'exploration dans l'empire chinois; ouvrage contenant 3 cartes, par M. l'Abbé Armand David. Paris, 1875, 2 vols. 12mo. By the Author.

Conchyliologie fluviatile de la Province de Nanking, par le R. P. Heude, de la Compagnie de Jésus. Premier Fascicule. Paris, Savy (1875) 4to. By the Author.

Manuel pratique de Langue Cambodgienne, par G. Janneau. Saigon. Collège des Stagiaires, 1874, folio. By Henri Cordier.

The Province of Shantung: its Geography, Natural History, etc. By A. Fauvel, of the Chinese Imperial Maritime Customs (reprinted from the *China Review*). Hongkong, 1875, ppt. 8vo. By the Author.

Uranographie chinoise ou Preuves directes que l'Astronomie primitive est originaire de la chine, et qu'elle a été empunitée par les anciens peuples occidentaux à la sphère chinoise; ouvrage accompagné d'un Atlas Céleste Chinois et Grec, par Gustave Schlegel, Docteur en Philosophie.....Publié par Institut Royal .....des Indes-Orientales Néerlandaises à la Haye. La Haye, 1875, 2 partres, 8vo. et Atlas. By the Institut Royal.

Dictionarium Linguæ Thai sive Siamensis interpretatione latina, gallica et anglica illustratum auctore D. J. B. Pallegoix Episcopo Mallensi, Vicario Apostolico Siamensi. Parisiis, MDCCCLIV. By the Société Asiatique.

Observations of Magnetic Declination made at Trevandrum and Agustia Malley, in the Observatories of His Highness the Maharajah of Travancore, G.C.S.I. in the years 1852 to 1869. Being Trevandrum Magnetical Observations, Volume I. Discussed and edited by John Allan Broun, F.R.S., late Director of the Observatories. London, 1874, imp. 4to. By H. H. the Maharajah of Travancore, G.C.S.I.

Abstract of Results of a Study of the genera *Geomys* and *Thomomys*: with addenda on the Osteology of *Geomyidæ*, and on the habits of *Geomys Tuza*, by Dr. Elliott Coues, U. S. Army. Washington, Government Printing Office, 1875, ppt. 4to.

La Vie et les Oeuvres de P. Chr. Asbjrnsen. Esquisse bibliographique et littéraire. Christiania, 1873, ppt. 4to.

Babad Tanah Djawi, in proza. Javaansche Geschiedenis loopende tot het jaar 1647 der javaansche jaartelling, met aanteekeningen, van J. T. Meinsma. S'Gravenhage, 1874, 8vo.

The Calendar of the Tokio Kaisei-gakko, or Imperial University of Tokio, for the year 1875. Published by the Director, 1875, 8vo. From D. B. McCartee, M.D.

Le Congrès des Orientalistes. Ce qu'il est aujourd'hui,—le rôle important qu'il peut être appelé à jouer dans l'interêt du commerce français en facilitant ses relations avec les peuples de l'Orient,—le but pratique qu'il devrait se proposer:—par Charles le Mansois du Prey. Saint-Étienne, 1875, br. in 8vo. From the Author.

Ornithological Notes made at Chefoo (Province of Shantung, North China). By R. Swinhoe, H. M's. Consul (*Ibis*, 1874, pp. 422/432; 1875, pp. 113/140).

Articles by Henry F. Hance, Ph. D., etc. Extracts from the *Journal of Botany*:—On Pterocarya Stenoptera (December, 1873). De Nova *Asplenii* specie (May, 1874). On some Asiatic *Corylaceæ* (August, 1874). On a small collection of Plants from Kiukiang (September, 1874). On three new Chinese *Calami* (September, 1874). Scirpus Triqueter, Linn., in Southern China (November, 1874). De Duabus *Ribis* speciebus e China septentrionaria (February, 1875). On a Chinese Screw-pine (March, 1875). Uses of the common Rush in China (April, 1875). De *Iride Dichotoma, Pall.*, breviter disceptat (April, 1875). On some mountain Plants from Northern China (May, 1875). From the Author.

Shanghai General Chamber of Commerce:—1st, Annual Reports and Minutes, 1865—1874, 1 vol. folio. The reports were not regularly printed before 1865. 2nd, Publications of the Shanghai General Chamber

of Commerce, 1 vol. folio. 3rd, Letters of the Baron F. von Richthofen, in 1 vol. folio:—I. Province of Hunan. II. Province of Hupeh. III. Provinces of Honan and Shansi. IV. Provinces of Chekiang and Nganhwei. V. Regions of Nanking and Chinkiang. VI. From Si-ngan-fu, on the Rebellion in Kansu and Shensi. VII. Provinces of Chili, Shansi, Shensi, Sz'chwan, with notes on Mongolia, Kansu, Yünnan and Kwei-chau. From the Committee of the Shanghai General Chamber of Commerce.

Returns of Trade at the Treaty Ports in China, for the year 1874. Part II. Statistics of the Trade at each Port. Shanghai, MDCCCLXXV. From the Statistical Department of the Imperial Maritime Customs.

The Twenty-eighth Annual Report of the Chinese Hospital at Shanghai..... for the year 1874.

Municipal Council of Shanghai: 1875. Report for the year ended 31st March, 1875. Report on proposed Water-works for Shanghai. Report of the Committee appointed to revise the Land Regulations.

Voyage dans la chine occidentale, par l'Abbé Armand David. Lettre à M. A. Daubrée, de l'Institut, directeur de l'école des mines, etc., etc. (Extrait du Bull. de la Société de Géographie, Août, 1874) ppt. 8vo. From the Author.

Questions on Agriculture and Husbandry in general, ppt. 8vo.

舊約全書 Translation of the Old Testament into the Mandarin Dialect, by S. I. J. Schereschewsky, D.D. of the American Episcopal Mission, Peking. Printed at the Mission Press of the American Board, Peking, 1874, roy. 8vo. By the Author.

HENRI CORDIER,
Hon. Librarian, N.-C.B.R.A.S.

SHANGHAI, *31st December, 1875.*

Curator's Report.

During the last twelve months, we have made considerable additions to our set-up collection of birds and other animals; and we have also laid by a considerable number of skins for exchange and other purposes. Most of the birds commonest around Shanghai are wanted by Museums at home; and although not many of the contributions we almost daily receive are required by ourselves, a great many skins are set aside for transmission to England. I have in fact received a letter from Mr. Janson the naturalist, asking me on behalf of the British Museum authorities, for any skins we can spare, of *all* our nonmigratory birds.

The additions to our other departments have not been large, but now that we have the two more interesting divisions—Mammals and Birds—well in hand, there will be more time to attend to other classes.

The case of skins sent to England last spring, arrived back here about two months ago; and aided by the books purchased last spring, and the kind help of Mr. J. P. Martin, who lent several valuable works of reference, and gave his personal assistance besides, the work of naming the various specimens has progressed well, and I am enabled to present with this report, a catalogue of the birds and other animals in the Museum. It has been somewhat hurriedly got up, as the time for having it printed was shortened by the Chinese new-year's holidays.

The chief difficulty to any one taking an interest in the study of Natural History in China, is the absence of works of reference whereby specimens obtained can be identified. About the most useful of the books existing, for this purpose, are Bentham's Flora Hongkongensis, Gunther's Reptiles of British India, and Jerden's Mammals and Birds of India. Besides these, there are articles, descriptive notices and paragraphs of all kinds bearing on Chinese Natural History, scattered among the various scientific journals of Europe and America. As an instance of this extreme difficulty of getting correct information, I may mention that, although for years aided by some of the best Entomologists at home, my collection of Lepidoptera is not above one-sixth identified yet; a great many of the others are probably new to science, and the remainder are referred to in scientific publications in all the languages of Europe.

The creation of a Museum in Shanghai is evidently the first and a very large step towards meeting this difficulty. As a centre for giving information on all subjects connected with Natural History in China, it should be invaluable; but something more even than this is needed; the information gained at the Museum should be made available to dwellers at the out-ports; and for this purpose it is desirable that as soon as the Museum has something like a fair collection of the Chinese representatives of all the orders, a catalogue should be issued of all the specimens, accompanied by plates, descriptions, illustrations and remarks generally, when needed. This work if accurately prepared, would be one of the most valuable additions to the science of Natural History ever published.

The little list of names we have just prepared therefore, must be looked upon as interesting, not on account of its size or the somewhat scanty information it gives, but as the first publication of the Museum, in an endeavour to collect into one book, all the information to be obtained regarding Chinese Zoology and Natural History generally.

W. B. PRYER,
Hon. Curator.

BALANCE SHEET OF THE
North-China Branch of the Royal Asiatic Society.
FOR THE YEAR 1875.

Dr. *Cr.*

1875		$	cts.	1875		$	cts.
Jan.	To Balance forward from last account	419	92		Paid Advertisements	26	67
Dec.	,, Subscriptions collected in 1875.....	419	22		,, Coolie wages	22	00
,,	,, Proceeds from sale of Journal	26	93		,, Gas	8	31
,,	,, Interest from Bank deposits	13	91		,, Sign-board	22	81
					,, Postages	0	56
					,, Municipal Tax	10	28
					,, Printing Circulars.....	4	81
					,, ,, Journal for 1874.....	400	05
					,, Repairs to roof, Tls. 30 *a* 73.2.....	40	99
					,, Fire Ins., Building .....Tls. 25.00		
					Contents ..... ,, 30.00		
					Tls. 55.00 *a* 73	75	38
					Balance.....	268	12
		$	879	98		$	879	98

Balance forward to next account.....$ 268.12

E. & O. E.

SHANGHAI, *January 1st, 1876.*

J. E. REDING,
Hon. Treasurer.

BALANCE SHEET OF THE

Museum Fund of the N.-C. Branch of the Royal Asiatic Society.

Dr. **FOR THE YEAR 1875.** *Cr.*

1875			Tls.	cts.
Jan.	1	To Balance forward from last account	45	56
Mar.	4	,, Received from Recreation Fund loan ...	600	00
July	21	,, do. do. ...	300	00
Nov.	11	,, do. do. ...	400	00
		Tls.	1,345	56

1875		Tls.	cts.
	Fire Insurance of Museum	10	00
	Birds, Tiger's head, Antelope's skin, Bird-stands, &c. .....$267.12 *a* 74.1	197	94
	Cases for Birds, &c.	62	88
	do. large	217	50
	Books of reference.....	104	09
	Animals, Birds, Skinning Table, Glass Jars, Implements for preparing and mounting .....Tls. 225.75		
	Paid on account of same.....	100	00
	Implements for preparing and mounting ...	32	79
	Carpentering	17	08
	Wages to preparator	141	06
	Rent for 1875.....	150	00
	Balance in hand.....	312	22
	Tls.	1,345	56

Balance forward to next account.....Tls. 312.22

E. & O. E.

SHANGHAI, *January 1st, 1876.*

J. E. REDING,
Hon. Treasurer.

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J. Barr Robertson.

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ARTICLE I.

ELUCIDATIONS OF MARCO POLO'S TRAVELS IN NORTH-CHINA, DRAWN FROM CHINESE SOURCES.*

By the Rev. ARCHIMANDRITE PALLADIUS.

I INTEND in the following notes to verify, by means of Chinese documents, some of Marco Polo's statements regarding his route from Lobnor, to Shangtu in the northern part of China proper. I do not undertake to explain all the dark and doubtful points in the narrative of the celebrated traveller, but merely offer some information in as far as my acquaintance with Chinese literature may enable me. The abundant and multifarious material found in this literature is well nigh inexhaustible; but a considerable collection of books and a good deal of time are required, to admit of the systematical research necessary for the solution of the questions before us. As a basis for my investigations, I have chosen Col. H. Yule's work, *The Book of Ser Marco Polo*, etc., London, 1871. The vast work of this learned commentator obviates the necessity of discussing many questions which have already been solved by him with the sound critical judgment which distinguishes his conclusions.

Book I.

Ch. XXXVIII.—*Charchan.*

"Charchan is a Province of Great Turkey, lying between north-east and east. The people worship Mahommet. There are numerous towns and villages, and the chief city of the kingdom bears its name, Charchan. The Province contains rivers which bring down jasper and chalcedony, and these are carried for sale into Cathay

* Read before the Society on January 20th, 1875.

where they fetch great prices. The whole of the Province is sandy, and so is the road all the way from Pein, and much of the water that you find is bitter and bad. However at some places you do find fresh and sweet water. When an army passes through the land, the people escape with their wives, children, and cattle a distance of two or three days' journey into the sandy waste; and knowing the spots where water is to be had they are able to live there, and to keep their cattle alive, whilst it is impossible to discover them; for the wind immediately blows the sand over their track." (Vol. i, p. 178.)

Such a name is not met with, either on the 16th century map * or in other extant geographical documents relating to the Mongol period; a name similar to it occurs for the first time in a description of the route from China to the west, as far as the Mediterranean Sea, compiled in the time of the Ming dynasty.† Eight hundred and fifty *li* west of Turfan, the town *Karahashitie* is mentioned in the itinerary. To the south of this town, it is further stated, is a river 扯力昌 *Ch'e-li-ch'ang*. Two hundred *li* further on (west) is mentioned 黑水泉 *He-shui-ts'iuen* "Black-water's source." To the north of this is the town of 叉力失 *Ch'a-li-shi*, and to the south, the town of 扯力昌 *Ch'e-li-ch'ang*. Three hundred *li* west of the Black-water's source, is mentioned the well of 察力察 *Ch'a-li-ch'a*; and to the north, 火烟山 *Ho-yen shan* "the Mountain of Fire." There is no necessity to see in this "Mountain of Fire," the mountain 磠砂山 *Nao-sha shan*, which lies a hundred *li* north of Kutch. Chinese geographers state that "burning caverns" are found in the mountain range of 天山 *Tien shan*, on the whole distance from Turfan to Kutch.‡

* Appended to the 海國圖志 *Hai kwo t'u chi*, and to vol iv of the *Contributions of the members of the Russian Ecclesiastical Mission*, Peking.

† This itinerary, published with some modifications during the present dynasty, is appended to the extensive work, 天下郡國利病書 *T'ien hia kiun ko li ping shu*, or "Strategetical Description of China (commenced in 1639, terminated in 1662)." There exist also manuscript copies of this itinerary, but they are, like the printed work, full of errors and discrepancies. The compilation of this itinerary, or at least the principal information contained in it, must belong to the beginning of the 15th century. It is mentioned in the 皇明大政紀 *Hwang ming ta ching ki*, that in 1415, 陳誠 *Ch'en Ch'ing* returned from the western countries after three years' travels, and that he wrote a detailed description of the countries he visited. This description probably served as a groundwork for the itinerary. There was another traveller, 安志道 *An Chi-tao*, who was despatched to Tamerlan in 1395, and returned in 1407; he also wrote a description of the western countries; but it was not published even in the time of the Ming dynasty. *Vide* 野獲編 *Ye ho pien*.

‡ See 回疆通志 *Hui kiang t'ung chi*, and other works.

There seems to be no doubt that *Ch'e-li-ch'ang* is the "Charchan" of Marco Polo, and that it is to be found in the present province of Karashar.

Ch. XXXIX.—*Lop, etc.*

"Lop is a large town at the edge of the Desert, which is called the Desert of Lop, and is situated between east and north-east. It belongs to the Great Kaan, and the people worship Mahommet. Now, such persons as propose to cross the Desert take a week's rest in this town to refresh themselves and their cattle; and then they make ready for the journey, taking with them a month's supply for man and beast. On quitting this city they enter the Desert. The length of this Desert is so great that 'tis said it would take a year and more to ride from one end of it to the other. And here, where its breadth is least, it takes a month to cross it. 'Tis all composed of hills and valleys of sand, and not a thing to eat is to be found on it. But after riding for a day and a night you find fresh water, enough mayhap for some 50 or 100 persons with their beasts, but not for more. And all across the Desert you will find water in like manner, that is to say, in some 28 places altogether you will find good water, but in no great quantity; and in four places also you find brackish water. Beasts there are none; for there is nought for them to eat. But there is a marvellous thing related of this Desert, which is that when travellers are on the move by night, and one of them chances to lag behind or to fall asleep or the like, when he tries to gain his company again he will hear spirits talking, and will suppose them to be his comrades. Sometimes the spirits will call him by name; and thus shall a traveller ofttimes be led astray so that he never finds his party. And in this way many have perished. [Sometimes the stray travellers will hear as it were the tramp and hum of a great cavalcade of people away from the real line of road, and taking this to be their own company they will follow the sound; and when day breaks they find that a cheat has been put on them and that they are in an ill plight.] Even in the day time one hears those spirits talking. And sometimes you shall hear the sound of a variety of musical instruments, and still more commonly the sound of drums. [Hence in making this journey 'tis customary for travellers to keep close together. All the animals, too have bells at their necks, so that they cannot easily get astray. And at sleeping time a signal is put up to show the direction of the next march.]" (Pp. 180, 181.)

Neither Chinese history nor Chinese geography contains any mention of the existence of the city of Lop, near the lake of this name. The descriptions of Chinese travellers do not show that the shores of this lake are inhabited at present; the only inhabitants of this locality,—half-savage people numbering several hundred families,—are settled on two little islands in the lake. The villages nearest to the lake are on the basin of the river Tarim, and the line of military posts, which begins at 敦煌

Tun-hwang (the ancient 沙州 *Sha-chow*), and turns round the southern part of Lobnor, extends to the Tarim. It may be that in the time of Marco Polo, caravans used to stop on this river also, and proceeded thence by the present line of posts through the desert as far as *Sha-chow*.

This desert was known in China of old by the name of 流沙 *Lew-sha*, *i.e.*, "Quick-sand," or literally "Flowing sands." In Chinese traditions the name of this desert occurs earlier than that of 沙莫 *Sha-mo*, the sandy region of Mongolia. *Lew-sha* is the western prolongation of *Sha-mo*; it stretches further south, into Kukunor, under the name of *Mo-hai* or *Mo-ho-yen* desert,* gradually diminishing in size; from thence it stretches east, to the sources of the Yellow River, and terminates in a curve on the north. A Chinese traveller, in the time of the T'ang dynasty, saw this termination on his way to Lhassa, or as he calls it, this tail of the great desert; he states that in that place, the desert is not over fifty *li* wide.† The Lew-sha was the subject of various most exaggerated stories. We find more reliable accounts of it in the 周書 *Chow shu*; thus it is mentioned in that history, that there sometimes arises in this desert a "burning wind," pernicious to men and cattle; in such cases the old camels of the caravan, having a presentiment of its approach, flock shrieking to one place, lie down on the ground and hide their heads in the sand; on this signal, the travellers also lie down, close nose and mouth, and remain in this position until the hurricane abates; unless these precautions are taken, men and beasts inevitably perish.

Ch. XL.—*Sachiu.*

"After you have travelled thirty days through the Desert as I have described, you come to a city called SACHIU lying between the north-east and east; it belongs to the Great Kaan, and is in a province called TANGUT. The people are for the most part Idolaters, but there are also some Nestorian Christians and some Saracens. The Idolaters have a peculiar language, and are no traders, but live by their agriculture. They have a great many abbeys and minsters full of idols of sundry fashions, to which they pay great honour and reverence, worshipping them and sacrificing to them with much ado. For example, such as have children will feed up a sheep in honour of the idol, and at the New Year, or on the day of the Idol's Feast, they will take their children and the sheep about with them into the presence of the idol with great ceremony. Then they will have the sheep slaughtered and cooked, and again present it before the idol with like reverence, and leave

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* 肅州志 *Su chow chi*, "Description of Suchow." 1737.

† 冊府元龜 *Tz'e fu yuen kui*, a collection of the *Sung* dynasty;—in the division on Embassies.

it there before him, whilst they are reciting the offices of their worship, and their prayers for the idol's blessing on their children. And if you will believe them the idol feeds on the meat that is set before it! After these ceremonies they take up the flesh and carry it home, and call together all their kindred, to eat it with them in great festivity [the idol-priests receiving for their portion the head, feet, entrails, and skin, with some part of the meat]. After they have eaten they collect the bones that are left and store them carefully in a hutch." (P. 184.)

沙州 *Sha-chow*, the present 敦煌縣 *Tun-hwang hien* (a few *li* east of the ancient town), has since the Han dynasty always been considered a very important point; chiefly because all the roads leading to China from the west passed through it; later accounts also confirm the statement that Tun-hwang lies on an important cross-road. Besides communication with Lobnor, it has a desert road to Turfan and another through Sertennor to Kukunor.* In 1820, or about that time, an attempt was made to re-establish the ancient direct way between Sha-chow and Khotan. With this object in view an exploring party of ten men was sent from Khotan towards Sha-chow; this party wandered in the desert over a month and found neither dwellings nor roads, but pastures and water everywhere.† M. Polo omits to mention a remarkable place at Sha-chow, a sandy hillock (a short distance south of this town) known under the name of 鳴沙山 *Ming-sha shan*,—the "rumbling sand hill." The sand in rolling down the hill produces a particular sound similar to that of distant thunder.‡ In M. Polo's time (1292), Khubilai removed the inhabitants of Sha-chow to the interior of China; § fearing probably the aggression of the seditious princes; and his successor, in 1303, placed there a garrison of ten thousand men.‖ Some time later granaries were established there, for the supply of the military posts over the site of the present Djungaria. During the emperor K'ien-lung's reign, the Tun-hwang district was colonized on a vast scale; in 1830 it numbered about a hundred thousand inhabitants.¶

Ch. XLI.—*Camul.*

"CAMUL is a province which in former days was a kingdom. It contains numerous towns and villages, but the chief city bears the name of CAMUL. The province lies between two deserts; for on the one side is the Great Desert of Lop, and

* *Su chow chi.*
† 敦煌縣志 *Tun hwang hien chi*,—in fine.
‡ *Tun hwang hien chi.*
§ 續通鑑綱目 *Siu t'ung kien kong mu.*
‖ *Ib.*
¶ *Tun hwang hien chi.*

on the other side is a small desert of three days' journey in extent. The people are all Idolaters, and have a peculiar language. They live by the fruits of the earth, which they have in plenty, and dispose of to travellers. They are a people who take things very easily, for they mind nothing but playing and singing and dancing and enjoying themselves. And it is a truth that if a foreigner comes to the house of one of these people to lodge, the host is delighted, and desires his wife to put herself entirely at the guest's disposal, whilst he himself gets out of the way, and comes back no more until the stranger shall have taken his departure. The guest may stay and enjoy the wife's society as long as he lists, whilst the husband has no shame in the matter, but indeed considers it an honour. And all the men of this province are made wittols of by their wives in this way. The women themselves are fair and wanton. Now it came to pass during the reign of MANGU KAAN, that as lord of this province he came to hear of this custom, and he sent forth an order commanding them under grievous penalties to do so no more [but to provide public hostelries for travellers]. And when they heard this order they were much vexed thereat. [For about three years' space they carried it out. But then they found that their lands were no longer fruitful, and that many mishaps befel them.] So they collected together and prepared a grand present which they sent to their Lord, praying him graciously to let them retain the custom which they had inherited from their ancestors; for it was by reason of this usage that their gods bestowed upon them all the good things that they possessed, and without it they saw not how they could continue to exist. When the Prince had heard their petition his reply was: 'Since ye must needs keep your shame, keep it then,' and so he left them at liberty to maintain their naughty custom. And they always have kept it up, and do so still." (P. 189, 190.)

Speaking of Hami, M. Polo describes a strange custom of the Uigurs, originating in a perverted notion of hospitality. It is remarkable that the Chinese author 洪皓 *Hung Hao*, who lived a century before M. Polo, makes mention in his memoirs * nearly in the same words of this custom of the Uigurs, with whom he became acquainted during his captivity in the kingdom of the *Kin*. According to the chronicle of the Tangut kingdom of 西夏 Si-hia,† Hami was the nursery of Buddhism in Si-hia and provided this kingdom with Buddhist books and monks.

Ch. XLII.—*Chingintalas.*

"CHINGINTALAS is also a province at the verge of the Desert, and lying between north-west and north. It has an extent of sixteen days' journey, and belongs to the Great Kaan, and contains numerous towns and villages. There are three different races of people in it—Idolaters, Saracens, and some Nestorian Christians. At the

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* 松漠紀聞 *Sung mo ki wen.*

† 西夏書事 *Si hia shu shi.* Edit. 1826.

northern extremity of this province there is a mountain in which are excellent veins of steel and ondanique. And you must know that in the same mountain there is a vein of the substance from which Salamander is made. For the real truth is that the Salamander is no beast, as they allege in our part of the world, but is a substance found in the earth ; and I will tell you about it." (Pp. 191, 192.)

Supposing that M. Polo mentions this place on his way from Sha-chow to Su-chow, it is natural to think that it is *Chi kin talas i.e.* "Chi-kin plain" or valley; 赤斤 Chi-kin was the name of a lake,* called so even now, and of a defile, which received its name from the lake. The latter is on the way from 嘉峪關 *Kia-yŭ kwan* to 安西州 An-si chow. The first mention of the name Chi-kin occurs, as far as I know, in Chinese history, only after the expulsion of the Mongols from China. When the armies of the new (Ming) dynasty were driving out the Mongols from the frontiers of China proper, they found beyond the barrier of Kia-yu kwan several Mongol aymaks (clans), which at once declared themselves subject to the new dynasty; among them was an aymak settled near lake Chi-kin, and composed of five hundred families; the military post 赤斤衞 *Chi-kin wei* was formed of this aymak, the chief of which, whose father had the honorary title of 丞相 *Ch'ing-siang, i.e.* "Minister," was appointed commander of the post. This happened in 1370 to 1380;† and since that time a separate chapter was devoted to Chi-kin wei and 赤斤蒙古 *Chi-kin mung-ku* "the Mongols of Chi-kin," in all the historical and geographical works of the Ming dynasty. Towards the middle of the 15th century, the Djagataian sultans or beks, having taken possession of Eastern Turkestan, drove out of Hami the Chingiskhanides of the eastern branch, and made incursions as far as Su-chow. The Ming government then removed the Chi-kin and other Mongols to the interior of China, and settled them in the district of Su-chow, in the same way as the emperors Kang-hi and Yung-ching of the present dynasty removed the descendents of these very Djagataians to 甘肅 Kan-su, in consequence of the invasions they suffered on the part of the Djungars. During the war with the Djungars Kang-hi re-established the military post of Chi-kin, but when peace was re-established,

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* *Chikin*, or more correctly *Chigin*, is a Mongol word, meaning "ear;" there was in Mongolia a *Chigin ola*, "Ear mountain," *i.e.*, a hill bearing a resemblance to an ear; it is probable that the lake has received this name on the same ground. The above-mentioned itinerary observes that there are two Chikin lakes, the great and the little one.

† 大明一統志 *Ta ming i t'ung chi*,—皇明從信錄 *Hwang ming ts'ung sin lu*, etc.

the post was reduced to a postal station, and placed under the administration of An-si.* During the Ming dynasty, Chi-kin was renowned for some natural products, 磄砂 *kang-sha* "sal ammoniac," 石油 *shi-yew* "petroleum," 蓯蓉 *ts'ung-yung* "orobanche," gold sand found in the northern "Black hills," etc.† Thus the Chinese accounts of Chi-kin are not in contradiction to the statements given by M. Polo regarding the same subject; but when the distances are taken into consideration, a serious difficulty arises; Chi-kin is two hundred and fifty or sixty *li* distant from Su-chow, whilst according to M. Polo's statement, ten days are necessary to cross this distance. One of the three following explanations of this discordance must be admitted: either Chingintalas is not Chi-kin, or the traveller's memory failed, or lastly an error crept into the number of days' journey. The two last suppositions I consider the most probable; the more so that similar difficulties occur several times in Marco Polo's narrative. However, having set forth the data, I leave it to readers who have thoroughly studied Marco Polo's work, to draw their own conclusion from them.

Ch. XLIII.—*Sukchur.*

"At the end of those ten days you come to another province called SUKCHUR, in which there are numerous towns and villages. The chief city is called SUKCHU. The people are partly Christians and partly Idolaters, and all are subject to the Great Kaan. The great General Province to which all these three provinces belong is called TANGUT. Over all the mountains of this province rhubarb is found in great abundance, and thither merchants come to buy it, and carry it thence all over the world. [Travellers, however, dare not visit those mountains with any cattle but those of the country, for a certain plant grows there which is so poisonous that cattle which eat it lose their hoofs. The cattle of the country know it and eschew it.] The people live by agriculture, and have not much trade. [They are of a brown complexion. The whole of the province is healthy.]" (P. 196.)

肅州 Su-chow, as a transit-trade point, was always an important town, from the number of its inhabitants and its wealth. Marco Polo, however, does not speak favourably of it,‡ and he is right; in his time this town could not yet have recovered from the Mongol devastation of 1226. Chingis khan, on his return from the western countries, laid waste by fire and sword the country from modern Ning-hia to Sha-chow, to avenge the refusal

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* 大清一統志 *Ta ts'ing i t'ung chi*, and *Su chow chi.*

† 潛確類書 *Tsien k'io lui shu*, "Cyclopædia," edit. 1830, *art.*—*Su chow chi*, etc.

‡ "It has not much trade."

of the king of Si-hia to join him in his campaign in the west. Irritated by the obstinate defence of Su-chow by its inhabitants, he slaughtered them all, men and women, young and old, after the town was captured.* With respect to rhubarb, of which M. Polo speaks, the 肅州志 *Su chow chi* also makes the remark, that the best rhubarb, with golden flowers in the breaking, is gathered in this province (district of 山丹 *Shan-tan*), and that it is equally beneficial to men and beasts, preserving them from the pernicious effects of the heat. M. Polo notices that the cattle not indigenous to the province lose their hoofs in the Su-chow mountains; but that is probably not on account of some poisonous grass, but in consequence of the stony ground. The Chinese envoy Kao Kiu-hui, when travelling in A. D. 981, from Kan-chow to Su-chow, fastened wooden shoes to his horses' hoofs, and tied yak's skin round and under the camels' feet.† The *Su chow chi* contains the following remarks on cattle-breeding in that province: "It cannot be said that horses and horned cattle breed here successfully; mules brought from other provinces are sometimes of extraordinary strength, so that they can carry burdens of from seven to eight hundred *kins* weight;‡ but they soon perish, the climate not agreeing with them. Yaks are bred by the Tanguts (settled in the Su-chow province), but they cannot be made use of by our cultivators; it being impossible to employ them in the fields, as they are not accustomed to our fodder. The cross breed of the yak and the common cow is a strong one;§ and fit both for agricultural purposes and for carrying burdens. The ordinary mode of conveyance here is on donkeys; military provisions are carried on them to Hami and Barkul; the transports leave in spring, and return in autumn. (1737)."

Ch. XLIV.—*Campichu.*

"CAMPICHU is also a city of Tangut, and a very great and noble one. Indeed it is the capital and place of government of the whole province of Tangut. The people are Idolaters, Saracens, and Christians, and the latter have three very fine churches in the city, whilst the Idolaters have many minsters and abbeys after their fashion. In these they have an enormous number of idols, both small and great, certain of the latter being a good ten paces

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* 西夏書事 *Si hia shu shi*, *Annals*, and Biography of Li-kung, a relative of the Tangut kings of Si-hia. His forefather betrayed his king and went over to Chingis khan; he was with him at the siege of Su-chow. It is stated in this biography, that Chingis khan spared a hundred and five families in Su-chow.

† 五代史記 *Wu tai shi ki.*

‡ About 1,000 lbs.;—somewhat incredible.

§ In Ch. lvii, M. Polo says the same in reference to 西寧 *Si-ning.*

in stature; some of them being of wood, others of clay, and others yet of stone. They are all highly polished, and then covered with gold. The great idols of which I speak lie at length. And round about them there are other figures of considerable size, as if adoring and paying homage before them." (Pp. 197, 198.)

Kan-chow has occupied rather an important place in the history of North China. In the beginning of the 11th century it was the residence of an Uigur prince. It fell under the Tangut dominion in 1208.* The temple, in which M. Polo saw an idol of Buddha, represented in a lying position, is evidently 臥佛寺 *Wo-fo-sze, i.e.*, "Monastery of the lying Buddha." It was built in 1103 by a Tangut queen, to place there three idols representing Buddha in this posture, which have since been found in the ground on this very spot.† Through 甘州 Kan-chow was the shortest, and most direct and convenient road to *I-tsi-nay*. The latter post used to be also furnished with provisions through Kan-chow.‡

Ch. XLV.—*Etzina.*

"When you leave the city of Campichu you ride for twelve days, and then reach a city called ETZINA, which is towards the north on the verge of the Sandy Desert; it belongs to the Province of Tangut. The people are Idolaters, and possess plenty of camels and cattle, and the country produces a number of good falcons, both Sakers and Lanners. The inhabitants live by their cultivation and their cattle, for they have no trade. At this city you must needs lay in victuals for forty days, because when you quit Etzina you enter on a Desert which extends forty days' journey to the north, and on which you meet with no habitation nor baiting-place. In the summer-time, indeed, you will fall in with people, but in the winter the cold is too great. You also meet with wild beasts (for there are some small pine-woods here and there), and with numbers of wild asses." (P. 202.)

亦集乃 *I-tsi-nay*, or Echiné, is properly the name of a lake. Khubilai, disquieted by his factious relatives on the north, established a military post near lake I-tsi-nay, and built a town, or a fort on the south-western shore of this lake. The name of I-tsi-nay appears from that time; it does not occur in the chronicle of the Tangut kingdom; the lake had then another name. Vestiges of the town are seen to this day; the buildings were of large dimensions, and some of them were very fine.§ In M. Polo's time there existed a direct route from I-tsi-nay to Kharakhorum; traces of this road are still noticeable, but it is no more used.‖ This

* *Si hia shu shi, Anno.*
† *Si hia shu shi.*
‡ *Siu t'ung kien kang mu.*
§ *Su chow chi.*
‖ *Ib.*—The displacing of the political centres, and consequently of those

circumstance, *i.e.*, the existence of a road from I-tsi-nay to Kharakhorum, probably led M. Polo to make an excursion (a mental one, I suppose) to the residence of the khans in Northern Mongolia.

Ch. XLVI.—*Caracoron.*

"CARACORON is a city some three miles in compass. [It is surrounded by a strong earthen rampart, for stone is scarce there. And beside it there a great citadel wherein is a fine palace in which the Governor resides.] 'Tis the first city that the Tartars possessed after they issued from their own country." (Pp. 203, 204.)

Everything that the studious Chinese authors could gather and say of the situation of Kharakhorum is collected in two Chinese works, 落颿樓文稿 *Lo fung low wen kao* (1849), and 蒙古游牧記 *Mung ku yew mu ki* (1859). However, no positive conclusion can be derived from these researches, chiefly in consequence of the absence of a tolerably correct map of Northern Mongolia.*

Ch. LI.

"You should be told also that all the Grand Kaans, and all the descendants of Chinghis their first Lord, are carried to a mountain that is called ALTAY to be interred. Wheresoever the Sovereign may die, he is carried to his burial in that mountain with his predecessors; no matter, if the place of his death were 100 days' journey distant, thither must he be carried to his burial." (P. 227.)

There are no accurate indications in the documents of the Mongol period on the burial-places of Chingis khan and of the khans who succeeded him. The 元史 *Yuan shi*, or "History of the Mongol dynasty in China," in speaking of the burial of the khans,

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of trade, was followed by a change in the general direction of the routes across the desert. The emperor Kang-hi, who carried on a long struggle with the Djungars, traced out several military roads across the Mongolian desert in various directions, in 1697. The route from 涼州府 *Liang-chow fu* to I-tsi-nay, and farther to the north-west was explored (v. *So mo fang lio*). In 1719 communications were established from Kuku hoton towards Barkul; this route is described in the *Ts'ung si ki lio* (translated into Russian by M. P. S. Popoff). Trade was not slow in availing itself of the new routes; the northern limit of I-tsi-nay became the meeting place of caravans from Kuku hoton and *Lan-chow fu*, on their way to Burkul and Urumtsi. *Vide Su chow chi* and *Mung ku yew mu ki*.

* M. Paderin (Secretary to the Russian Consulate, Urga) has recently, on his way from Urga to Uliasutai, set himself to the task of finding the site of Kharakhorum, in following partly the indication contained in the diary of Chang Te-hui, 1248 (the diary is translated and inserted in the *Records of the Siberian Branch of the Russ. Geogr. Society*, Irkutsk, 1867). His efforts were apparently crowned with success; it is to be regretted that he had no means to determine astronomically the site; his report is probably already published by the Geographical Society of Petersburg.

mentions only that they used to be conveyed from Peking to the north, to their common burial-ground in the *K'i-lien* valley. This name cannot have anything in common with the ancient *K'i-lien* of the Hiung-nu, a hill situated to the west of the Mongol desert; the *K'i-lien* of the Mongols is to be sought more to the east. When Khubilai marched out against Prince Nayan, and reached the modern Talnor, news was received of the occupation of the khans' burial-ground by the rebels. They held out there very long, which exceedingly afflicted Khubilai;* and this goes to prove that the tombs could not be situated much to the west. Some more positive information on this subject is found in the diary of the campaign in Mongolia in 1410, of the Ming Emperor Yung-lo.† He reached the Kerulen in the place where this river, after running south, takes an easterly direction. The author of the diary notes, that from a place one march and a half before reaching the Kerulen, a very large mountain was visible to the north-east, and at its foot a solitary, high and pointed hillock, covered with stones. The author says, that the sovereigns of the house of Yuan used to be buried near this hill.‡ It may therefore be plausibly supposed, that the tombs of the Mongol khans were near the Kerulen; and that the "K'i-lien" of the *Yuan-shi* is to be applied to this locality; it seems to me even, that K'i-lien is an abbreviation, customary to Chinese authors, of Kerulen. The way of burying the Mongol khans is described in the *Yuan shi* (chap. On the national religious rites of the Mongols,) as well as in the 輟耕錄 *Ch'ue keng lu*, "Memoirs of the time of the Yuan dynasty."§ When burying, the greatest care was taken to conceal from outside people the knowledge of the locality of the tomb. With this object in view, after the tomb was closed, a drove of horses was driven over it, and by this means the ground was for a considerable distance trampled down and levelled. It

* 元史類編 *Yuan shi lui pien.*

† 北征錄 *Pe ching lu.*

‡ Our well-known Mongolist, N. Golovkin has told us, that according to a story actually current among the Mongols, the tombs of the former Mongol khans are situated near Tas-ola hill, equally in the vicinity of the Kerulen. He states also that even now the Mongols are accustomed to assemble on that hill on the 7th day of the 7th moon (according to an ancient custom), in order to adore Chingis khan's tomb. Altan tobchi (translated into Russian by Galsan Gomboeff), in relating the history of the Mongols after their expulsion from China, and speaking of the khans' tombs, calls them *Naiman tzagan gher, i.e.* "Eight White tents" (according to the number of chambers for the souls of the chief deceased khans in Peking), and sometimes simply *Tzagan gher*, "the White tent," which according to the translator's explanation, denotes only Chigis khan's tomb.

§ Extracts from these memoirs are inserted in vol. iv. of the *Contributions of the members of the Russ. Eccl. Mission*, Peking.

is added to this (probably from hearsay), in the 草木子 *Ts'ao mu tze Memoirs* (also of the time of the Yuan dynasty), that a young camel used to be killed (in the presence of its mother), on the tomb of the deceased khan; afterwards, when the time of the usual offerings on the tomb approached, the mother of this immolated camel was set at liberty, and she came crying to the place where it was killed; the locality of the tomb was ascertained in this way.

"Let me tell you a strange thing too. When they are carrying the body of any Emperor to be buried with the others, the convoy that goes with the body doth put to the sword all whom they fall in with on the road, saying: 'Go and wait upon your Lord in the other world!' For they do in sooth believe that all such as they slay in this manner do go to serve their Lord in the other world. They do the same too with horses; for when the Emperor dies, they kill all his best horses, in order that he may have the use of them in the other world, as they believe. And I tell you as a certain truth, that when Mongou Kaan died, more than 20,000 persons, who chanced to meet the body on its way, were slain in the manner I have told." (P. 217.)

The burying of living men with the dead was a general custom with the tribes of Eastern Asia. Favourite servants and wives were usually buried in this way. In China, the chief wives and those concubines who had already borne children were exempted from this lot. The Tunguz and other tribes were accustomed to kill the selected victims by strangulation. In China they used to be buried alive; but the custom of burying living men ceased in A.D. 1464.* In the time of the present Manchu dynasty, the burying of living men was prohibited by the emperor Kang-hi, at the close of the 17th century, *i.e.*, the forced burying; but voluntary sepulture remained in force.† Notwithstanding this prohibition, cases of forced burying occurred again in remote parts of Manchuria; when a concubine refused to follow her deceased master, she was forcibly strangled with a bow-string.‡ I must observe, however, that there is no mention made in historical documents, of the existence of this custom with the Mongols; it is only an hypothesis based on the analogy between the religious ideas and customs of the Mongols and those of other tribes.

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* 皇明從信錄 *Hwang ming ts'ung sin lu,—Ann.* The 國史畧 *Kwo shi lio (Koku-shi riaku)* "Abridged History of Japan," under A.D. 646, says, that in this year the burying of living men with the dead was prohibited, and it reproaches China with the tardy stoppage of this inhuman custom.

† *Yu chi wen.* Part ii.

‡ 寧古塔志 *Ninguta chi.*

Ch. LII.—*Pharaoh's Rats.*

"They live on the milk and meat which their herds supply, and on the produce of the chase; and they eat all kinds of flesh, including that of horses and dogs, and Pharaoh's rats, of which last there are great numbers in burrows on those plains." (P. 220.)

In the Mongol biography of Chingis khan,* mention is made of two kinds of animals (mice) used by the Mongols for food: the tarbagat† and kuchugur.

Ch. LIII.

"This is the fashion of their religion. [They say there is a Most High God of Heaven, whom they worship daily with thurible and incense, but they pray to him only for health of mind and body." (P. 224.)

The God of Heaven is evidently the *Tengri* of the Mongols,‡ the highest object of their reverence. They used to apply to it the epithets of *Dere*, "Supreme," and *Munke*, "Eternal."§ The affinity of the Shaman idea of Heaven with that of the Chinese is indubitable. It does not appear, however, that Shamanism admits the idea of a personified and intelligent supreme being, similar to that existing in China, where this idea has inspired some thinkers, and raised their mind to high spiritual conceptions.‖ Still the acknowledgment of Heaven as the highest power, was the best side of the coarse religion of Shamanism; as the reverent awe of Heaven was the principal moral check for half savage tribes. The sacrifice to Heaven consisted in the raising of the sacrificial flesh on a stake or pole,¶ and the libation of *kumiss*, or the milk of a white mare. The sacrificial stake is to this day the indispensable attribute of Shaman ceremonies. With the Manchus it is called *somo*, and is chiefly employed in the offerings to the Ongons.** It was used also in ancient Corea,†† and

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* 元朝秘史 *Yuan ch'ao pi shi* (Mongol text).

† *Aritomys Bobac.*

‡ Dorji Banzaroff, in his dissertation "On the Black Religion," *i.e.* Shamanism, 1846, has investigated the religious ideas of that system with all possible fullness; I deem it unnecessary therefore to repeat what has been already published by him on the subject.

§ *Yuan ch'ao pi shi*, Mongol text. This ancient text (of the 13th century) is the only unquestionable authority on Mongol antiquities, the influence of extraneous elements not being noticeable in it. Later monuments of the Mongol literature, as the work of Sanang Setzen and Altan tobchi are strongly impregnated with Buddhist ideas.

‖ It is sufficient to quote, for instance, the following sentence of a Confucianist: "The Supreme Lord (Shang-ti) dwells in an unattainable depth (darkness), but his presence is flaming everywhere."

¶ This sacrificial stake is indubitably "the tree, to which, as the Russian chronicles narrate, a pious Russian prince refused to bow."

** 大清會典 *Ta ts'ing hui tien.*

†† 漢書 *Han shu.*

is even now not unknown in the popular Corean religion.* The author of the 譯語 *Y yu* (middle of 16th century) relates that in his time, the Mongols used to make human offerings to Heaven. I quote his words: "The Mongols deeply revere Heaven. . . . Before every important undertaking they offer a human sacrifice to Heaven. For this purpose they usually select a Chinaman (among the prisoners) of as fine a form as possible, strip him of his clothes and pour water over him; . . . . . the victim is bound in the field, and a nimble horseman cuts his head off at a run; his belly is then cut open, and the bowels are spread on the ground (as an offering to Heaven)." It is difficult to vouch for the accuracy of this statement.

Natigay.

"[But] they have [also] a certain [other] god of theirs called NATIGAY, and they say he is the God of the Earth, who watches over their children, cattle, and crops. They show him great worship and honour, and every man hath a figure of him in his house, made of felt and cloth; and they also make in the same manner images of his wife and children. The wife they put on the left hand, and the children in front. And when they eat, they take the fat of the meat and grease the god's mouth withal, as well as the mouths of his wife and children. Then they take of the broth and sprinkle it before the door of the house; and that done, they deem that their god and his family have had their share of the dinner." (P. 224.)

Whether this word is to be taken as a corruption of the word *Ongot* (according to Yule), or as corresponding to *Etugen*,† is equally difficult to verify by means of ancient documents. I cannot find in the Mongol text of the *Yuan ch'ao pi shi* the word *Ongon*, or *Ongot*. The souls of deceased parents and ancestors are called there *Ekes, i.e.* "Magnates, Lords;" *Ongon* is probably of Tungusian, not Mongol origin. It is necessary to keep in view, that there exist in Shamanism not only local differences, and some belonging to certain tribes, but that in the course of time and under the influence of Buddhism, some essential changes may have happened. It is not altogether easy therefore, to judge of ancient Shamanism by that of the present day. I shall add one new *variant* to what the learned Col. Yule has collected and set forth with such precision, on the Shaman household gods. "The Dahurs and Barhus have in their dwellings, according to the

* 象胥紀聞 *Siang siu ki wen.*

† Dorji Banzaroff is disposed to see in Natigay of M. Polo, the Ytoga of other travellers, i.e. the Mongol *Etugen*,—"earth" as the object of veneration of the Mongol Shamans. They look upon it as a divinity, for its power as *Delegei in echen*, i.e. "the Lord of Earth," and on account of its productiveness,—*Altan delegei*, i.e. "Golden Earth."

number of the male members of the family, puppets made of straw, on which eyes, eyebrows and mouth are drawn; these puppets are dressed up to the waist. When some one of the family dies, his puppet is taken out of the house, and a new puppet is made for every newly-born member of the family. On new-year's day, offerings are made to the puppets, and care is taken not to disturb them (by moving them, etc.), in order to avoid bringing sickness upon the family."*

Ch. LVI.—*Bargu.*

"And when you leave Caracoron and the Altay, in which they bury the bodies of the Tartar Sovereigns, as I told you, you go north for forty days till you reach a country called the PLAIN OF BARGU. The people there are called MESCRIPT; they are a very wild race, and live by their cattle, the most of which are stags, and these stags, I assure you, they use to ride upon. Their customs are like those of the Tartars, and they are subject to the Great Kaan. They have neither corn nor wine. [They get birds for food, for the country is full of lakes and pools and marshes, which are much frequented by the birds when they are moulting, and when they have quite cast their feathers and can't fly, those people catch them. They also live partly on fish.]" (Pp. 236, 237.)

In the Mongol text of Chingis khan's biography, this country is called Barhu and Barhuchin; it is to be supposed, according to Col. Yule's identification of this name with the modern Barguzin, that this country was near lake Baikal. The fact that Merkits were in Bargu is confirmed by the following statement in Chingis khan's biography: "When Chingis khan defeated his enemies the Merkits, they fled to Barhuchin tokum." *Tokum* signifies "a hollow, a low place," according to the Chinese translation of the above-mentioned biography, made in 1381; thus Barhuchin tokum undoubtedly corresponds to M. Polo's Plain of Bargu. As to M. Polo's statement that the inhabitants of Bargu were Merkits, it cannot be accepted unconditionally. The Merkits were not indigenous to the country near Baikal, but belonged originally,—according to a division set forth in the Mongol text of the *Yuan ch'ao pi shi*,—to the category of tribes *living in yurts, i.e.* nomade tribes, or tribes of the desert. Meanwhile we find in the same biography of Chingis khan, mention of a people called Barhun, which belonged to the category of tribes *living in the forests;* and we have therefore reason to suppose that the Barhuns were the aborigines of Barhu. After the time of Chingis khan, this ethnographic name disappears from Chinese history; it appears again in the middle of the 16th century. The author of the *Y yu* (1543-4) in enumerating the tribes inhabiting Mongolia and the

*黑龍江外記 *He lung kiang wai ki.*

adjacent countries, mentions the Barhu, as a strong tribe, able to supply up to several tens of thousands (?) of warriors, armed with steel swords; but the country inhabited by them is not indicated. The Mongols, it is added, call them Black Ta-tze (Khara Mongols).* At the close of the 17th century, the Barhus are found inhabiting the western slopes of the interior Hing'an, as well as between lake Kulon and river Khalkha, and dependent on a prince of eastern Khalkhas, Doro beile.† At the time of Galdan khan's invasion, a part of them fled to Siberia with the eastern Khalkhas, but afterwards they returned.‡ After their rebellion in 1696, quelled by a Manchu general, they were included with other petty tribes (regarding which few researches have been made) in the category *butkha*, or hunters, and received a military organisation. They are divided into Old and New Barhu, according to the time when they were brought under Manchu rule. The Barhus belong to the Mongolian, not to the Tungusian race; they are sometimes considered even to have been in relationship with the Khalkhas.§ This is all the substantial information we possess on the Barhu. Is there an affinity to be found between the modern Barhus and the Barhuns of Chingis khan's biography;—and is it to be supposed, that in the course of time, they spread from lake Baikal to the Hing'an range? or is it more correct to consider them a branch of the Mongol race indigenous to the Hing'an mountains, and which received the general archaic name of Bargu, which might have pointed out the physical character of the country they inhabited,‖ just as we find in history the Urianhai of Altai and the Urianhai of Western Manchuria? It is difficult to solve this question for want of historical data.¶

Chap. LVII.

"On leaving Campichu, then, you travel five days across a tract in

* *i.e.* "Lower Mongols." On the maps of the Ming dynasty time, the name *Siao Ta-tze*, or "Little Mongols" (near the Amur), probably designates also the Barhu.

† A Manchu title, conferred on him by the emperor Kang-hi.

‡ *Mung ku yew mu ki* and *Lung sha ki lio*.

§ *He lung kiang wai ki* and *Lung sha ki lio*.

‖ The *Kin shi*, or "History of the Kin dynasty," for instance, clearly proves, that all the tribes of Churchin received their names, from the mountains, rivers and lakes, near which they lived.

¶ In Eastern Siberia, the Buriats of the Buddhist creed give to Shaman Buriats the name of Bargu Buriats; taking the word Bargu in the sense of *stupid* and *rude*. It is also stated that Manchu officials call the modern Barhus indiscriminately Barhus and Barhu Buriats (N. Gomboeff). The Buriats are also an ancient tribe, already known in Chingis khan's time. It was like the Barhun, placed in the category of sylvan tribes. I do not take upon myself to elucidate this ethnographical discrepancy, founded it may be on an error or a misunderstanding.

which many spirits are heard speaking in the night season ; and at the end of those five marches, towards the east, you come to a kingdom called ERGUIUL, belonging to the Great Kaan. It is one of the several kingdoms that make up the great Province of Tangut. The people consist of Nestorian Christians, Idolaters, and worshippers of Mahommet." (P. 241.)

Erguiul is Erichew of the Mongol text of the *Yuen ch'ao pi shi*, *Si-liang* in the Chinese history, the modern *Liang-chow fu*. Klaproth, on the authority of Rashid-eddin, has already identified this name with that of Si-liang.

"In this country too is found the best musk in the world ; and I will tell you how 'tis produced. There exists in that region a kind of wild animal like a gazelle. It has feet and tail like the gazelle's, and stag's hair of a very coarse kind, but no horns. It has four tusks, two below, and two above, about three inches long, and slender in form, one pair growing upwards, and the other downwards. It is a very pretty creature. The musk is found in this way. When the creature has been taken, they find at the navel between the flesh and the skin something like an impostume full of blood, which they cut out and remove with all the skin attached to it. And the blood inside this impostume is the musk that produces that powerful perfume. There is an immense number of these beasts in the country we are speaking of." (P. 242.)

Here M. Polo speaks of musk ; musk—and rhubarb (which he mentioned before *) are the most renowned and valuable of the products of the province of Kansu, which comparatively produces very little ; the industry in both these articles is at present in the hands of the Tanguts of that province.†

Chap. LVIII.

"Starting from Erguiul you ride eastward for eight days, and then come to a province called EGRIGAIA, containing numerous cities and villages, and belonging to Tangut." (P. 247.)

From Liang-chow fu M. Polo follows a special route, leaving the modern postal road on his right ; the road he took has since the time of the emperor Kang-hi been called the courier's route.

Egrigaia is Erigaia of the Mongol text. Klaproth was correct in his supposition that it is modern Ning-hia. Even now the Eleuts of Alashan call Ning-hia—*Yargai*. In M. Polo's time this department was famous for the cultivation of the safflower (carthamus tinctorius).‡

* In Chap. xliii, describing Sukchur or Su-chow, he says :—"Over all the mountains of this province rhubarb is found in great abundance, and thither merchants come to buy it, and carry it thence all over the world." (P. 196.)

† *Su chow chi.*

‡ *Siu t'ung kien*, A.D. 1292.

Erigaia is not to be confounded with *Urahai*, often mentioned in the history of Chingis khan's wars with the Tangut kingdom. Urahai was a fortress in a pass of the same name in the Alashan mountains. Chingis khan spent five months there (an. 1208), during which he invaded and plundered the country in the neighbourhood.* The Alashan mountains form a semicircle five hundred *li* in extent, and have over forty narrow passes leading to the department of Ning-hia; the broadest and most practicable of these is now called Ch'i-mu k'ow;† it is not more than eighty feet broad.‡ It may be that the Urahai fortress existed near this pass.

"The capital city is called CALACHAN. The people are chiefly Idolaters, but there are fine churches belonging to the Nestorian Christians. They are all subjects of the Great Kaan. They make in this city great quantities of camlets of camel's wool, the finest in the world; and some of the camlets that they make are white, for they have white camels, and these are the best of all. Merchants purchase these stuffs here, and carry them over the world for sale." (P. 247.)

Calachan is the chief town of the Egrigaia province, according to M. Polo's statement. M. Polo, when describing the Tangut kingdom, apparently spoke of a state of things already past in his time; but preserved in the popular memory. Under the name of Calachan he probably means the summer residence of the Tangut kings, which was sixty *li* from Ning-hia, at the foot of the Alashan mountains. It was built by the famous Tangut king Yuen-hao, on a large scale, in the shape of a castle, in which were high terraces and magnificent buildings.§ Traces of these buildings are visible to this day. There are often found coloured tiles and iron nails one foot, and even two feet long.‖ The last Tangut kings made this place their permanent residence, and led there an indolent and sensual life. The Chinese name of this residence was Ho-lan shan *Li-kung*.¶ There is sufficient reason to suppose that this very residence is named (under the year 1226) in the Mongol text *Alashai nuntuh*;** and in the chronicles of

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* *Si hia shu shi.*

† 赤木口.

‡ *Ning hia fu chi.*

§ *Si hia shu shi.*

‖ *Ning hia fu chi.*

¶ *Li-kung*, literally "a separate palace," cannot be translated a suburban palace, as such palaces in China were often very distant from the capital; it is more correct to render it by "temporary residence." The Tangut kings had besides this a summer palace. Ho-lan-shan is the Chinese form of Alashan; in the Mongol text—*Alashai.*

** *Nuntuh* (at present Notok) has in the Mongol text the meaning of 'nomade camp, residence, military quarters and military camps."

the Tangut kingdom, *Halahachar*, otherwise *Halachar*, apparently in the Tangut language. Thus M. Polo's Calachan can be identified with the Halachar of the *Si hia shu shi*, and can be taken to designate the Alashan residence of the Tangut kings.

Ch. LIX.

"TENDUC is a province which lies towards the east, and contains numerous towns and villages; among which is the chief city also called TENDUC.....And when you have ridden seven days eastward through this province you get near the provinces of Cathay. You find throughout those seven days' journey plenty of towns and villages, the inhabitants of which are Mahommetans, but with a mixture also of Idolaters and Nestorian Christians. They get their living by trade and manufactures; weaving those fine cloths of gold which are called *Nasich* and *Naques*, besides silk stuffs of many other kinds. For just as we have cloths of wool in our country, manufactured in a great variety of kinds, so in those regions they have stuffs of silk and gold in like variety." (Pp. 249, 250.)

M. Polo does not speak of the journey from Ning-hia to the boundary of Tenduc through the steppes of the modern Ordos. The principal route from Ning-hia to the east * lies, through the town of 神木縣 *Shin-mu hien*, to the crossing of the Hoang-ho near the town of Pao-te chow, a distance of 975 *li* in a straight line; or 1135 *li* if taking the indirect way through Yü-lin. It is the direct road from Shensi to the northern part of Shansi. The shortest road to Kuku-hoton (the supposed Tenduc) lies towards a more northern crossing, namely, *Hu-tan-hosho*.† Here was the western boundary of the *Tien-te kiun* ‡ (Tenduc), as it is now the boundary of Kuku-hoton, Further, the distances between Pao-te chow and Siuen-hwa fu (Siuen-te chow in M. Polo's time) through Ta-t'ung fu on the one hand, and between Hutan-hosho and Siuen-hwa fu, through Kuku-hoton and Ta-t'ung fu, on the other, are almost equal,—about 950 *li*. It follows that it comes to the same, whether M. Polo travelled by the one or other of these routes, and that the towns which he saw during his seven days' journey, and which according to his statement belonged to Tenduc, are to be placed inside, not outside the Great Wall; for if from Tenduc he did not go to Ta-t'ung fu, but straight east to Shang-tu, it follows that he could not be in Siuen-te chow, where he would have had to go down from the mountains, in order afterwards nearly to retrace

* Explored in 1697. *Ping ting so mo fang lio;* cf. Gerbillon's journal, the same year.

† 胡坦和碩 at the mouth of the Hutan river on the Hoang-ho.

‡ *Si hia shu shi.*

his steps. It seems to me, then, that M. Polo on his way from the banks of Hoang-ho to Siuen-te chow travelled mostly inside the Great Wall. As to the power and the extent of the dominions of the tribe which inhabited Tenduc, our traveller took historical traditions for actualities.

The name of Tenduc obviously corresponds to T'ien-te kiun,* a military post, the position of which Chinese geographers identify correctly with that of the modern Kuku-hoton.† The T'ien-te kiun post existed under this name during the K'itan (Liao) and Kin dynasties,‡ up to Khubilai's time (1267); when under the name of Fung-chow it was left only a district town in the department of Ta-t'ung fu.§ The Kin kept in T'ien-te kiun a military chief *Chao-t'ao-shi*,‖ whose duty it was to keep an eye on the neighbouring tribes, and to use, if needed, military force against them. The T'ien-te kiun district was hardly greater in extent than the modern aïmak of Tumot, into which Kuku-hoton was included since the 16th century, *i.e.* 370 *li* from north to south and 400 *li* from east to west;¶ during the Kin it had a settled population numbering twenty-two thousand six hundred families.

> "The king of the province is of the lineage of Prester John, George by name, and he holds the land under the Great Kaan; not that he holds anything like the whole of what Prester John possessed. It is a custom, I may tell you, that these kings of the lineage of Prester John always obtain to wife either daughters of the Great Kaan or other princesses of his family. . . . . You must know that it was in this same capital city of Tenduc that Prester John had the seat of his government when he ruled over the Tartars, and his heirs still abide there; for as I have told you this king George is of his line, in fact, he is the sixth in descent from Prester John." (Pp. 249, 250.)

T'ien-te kiun was bounded on the north by the 陰山 *Yn-shan* mountains, in and beyond which was settled the Sha-t'o Tu-k'iu tribe, *i.e.* Tu-k'iu of the sandy desert. The K'itans, when they conquered the northern borders of China, brought also under their rule the dispersed family of these Tu-k'iu. With the ac-

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* 天德軍.

† *Ta ts'ing y t'ung chi*, chap. on the Tumots of Kuku-hoton.

‡ *Vide* the geographical parts of the *Liao shi*, *Kin shi* and *Yuen shi*; M. Polo's commentators are wrong in suspecting an anachronism in his statement, or trying to find Tenduc elsewhere.

§ During the Kin dynasty, Tien-te kiun was also the centre of administration for the agricultural population of the district; and as such was also called 豐州 Fung-chow.

‖ 招討使.

¶ *Yi t'ung chi*, Tumots of Kui-hoa ch'ing.

cession of the Kin, a Wang-ku * family made its appearance, as the ruling family of those tribes; it issued from those Sha-t'o Tu-k'iu who once reigned in the north of China as the How T'ang dynasty (923 to 936 A.D.).† It split into two branches, the Wang-ku of the Yn-shan, and the Wang-ku of the Lin-t'ao (west of Kan-su). The Kin removed the latter branch to Liao-tung (in Manchuria).‡ The Yn-shan Wang-ku guarded the northern borders of China belonging to the Kin, and watched their herds. When the Kin, as a protection against the inroads of the tribes of the desert, erected a rampart, or new wall, from the boundary of the T'angut kingdom down to Manchuria,§ they intrusted the defence of the principal places of the Yn-shan portion of the wall to the Wang-ku, and transferred there also the Liao-tung Wang-ku. At the time Chingis khan became powerful, the chief of the Wang-ku of the Yn-shan was Alahush; and at the head of the Liao-tung Wang-ku stood *Pa-sao-ma-ie-li*.‖ Alahush proved a traitor to the Kin, and passed over to Chingis khan; for this he was murdered by the malcontents of his family, perhaps by Pa-sao-ma-ie-li, who remained true to the Kin.¶ Later on Chingis khan married one of his daughters to the son of Alahush, by name Po-yao-ho, who however had no children by her. He had three sons by a concubine; the eldest of whom, Kiun-pu-hwa, was married to Kuyuk khan's daughter. Kiun-pu-hwa's son ** Ko-li-ki-sze had two wives, both of imperial blood. During a campaign against Haidu, he was made prisoner in 1298, and murdered. His title and dignities passed over in A.D. 1310 to his son *Chuan*.†† Nothing is known of Alahush's later descendants; they probably became entirely Chinese, like their relatives of the Liao-tung branch.

The Wang-ku princes were thus *de jure* the sons-in-law of the

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* 王古; also called Yung-ku 雍古, Ongot of Rashid-eddin, Ongut of the Mongol text.

† *Yuen shi*, Biography of Alahush, chap. cxviii, fol. 19.

‡ *Yuen shi*, Biography of Yue-nai-ho, chap. cxxxiv, fol. 2.

§ *Kin shi*, an. 1200; *Siu t'ung kien*, an. 1199-1200; *Si hia shu shi*, an. 1201. *Yi t'ung chi*, Tumot. Traces of this wall of the Kin can be seen even at the present day north of the Great Wall.

‖ Biography of Alahush and of *Yue-nai-ho;* in the last mention is made of Pa-sao-ma-ie-li's grandfather—Yue-ko Temur, *var*. Temur Yue-ko.

¶ Pa-sao-ma-ie-li's son Si-li-ki-sze lost his life in Shensi, in a battle with the Mongols; his son Yue-nai-ho went over to the Mongols in Munke khan's time (biography of Yue-nai-ho); his descendant Matsuch'ang was a well-known Chinese literary man.

** According to the list of princesses in the *Yuen shi;* but according to *Ki-li-ki-sze's* biography he was son of Po-yao-ho's second son Ai-pu-hwa, who was married to Khubilai's daughter.

†† Biography of Ki-li-ki-sze, in the *Yuen shi*, chap. cxviii.

Mongol khans, and they had moreover the hereditary title of Kao-t'ang princes (Kao-t'ang wang *); it is very possible that they had their residence in ancient Tien-te kiun (although no mention is made of it in history), just as at present the Tumot princes reside in Kuku-hoton.

The consonance of the names of Wang-khan and Wang-ku (Ung-khan and Ongu) led to the confusion regarding the tribes and persons, which at M. Polo's time seems to have been general among the Europeans in China; M. Polo and Johannes de Monte Corvino transfer the title of Prester John from Wang-khan, already perished at that time, to the distinguished family of Wang-ku. Their Georgius is undoubtedly Ko-li-ki-sze, Alahush's great-grandson. That this name is a Christian one is confirmed by other testimonies; thus in the Asu (Azes) regiment of the khan's guards was Ko-li-ki-sze, alias Kow-r-ki, († 1311) and his son Ti-mi-ti-r.† There is no doubt that one of them was Georgius, and the other Demetrius. Further, in the Description of *Chin-kiang*‡ in the time of the Yuen, mention is made of Ko-li-ki-sze Ye-li-ko-wen, i.e. Ko-li-ki-sze the Christian, and of his son Lu-ho (Luke).

Ko-li-ki-sze of Wang-ku is much praised in history for his valour and his love for Confucian doctrine; he had in consequence of a special favour of the khan two Mongol princesses for wives at the same time (which is rather difficult to conciliate with his being a Christian). The time of his death is correctly indicated in a letter of Joannes de M. Corvino of the year 1305: *ante sex annos migravit ad Dominum.* He left a young son 朮安 *Chu-an*, who probably is the Joannes of the letter of Ioannes (Giovani) de M. C., so called *propter nomen meum*, says the missionary. In another Wang-ku branch, Si-li-ki-sze reminds one also of the Christian name *Sergius.*

Argons.

"The rule of the province is in the hands of the Christians as I have told you; but there are also plenty of Idolaters and worshippers of Mahommet. And there is also here a class of people called *Argons*, which is as much as to say in French *Guasmul*, or, in other words, sprung from two different races; to wit, of the race of the Idolaters of Tenduc and of that of the worshippers of Mahommet. They are handsomer men than the other natives of the country, and having more ability they come to have authority; and they are also capital merchants." (P. 250.)

It is impossible to admit that M. Polo had meant to designate the Christians by this name, who were called by the

* 高唐王.
† *Yuen shi*, chap. cxxxv, fol. 7.
‡ 至順鎮江志 *Chi sun chin kiang chi*, chap. xv, fol. 16.

Mongols *Erkeun*. He was well acquainted with the Christians in China, and of course could not ignore the name under which they were generally known, to such a degree, as to see in it a designation of a cross-race of Mahommetans and heathens. It is difficult to understand who is to be meant under the name of Mahommetans. I shall, without venturing upon idle hypothesis, lay before the reader whatever I have found in Chinese documents of a nature to elucidate this question.

1.—It is mentioned in the *Yuen ch'ao pi shi*, that there lived amongst the Wang-ku a certain *Asan*, who carried on trade with the nomade tribes; to judge by his name (Hassan) he was a Mahommetan. He was, according to the Mongol text of the *Yuen ch'ao pi shi* a *Sartaht'ai*, *i.e.* native of *Sartaul* or *Sartol*. The Mongols generally called this Western Turkestan, not merely because it was the country of the Sartes. We see then that in those times there were, amongst the Wang-kus, emigrants from Western Turkestan.

2.—We find among the tribes mentioned in the *Yuen shi* one called *A-r-hun;* in the ethnographical division adopted by the Yuen of the tribes and nations subdued by them, in four groups,* *A-r-hun* belonged to the second, *i.e.* to the group of Turk and other western tribes; the Wang-ku belonged also to this group; judging by the name of an *A-r-hun* (Ali) mentioned in the description of Chin-kiang fu, the A-r-hun were Mahommetans.

3.—If A-la-un, mentioned in the *Yuen shi* and not to be found in the list of tribes, is a variant of A-r-gun, we learn that it was a distinguished family in the western countries (as history says) and that it belonged also to the Mahommetan faith, if we take the names into account.

That is all that I can say about the Argons of M. Polo.

Sindachu.

"All this region is subject to the Great Kaan. There is a city you come to called SINDACHU, where they carry on a great many crafts such as provide for the equipment of the Emperor's troops. In a mountain of the province there is a very good silver mine, from which much silver is got; the place is called YDIFU. The country is well stocked with game, both beast and bird." (Pp. 250, 251.)

Siuen-te chow is the modern Siuen-hwa fu. Marco Polo's remark on the existence of silver mines in this country is corroborated in the *Yuen shi*, in which it is stated that there were

* The 1st group—the Mongols, and other nomade tribes;—the 2nd group: Naiman, Wangku, Arhun, Kipchak, Kankly, etc.;—3rd group: the northern Chinese, Coreans, Kitans, etc.;—4th group: the southern Chinese.—*Vide* the list of tribes in the 輟畊錄 *Ch'uo keng lu*.

gold and silver mines in the districts of Siuen-te chow and 蔚州 Yu chow, as well as in the 鷄鳴山 Ki-ming shan mountain. These mines were worked by the government itself up to 1323, when they were transferred to private enterprise.* M. Polo's *Ydifu* is probably a copyist's error, and stands instead of Yu chow.

M. Polo stopped in Siuen-te chow on the so-called western road connecting Shangtu with Peking; which ran from Peking to Siuen-te chow through the same places as now; but from the latter town it led,—not to Kalgan as it does now,—but more to the west to a place called now Shan-fang p'u,† where the pass across the 野狐嶺 Ye-hu ling range begins. In the town of 興和 Hing-ho,‡ the modern Kharabalgasun, it joined the present caravan road from Kalgan, and left it again in the same place. The distance from Peking to Shangtu by this road was 1095 *li*. Besides this western route to Shangtu, there existed yet two other roads, both to the east of the former, and leading to Shangtu through Tu-shi k'ow. One of them diverged at the northern exit of the Kiu-yung-kwan pass.§ The other left at the place called 土木 T'u mu. Both converged in one road towards T'u-shi-k'ow, and then joined the western road, leading through Ye-hu ling, at the lake *Chagan-nor*, south of Shangtu. By this road it was 750 *li* from Peking to Shangtu. The Mongol khans when proceeding to Shangtu for the summer season, used to take the eastern road through Tu-shi- k'ow, but for the return journey followed the western road by Ye-hu ling.‖ On both these roads 納鉢 *nabo*,¶ or temporary palaces, were built, as resting-places for the khans; eighteen on the eastern road and twenty-four on the western.**

Ch. LXI.

"And when you have ridden three days from the city last mentioned, between north-east and north, you come to a city called CHANDU, which was built by the Kaan now reigning. There is at this place a very fine marble Palace, the rooms of which are all gilt and painted with figures of men and beasts and birds, and with a variety of trees and flowers, all executed with such exquisite art that you regard them with delight and astonishment." (P. 263.)

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* *Siu t'ung kien*, ann.

† 膳房堡 about 30 *li* from Kalgan.

‡ Called 撫州 Fu-chow at the time of the Kin.

§ This branch was called the Palankin road.

‖ The greater part of the khan's suite and baggage usually went by the way of Ku-pe k'ow.

¶ *Nabo* or *Naba* is a Kitan name; the Kin adopted it, and it passed from them to the Mongols.

** 元上都驛程考 *Yuen shang tu yi ch'ing k'ao* (Researches on the routes to Shangtu).

M. Polo's statement that he travelled three days from Siuen-te-chow to Chagannor, and three days also from the latter places to Shangtu, agrees with the information contained in the "Researches on the routes to Shangtu." The Chinese authors have not given the precise position of lake Chagannor; there are several lakes in the desert on the road to Shangtu, and their names have changed with time. The palace in Chagannor was built in 1280.*

Chandu,—Shantu, i.e. "the upper capital," called also Loan king,† *i.e.* "the capital on the *Loan* river." Mangu khan having in 1256 committed to Khubilai the task of building a residence near the limits of China proper, had in view to establish a southern *ordo* (residence), and in it a fair for the trade between China and Mongolia;‡ but violating the will of his predecessors whose plan was not to leave the steppes, but to govern the subjugated populations from the depths of Mongolia, Khubilai preferred a settled abode in Peking, and made of Shangtu a summer residence.§

"The Lord abides at this Park of his, dwelling sometimes in the Marble Palace and sometimes in the Cane Palace for three months of the year, to wit June, July, and August; preferring this residence because it is by no means hot; in fact it is a very cool place. When the 28th day of [the Moon of] August arrives he takes his departure, and the Cane Palace is taken to pieces." (P. 264.)

The khans usually resorted to Shangtu in the 4th moon and returned to Peking in the 9th. On the 7th day of the 7th moon there were libations performed in honour of the ancestors; a shaman, his face to the north, uttered in a loud voice the names of Chingis khan and of other deceased khans, and poured mare's milk on the ground. The propitious day for the return journey to Peking was also appointed then.‖

"Moreover [at a spot in the Park where there is a charming wood] he has another Palace built of cane, of which I must give you a description. It is gilt all over, and most elaborately finished inside. [It is stayed on gilt and lackered columns, on each of which is a dragon all gilt, the tail of which is attached to the column whilst the head supports the architrave, and the claws likewise are stretched out right and left to support the architrave.] The roof, like the rest, is formed of canes, covered with a varnish so strong and excellent that no amount of rain will rot them. These

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* *Siu t'ung kien.*

† 灤京.

‡ *Siu t'ung kien.*

§ Detailed information on Shangtu is to be found in 口北三廳志 *K'ow pe san ting chi* and in the *Yuen shang tu y ch'ing k'ao;* cf. 大明一統志 *Ta ming y t'ung chi* and the *Ta ts'ing y t'ung chi.*

‖ *Yuen shang tu y ch'ing k'ao.*

canes are a good 3 palms in girth, and from 10 to 15 paces in length. [They are cut across at each knot, and then the pieces are split so as to form each two hollow tiles, and with these the house is roofed; only every such tile of cane has to be nailed down to prevent the wind from lifting it.] In short, the whole Palace is built of these canes, which (I may mention) serve also for a great variety of other useful purposes. The construction of the Palace is so devised that it can be taken down and put up again with great celerity; and it can all be taken to pieces and removed whithersoever the Emperor may command. When erected, it is stayed [against mishaps from the wind] by more than 200 cords of silk." (P. 264.)

The Palace of canes is probably the Palm Hall * of the Chinese authors, which was situated in the western palace garden of Shangtu.†

Horiad.

"You must know that the Kaan keeps an immense stud of white horses and mares; in fact more than 10,000 of them, and all pure white without a speck. The milk of these mares is drunk by himself and his family, and by none else, except by those of one great tribe that have also the privilege of drinking it. This privilege was granted them by Chinghis Kaan, on account of a certain victory that they helped him to win long ago. The name of the tribe is HORIAD." (Pp. 264, 265.)

If according to Col. Yule's conjecture we should take this name to designate the Oirat tribe, the honours which, as M. Polo says, were paid to this tribe, were addressed probably to the descendants of *Hutukhabeki*, one of the Oirat princes, in consideration of his having been the first to submit to Chuchi, Chingis khan's son, and of the aid lent by him for subduing the other Oirat princes. Chingis khan had, for these services, married his daughter Chechegen to Inalchi, Hutukhabeki's son.‡ It is, however, strange that the Oirats alone enjoyed the privilege described by M. Polo; for the highest position at the Mongol khan's court belonged to the Kunkrat tribe, out of which the khans used to choose their first wives, who were called Empresses of the first *ordo*.§

Tebet and *Kasimur*.

"But I must now tell you a strange thing that hitherto I have forgotten to mention. During the three months of every year that the Lord resides at this place, if it should happen to be bad weather, there are certain crafty enchanters and astrologers in his train, who are such adepts in necromancy and the diabolic arts, that

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* 櫻殿 *Tsung tien*, alias 櫻毛殿 *Tsung mao tien*.
† Mention is made also in the Altan Tobchi of a cane tent in Shangtu.
‡ *Yuen ch'ao pi shi*.
§ Conf. *Yuen shi*, chap. cxxviii, p. 14.

they are able to prevent any cloud or storm from passing over the place where the Emperor's Palace stands. The sorcerers who do this are called TEBET and KESIMUR, which are the names of two nations of Idolaters. Whatever they do in this way is by the help of the Devil, but they make those people believe that it is compassed by dint of their own sanctity and the help of God. [They always go in a state of dirt and uncleanness, devoid of respect for themselves, or for those who see them, unwashed, unkempt, and sordidly attired.] These people also have a custom which I must tell you. If a man is condemned to death and executed by the lawful authority, they take his body and cook and eat it. But if any one die a natural death then they will not eat the body." (Pp. 265, 266.)

"Lamas were of various extraction; at the time of the great assemblies, and of the khan's festivities in Shangtu, they erected an altar near the khan's tent and prayed for fine weather; the whistling of shells rose up to heaven." These are the words in which M. Polo's narrative is corroborated by an eye-witness who has celebrated the remarkable objects of Shangtu.* These lamas, in spite of the prohibition by the Buddhist creed of bloody sacrifices, used to sacrifice sheep's hearts to Mahakala. It happened, as it seems, that the heart of an executed criminal was also considered an agreeable offering ;† and as the offerings could be, after the ceremony, eaten by the sacrificing priests, M. Polo had some reason to accuse the lamas of cannibalism.

"There are some among these *Bacsi* who are allowed by their rule to take wives, and who have plenty of children." (P. 267.)

A good number of lamas were married, as M. Polo correctly remarks; their wives were known, amongst the Chinese, under the name of 梵嫂 Fan-sao.‡

"And when the Idol Festivals come round, these *Bacsi* go to the Prince and say: "Sire, the Feast of such a god is come" [naming him]. "My Lord, you know," the enchanter will say, "that this god, when he gets no offerings, always sends bad weather and spoils our seasons. So we pray you to give us such and such a number of black-faced sheep," naming whatever number they please. "And we beg also, good my lord, that we may have such a quantity of incense, and such a quantity of lign-aloes, and"—so much of this, so much of that, and so much of t'other, according to their fancy—"that we may perform a solemn service and a great sacrifice to our Idols, and that so they may be induced to protect us and all that is ours." The *Bacsi* say these thing to the Barons entrusted with the Stewardship, who stand round the Great Kaan, and these repeat them to the Kaan, and he then orders the Barons

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* 灤京雜咏 *Loan king tsa yung.*
† *Siu t'ung kien*, chap. cciii.
‡ *Ch'ue keng lu.*

to give everything that the Bacsi have asked for. And when they have got the articles they go and make a great feast in honour of their god, and hold great ceremonies of worship with grand illuminations and quantities of incense of a variety of odours, which they make up from different aromatic spices. And then they cook the meat, and set it before the idols, and sprinkle the broth hither and thither, saying that in this way the idols get their bellyful. Thus it is that they keep their festivals. You must know that each of the idols has a name of his own, and a feast day, just as our Saints have their anniversaries." (Pp. 266, 267.)

The maintenance of the lamas, of their monasteries, the expenses for the sacrifices and for transcription of sacred books, required enormous sums. The lamas enjoyed a preponderating influence, and stood much higher than the priests of other creeds, living in the palace as if in their own house. The perfumes, which M. Polo mentions, were used by the lamas for two purposes; they used them for joss-sticks,* and for making small turrets, known under the name of *ts'a-ts'a*;† the joss-sticks used to be burnt in the same way as they are now; the *ts'a-ts'a* were inserted in *suburgas* or buried in the ground.‡ At the time when the *suburga* was built in the garden of the Peking palace in 1271,§ there were used, according to the Empress' wish, 1008 turrets made of the most expensive perfumes, mixed with pounded gold, silver, pearls and corals, and 130,000 *ts'a-ts'a* made of ordinary perfumes.‖

"They have also immense Minsters and Abbeys, some of them as big as a small town, with more than two thousand monks (*i.e.* after their fashion) in a single abbey. These monks dress more decently than the rest of the people, and have the head and beard shaven." (P. 267.)

The monasteries with numbers of monks, who, as M. Polo asserts, behaved decently, evidently belonged to Chinese Buddhists, *ho-shang*; in Khubilai's time they had two monasteries in Shang-tu, in the N.E. and N.W. parts of the town.¶

"Then there is another kind of devotees called SENSIN, who are men of extraordinary abstinence after their fashion, and lead a life of such hardship as I will describe. All their life long they eat

* Joss-sticks are made even now in Thibet with musk and Thibetan saffron.

† *Yuen shi*, section on Buddhism.

‡ *Yuen shi.*

§ On the same spot where a *suburga* exists now; it is called Pe t'a, "the white pagoda," and was built in Shun chi's time.

‖ 辯僞錄 *Pien wei lu, in fine;* here is quoted the text of the tablet relating to the construction of the *suburga;* the perfumes used are also enumerated.

¶ *Hwa yen sze pei,* "Tablet of the construction of the Hwa-yen-sze monastery (in Shangtu) 華嚴寺碑; *vide* 元文抄.

nothing but bran, which they take mixt with hot water. That is their food, bran and nothing but bran, and water for their drink. 'Tis a life-long fast! so that I may well say their life is one of extraordinary asceticism. They have great idols, and plenty of them; but they sometimes also worship fire." (Pp. 267, 268.)

Sensin is a sufficiently faithful transcription of 先生 *Sien-seng* (Sien-shing in Pekingese); the Mongols called thus, as well in conversation as in official documents, the Tao-sze, in the sense of preceptors, just as lamas were called by them *Bacshi*, which corresponds to the Chinese *Sien-seng*.* M. Polo calls them fasters and ascetics. It was one of the sects of Taouism. There was another one which practised cabalistic and other mysteries.† The Tao-sze had two monasteries in Shangtu, one in the east part of the town, the other in the western part.‡

"The other Idolaters who are not of this sect call these people heretics —*Patarins* as we should say—because they do not worship their idols in their own fashion. Those of whom I am speaking would not take a wife on any consideration." (P. 268.)

The Tao-sze, says M. Polo, were looked upon as heretics by the other sects; that is, of course, by the Lamas and Ho-shangs; in fact in his time a passionate struggle was going on between Buddhists and Tao-sze, or rather a persecution of the latter by the former; the Buddhists attributed to the doctrine of the Tao-sze a pernicious tendency, and accused them of deceit; and in support of these assertions they pointed to some of their sacred books. Taking advantage of their influence at Court, they persuaded Khubilai to decree the burning of these books, and it was carried out in Peking, A.D. 1281.§

"They wear dresses of hempen stuff, black and blue, and sleep upon mats; in fact their ascetism is something astonishing." (P. 268.)

The Tao-sze, says M. Polo, wear dresses of black and blue linen; *i.e.* they wear dresses made of tatters of black and blue linen, as can be seen also at the present day.

"Their idols are all feminine, that is to say, they have women's names." (P. 268.)

The idols of the Tao-sze, according to M. Polo's statement, have female names; in fact, there are in the pantheon of Taoism a

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* *Vide* Chinese text of the charters granted to monasteries; cf. "*Researches on Christianity in China*," in the Russian "*Eastern Magazine*." The Mongols gave no translation of the word *Sien-seng* in their language, and pronounced it Shan-shing. *Vide* 北虜譯言 "*Vocabulary of Mongol words*."

† *Yueu shi*, art. on the Tao-sze.

‡ *Hwa yen sze pei*.

§ *Pien wei lu*.

great many female divinities, still enjoying popular veneration in China; such are 斗母 *Tow mu* (the "Ursa major," constellation), *Pi-hia-yuen kiun* (the celestial queen), female divinities for lying-in women, for children, for diseases of the eyes; and others, which are to be seen everywhere. The Tao-sze have, besides these a good number of male divinities bearing the title of 君 *Kiun* in common with female divinities; both these circumstances might have led M. Polo to make the above statement.

Book II.

Chap. II., seq.—*Nayan.*

"There was a great Tartar Chief, whose name was Nayan, a young man [of thirty], Lord over many lands and many provinces; and he was Uncle to the Emperor Cublay Kaan, of whom we are speaking. And when he found himself in authority this Nayan waxed proud in the insolence of his youth and his great power; for indeed he could bring into the field 300,000 horsemen, though all the time he was liegeman to his nephew the Great Kaan Cublay as was right and reason." (Pp. 296, 297.)

His great grandfather, *Belgutai*, was Chingis khan's step-brother. The situation and limits of his appanage are not clearly defined in history. According to Belgutai's biography, it was between the Onon and Kerulen,* and according to Shin Yao's researches,† at the confluence of the Argun and Shilka. Finally, according to Harabadur's biography, it was situated in Abalahu,—which geographically and etymologically corresponds to modern Butkha;‡ Abalahu, as Khubilai himself said, was rich in fish; indeed, after the suppression of Nayan's rebellion, the governor of that country used to send to the Peking Court, fishes weighing up to a thousand Chinese pounds (*kin*). It was evidently a country near the Amur river. But history has apparently connected Nayan's appanage with that of Hatan,§ whose *ordo* was contiguous to Nayan's, on the left bank of the Amur, hypothetically east of Blagoveshtshensk, on the spot, where still the traces of an ancient city can be seen.‖ Nayan's possessions stretched south to 廣寧 Kuang-ning, which belonged to his appanage, and it was from this town that he had the title of prince of Kuang-ning (Kuang-ning-wang.)¶

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* *Yuen shi.*

† *Lo fung low wen kao.*

‡ *Yuen shi.* See Harabadur's biography.

§ A grandson of Hachiun, brother of Chingis khan.

‖ Shin Yao, Researches; Biogr. of Yusi-Temur. The Mongol appanage princes, although they were nomads, liked to surround their *ordos* with settlements and walls.

¶ *Yuen shi*,—Geographical part. Kuang-ning bears this name also now; it is situated in southern Manchuria, near a mountain range of the same

"And when the Great Kaan had gained this battle, as you have heard, all the Barons and people of Nayan's provinces renewed their fealty to the Kaan. Now these provinces that had been under the Lordship of Nayan were four in number; to wit, the first called CHORCHA; the second CAULY; the third BARSCOL; the fourth SIKINTINJU. Of all these four great provinces had Nayan been Lord; it was a very great dominion." (Pp. 306, 307.)

According to M. Polo's statement, Ch. V., Chorcha, Cauly, Barscol and Sikintinju formed part of Nayan's appanage.

Chorcha is Churchin.—Nayan, as vassal of the Mongol khans, had the commission to keep in obedience the people of Manchuria (subdued in 1233), and to care for the security of the country;* there is no doubt that he shared these obligations with his relative Hatan, who stood nearer to the native tribes of Manchuria.

Cauly is Corea.—The Corean kingdom proper could not be a part of the prince's appanage. M. Polo might mean the northern part of Corea, which submitted to the Mongols in A.D. 1269, with sixty towns, and which was subordinated entirely to the central administration in Liao-yang. As to the southern part of Corea, it was left to the king of Corea, who however, was a vassal of the Mongols.

Barscol.—There are in the *Yuen shi* the names of the department of 浦與路 *P'u-yü-lu* and of the place *Pu-lo-ho*,† which, according to the system of Chinese transcription, approach to Barscol; but it is difficult to prove this identification, since our knowledge of these places is a very scanty one; it remains only to identify Barscol with Abalahu, already known, all the more as the two names of P'u-yü-lu and Pu-lo-ho have also some resemblance with Abalahu.

Sikintinju.—It is easy to distinguish in this complicated name, the name of 建州 Kien-chow, belonging to a town which was in Nayan's appanage, and is mentioned in the history of his rebellion. There were two Kien-chow, one in the time of the Kin in the

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name, (the ancient 醫巫閭 *Yi-wu-lui.*)

* *Yuen shi*, geograph. part, where five tribes of Churchin are enumerated. One of them was called *Odolen*, from which the present Manchu race derive their origin.

† These names existed in the time of the Kin, but were preserved, as many others, by the Mongols; the places to which they refer must have been in the neighbourhood of Nayan's appanage. Compare the map of the dominions of the Kin in the 歷代地理沿革圖 *Li tai ti li yen ke t'u* published in Nanking 1872. P'u-yü-lu was also called 扶餘路 *Fu-yü-lu.*

modern aimak of Khorchin;* the other during the Mongol dynasty, on the upper part of the river 大凌河 Ta-ling ho, in the limits of the modern aimak of Kharachin;† the latter depended on Kuang-ning.‡ Mention is made of Kien-chow in connexion with the following circumstance. When Nayan's rebellion broke out, the Court of Peking sent orders to the King of Corea, requiring from him auxiliary troops; this circumstance is mentioned in the Corean Annals, under the year 1288 § in the following words:—"in the present year, in the 4th month, orders were received from Peking to send five thousand men with provisions to Kien-chow, which is three thousand *li* distant from the king's residence."‖ This number of *li* cannot of course be taken literally; judging by the distances estimated at the present day, it was about two thousand *li* from the Corean K'ai-ch'ing fu to the Mongol Kien-chow; and as much to the Kien-chow of the Kin (through Mukden and the pass of Fa-k'u mun in the willow palisade). It is difficult to decide to which of these two cities of the same name the troops were ordered to go, but at any rate, there are sufficient reasons to identify Sikintinju of M. Polo with Kien-chow.

"Seeing then what great power he had, he took it into his head that he would be the Great Kaan's vassal no longer; nay more, he would fain wrest his empire from him if he could. So this Nayan sent envoys to another Tartar Prince called CAIDU, also a great and potent Lord, who was a kinsman of his, and who was a nephew of the Great Kaan and his lawful liegeman also, though he was in rebellion and at bitter enmity with his Sovereign Lord and Uncle. Now the message that Nayan sent was this: That he himself was making ready to march against the Great Kaan with all his forces (which were great), and he begged Caidu to do likewise from his side, so that by attacking Cublay on two sides at once with such great forces they would be able to wrest his dominion from him. And when Caidu heard the message of Nayan, he was right glad thereat, and thought the time was come at last to gain his object. So he sent back answer that he would do as requested; and got ready his host, which mustered a good hundred thousand horsemen. . . . . When the Great Kaan heard what was afoot, he made his preparations in right good heart, like

* Kien-chow of the Kin was probably on the site of modern 長春堡 Ch'ang-ch'un pu, on the boundary of Manchuria and Mongolia, west of Modern Kizin.

† *Man chow yuen lew k'ao.*

‡ *Yuen shi*, geograph. part.

§ *Kao li shi*, chap. xxx, fol. 11.

‖ The Corean capital was at that time in K'ai-ch'ing fu. According to the *Siu tung k'ien*, the Coreans sent five hundred men instead of five thousand. The *Siu t'ung k'ien* places this event in 1287, differently from the Coreans.

one who feared not the issue of an attempt so contrary to justice. Confident in his own conduct and prowess, he was in no degree disturbed, but vowed that he would never wear crown again if he brought not those two traitorous and disloyal Tartar chiefs to an ill end. So swiftly and secretly were his preparations made that no one knew of them but his Privy Council, and all were completed within ten or twelve days. . . . . And when he had got ready this handful (as it were) of his troops, he ordered his astrologers to declare whether he should gain the battle and get the better of his enemies. After they had made their observations, they told him to go on boldly, for he would conquer and gain a glorious victory: whereat he greatly rejoiced. So he marched with his army, and after advancing for 20 days they arrived at a great plain, where Nayan lay with all his host, amounting to some 400,000 horse. Now the Great Kaan's forces arrived so fast and so suddenly that the others knew nothing about the matter. For the Kaan had caused such strict watch to be made in every direction for scouts that every one that appeared was instantly captured. Thus Nayan had no warning of his coming and was completely taken by surprise; insomuch that when the Great Kaan's army came up, he was asleep in the arms of a wife of his of whom he was extravagantly fond. So thus you see why it was that the Emperor equipped his force with such speed and secresy. What shall I say about it [the battle]? When day had well broken, there was the Kaan with all his host upon a hill overlooking the plain where Nayan lay in his tent, in all security, without the slightest thought of any one coming thither to do him hurt. In fact, this confidence of his was such that he kept no vedettes whether in front or in rear; for he knew nothing of the coming of the Great Kaan, owing to all the approaches having been completely occupied as I told you. Moreover the place was in a remote wilderness, more than thirty marches from the Court, though the Kaan had made the distance in twenty, so eager was he to come to battle with Nayan. And what shall I tell you next? The Kaan was there on the hill, mounted on a great wooden bartizan, which was borne by four well trained elephants, and over him was hoisted his standard, so high aloft that it could be seen from all sides. His troops were ordered in battles of 30,000 men apiece; and a great part of the horsemen had each a foot soldier armed with a lance set on the crupper behind him (for it was thus that the footmen were disposed of); and the whole plain seemed to be covered with his forces. So it was thus that the Great Kaan's army was arrayed for battle. When Nayan and his people saw what had happened, they were sorely confounded, and rushed in haste to arms. Nevertheless they made them ready in good style and formed their troops in an orderly manner. And when all were in battle array on both sides as I have told you, and nothing remained but to fall to blows, then might you have heard a sound arise of many instruments of various music, and of the voices of the whole of the two hosts loudly singing. For this is a custom of the Tartars that before they join battle they all unite in singing and playing on a certain two-stringed instrument of theirs, a thing

right pleasant to hear. And so they continue in their array of battle, singing and playing in this pleasing manner, until the great Naccara of the Prince is heard to sound. As soon as that begins to sound the fight also begins on both sides ; and in no case before the Prince's Naccara sounds dare any commence fighting. So then, as they were thus singing and playing, though ordered and ready for battle, the great Naccara of the Great Kaan began to sound. And that of Nayan also began to sound. And thenceforward the din of battle began to be heard loudly from this side and from that. And they rushed to work so doughtily with their bows and their maces, with their lances and swords, and with the arblasts of the footmen, that it was a wondrous sight to see. Now might you behold such flights of arrows from this side and from that, that the whole heaven was canopied with them, and they fell like rain. Now might you see on this side and on that full many a cavalier and man-at-arms fall slain, in so much that the whole field seemed covered with them. From this side and from that such cries arose from the crowds of the wounded and dying that had God thundered, you would not have heard Him ! For fierce and furious was the battle, and quarter there was none given. But why should I make a long story of it? You must know that it was the most parlous and fierce and fearful battle that ever has been fought in our day. Nor have there ever been such forces in the field in actual fight, especially of horsemen, as were engaged—for, taking both sides, there were not fewer than 760,000 horsemen, a mighty force ! and that without reckoning the footmen, who were also very numerous. The battle endured with various fortune on this side and on that from morning till noon. But at the last, by God's pleasure and the right that was on his side, the Great Kaan had the victory, and Nayan lost the battle and was utterly routed. For the army of the Great Kaan performed such feats of arms that Nayan and his host could stand against them no longer, so they turned and fled. But this availed nothing for Nayan ; for he and all the barons with him were taken prisoners, and had to surrender to the Kaan with all their arms. Now you must know that Nayan was a baptized Christian, and bore the cross on his banner ; but this nought availed him, seeing how grievously he had done amiss in rebelling against his Lord. For he was the Great Kaan's liegeman, and was bound to hold his lands of him like all his ancestors before him. And when the Great Kaan learned that Nayan was taken right glad was he, and commanded that he should be put to death straightway and in secret, lest endeavours should be made to obtain pity and pardon for him, because he was of the Kaan's own flesh and blood. And this was the way in which he was put to death : he was wrapped in a carpet, and tossed to and fro so mercilessly that he died. And the Kaan caused him to be put to death in this way because he would not have the blood of his Line Imperial spilt upon the ground or exposed in the eye of Heaven and before the Sun." (Pp. 297-306.)

The rebellion of Nayan and Hatan is incompletely and contradictorily related in Chinese history. The suppression of both

these rebellions lasted four years. In 1287, Nayan marched from his *ordo* with sixty thousand men through eastern Mongolia. In the 5th moon (*var.* 6th) of the same year Khabilai marched against him from Shangtu. The battle was fought in south-eastern Mongolia and gained by Khabilai, who returned to Shangtu in the 8th month. Nayan fled to the south-east, across the mountain range, along which a willow palisade stands now; but forces had been sent beforehand from 瀋州 Shin-chow (modern Mukden) and Kuang-ning (probably to watch the pass), and Nayan was made prisoner.*

Two months had not passed, when Hatan's rebellion broke out† (so that it took place in the same year 1287). It is mentioned‡ under year 1288, that Hatan was beaten and that the whole of Manchuria was pacified; but in 1290, it is again mentioned, that Hatan disturbed southern Manchuria, and that he was again defeated. It is to this time that the narratives in the biographies of Liting, Yuesi Femur, and Mangwu ought to be referred. According to the first of these biographies, Hatan after his defeat by Liting on the river Kui lui (Kuilar?) fled and perished. According to the second biography, Hatan's dwelling (on the Amur river) was destroyed and he disappeared. According to the third, Mangwu and Naimatai pursued Hatan to the extreme north, up to the eastern sea-coast (the mouth of the Amur). Hatan fled, but two of his wives and his son Laoti were taken; the latter was executed, and this was the concluding act of the suppression of the rebellion in Manchuria. We find, however, an important *variante* in the history of Corea; it is stated there, that in 1290, Hatan and his son Laoti were carrying fire and slaughter to Corea, and devasted that country; they slew the inhabitants and fed on human flesh. The King of Corea fled to the Kiang-hwa § island. The Coreans were not able to withstand the invasion. The Mongols sent to their aid, in 1291, troops under the command of two generals, Seshekan (who was at that time governor of Liao tung) and Namantai (evidently the above-mentioned Naimatai). The Mongols conjointly with the Coreans defeated the insurgents, who had penetrated into the very heart of the country; their corpses covered a space thirty *li* in extent; Hatan and his son made their way through the victorious army and fled,‖ finding a refuge in

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* *Siu t'ung kien; Yuen shi lui pien;* and biography of Mangwu, in the *Yuen ven cha'o.*

† Biogr. of Mangwu.

‡ In the *Siu t'ung kien.*

§ 江華島.

‖ 東國史略 *Tsung kwo shi lio,* a short history of Corea.

the Niuchi (Djurdji) country,* from which Laotai made a later incursion into Corea.† Such is the discrepancy between historians of the same fact. The statement found in the Corean history seems to me more reliable than the facts given by Chinese history.

Ch. III.—*Note.*

"In that time he had assembled good 360,000 horsemen and 100,000 footmen,—but a small force indeed for him, and consisting only of those that were in the vicinity. For the rest of his vast and innumerable troops were too far off to answer so hasty a summons, being engaged under orders from him on distant expeditions to conquer divers countries and provinces. If he had waited to summon all his forces, the multitude assembled would have been beyond all belief, a multitude such as never was heard of or told of, past all counting! In fact, those 360,000 horsemen that he got to together consisted merely of the falconers and whippers in that were about his court!" (P. 299.)

"Ramusio has here the following explanatory addition:—'You must know that in all the Provinces of Cathay and Mangi, and throughout the Great Kaan's dominions, there are too many disloyal folk ready to break into rebellion against their Lord, and hence it is needful in every province containing large cities and much population, to maintain garrisons. These are stationed four or five miles from the cities, and the latter are not allowed to have walls or gates by which they might obstruct the entrance of the troops at their pleasure. These garrisons, as well as their commanders, the Great Kaan causes to be relieved every two years; and bridled in this way the people are kept quiet, and can make no disturbance. The troops are maintained not only by the pay which the Kaan regularly assigns from the revenues of each province, but also by the vast quantities of cattle which they keep, and by the sale of milk in the cities, which furnishes the means of buying what they require. They are scattered among their different stations, at distances of 30, 40, or 60 days (from the capital); and had Cublay decided to summom but the half of them, the number would have been incredible,' &c." (P. 300.)

Col. Yule extracts from Ramusio M. Polo's statement as to the Mongol garrisons cantonned near the Chinese towns. In the Mongol-Chinese documents ‡ they are mentioned under the name of *Aolu*, but no explanation of the term is given; M. Polo gives a clear idea of them.

Ch. V.

"And after the Great Kaan had conquered Nayan, as you have heard, it came to pass that the different kinds of people who were present, Saracens and Idolaters and Jews, and many others that believed

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* *i.e.* the present maritime province, belonging to Russia.

† *Kao li shi*, "The history of Corea," chap. cxiv, fol. 15.

‡ *Vide* 經世大典 *King shi ta tien* (in extracts). *Aolu* is given in the Mongol text of the *Yuen ch'ao pi shi* as *Aoluh*.

not in God, did gibe those that were Christians because of the cross that Nayan had borne on his standard, and that so grievously that there was no bearing it." (P. 307.)

The Jews are mentioned for the first time in the *Yuen shi* under the year 1329,* on the occasion of the re-establishment of the law on the collection of taxes from dissidents. Mention of them is made again under the year 1354,† when on account of several insurrections in China, rich Mahommetans and Jews were invited to the capital in order to join the army. In both cases they are named 术忽 *Chu hu* (Djuhud).

Ch. VII.

"So we will have done with this matter of Nayan, and go on with our account of the great state of the Great Kaan. We have already told you of his lineage and of his age; but now I must tell you what he did after his return, in regard to those Barons who had behaved well in the battle. Him who was before captain of 100 he made captain of 1,000; and him who was captain of 1,000 men he made to be captain of 10,000, advancing every man according to his deserts and to his previous rank. Besides that, he also made them presents of fine silver plate and other rich appointments; gave them Tablets of Authority of a higher degree than they held before; and bestowed upon them fine jewels of gold and silver, and pearls and precious stones; insomuch that the amount that fell to each of them was something astonishing. And yet 'twas not so much as they had deserved; for never were men seen who did such feats of arms for the love and honour of their Lord, as these had done on that day of the battle. Now those Tablets of Authority, of which I have spoken, are ordered in this way. The officer who is a captain of 100 hath a tablet of silver; the captain of 1,000 hath a tablet of gold or silver-gilt; the commander of 10,000 hath a tablet of gold, with a lion's head on it. And I will tell you the weight of the different tablets, and what they denote. The tablets of the captains of 100 and 1,000 weigh each of them 120 *saggi;* and the tablet with the lion's head engraven on it, which is that of the commander of 10,000, weighs 220 *saggi.* And on each of the tablets is inscribed a device, which runs: "*By the strength of the Great God, and of the great grace which He hath accorded to our Emperor, may the name of the Kaan be blessed; and let all such as will not obey him be slain and be destroyed.*" And I tell you besides that all who hold these tablets likewise receive warrants in writing, declaring all their powers and privileges. I should mention too that an officer who holds the chief command of 100,000 men, or who is general-in-chief of a great host, is entitled to a tablet that weighs 300 *saggi.* It has an inscription thereon to the same purport that I have told you already, and below the inscription there is the figure of a lion, and below the lion the sun and moon. They have warrants also of their high rank, command, and power.

* *Yuen shi*, chap. xxxiii, p. 7.
† Ib. chap. xliii, fol. 10.

Every one, moreover, who holds a tablet of this exalted degree is entitled, whenever he goes abroad, to have a little golden canopy, such as is called an umbrella, carried on a spear over his head in token of his high command. And whenever he sits, he sits in a silver chair. To certain very great lords also there is given a tablet with gerfalcons on it; this is only to the very greatest of the Kaan's barons, and it confers on them his own full power and authority; so that if one of these chiefs wishes to send a messenger any whither, he can seize the horses of any man, be he even a king, and any other chattels at his pleasure. (Pp. 312, 313.)

Tiger's tablets,—*Sinice Hu fu,** and *p'ai tsze*† in the common language. The Mongols had them of several kinds, which differed by the metal, of which they were made, as well as by the number of pearls (one, two or three in number), which were incrusted in the upper part of the tablet. Falcon's tablets with the figure of a falcon, were round, and used to be given only to special couriers and envoys of the khan.‡ The use of the Hu-fu was adopted by the Mongols probably from the Kin.

Ch. VIII.

"The personal appearance of the Great Kaan, Lord of Lords, whose name is Cublay, is such as I shall now tell you. He is of a good stature, neither tall nor short, but of a middle height. He has a becoming amount of flesh, and is very shapely in all his limbs. His complexion is white and red, the eyes black and fine, the nose well formed and well set on. He has four wives, whom he retains permanently as his legitimate consorts; and the eldest of his sons by those four wives ought by rights to be emperor;—I mean when his father dies. Those four ladies are called empresses, but each is distinguished also by her proper name. And each of them has a special court of her own, very grand and ample; no one of them having fewer than 300 fair and charming damsels. They have also many pages and eunuchs, and a number of other attendants of both sexes; so that each of these ladies has not less than 10,000 persons attached to her Court. When the Emperor desires the society of one of these four consorts he will sometimes send for the lady to his apartment, and sometimes visit her at her own. He has also a great number of concubines, and I will tell you how he obtains them. You must know that there is a tribe of Tartars called UNGRAT who are noted for their beauty. Now every year a hundred of the most beautiful maidens of this tribe are sent to the Great Kaan, who commits them to the charge of certain elderly ladies dwelling in his palace. And these old ladies make the girls sleep with them, in order to ascertain if they have sweet breath [and do not snore], and are sound in all their limbs. Then such of them as are of

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* 虎符.
† 牌子.
‡ *Yuen shi lui pien*, and *Yuen ch'ao tien chang.*

approved beauty, and are good and sound in all respects, are appointed to attend on the Emperor by turns. Thus six of these damsels take their turn for three days and nights, and wait on him when he is in his chamber and when he is in bed, to serve him in any way, and to be entirely at his orders. At the end of three days and nights they are relieved by other six. And so throughout the year, there are reliefs of maidens by six and six, changing every three days and nights." (Pp. 318, 319.)

Kubilai's four wives, *i.e.* the empresses of the first, second, third and fourth *ordos*. *Ordo* is properly speaking a separate palace of the khan, under the management of one of his wives. Chinese authors translate therefore the word *ordo* by "harem." The four *ordo* established by Chingis khan were destined for the empresses, who were chosen out of four different nomad tribes.* During the reign of the first four khans, who lived in Mongolia, the four *ordo* were considerably distant one from another, and the khans visited them in different seasons of the year; they existed nominally as long as China remained under Mongol domination. The custom of choosing the empress out of certain tribes, was in the course of time set aside by the khans. The empress, wife of the last Mongol khan in China was a Corean princess by birth; and she contributed in a great measure to the downfall of the Mongol dynasty.†

Ch. X and XI.

"You must know that for three months of the year, to wit, December, January, and February, the Great Kaan resides in the capital city of Cathay, which is called CAMBALUC, and which is at the north-eastern extremity of the country. In that city stands this great Palace, and now I will tell you what it is like. It is enclosed all round by a great wall forming a square, each side of which is a mile in length; that is to say, the whole compass thereof is four miles. This you may depend on; it is also very thick, and a good ten paces in height, whitewashed and loop-holed all round. . . . . Now there was on that spot in old times a great and noble city called CAMBALUC, which is as much as to say in our tongue "The City of the Emperor. But the Great Kaan was informed by his Astrologers that this city would prove rebellious, and raise great disorder against his imperial authority. So he caused the present city to be built close beside the old one, with only a river between them. And he caused the people of the old city to be removed to the new town which he had founded; and this is called TAIDU. [However, he allowed a portion of the people which he did not suspect, to remain in the old city, because the new one could not hold the whole of them, big as it is.] As regards the size of this (new) city you must know that it has a

* See *Yuen shi*, on the empresses, and also *Yuen ch'ao pi shi*.
† See *Yuen shi*,—*Pen ki*.

compass of 24 miles, for each side of it hath a length of 6 miles, and it is four-square. And it is all walled round with walls of earth which have a thickness of full ten paces at bottom, and a height of more than ten paces; but they are not so thick at top, for they diminish in thickness as they rise, so that at top they are only about three paces thick. And they are provided throughout with loop-holed battlements, which are all whitewashed. There are 12 gates, and over each gate there is a great and handsome palace, so that there are on each side of the square, three gates and five palaces; for (I ought to mention) there is at each angle also a great and handsome palace. In those palaces are vast halls in which are kept the arms of the city garrison." (Pp. 324, 331, 332.)

Peking.—Abundance of historical and archeological information on Peking is contained in the historical description of the city 日下舊聞考 *Yi hia kiu wen k'ao*, 1774,* but unfortunately without criticism. The Peking of the Mongol time, as well as the palace of the khans, seem to have existed on the site of the modern town, and of the Bogdo khan's palace. The town was in those times 60 *li* in circumference, but the *Chue keng lu* state expressly that those *li* (field *li*) are meant, which contain only 240 *pu*. This will give for the circuit of the Mongol capital only forty geographical *li*, each of them containing now 360 *pu*. When the Ming army took possession of Peking, the Emperor Hung-wu reduced its dimensions, but his son Yung-lo, who determined to make it the northern capital, enlarged it again. In his time Peking was 6879,83 *chang*† in circumference, *i.e.* 13759,33 *pu*,‡ not over 640 *pu* less than during the Mongols. The wall surrounding the palaces of the Mongol khans was 9 *li* 30 *pu* in circumference. The square measured from east to west 480 *pu*, from north to south 615 *pu*. Consequently the opinion of those who think that the ancient wall 5 or 6 *li* north of Peking belongs not to the Mongol time but to a remoter period§ is not unfounded. Besides this, the author of the 長安客話 *Ch'ang an ko hua* (published during the Ming dynasty) states expressly that Yung lo built the walls of Peking on the walls of the Mongol capital. It is possible, however, to verify this point. The first *Nabo* (station of khan) on the road from Peking to Shang-tu was 20 *li* north of the 健德門 *Kien te men* gate, in the small borough 大口 *Ta-k'ow*. There were three hillocks on that spot and this circumstance caused Ta-k'ow to be called also *San-ko-ta* (the three humps.|| Physical signs are not destroyed by time as rapidly as

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* See Wylie's *Notes on Chinese Literature*.

† *Yi hia kiu wen k'ao*, chap. xxxviii, fol. 12.

‡ The modern *pu* equal to 5 large feet = the ancient *pu* of 6 small feet.

§ 野獲編 *Ye hu pien*, published in 1606.

|| *Researches on the routes to Shang-tu.*

buildings are; it is probable therefore, that these hillocks still exist; and it is possible by their relative distance from the present northern wall of Peking, to determine how far the Mongol capital stretched to the north. If the wall of modern Peking was built on the wall of the Mongol capital, the *Kien-te-men* gate of the Mongol time would answer to the present *Te-shing-men* gate. Twenty *li* north of this gate, lies now the small town of 清河 *Ts'ing ho* on the river of the same name. There was at this place during the Ming dynasty a temporary palace, on the road to the imperial cemetery. In the time of the Mongols, roads were measured, as they are now, in ordinary *li*.

As I know that one of my friends in Peking has undertaken to examine the remains of ancient Peking, and that he intends to publish his archeological investigations, I need not enlarge upon this subject.

Ch. XII.

"You must know that the Great Kaan, to maintain his state, hath a guard of twelve thousand horsemen, who are styled KESHICAN, which is as much as to say "Knights devoted to their Lord." Not that he keeps these for fear of any man whatever, but merely because of his own exalted dignity. These 12,000 men have four captains, each of whom is in command of 3,000; and each body of 3,000 takes a turn of three days and three nights to guard the palace, where they also take their meals. After the expiration of three days and nights they are relieved by another 3,000, who mount guard for the same space of time, and then another body takes its turn, so that there are always 3,000 on guard. Thus it goes until the whole 12,000, who are styled (as I said) Keshican, have been on duty; and then the tour begins again, and so runs on from year's end to year's end." (P. 336.)

By *Keshican* in Col. Yule's M. Polo, *Keshikten* is evidently meant. This is a general Mongol term to designate the Khan's life guard. It is derived from the word *keshik* meaning a guard by turns, a corps on tour of duty.* *Keshik* is one of the archaisms of the Mongol language, for now this word has another meaning in Mongol. Col. Yule has brought together several explanations of the term. It seems to me that among his suppositions the following is the most consistent with the ancient meaning of the word:—

"We find *Kishik* still used at the court of Hindustan, under "the great kings of Timur's House, for the corps on tour of duty "at the palace. . . . . The royal guards in Persia, who "watch the king's person at night, are termed *Keshikchi*."

* Comp. *Yüan ch'ao pi shi*. The Mongol as well as the Chinese text give detailed accounts respecting this guard.

The Keshikten was divided into a day-watch called *Turgaut* * and a night-watch *Kebteul.*† The Kebte-ul consisted of pure Mongols, whilst the Turgaut was composed of the sons of the vassal princes and governors of the provinces, and of hostages. The watch of the khan was changed every three days, and contained 400 men.‡ In 1330 it was reduced to 100 men.

Ch. XIII.

"[There are certain Barons specially deputed to see that foreigners, who do not know the customs of the Court, are provided with places suited to their rank; and these Barons are continually moving to and fro in the hall, looking to the wants of the guests at table, and causing the servants to supply them promptly with wine, milk, meat, or whatever they lack. At every door of the hall (or, indeed, wherever the Emperor may be) there stand a couple of big men like giants, one on each side, armed with staves. Their business is to see that no one steps upon the threshold in entering, and if this does happen, they strip the offender of his clothes, and he must pay a forfeit to have them back again; or in lieu of taking his clothes, they give him a certain number of blows. If they are foreigners ignorant of the order, then there are Barons appointed to introduce them, and explain it to them. They think, in fact, that it brings bad luck if any one touches the threshold. Howbeit, they are not expected to stick to this in going forth again, for at that time some are like to be the worse for liquor, and incapable of looking to their steps.]" (Pp. 339, 340.)

The author of the *Ch'ue keng lu* mentions also the athletes with clubs standing at the door, at the time of the khan's presence in the hall. He adds, that next to the khan, two other life-guards used to stand, who held in their hands "natural" axes of jade.§

Ch. XIV.

"You must know that the Tartars keep high festival yearly on their birthdays. And the Great Kaan was born on the 28th day of the September moon, so on that day is held the greatest feast of the year at the Kaan's Court, always excepting that which he holds on New Year's Day, of which I shall tell you afterwards. Now, on his birthday, the Great Kaan dresses in the best of his robes, all wrought with beaten gold; and full 12,000 Barons and Knights on that day come forth dressed in robes of the same colour, and precisely like those of the Great Kaan, except that they are not so costly; but still they are all of the same colour as his, and are also of silk and gold. Every man so clothed has also a girdle of gold; and this as well as the dress is given him by the Sovereign.

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* Abulghaji spells this word, *Torgak.*

† It is a curious fact, that the tribe of the *Kalmuk—Torgauts* near Astrakhan derive their origin from the life-guard of the Mongol khans.

‡ See *Yuen shi lui pien.*

§ *i.e.* axes found fortuitously in the ground, probably primitive weapons.

> And I will aver that there are some of these suits decked with so many pearls and precious stones that a single suit shall be worth full 10,000 golden bezants. And of such raiment there are several sets. For you must know that the Great Kaan, thirteen times in the year, presents to his Barons and Knights such raiment as I am speaking of. And on each occasion they wear the same colour that he does, a different colour being assigned to each festival. Hence you may see what a huge business it is, and that there is no prince in the world but he alone who could keep up such customs as these. On his birthday also all the Tartars in the world, and all the countries and governments that owe allegiance to the Kaan, offer him great presents according to their several ability, and as prescription or orders have fixed the amount. And many other persons also come with great presents to the Kaan, in order to beg for some employment from him. And the Great Kaan has chosen twelve Barons on whom is laid the charge of assigning to each of these supplicants a suitable answer. On this day likewise all the Idolaters, all the Saracens, and all the Christians and other descriptions of people make great and solemn devotions, with much chaunting and lighting of lamps and burning of incense, each to the God whom He doth worship, praying that He would save the Emperor, and grant him long life and health and happiness." (Pp. 343, 344.)

The accounts given by M. Polo regarding the feasts of the khan and the festival dresses at his Court agree perfectly with the statements on the same subject of contemporary Chinese writers. Banquets were called in the common Mongol language *chama*, and festival dresses *chisun*.* General festivals used to be held at the new year and at the birthday of the khan.† In the *Mongol-Chinese Code*, the ceremonies performed in the provinces on the khan's birthday are described. One month before that day the civil and military officers repaired to a temple, where a service was performed to the khan's health. On the morning of the birthday a sumptuously adorned table was placed in the open air, and the representatives of all classes and all confessions were obliged to approach the table, to prostrate themselves and exclaim three times : *wan-sui* (*i.e.* "ten thousand years" life to the khan). After that the banquet took place. In the same code (in the article on the *Ye li ke un* ‡) it is stated, that in the year 1304,—owing to a dispute, which had arisen in the province of Kiang-nan between the *ho-shang* (Buddhist priests) and the Christian missionaries, as to precedence in the above-mentioned ceremony,—a

* Comp. the above-mentioned *Researches on the routes to Shang-tu.*

† See *Yüen shi*, section on ceremonies, and 元朝典章 *Yuen ch'ao tien chang* or "Mongol Chinese Code."

‡ 也里可溫 *Ye li ke un* was the name by which *Christians* were designated at the time of the Mongol dynasty. The word is *Erke-un* in Mongol.

special edict was published, in which it was decided that in the rite of supplication, Christians should follow the Buddhist and Taouist priests.*

Ch. XVII—seq.

"The three months of December, January, and February, during which the Emperor resides at his Capital City, are assigned for hunting and fowling, to the extent of some 40 days' journey round the city; and it is ordained that the larger game taken be sent to the Court. To be more particular: of all the larger beasts of the chase, such as boars, roebucks, bucks, stags, lions, bears, &c., the greater part of what is taken has to be sent, and feathered game likewise. The animals are gutted and despatched to the Court on carts. This is done by all the people within 20 or 30 days' journey, and the quantity so despatched is immense. Those at a greater distance cannot send the game, but they have to send the skins after tanning them, and these are employed in the making of equipments for the Emperor's army." (P. 352.)

Kubilai khan kept a whole army, 14,000 men, huntsmen, distributed in Peking and other cities in the present province of Chili.† The khan used to hunt in the Peking plain from the beginning of spring, until his departure to Shang-tu. There are in the Peking department many low and marshy places, stretching often to a considerable extent and abounding in game. In the biography of *Ai sie*, (*Yuen shi*, chap. cxxxiv), who was a Christian, it is mentioned that Kubilai was hunting also in the department of Pao-ting fu.

"And when he (the Emperor) has travelled till he reaches a place called CACHAR MODUN, there he finds his tents pitched, with the tents of his Sons, and his Barons, and those of his Ladies and theirs, so that there shall be full 10,000 tents in all, and all fine and rich ones. And I will tell you how his own quarters are disposed. The tent in which he holds his courts is large enough to give cover easily to a thousand souls. It is pitched with its door to the south, and the Barons and Knights remain in waiting in it, whilst the Lord abides in another close to it on the west side. When he wishes to speak with any one he causes the person to be summoned to that other tent, &c." (Pp. 359, 360.)

With respect to *Cachar Modun*, Marco Polo intends perhaps by this name 河西務 *Ho-si wu*, which place together with 楊村 *Yang-ts'un* were comprised in the general name 馬頭 *ma-t'ou* (perhaps the *modun* of M. Polo). Ma-t'ou is even now a general term for a jetty in Chinese. *Ho si* in the Mongol spelling was *Ha shin*‡. D'Ohsson in his translation of Rashid-eddin renders

* In the *Mongol-Chinese Code* the whole text of the edict is found.

† *Yuen shi*, 食貨志.

‡ See Mongol text of the *Yuen ch'ao pi shi*.

Ho si by *Co shi*,* but Rashid in that case speaks not of Ho-si wu but of the Tangut empire, which in Chinese was called 河西 Ho si, meaning west of the (yellow) river. Ho-si wu as well as Yang ts'un, both exist even now as villages on the Peiho river, and near the first ancient walls can be seen. Ho-si wu means: "custom's barrier west of the (Peiho) river."

Ch. XIX.—*Chinuchi, Cunici.*

"The Emperor hath two Barons who are own brothers, one called Baian and the other Mingan; and these two are styled *Chinuchi* (or *Cunichi*) which is as much as to say, "The Keepers of the Mastiff Dogs." Each of these brothers hath 10,000 men under his orders; each body of 10,000 being dressed alike, the one in red and the other in blue, and whenever they accompany the Lord to the chase, they wear this livery, in order to be recognized. Out of each body of 10,000 there are 2,000 men who are each in charge of one or more great mastiffs, so that the whole number of these is very large. And when the Prince goes a-hunting, one of those Barons, with his 10,000 men and something like 5,000 dogs, goes towards the right, whilst the other goes towards the left with his party in like manner. They move along, all abreast of one another, so that the whole line extends over a full days' journey, and no animal can escape them. Truly it is a glorious sight to see the working of the dogs and the huntsmen on such an occasion! And as the Lord rides a fowling across the plains, you will see these big hounds coming tearing up, one pack after a bear, another pack after a stag, or some other beast, as it may hap, and running the game down now on this side and now on that, so that it is really a most delightful sport and spectacle." (P. 356.)

Chinuchi, Cunici.—These names are used by M. Polo to designate two dog-keepers of Kubilai, but they have no resemblance with any of the names found in the *Yuen shi*, chap. xcix, article *Ping-chi* (military organisation), and relating to the hunting staff of the khan, viz.: 昔寶赤 *Si pao ch'i* (falconers), 火兒赤 *Ho r c'hi* (archers), and 怯憐赤 *Ke lien ch'i* (probably those who managed the hounds).

Ch. XX.—*Toscaol.—Toscaul.*

"After he has stopped at his capital city these three months that I mentioned, to wit, December, January, and February, he starts off on the 1st day of March, and travels southward towards the Ocean Sea, a journey of two days. He takes with him full 10,000 falconers, and some 500 gerfalcons besides peregrines, sakers, and other hawks in great numbers; and goshawks also to fly at the waterfowl. But do not suppose that he keeps all these together by him; they are distributed about, hither and thither, one hundred together, or two hundred at the utmost, as he thinks proper. But they

* *Hist. des Mong.*, tom. I, p. 95.

are always fowling as they advance, and the most part of the quarry taken is carried to the Emperor. And let me tell you when he goes thus a fowling with his gerfalcons and other hawks, he is attended by full 10,000 men who are disposed in couples; and these are called *Toscaol*, which is as much as to say 'Watchers.' And the name describes their business. They are posted from spot to spot, always in couples, and thus they cover a great deal of ground! Every man of them is provided with a whistle and hood, so as to be able to call in a hawk and hold it in hand. And when the Emperor makes a cast, there is no need that he follow it up, for those men I speak of keep so good a look out that they never lose sight of the birds, and if these hawks have need of help they are ready to render it." (Pp. 357, 358.)

I have heard from men well acquainted with the customs of the Mongols, that at the present day the leaders of the two flanks in "battues," which surround the game, are called *toscaul* in Mongol.

Bularguchi.

"All the Emperor's hawks, and those of the Barons as well, have a little label attached to the leg to mark them, on which is written the names of the owner and the keeper of the bird. And in this way the hawk, when caught, is at once identified and handed over to its owner. But if not, the bird it carried to a certain Baron who is styled *Bularguchi*, which is as much as to say 'The Keeper of Lost Property.' And I tell you that whatever may be found without a known owner, whether it be a horse, or a sword, or a hawk, or what not, it is carried to that Baron straightway, and he takes charge of it. And if the finder neglects to carry his trover to the Baron, the latter punishes him. Likewise the loser of any article goes to the Baron, and if the thing be in his hands it is immediately given up to the owner. Moreover, the said Baron always pitches on the highest spot of the camp, with his banner displayed, in order that those who have lost or found anything may have no difficulty in finding their way to him. Thus nothing can be lost but it shall be straightway found and restored." (Pp. 358, 359.)

Bularguchi.—There are two Mongol terms, which resemble this word, viz., *Balagachi* and *Buluguchi*. But the first was the name used for the door-keeper of the tent of the khan. By Buluguchi the Mongols understood a hunter and especially sable hunters.* No one of these terms can be made consistent with the accounts given by M. Polo regarding the Bularguchi. In the 癸辛雜識 *Kui sin tsa shi* written by 周密 Chow Mi, in the former part of the 14th century,† interesting particulars regarding Mongol hunting (大打圍) are found.

* See the 滿洲原流考 *Man chow yuen liu k'ao.*
† See Wylie's *Notes on Chinese Literature*, p. 158.

"The Emperor himself is carried upon four elephants in a fine chamber made of timber, lined inside with plates of beaten gold, and outside with lion's skins [for he always travels in this way on his fowling expeditions, because he is troubled with gout]. He always keeps beside him a dozen of his choicest gerfalcons, and is attended by several of his Barons who ride on horseback alongside. And sometimes, as they may be going along, and the Emperor from his chamber is holding discourse with the Barons, one of the latter shall exclaim: 'Sire! Look out for Cranes!' Then the Emperor instantly has the top of his chamber thrown open, and having marked the cranes he casts one of his gerfalcons, whichever he pleases; and often the quarry is struck within his view, so that he has the most exquisite sport and diversion, there as he sits in his chamber or lies on his bed; and all the Barons with him get the enjoyment of it likewise! So it is not without reason I tell you that I do not believe there ever existed in the world or ever will exist, a man with such sport and enjoyment as he has, or with such rare opportunities." (P. 359.)

The gout of Kubilai khan.—In the Corean history allusion is made twice to the khan's suffering from this disease.* Under the year 1267 it is there recorded that in the 9th month, envoys of the khan with a letter to the king arrived in Corea. Kubilai asked for the skin of the *Akirho munho*, a fish resembling a cow.† The envoy was informed that, as the khan suffered from swollen feet it would be useful for him to wear boots made of the skin of this animal, and in the 10th month, the king of Corea forwarded to the khan seventeen skins of it.

It is further recorded in the Corean history, that in the 8th month of 1292, sorcerers and *Shaman* women from Corea‡ were sent at the request of the khan to cure him of a disease of the feet and hands. At that time the king of Corea was also in Peking, and the sorcerers and shaman women were admitted during an audience the king had of the khan. They took the khan's hands and feet and began to recite exorcisms, whilst Kubilai was laughing.

Ch. XXIV.—*Bank Notes.*

"Now that I have told you in detail of the splendour of this City of the Emperor's, I shall proceed to tell you of the Mint which he hath in the same city, in the which he hath his money coined and struck, as I shall relate to you. And in doing so I shall make manifest to you how it is that the Great Lord may well be able to

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* *Kao li shi*, chap. xxvi, fol. 8-9, and chap. xxx, fol. 22.

† In Russian Manchuria the Sea-dog is called *a kipi*. Perhaps by *akirho munho* "the sea cow" (*Rhytina Stelleri*) is meant. As Dr. Bretschneider formed me, this large sea beast was found in the sea of Behring, near Kamtchatka, last century by Steller, which however at the present time can be considered as extinct.

‡ The shaman women of Corea were famed all over China for their powers of charming.

accomplish even much more than I have told you, or am going to tell you, in this Book. For, tell it how I might, you never would be satisfied that I was keeping within truth or reason! The Emperor's Mint then is in this same City of Cambaluc, and the way it is wrought is such that you might say he hath the Secret of Alchemy in perfection, and you would be right! For he makes his money after this fashion. He makes them take of the bark of a certain tree in fact the Mulberry Tree, the leaves of which are the food of the silkworms,—these trees being so numerous that whole districts are full of them. What they take is a certain fine white bast or skin which lies between the wood of the tree and the thick outer bark, and this they make into something resembling sheets of paper, but black. When these sheets have been prepared they are cut up into pieces of different sizes. The smallest of these sizes is worth a half tornesel; the next, a little larger, one tornesel; one, a little larger still, is worth half a silver groat of Venice; another a whole groat; others yet two groats, five groats, and ten groats. There is also a kind worth one Bezant of gold, and others of three Bezants, and so up to ten. All these pieces of paper are issued with as much solemnity and authority as if they were of pure gold or silver; and on every piece a variety of officials, whose duty it is, have to write their names, and to put their seals. And when all is prepared duly, the chief officer deputed by the Kaan smears the Seal entrusted to him with vermilion, and impresses it on the paper, so that the form of the Seal remains stamped upon it in red; the Money is then authentic. Any one forging it would be punished with death]. And the Kaan causes every year to be made such a vast quantity of this money, which costs him nothing, that it must equal in amount all the treasure in the world. With these pieces of paper, made as I have described, he causes all payments on his own account to be made; and he makes them to pass current universally over all his kingdoms and provinces and territories, and whithersoever his power and sovereignty extends. And nobody, however important he may think himself, dares to refuse them on pain of death. And indeed everybody takes them readily, for wheresoever a person may go throughout the Great Kaan's dominions he shall find these pieces of paper current, and shall be able to transact all sales and purchases of goods by means of them just as well as if they were coins of pure gold. And all the while they are so light that ten bezants' worth does not weigh one golden bezant. Furthermore all merchants arriving from India or other countries, and bringing with them gold or silver or gems and pearls, are prohibited from selling to any one but the Emperor. He has twelve experts chosen for this business, men of shrewdness and experience in such affairs; these appraise the articles, and the Emperor then pays a liberal price for them in those pieces of paper. The merchants accept his price readily, for in the first place they would not get so good an one from anybody else, and secondly they are paid without any delay. And with this paper-money they can buy what they like anywhere over the Empire, whilst it is also vastly lighter to carry about on their journeys. And it is a truth that the merchants will several

times in the year bring wares to the amount of 400,000 bezants, and the Grand Sire pays for all in that paper. So he buys such a quantity of those precious things every year that his treasure is endless, whilst all the time the money he pays away costs him nothing at all. Moreover several times in the year proclamation is made through the city that any one who may have gold or silver or gems or pearls, by taking them to the Mint shall get a handsome price for them. And the owners are glad to do this, because they would find no other purchaser give so large a price. Thus the quantity they bring in is marvellous, though those who do not choose to do so may let it alone. Still, in this way, nearly all the valuables in the country come into the Kaan's possession. When any of those pieces of paper are spoilt—not that they are so very flimsy neither—the owner carries them to the Mint, and by paying 3 per cent. on the value he gets new pieces in exchange. And if any Baron, or any one else soever, hath need of gold or silver or gems or pearls, in order to make plate, or girdles or the like, he goes to the Mint and buys as much as he list, paying in this paper-money." (Pp. 378-380.)

Without doubt the Mongols borrowed the bank-note system from the Kin. Up to this time there is in Sian fu a block kept, which was used for printing the bank-notes of the Kin dynasty. I have had the opportunity of seeing a print of those bank-notes. They were of the same size and the same shape as the bank-notes of the Ming. A reproduction of the text of the Kin bank-notes is found in the 金石萃編 *Kin shi ts'ui pien.** This copy has the characters 寶券 *pao küan* (precious charter) and the years of reign 貞祐 1213-1216. The first essay of the Mongols to introduce bank-notes dates from the time of Ogodai khan 1229-42, but Chinese history only mentions the fact without giving details. At that time silk in skeins was the only article of a determinate value in the trade and on the project of *Ye lü ch'u ts'ai*, minister of Ogodai the taxes were also collected in silk delivered by weight.† It can therefore be assumed that the name 絲鈔 *sze ch'ao* (*i.e.* bank-notes referring to the weight of silk),‡ dates back to the same time. At any rate at a later time, as, under the reign of Kubilai, the issuing of bank-notes was decreed, silk was taken as the standard to express the value of silver and 1,000 *liang* silk was estimated=50 *liang* (or 1 *ting*) silver.§ Thus, in

* See Wylie's *Notes on Chinese Literature*, p. 64.

† Transactions of that kind were in use until a short time ago in Kiakhta on the Russian-Chinese frontier, where in the retail trade between Russians, Chinese and Mongols, silk skeins took the place of money.

‡ I think that *sze-ch'ao* cannot mean bank-notes made of silk-paper as has been suggested by some sinologues.

§ The *ting* of the Mongol time as well as during the reign of the Kin, was a unit of weight equivalent to 50 *liang*, but not to 10 *liang* as has been suggested by some interpreters of M. Polo. (Comp. *Ch'ue keng lu*, and

consequence of those measures, it became gradually a rule to transfer the taxes and rents originally paid in silk, into silver.

The wealth of the Mongol khans in precious metals was renowned. The accounts regarding their revenues, however, which we meet occasionally in Chinese history, do not surprise by their vastness. In the year 1298 for instance the amount of the revenue is stated in the *Siu t'ung kien* to have been :—

19,000 *liang* of gold=(190,000 *liang* of silver according to the exchange of that time at the rate of 1 to 10).

60,000 „ „ silver.

3,600,000 *ting* of silver in bank-notes (*i.e.* 180 millions liang).

altogether 180,250,000 liang of silver.

The number seems indeed very high for that time. But if the exceedingly low exchange of the bank-notes be taken into consideration the sum will be reduced to a modest amount.

Ch. XXXIII.—*Astronomers* and *Astrologers*.

"[There are in the city of Cambaluc, what with Christians, Saracens, and Cathayans, some 5,000 astrologers and soothsayers, whom the Great Kaan provides with annual maintenance and clothing, just as he provides the poor of whom we have spoken, and they are in the constant exercise of their art in this city. They have a kind of Astrolabe on which are inscribed the planetary signs, the hours and critical points of the whole year. And every year these Christian, Saracen, and Cathayan astrologers, each sect apart, investigate by means of this astrolabe the course and character of the whole year, according to the indications of each of its Moons, in order to discover by the natural course and disposition of the planets, and the other circumstances of the heavens, what shall be the nature of the weather, and what peculiarities shall be produced by each Moon of the year; as for example, under which Moon there shall be thunderstorms and tempests, under which there shall be disease, murrain, wars, disorders, and treasons, and so on according to the indications of each; but always adding that it lies with God to do less or more according to his pleasure. And they write down the results of their examination in certain little pamphlets for the year, which are called *Tacuin*, and these are sold for a groat to all who desire to know what is coming. Those of the astrologers, of course, whose predictions are found to be most exact, are held to be the greatest adepts in their art, and get the greater fame.]" (Pp. 399, 400.)

Kubilai khan established in Peking two astronomical boards

Yuen shi, chap. xcv 歲賜). The 元寶 *Yuen pao*, which as everybody in China knows, is equivalent to 50 *liang* (taels) of silver, is the same as the ancient *ting*, and the character *yuen* indicates, that it dates from the *Yuen* dynasty.

and two observatories. One of them was a Chinese observatory *(sze t'ien t'ai)*, the other a Mohammedan observatory *(hui hui sze t'ien t'ai)* each with its particular astronomical and chronological systems, its particular astrology and instruments. The first astronomical and calendar system was compiled for the Mongols by Ye-liu Ch'u-ts'ai, who was in Chingis khan's service, not only as a high counsellor, but also as an astronomer and astrologer. After having been convinced of the obsoleteness and incorrectness of the astronomical calculations in the *Ta ming li* (the name of the calendar system of the Kin dynasty), he thought out at the time he was at Samarcand a new system, valid not only for China, but also for the countries conquered by the Mongols in western Asia; and named it in memory of Chingis khan's expedition 西征庚午元歷 *Si ching keng wu yüan li, i.e.* "Astronomical calendar beginning with the year *keng-wu*, compiled during the war in the west." Keng-wu was the year 1210 of our era. Ye-liu Ch'u-ts'ai chose this year, and the moment of the winter solstice, for the beginning of his period; because according to his calculations, it coincided with the beginning of a new astronomical or planetary period. He took also into consideration, that since the year 1211 Chingis khan's glory had spread over the whole world.* Ye-liu Ch'u-ts'ai's calendar was not adopted in China, but the system of it is explained in the *Yuen shi*, in the section on Astronomy and the Calendar.†

In the year 1267 the Mohammedans presented to Kubilai their astronomical calendar, *wan nien li, i.e.* the calendar of ten thousand years. By taking this denomination in its literal sense, we may conclude, that the Mahommedans brought to China the ancient Persian system, founded on the period of 10,000 years. The compilers of the *Yuen shi* seem not to have had access to documents relating to this system, for they give no details about it.

Finally by order of Kubilai the astronomers *Hiu Heng* and *Ko Show-king* composed a new calculation under the name of *Shou-shi li*, which came into use from the year 1280. It is thoroughly explained in the *Yuen shi*. Notwithstanding the fame this system generally enjoyed, its blemishes came soon to light. In the 6th

* See Ye-liu Ch'u-ts'ai's address to Chingis khan in the 元文抄 *Yüan wen ch'ao.*

† In the *Ch'ue keng lu* it is stated, that Ye-liu Ch'u-ts'ai was an adherent of the astronomy of the Mohammedans, because he found that there the theory of the five planets was more precisely explained than in Chinese astronomy (probably the hypothesis of the epicycles is meant). Inspired by these theories he compiled the astronomical calculation 麻答把歷 *Ma-ta-pa* (evidently a Mohammedan term). I leave to specialists to decide what connection could be supposed between the system of Ch'u-ts'ai and the Ma-ta-pa.

month of 1302 an eclipse of the sun happened, and the calculation of the astronomer proved to be erroneous (it seems the calculation had anticipated the real time).*

The astronomers of the Ming dynasty explained the errors in the *Shou-shi li* by the circumstance, that in that calculation the period for one degree of precession of the equinox was taken too long (81 years).† But they were themselves hardly able to overcome these difficulties.

Ch. XXXIV.

"As we have said before, these people are Idolaters, and as regards their gods, each has a tablet fixed high up on the wall of his chamber, on which is inscribed a name which represents the Most High and Heavenly God; and before this they pay daily worship, offering incense from a thurible, raising their hands aloft, and gnashing their teeth three times, praying Him to grant them health of mind and body; but of Him they ask nought else. And below on the ground there is a figure which they call *Natigai*, which is the god of things terrestrial. To him they give a wife and children, and they worship him in the same manner, with incense, and gnashing of teeth, and lifting up of hands; and of him they ask seasonable weather, and the fruits of the earth, children, and so forth." (P. 404.)

By the "Most High and Heavenly God" worshipped by the Chinese, as Marco Polo reports, evidently the Chinese 天 *T'ien*, "Heaven" is meant, *Lao t'ien ye* in the common language. Regarding "the God of things terrestrial" whose figure the Chinese, according to M. Polo, "placed below on the ground" there can also be no doubt that he understands the 土地 *T'u-ti*, the local "Lar" of the Chinese, to which they present indeed sacrifices on the floor, near the wall under the table.‡

M. Polo reports, that the Chinese worship their God offering incense, raising their hands aloft, and gnashing their teeth.§ Of course he means that they placed the hands together, or held kindled joss-stick bundles in their hands, according to the Chinese custom. The statement of M. Polo *sbattano i denti* is very remarkable. It seems to me, that very few of the Chinese are aware of the fact, that this custom still exists among the Taouists. In the rituals of

* The answer of the astronomer, called to account, is worthy of being mentioned. He pretended, that his calculation was correct, and that the fact of the non-accordance with the phenomenon was the business of Heaven, and not the fault of the astronomer. See: *Siu t'ung kien* year 1302.

† 荊川稗編 *King ch'uan pai pien* published in A.D. 1581 (see Wylie's *Notes on Chinese Literature*, p. 149). Section on Astronomy.

‡ This household god is represented as an old man, and they add also his wife under the name of *T'u-ti Nai nai*.

§ Ramusio's original text has *sbattano i denti*.

the Taouists the 扣齒 *k'ow-c'hi* (*ko'w*="to knock against," *ch'i*="teeth") is prescribed as a comminatory and propitiatory act. It is effected by the four upper and lower fore-teeth. The Taouists are obliged before the service begins to perform a certain number of *k'ow-ch'i*, turning their heads alternately to the left and to the right, in order to drive away mundane thoughts and aggressions of bad spirits. The *k'ow-c'hi* repeated three times is called 鳴法鼓 *ming fa ku* in Chinese, *i.e.* "to beat the spiritual drum." The ritual says, that it is heard by the most high Ruler, who is moved by it to grace.*

M. Polo observed this custom among the lay heathen. Indeed it appears from a small treatise, written in China more than a hundred years before M. Polo,† that at the time the Chinese author wrote, all devout men, entering a temple, used to perform the *k'ow-ch'i*, and considered it an expression of veneration and devotion to the idols. Thus this custom had been preserved to the time of M. Polo, who did not fail to mention this strange peculiarity in the exterior observances of the Chinese. As regards the present time it seems to me, that this custom is not known among the people, and even with respect to the Taouists it is only performed on certain occasions, and not in all Taouist temples.

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* See the 太清玉冊 *T'ai ts'ing yü ts'e* published in 1444. Explanation of the principal rituals of the Taouists.

† 道山清話 *Tao shan ts'ing hwa*, published in A. D. 1106. It is generally included in the Chinese collections of reprints, f. i. in the 百川學海.

ARTICLE II.

NOTES MADE ON A TOUR THROUGH SHAN-HSI AND SHEN-HSI.*

By Rev. C. HOLCOMBE.

THE "Imperial Highway" from Peking to the western and southern provinces of China, passes, as is well known, along the great "Plain of Chih-li" in a general south-westerly direction, at an average distance of about fifteen English miles from the "Western Hills," until Ching-ting fu (正定府) is reached, at a distance of two hundred miles from the Imperial capital. At this point, the "Great Road" sends off a branch due south, passing through K'ai-feng fu (開封府), the provincial capital of Ho-nan (河南), and thence on to the central and south-eastern provinces. The main road, however, turns due west at Ching-ting fu, and enters Shan-hsi through what is known among Chinese travellers as the "Ku-kuan" (固關). It is the purpose of the writer to follow this great highway into Shan-hsi (山西), and then, still following it, or diverging from it at his pleasure, to attempt some descriptions of the geography and natural scenery of that province and of the south-eastern portion of the province of Shen-hsi (陝西), adjacent to, and bounding the first named province upon the west.

The city of Ching-ting fu is like an empted pea-pod, all shell. Possessing a fine wall, stretching around a very considerable area, the great proportion of the land so enclosed is still devoted to vegetable gardens, and wheat and millet fields; while the few business shops which the city contains, are gathered in a little knot about the intersection and crossing of the two great streets which connect the four gates of the city. The notable, perhaps one might say, the ominous sight to be seen, is found in the north-eastern corner of the city, and consists of a great Buddhist temple with its innumerable rows of outbuildings, all giving evidence of original costliness and former splendour, but now decayed and falling to ruin; while immediately beside it, rise the fair towers, and well proportioned walls of the Romish Cathedral, with its new and finely kept buildings and gardens. It hardly need be added, that although the great Buddha of the temple lifts its impassive bronze face up nearly a hundred feet into the air, the twin

* Read before the Society on June 7th, 1875.

towers of the Cathedral mount still higher, and overtop the idol. There again, Christianity looks down upon heathenism. Crossing a small moat of running water, outside the west gate of this city, and travelling ten *li* to the west, in which distance two heavy dykes are crossed, the Hu-t'o river (滹沱河) is reached. To defend the city against the ravages of this river is the evident purpose of the dykes. The stream has its origin upon the western slope of the mountains which separate the provinces of Chih-li and Shan-hsi. We shall meet it again in the course of our journey. It has all the expansive and destructive powers peculiar to the streams of North-China; is not navigable at Ching-ting fu or any point above; and aside from irrigation serves no useful purpose, except turning a few rudely constructed water-wheels.

Williamson states in his *Journeys in North-China*, that the name of this stream is properly *Poo-too Ho*—"Grape River" (葡萄河), but is sometimes written Hu-t'ou river incorrectly. The above-named author however, is himself in error, the name given above being invariably found in all Chinese authorities, as well as being the name by which the stream is known all along its course. At the time it was crossed by the writer—in October, 1874, it was very broad, but barely two feet at its greatest depth. The current was rapid and full of sand and earthy substances.

Sixty *li* west of Ching-ting fu, the traveller reaches Huai-lu hsien,—properly pronounced Huo-lu hsien (藿鹿縣), a miserable town lying among the foot hills, and at the mouth of the valley, up which the road into Shan-hsi lies. This valley, at first broad, and filled with the pebbly debris from a hundred mountain streams, which in summer, foam and roar down the precipitous hill sides, soon narrowed into a deep-cut gorge,—or rather, our road led into one of many gorges, which by their union form the valley. The mountain walls on either hand were of dark-blue limestone, —almost black,— and so far as could be seen, bore no traces of fossils. Limestone seemed to be the only material entering into the composition of these hills, at least in their eastern faces, and large quantities of it were being quarried, and burned for building purposes. The mountain faces were bald and barren; but the gorge, up which the path led, was quite thickly populated, and the beautiful brook of mountain water flowing down its center, was turned aside to purposes of utility as well as beauty, and irrigated many little patches of cultivated ground, none of them larger than the floor of a good-sized drawing room.

The ascent grew more steep as we proceeded, until at a distance of some eight miles from the plain, the gorge shallowed out, and the road, climbing three miles more up the bare precipitous face of the mountain, at last gained the crest of the first range, and passed

under the "Eastern Celestial Gate" (東天門). The view at this point was worthy the pencil of a painter. At the west, and almost beneath the traveller's feet, so precipitous were the slopes, lay a valley held in the lap of the hills, lifted here, and depressed there, but full of trees and villages; the hill-sides terraced to their summits, and yellow with the ungathered harvest, all lying in the shimmer of the hazy October sun which lit up one slope, and cast another into shadow; and, vibrating through the air, sounded the deep, sweet tone of a distant Temple bell, so deep, and so sweet, that it came, not as made by hands, but as the very throb and pulse of the atmosphere itself. This beautiful landscape seemed to be not without its elevating and refining influences upon the people whose happy lot it is to live in the midst of such beauty. For, as the writer stood drinking in the precious vision, there came near to him a ragged, dirty, *verminous* Chinese boy, busily engaged in his work as scavenger upon the public highway; and neatly tied to the handle of his basket, was a bunch of purple hare-bells, and other wild flowers!

A few *li* of slipping and stumbling down the western face of this first line of hills, brings the traveller to a level—only temporary—in the bed of the "Ching-hsing River" (井陘河). He sees a bright mountain stream of *clear* water, flashing and making music as it slips over its bed of pebbles and clean gravel. But by the road side, on the brink of the stream, stands a striking monument to the destructive force of the river when it rises in its strength. It—the monument—is the single remaining arch of a massive stone bridge, which once spanned the stream at this point, its central arch being not less than twenty-five feet above the ordinary water mark. The entire bridge has been carried away, this one arch, in the eastern approach to the bridge proper, alone remaining. When crossed by the writer, the stream was about twenty inches deep. It runs in a north-easterly direction, and is one of the main tributaries of the Hu-t'ou river. A large number of grist mills, run by water power, were found upon its banks. In each case, a few large stones were laid across the stream at a considerable distance above the mill, in order to divert a portion of the current to a sluice-way prepared to receive it. The sluice-way terminated in a small dam, so arranged as to give a fall of about three feet, and the water poured over this dam in two streams of unequal size, striking at a slight angle the floats of two upright wheels—like a turbine, minus the inclosing case. Of course there is a very large loss of power. Upon the upper end of the vertical shaft of the larger wheel is fastened the *nether* millstone, which revolves with the wheel. The upper stone rests upon it and is chained, or roped to the building, to prevent its revolving from

motion communicated to it by the lower stone. The grain is fed from a hopper, through a circular opening, in the center of the upper stone. The smaller wheel drives the bolting apparatus. As a rule, the flume of these mills was not provided with any gate. When it was desired to stop the machinery, it was done by applying a brake to the nether millstone, and chaining it so as to prevent not only its revolutions, but those of the wheel as well. These mills were very common throughout the mountain regions of central and southern Shan-hsi.

The highway follows the course of this stream for a number of miles, going continually up its bed. It finally leaves it, a mile or more, south of Ching-hsing hsien (井陘縣), a decayed and dying city lying upon the bank of the stream. Here again appeared another bridge, built of huge blocks of limestone, wrenched in two, in the middle, and one half destroyed and swept away by the flood. As has been already indicated, both slopes of this valley were susceptible of cultivation. The rock which had on the eastern slope, been all limestone, now alternated between limestone, and clay shale. Signs of coal were abundant, and in several places the mineral itself cropped out, in the cutting of the road along a bluff, or through a bank. At the point, a mile beyond Ching-hsing hsien, where the road finally leaves the river and commences to climb the second range of hills, were some rude furnaces for smelting iron, the ore being brought from a mine some five miles distant. Traces of iron were abundant, in the rock of the immediate vicinity.

The ascent of the second range was, perhaps, a trifle less precipitous than the first. The road was through a constant succession of villages, each having its own finely-cut gateways, or arches, of stone, at either extremity of the town. The houses were of a good class, for the most part being built of square blocks of limestone, well laid in good lime, and carefully pointed. A large proportion of them had flat and battlemented roofs, and in several instances, a short flight of steps at one corner of the roof was noticed, coming down from the roof to a point reachable by a ladder of moderate length and there ending, flush with the main wall of the building. As the road wound up nearer to the crest of the second line of hills, the foundation became again composed, almost exclusively of limestone, and coal measures and clay shale seemed to disappear in company. Five *li* below the crown of the ascent stands a stone *Pai-lou* on the sides of which are cut, respectively, "Western limit of Chih-li" and "Eastern limit of Shan-hsi." And upon the crown of the ascent, stands the archway called the "Northern Celestial Gate." Opportunity is here given, to such as desire, to return thanks—in *cash*—in one, or several temples to Buddha, for the safe ascent of the mountain. Five *li* down the western face,

brings the traveller to the Great Wall, which, as is well known, stretches an arm down this line of mountains between the two provinces. It is really little more than a line of towers, substantially built, surmounting the tops of the hills. Here is the Customs' barrier called *Ku Kwan* (固關).

The ascent of the third range, which commences only some two or three miles beyond the Customs' barrier is precipitous, and wild in the extreme. The path winds, twists, and turns up the rocky bed of a gorge, cut down deep in the heart of barren desolate mountains. The path is very tortuous, and the traveller frequently finds himself facing a solid wall of rock, hundreds of feet in height, and just as he is debating whether he must indeed, turn back or *fly out*, a crevice opens at one side, and he slips through that, only to be again confronted with overhanging cliffs, and to turn again. At numerous places the warning is cut into the rock by the path—"Beware of mountain floods, don't shelter from rain here." And the warning would seem to be timely. This ascent, gloomy and wild, ends at last at the "Western Celestial Gate," passing which the descent begins down the open face of the mountain. On every side were terraced hill slopes, and villages with their inevitable attending groves of trees. Every inch of ground seemed to be brought under cultivation. The mountain sides were cut into huge flights of stairs, and wheat fields, not large enough to turn a donkey of any enterprise around in, were terraced and notched into every ravine. At one point, fifty-seven distinct and separate terraces were counted, rising from the ravine at the bottom of a long hill side, to the little circle, twice as large as a dining table, which crowned its summit.

A large, beautiful, and fertile valley, ends the western slope of this third range; and at the south-western point of this valley is situated the interesting, and prospectively important city of Ping-ting cho (平定州). It lies in the center of a region of country, inexhaustible in its mineral resources. Coal and iron might almost be said to make up the hills on every side. It costs nothing to mine the ore, because it lies exposed on the surface of the hill slopes, and only the merest trifle to smelt it, because the coal is even more easily accessible than the iron. Under any proper system of development, this city would at no distant day become the Pittsburg, or Birmingham of China. At present, beautiful for situation, and full of undeveloped wealth, it is principally remarkable for the great number of *pai-lous* which adorn and obstruct its main street, and for the kindly disposition, and courteous demeanor of all its people, even down to "the small boys."

The road bends sharply to the south as it leaves Ping-ting cho,

and after a sharp climb of two miles reaches the summit of the last range of hills, crowned with the last, and "Southern Celestial Gate." Here a picture finer even than any which had preceeded it awaits the traveller, doubly beautiful, if he sees it, as the writer did, at sunrise. An oval basin, among the mountains, hollowed out at its bottom and in the direction of its longer diameter; a line of trees, showing where a stream ran; capping the trees, and twisting and writhing beneath the warm rays of the sun, just getting over the hill-tops, lay a long and slender fog line, growing smaller each moment as masses broke off, and wreathed, and rose, and vanished; the lower slopes of the hills terraced, under cultivation, and blocked off into unequal squares of green, from the newly sown wheat, or of yellow, from the ungathered millet; higher up, the bare mountain faces banded with broad stripes of chocolate, and purple, and blue, and grey, and black, from the various mineral substances of which they were composed; and capping all, the many pointed crown of the circling hills. Such was the picture lying there, food for the eyes of the weary traveller as he rests a moment from his steep climb, and gathers breath for his no less precipitous descent. The road winds down into this valley, and follows up the stream for many miles, until it comes to its source among the hills at the south-west. Here the character of the scenery changes as if by magic. Gravel, sand, rocks, and bare mountains, which had formed the characteristic features of the way, suddenly disappear, and in their stead is a table-land, or more correctly a water-shed of yellow slippery clay. Great yawning gullies gape on every side, and deep cuts through the clayey soil continually hide the traveller as he follows his path in its tortuous course along this water-shed. There is still some climbing to be done, until as Shih-lieh is reached, the traveller seems to have gained at last the very ridge-pole of the world, and to stand at an altitude where he can literally "look down" upon all the kingdoms and cities of the globe. Indeed this whole pass, although containing some *descents* is still literally climbing one enormous flight of stairs, stretching over a hundred and fifty miles in length, from Ching-ting fu in Chih-li to Shih-lieh in Shan-hsi. The soil however does not vary, after the sudden change noticed above, but continues the same throughout the greater portion of the province last named.

T'ai-yuen fu, the provincial capital, lies in the extreme northern point of a district which may be called the "Central plain of Shan-hsi." Immediately outside the north gate of the city, a rather low range of hills stretches across, in nearly a western course, and separates this plateau from one still more elevated at the north. The great road which we have followed through the mountain

pass from the plain of Chih-li debouches upon this central plain about ten miles to the south-east of the provincial capital.

This plain is the garden of Shan-hsi, and so far as the writer's observation extends, of all north China. Its general direction is to the south-west, and it has a length of about ninety-five English miles, by an average breadth of, say eighteen. Along its western border, flows the Fan river (汾 河), of no value here except for general purposes of irrigation. Frequent smaller streams come down from the mountains which surround this basin, and these are all utilized, in a manner which puts into most favorable light the far-sightedness of the people, for watering the numerous and carefully cultivated fields. Channels are carefully constructed for these streams, and as carefully kept in order, and suitable gates, frequently of stone, are prepared here and there, by which the water can be let on to any man's land at will. By this care, these streams are carried many miles, and made to increase the fertility and productiveness of large areas of country. The soil is in a high state of cultivation, and supports a very dense population. The hills on every side are rich in coal and iron, the former mainly bituminous and of the best quality; the latter famous all over the empire for its toughness and strength. In the mountains directly west of T'ai-yuen fu, are large deposits of sulphur, which are the personal property of the emperor, and from which large supplies are drawn for preparing munitions of war. Large quantities of cotton, wheat, and millet are grown, besides tobacco and some *opium*. West of the Fan river, is a large area, close under the hills, almost exclusively given up to the cultivation of the grape. The grapes are unusually large, and of delicious flavor. They were sold to the writer, at about two cents a catty, which, as was subsequently learned, was about double the proper price. North of the grape region, and also west of the Fan river, is a large cluster of villages given exclusively to the manufacture of paper, while still north of them is another the sole business of which is mat weaving. The style of architecture was very noticeable, indicating not only thrift, and a population on the whole well-to-do, but also possessing not a little taste and sense of the beautiful. A large proportion of the houses were built of good kiln-dried brick, comparatively few mud houses were seen, and it was quite common to see these brick residences, built with towers, and a battlemented wall surrounding a courtyard, reminding one strongly of the castles and noble residences of Great Britain and the continent of Europe. These premises would hardly bear very close or searching inspection, but their outlines were in many instances decidedly beautiful, and spoke well for the character of their occupants. In short, everything in this plain,—or perhaps more properly, basin,—

betokened an amount of thrift, intelligence, and taste, far above that found among the inhabitants of Chih-li, or other portions of North-China visited by the writer. There are three large centers of trade in this basin,—namely Ta'i-yuen fu, the capital, Fan-chow fu on the western edge of the plain and about midway between its northern and southern extremeties, and "Ping-yao hsien" (平遙縣), on the great road and nearer the eastern border.

The great highway, having kept along the eastern edge of the basin through its entire length, and consequently at a very considerable distance from the Fan river, comes into the narrow valley of this river at the lower extremity of the Central plain, and follows along its gorge for about twenty-five miles, to a point ten *li* south of Ling-shih hsien (靈石縣). Here the stream makes a long curve to the west, while the great road climbs the mountains, crossing at the Han-hou pass (韓侯嶺). The bluffs, of clay shale, on either bank of the river for the entire twenty-five miles mentioned above, are literally full of coal, both anthracite and bituminous being found of the best quality and in greatest abundance. As an illustration of the exceeding cheapness with which many kinds of manufacturing industries are carried on, take the following. At one point, a pottery was visited, which made large quantities of the common ware in use among the Chinese, but of a quality rather above the average. The clay, of fine quality, was found in the bluff, and cost merely the labour of digging,—that is about ten cents a day, and coal for burning the crockery was to be had, in inexhaustible quantities and of most excellent quality, for three cents per hundred catties, or about forty-five Mexican dollar cents per ton! In different points in the province, all the necessary materials for manufacturing common window and bottle glass, were found in equal quantities and equally cheap.

The Han-hou mountains lie in a cluster rather than in an extended line, and fill up the entire space between the two main lines of hills on the eastern and western borders of Shan-hsi, except a very narrow and circuitous gorge, through which the Fan river finds its way. They thus separate the central plain of Shan-hsi, from the smaller and lower Ping-yang fu (平陽府) basin, which I will soon describe. The foundation of these mountains seems to be a clay rock, friable and quickly decomposing on exposure to the atmosphere. The cuttings for the roadway through the clay soil are very deep, and the pitch of the road exceedingly great, more than at any point in the pass between Chih-li and Shan-hsi. But the roadway being for the most part smooth and devoid of stones, affords better foot-hold for animals, and is more easily travelled than the other, except during rainy

weather. Then it would probably be so slippery as to be exceedingly difficult, if not absolutely impassible.

Throughout these hills there is the same beautiful banding of colors spoken of above, and mines of coal are frequent, while unmined seams and measures of coal, are to be found everywhere. Sheep raising is a common occupation, while the less precipitous hill slopes are carefully terraced and sown with wheat and millet, or planted with cotton or potatoes. The style of architecture is quite peculiar. On the slopes of the mountains, whole villages are to be seen, in which the houses are built tier above tier, the flat roof of the lower tier forming the front yard to the tier next above, while the roofs of that tier serve the same purpose for their more exalted neighbours. The house itself is simply an arch laid in brick, about fifteen feet in length, with a diameter of ten feet, and height, to crown, of about eight feet. The rear end of this arch being generally in the hill, has a wall of solid mountain enclosing it, while the front end, is bricked up and fitted with door and windows. This style of architecture proves to be so satisfactory that it was found to be quite commonly adopted, even out on the level plain. Huo-cho (霍州), a miserable opium-stricken city, lies in a valley in the midst of this mountain pass, where the road for a short distance dips down again to the banks of the Fan river. Here large numbers of grist mills are found, driven by water power, and all grinding wheat. The flour is carried up the valley and over the pass into the central plain in great quantities, where it finds ready market; mules and donkeys, mainly the latter, are the means of transportation. The wheat is grown in the deep gorges along the river-side, and is said to be of a superior quality.

The Han-hou pass is about sixty miles in length, extending from near Chieh-hsin hsien (介休縣) to Chao-chêng hsien (趙城縣). Near the latter city the descent is made to the Ping-yang fu basin, a section of country about forty miles in length by eight or ten in width, and lying along the same stream the course of which we have followed so long. The principal centers of trade here, are the cities of Chao-chêng hsien and Hung-lung-hsien (洪洞縣), the more pretentious city of Ping-yang fu being in a state of chronic decay and desolation, owing evidently to an excess of alcohol and opium. Great care is given to proper irrigation upon this plain; in one instance at least, a very considerable stream of water being carried by an aqueduct over another stream, in its course to the fields needing its moisture. The growth of grain is less upon this plain than upon its northern neighbour, while the areas devoted to cotton and opium have increased considerably. This basin is decidedly inferior to the one heretofore described, whether

regard be had to beauty of prospect, quality of soil, variety of products, or the thrift and general intelligence of the people, or lastly to the density of population. Yet it is superior in the writer's opinion to the plain of Chih-li, in perhaps all these respects, save the one of density of population. Coal and iron abound in the hills.

Twelve miles below Ping-yang fu the road bids a final farewell to the Fan river, which at this point turns more to the westward, which course it keeps until it is swallowed up in the Huang-ho (黃河), while the highway enters another low pass, precisely similar in general character and appearance to the last described, though shorter and less difficult. This low range of hills serves to separate the Ping-yang fu basin from the southern plain of Shan-hsi. This plain extends from the city of Wên-hsi hsien (聞喜縣), which lies nearly in its north-eastern apex, to the Yellow river, a distance of a hundred and fifteen miles. For about half this distance the plain has mountains on three sides, but finally those on the west, end abruptly in one bold peak, and the plain in that direction is limited by the Yellow river. The character of the soil is essentially the same as that of the Ping-yang fu basin. The areas devoted to the cultivation of cotton and opium have increased, while there has been a corresponding decrease in the acreage of the cereals, and a resultant decrease in the prosperity and intelligence of the people. Large orchards of persimmon trees, grafted, are found, and not infrequently the traveller meets with apparatus by which persimmon whiskey is distilled. The process is simple. The fruit is partially dried in the sun, then mashed to a pulp, and the liquor produced from the fermentation of this pulp is subjected to a process of distillation. The product tastes not unlike a poor quality of Scotch whiskey.

On the eastern edge of this plain, close under the bordering hills, lies an extensive salt marsh. It is the exclusive property of the emperor; is placed under the superintendence of a Tau-t'ai; and is farmed out to companies who manufacture the salt. The process is the ordinary one of solar evaporation, and of purification by water, leached through clay, and needs no description here. The product is carried into Ho-nan and Shen-hsi, besides supplying the central and southern portions of Shan-hsi. The most important trade-centers of this plain, are Lu-t'sun (鹵村) and Chieh-cho (解州), at the northern and southern extremities of this salt marsh. Wên-hsi hsien is also a place of very considerable trade.

P'u-cho fu (蒲州府) lies on a level with the Yellow river,

and on the edge of a large extent of worthless marsh land, full of pools of brackish, and in some places, positively salt water. A descent of several hundred feet must be made in getting from the plain of P'u-cho fu to the marsh in which the city itself stands. The city has the general appearance of having slipped from the plain on which it *ought* to have stood, down into this quagmire,—and to have slipped down from all prosperous growth, and general respectability at the same time. The business of the place is confined to a single dirty street in the eastern suburb. The great road does not pass into the town, having succeeded in maintaining its position on the high ground from which the town has *backslided*. In the pools of salt water upon the plain, or marsh, surrounding the city, a species of shrimp was found in great numbers, differing somewhat, yet bearing a strong family resemblance to the one ordinarily seen. The great road keeping to the bluff, runs on, turning first south, and then a trifle to the east of south, until the road, the bluff, and Shan-hsi, all end together, making a sudden plunge down a precipice and being lost in the dirty waters of the Yellow river.

At this point, the three provinces of Shan-hsi, Ho-nan, and Shen-hsi abut upon each other, the river forming the line of division between the first named and the others. The banks just at this point are very steep, and the river, narrowed in between these walls, runs with very great rapidity. It is barely half a mile in width. Williamson states that it was so deep that no bottom could be found by sounding as they crossed. But when it was crossed by the writer, it was nowhere more than six feet deep, and on returning, three of the boatmen sprang into the water in midstream and waded ashore, carrying a line from the ferry-boat to prevent us from rapidly drifting down with the current. The water was just up to their hips. The boat is carried nearly a mile down stream in crossing, and to get from bank to bank is good work for a half day; at least the writer found it so, both times, when he crossed. There seems to be a small amount of traffic on the river for boats drawing when loaded, not more than *twelve inches*,—and a small Chinese gunboat, of the same fashion as those common on the Pei-ho at Tientsin, was lying at the ferry. The fact seems to be, that this river in many places spreads out to an enormous width,—as it does at a point a few miles above this crossing, and becomes correspondingly shallow,—so shallow as to be impassible to boats of any draft. The large, thriving, business-like city, lying upon the western bank, opposite the ferry, is not, as the above quoted author calls it *Tung-kwan* (東關) "The *Eastern* Fortress," but *Tu'ng-kwan* (潼關).

The hills on the Shen-hsi bank are very steep and high. They are

the range in which the famous Hua-shan (華山), one of China's sacred mountains is found. They rise in very abrupt ascent from the bank of the Yellow river, and clinging to their sides, its walls dipping down into the ravines, and capping the highest summits, is the city and fortification of Tu'ng-kwan. The walls and gate-towers are high and in excellent repair, and in conjunction with the bare, brown, hill sides, and their clean-cut sky-line, form a picture peculiarly Chinese, and by no means devoid of beauty.

From Tu'ng-kwan to Hsi-an fu (西安府), the capital of the province, the road runs in a direction nearly due west, through a most lovely section of country, having the range of high hills just mentioned upon the south, and the Wei river (渭河), on the north.

The road lies through one long orchard, and the walled towns and cities lie thickly along, for the most part at a little distance from the highway.

The only uncomfortable part of the picture was the one or two large towns and cities which had been destroyed during the Mohammedan rebellion, and had not been rebuilt. Hua-cho (華州), the city where it first broke out, was in a state of the most utter desolation. Near that city was a genuine bit of wild, New England scenery, with its moss-covered granite rocks and boulders, its many springs of beautiful water, and its thickets of evergreen trees and shrubs. It seemed lost, and out of place, in the midst of scenery which was so unlike it.

At Lin-tu'ng-hsien (臨潼縣) is a very large fountain of hot water, bursting from the rocks at the base of the hills, just outside the south gate of the city. Numerous baths have been constructed at the fountain by the Chinese, and the warm water having assisted to cleanse the soiled sons of Han, makes its way down the slope and into the Wei river, by two streams, its course traceable from a distance by the threads of vapor hanging in the air above it.

From this point the great road descends very gradually for about five miles, and thus reaches and crosses the marshy bed of a small affluent of the Wei. The traveller crosses this stream upon a fine bridge of wood, resting upon stone piers, and then sees in front, the perpendicular face of a bluff, several hundred feet in height, its face honey-combed with the residences of troglodytic Chinese, whole villages of whom are found snugly ensconced on eligible building sites, having an eastern exposure and protected against the cold winds from the north and west. These villages are composed of those who cultivate the bottom-land near by, and which cannot be built upon as it is flooded several times each year.

Ascending this bluff by a path cut through its face, the traveller comes out upon another plain, and sees at a distance of three miles, the high towers and finely built walls of Si-ngan fu (西安府), the provincial capital, and the ancient capital of the empire. Standing out upon the plain in bold relief, unobscured by trees or other obstructions, it presents a finer appearance than Peking, or any Chinese city yet visited by the writer. The east and west gate-towers are especially fine, being unsurpassed, even by the lofty ones found in the present capital. The walls are high, broad, and kept in excellent repair, and within them is a dense and busy crowd of people. Careful examination of all sections of the city, failed to develop any considerable areas of vacant space. The entire city appeared to be closely built over, and to be crowded with inhabitants. The population is somewhat heterogeneous, being composed of natives of Shen-hsi, Shan-hsi, Ho-nan, Kan-suh, Sze-chuen, not to mention a Manchu garrison of some five thousand families, and a note-worthy sprinkling of Mongols. Thibetans were also seen about the streets. The city is third in population in North-China, Peking and Tientsin only out-numbering it. The old wall enclosing the imperial residence, and some of the palace buildings are still standing. The market is excellent, vegetables of all sorts, with a great variety of fine fruits and nuts, appearing upon the streets every day. The quantity and variety of foreign goods exposed for sale in the fine large shops is something surprising and remarkable. The greater portion of these are obtained from Hankow (漢口), though some come overland from Russia. So far as could be learned, there is no foreign trade between this city and Tientsin. Indeed, the shortest route to Tientsin in point of time,—is *viâ* Hankow and Shanghai. The number of shops given up to the trade in opium is alarming, and the percentage of opium-smokers in the population seems to be much greater than in Chih-li.

Having thus traversed Shan-hsi from its capital—T'ai-yuen fu—to its southern extremity, allow the traveller to retrace his steps, and from that city as a starting point, to explore in a hasty way, the northern sections of the province.

Immediately outside the north gate of T'ai-yuen, rises a low range of hills, a spur thrown out from the longer range at the east, and which the tourist crossed in the early part of this paper. This range forms the northern limit to the plain on which the city stands. The Fan river at this point makes a sharp turn to the west, and comes down a gorge at a point where the hill-line is quite low, close under the main line of western hills.

The great road north from T'ai-yuen fu,—through Yên-mun kuan (雁門關), and thence to Ta-t'ung fu (大同府), where it forks,

one branch continuing north-west to Kuei-hua ch'êng (歸化城), and one north-east to Chang-chia k'ou (張家口), *Kulgan*—cuts this line of hills immediately after leaving the gates of the provincial center. The ascent from the south, through the deep cutting, worn by the travel of centuries, in the loess of which the hills are composed, may be two or three hundred feet in excess of the descent upon the north side, which is slight. The road is nearly straight, and good, but not equal to the demands of travel which are very great indeed. These hills, being low and entirely devoid of rocks, are, for the most part, under cultivation. This line of hills forms a water-shed between the head-waters of certain tributaries to the Huang-ho (黃河) and the Pei-ho (北河), all streams south of this range finding their way into the former, and all above it into the latter. Having passed this water-shed, the traveller finds himself upon a plateau of slightly rolling ground, the longest diameter of which runs nearly due east and west. It is walled in, by what may fairly be called mountains, upon the east and north, and by hills of moderate elevation, upon the west. The products of the soil indicate a higher altitude than the plains further south. Oats, Irish potatoes, and millet are the staples. Wheat is grown in but small quantities. Coal, or coke prepared from the coal, is the only fuel used, and it is abundant, and in consequence very cheap. Hsin-cho (新州), and Tai-cho (代州), are the principal cities, while there are a large number of thriving market towns scattered about. The population, although less in proportion to area than in the center of the province, is still quite dense, and gives evidence of a fair degree of thrift and intelligence. A very fair quality of slate is found in inexhaustible quantities, in the mountains at the east of this plateau, near the Hu-tou river, which here enters the mountains and makes its way to the plain of Chih-li, near Ching-ting fu where we have seen it. And, rising somewhat above their fellows, in the north-eastern corner of this plateau, are the mountains famous and sacred in Buddhistic annals as Wu-t'ai shan (五臺山). They seem to form the culminating peaks of all these lines of hills and mountains, and while their summits are not clothed in everlasting snows, they are condemned to stand in everlasting sterility. Down their slopes, and in their narrow ravines, are found the only two crops which grow in their inhospitable neighbourhood, oats, and Buddhist priests. The first are of good quality, but the yield is small. Of the second the yield is ample, but the quality bad. These mountains are accessible from three points. A mule-path will take the traveller to their fastnesses in four or five days, from Pao-ting fu, from which city they lie due west. Or from T'ai-yuan fu, he may go north

and east, upon the plain which we have just crossed, to Wu-t'ai hsien (五臺縣), from which point a bridle-path, through country rough and wild in the extreme, will take him by a journey of forty miles to the sacred mountains. The third and most commonly travelled route, brings in the pilgrims from Mongolia. It is impassable for carts, for a distance of about fifty miles from the town, which is the center of the mountains. No one of these peaks is higher in any considerable degree than the others, and the view from the summit of any one is not extensive, being limited to the rough sea of hills, mountain-peaks, ravines, winding gorges, and precipices, which fill the horizon in all directions There are immense beds of a very superior quality of bituminous coal in these mountains, and the coal is sold for about half a dollar a ton. Insufficient transportation would, however, make it more expensive, delivered in Peking than the best English coal.

The "Mongol Pilgrim Road" out of Wu-t'ai shan, takes a course due west, and having surmounted one of the steepest of the many hills, meets with one of the main tributaries of the Hu-t'ou river at its source, in a beautiful spring, far up the western side of this hill. The path follows the tiny thread of water down the mountain side, and into the cheerless winding gorge which yawns to receive it at the bottom. It follows this stream when it has become a brawling noisy brook, still in this deep mountain walled gorge, and when it has grown into a deeper and more quiet stream, still the pathway keeps by its side, in many turns and twists, but with a general westerly course, until having reached the plain, the stream turns to the north, while the path, now grown to a cart-road still keeps due west to Tai-cho. Here it turns north, and enters the great road to Ta-t'ung fu, at Nan-k'ou (南口), the southern mouth of the Yên-mên kuan (雁門關).

This pass, only about fifteen miles long, is in the range of mountains forming the northern boundary of the plain just left. The descent upon the northern slope, is again, much less than the ascent from the southern side. The roadway is for the most part good, speaking from a Chinese point of view, but very slippery and dangerous to animals in winter, from the ice which covers it in great sheets. On its northern declivity the inner line of the great wall is passed, a continuation of the wall seen at Nan-k'ou—thirty miles north of Peking.

Of the plain of Ta-t'ung fu, the northern plateau of Shan-hsi, little need be said. It extends, with but slight variations in its surface, away to the steppes of Mongolia, and is for the most part a miserable, dreary waste, with a poor thin soil of drifting sand, and a sparse, and half-starved population. Its hills, bordering upon the east and west, are rich in coal and iron. Ta-t'ung fu

(大同府), the one city of importance upon it, has considerable trade in these two commodities, but seems to be in a chronic condition of demoralization and decay. A large proportion of the area inclosed within the city walls is vacant, only occupied with the debris of fallen buildings, and, so far as could be discovered, not a single public building was in a creditible state of repair.

It should be said, in conclusion, that the observations recorded here, were made during a missionary tour of about three months' duration. This may serve to account for the somewhat superficial character of the observations, as the traveller's time was mainly given to other things than to the study of the geography, or the resources of the country.

As illustrating the peaceful nature, and kind disposition, of the people, it should also be remarked that throughout the entire journey no trouble of any sort was experienced from them, and as a rule, to which there were at most but few exceptions, cordial greetings and a pleasant reception were everywhere met with. Landlords were for the most part courteous in their treatment, and moderate in their charges; officials showed no disposition to place obstacles of any sort in the traveller's way; and the people, few of whom had met with foreigners before, were curious, but as a rule, not rude.

The journey was throughout pleasant, instructive, and satisfactory beyond expectation.

ARTICLE III.

SHORT NOTES ON THE IDENTIFICATION OF THE YUÈ-TI AND KIANG TRIBES OF ANCIENT CHINESE HISTORY.*

By T. W. KINGSMILL.

WHEN engaged last year in preparing some notes on the probably recent elevation of Central Asia, I had occasion to insert some remarks with regard to the tribes handed down in Chinese history as the 月 氐 (in modern Chinese Yuèti). None of the identifications usually accepted for those tribes seemed to tally with the circumstances of the case, and finding myself without external evidence, I suggested from philological motives alone that the word Vidal would be found an approximation to the actual name of the tribes.

I was unaware at the time that M. Vivien de St. Martin had, in a review of the destruction of the Greco-Bactrian Kingdom, from historic grounds identified the so-called Yuèti with the White Huns, the Haiáthalah, the Ephthalites of the Greek writers, who about the year 134 B. C. overran that country, and finally destroyed the Grecian dynasty which from the time of Alexander's death had been paramount.

Vidhal rather than Vidal should have been the rendering of the old Chinese name, and as this may be considered as identical with the Greek name for the tribe,—the Ephthalites, as well as its Arabic form Haiáthalah, it may be interesting to review the grounds on which this reconstruction of the ancient sounds of the characters was founded.

The characters made use of to express the name of the tribes, have in their present form no meaning; they were at first only used as phonetic elements. To arrive at their archaic sounds it will be necessary, however, to analyse their separate meanings; and endeavour if possible to find their analogues in some language making use of an alphabet. Such we find in Sanscrit,—a language having many relations with primitive Chinese.

Taking then the Chinese characters separately, we find the first 月 Yuè, *the moon*, in Cantonese, the nearest existing dialect to

* Read before the Society on June 7th, 1875.

that spoken at the beginning of Chinese history, Út or Yüet; the second 底 ti, in Cantonese tai, meaning *fundamental, radical, reaching to the ground.* Comparing these words with Sanscrit we find the first represented by a word vidhu, with the same meaning. Bopp gives no derivation, nor does he mention any analogues amongst Aryan languages. It may therefore be fairly accepted as a non-Aryan term for the moon which found acceptance in Sanscrit. The form tai for the second syllable seems to point to a lost liquid termination, l or r, more probably the former. Tai will thus agree in its original sound with the Sanscrit tal, *condere.* This root is one of extensive distribution; in Sanscrit it gives tala, *solum, fundus;* in Latin tellus; in Chinese 地 ti, *the earth,* 底 ti, *fundamental,* &c.

From analogy therefore the combination of the two characters would have been pronounced Vidh-tal, Vidal or Vidhal; thus corresponding with the actual name of the tribes as handed down from other sounds.

Similar reasons would lead me to identify the Kiang tribes of the Chinese with the Kurus of the Indian legends. The change of r into Chinese ng is of the commonest; Çûra, *hero,* reads Kung in Chinese; kara, *tribute,* Kung; mri, *mori,* 亡 mong or wang, &c.

The dawn of Hindoo story finds the Kurus in Central Asia, whence they succeeded in effecting a lodgment in North-western India. The dawn of Chinese legends brings them in contact with the ancestors of the Chinese along their western frontier.

They are more or less allied to the Yuèti, but there is some difficulty in agreeing with the Chinese as to their descent from the Sanmiaou of the Shooking.

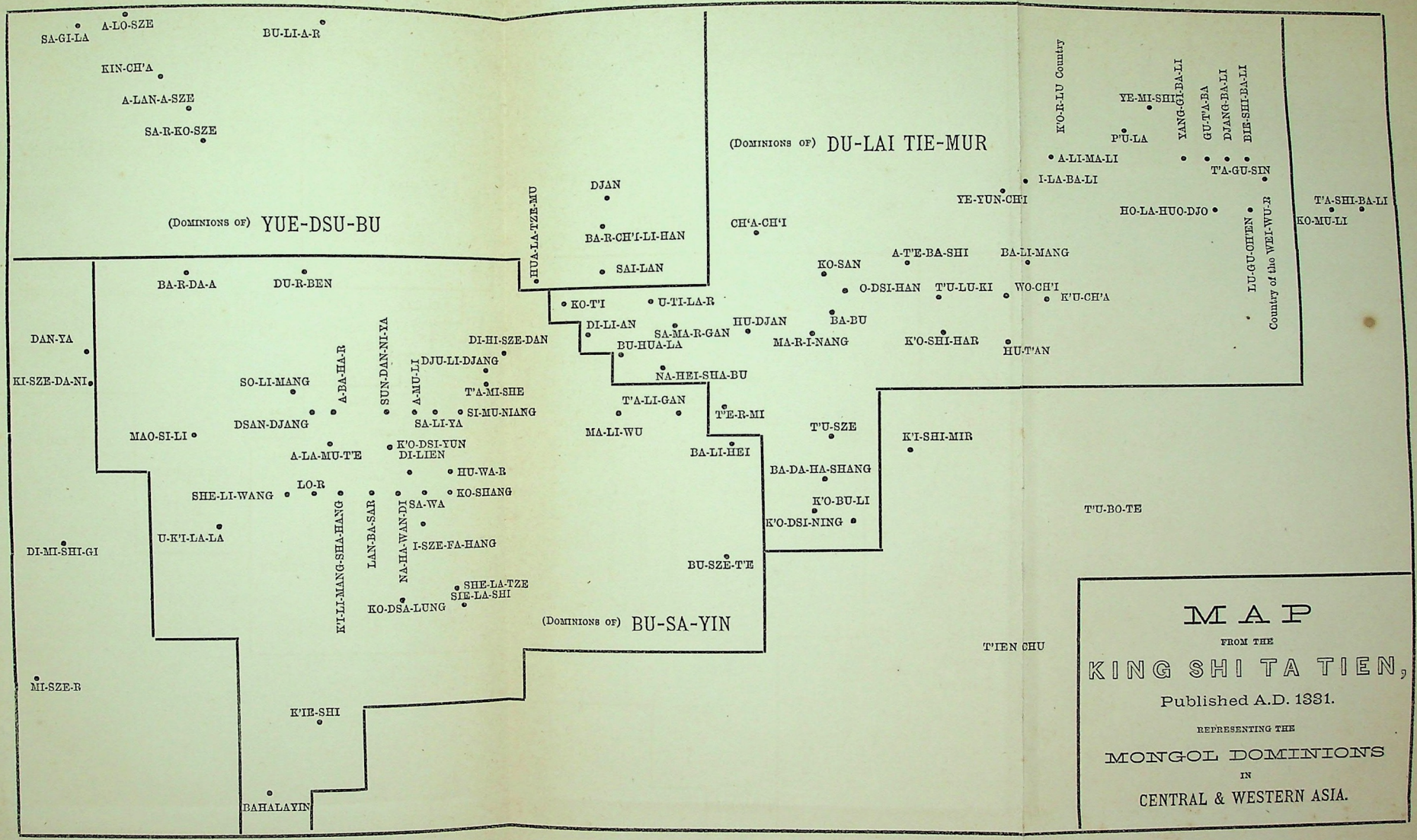
The contest of the Kurus and the Pândavas in early Indian legend seems to indicate a struggle between the Scythian and Aryan races for supremacy. The Chinese describe the Kiang as nomadic and little given to agriculture, and this character would probably best suit their compatriots in India.

The Kurus were, however, advanced to a certain stage of civilization, and Kurukshetra, the plain of the Kurus, becomes the cradle of Indian culture. It is there that the gods themselves offer sacrifice, and here was fought the battle of Panniput. The eponym Kuru founds the two families of the Pandavas by whom the arts were introduced into Hindoostan. He therefore appears to correspond with the Chinese mythical hero Shin-nung or Kiang 姜 who fashioned timber into ploughs and taught the people husbandry. The legend of Shin-nung belongs to a different cycle from that of the Chow tribes. We read nothing of it in the earlier

authors of the Chow dynasty, and the Book of Poetry is silent. It in great part belongs to that period of the early Han when communication with India seems for a time to have been constant, and which has given a distinctly Indian aspect to the later Chinese legends.

Kuru was the son of Agnîdhra, King of Jambudwipa, while the Chinese story makes Kiang the son of Ngan-teng, its nearest analogue. Ngan-teng was a princess, but changes of sex make little difference in mythology. Kuru dwelt in the Sweta mountain, *Mons Candidus*, as did Kiang by the Liet-shan of similar meaning, while the former is associated with the Kurab, as the latter with the Kiang-shui river.

These short notes are only intended to show that in the early Chinese legends, which have hitherto been looked upon as unconnected with those of other countries, there really exists a bond of common origin with those preserved to us in Indian literature. To comprehend this connection thoroughly will need an intimate knowledge of the ancient literature of both countries, to which no one has as yet attained. Points of similarity as well as of difference have in comparative mythology their meaning and power, and we shall be better able to trace the early movements of mankind when we have compared the oldest forms of these legends.


SA-GI-LA
A-LO-SZE
BU-LI-A-R
KIN-CH'A
A-LAN-A-SZE
SA-R-KO-SZE
(Dominions of) YUE-DSU-BU
HUA-LA-TZE-MU
DJAN
BA-R-CH'I-LI-HAN
SAI-LAN
(Dominions of) DU-LAI TIE-MUR
K'O-R-LU Country
YE-MI-SHI
P'U-LA
YANG-GI-BA-LI
GU-T'A-BA
DJANG-BA-LI
BIE-SHI-BA-LI
A-LI-MA-LI
I-LA-BA-LI
T'A-GU-SIN
YE-YUN-CH'I
HO-LA-HUO-DJO
T'A-SHI-BA-LI
KO-MU-LI
CH'A-CH'I
LU-GU-CH'IEN
Country of the WEI-WU-R
A-T'E-BA-SHI
BA-LI-MANG
KO-SAN
O-DSI-HAN
T'U-LU-KI
WO-CH'I
K'U-CH'A
BA-R-DA-A
DU-R-BEN
KO-T'I
U-TI-LA-R
DI-LI-AN
SA-MA-R-GAN
HU-DJAN
BA-BU
BU-HUA-LA
MA-R-I-NANG
K'O-SHI-HAR
HU-T'AN
DAN-YA
KI-SZE-DA-NI
DI-HI-SZE-DAN
DJU-LI-DJANG
NA-HEI-SHA-BU
SO-LI-MANG
A-BA-HA-R
SUN-DAN-NI-YA
A-MU-LI
T'A-MI-SHE
SI-MU-NIANG
T'A-LI-GAN
T'E-R-MI
DSAN-DJANG
SA-LI-YA
MA-LI-WU
T'U-SZE
K'I-SHI-MIR
MAO-SI-LI
A-LA-MU-T'E
K'O-DSI-YUN
DI-LIEN
BA-LI-HEI
HU-WA-R
BA-DA-HA-SHANG
LO-R
SHE-LI-WANG
KO-SHANG
K'O-BU-LI
SA-WA
K'O-DSI-NING
T'U-BO-TE
U-K'I-LA-LA
I-SZE-FA-HANG
DI-MI-SHI-GI
BU-SZE-T'E
K'I-LI-MANG-SHA-HANG
LAN-BA-SAR
NA-HA-WAN-DI
SHE-LA-TZE
SIE-LA-SHI
KO-DSA-LUNG
(Dominions of) BU-SA-YIN
T'IEN CHU
MI-SZE-R
K'IE-SHI
BAHALAYIN
MAP
FROM THE
KING SHI TA TIEN,
Published A.D. 1331.
REPRESENTING THE
MONGOL DOMINIONS
IN
CENTRAL & WESTERN ASIA.

ARTICLE IV.

NOTICES OF THE MEDIÆVAL GEOGRAPHY AND HISTORY OF CENTRAL AND WESTERN ASIA.

*Drawn from Chinese and Mongol writings, and compared with the observations of Western authors in the Middle ages.**

By E. BRETSCHNEIDER, M.D.

INTRODUCTION.

THE restlessly progressing civilization of Europe has led to a high development of the faculties and the critical judgment of European nations. Every day science unveils mysteries and facts, which have been hidden from human knowledge for many thousand years. It is also a merit of our times to have delivered science from all the fables and hypotheses, with which ancient scholars were so much pleased. It is now a rule adopted for all branches of knowledge, that in scientific researches, the leading idea must be to bring to light the truth. With respect to some sciences,—as for instance geography,—this aim can be attained with more or less completeness by means of direct observations. But as to history, and especially history of remote times, we depend entirely upon the statements and views of ancient chroniclers, whose style is often far from being clear, whilst the veracity of their reports is not always to be relied on. The same must be said with respect to ancient geographical accounts and narratives of travels. For researches in these departments it is therefore of great importance, to compare the statements of several contemporaneous authors who have written on the same subject. Judging from this point of view, it seems to me that the ancient historical and geographical accounts of the Chinese, as far as they treat of nations, countries and events spoken of also by western writers, present a high interest; all the more so, when we have to compare statements on the same subject of nations so diametrically different in their mode of viewing things. In a recently published paper (*Notes on Chinese Mediæval Travellers to the West*) I tried to review the narratives of some Chinese travellers to western Asia in the Mongol period, which permit a

* Read before the Society, on November 29th, 1875.

comparison with the accounts of those western mediæval travellers, who went to eastern Asia in the same 13th century. Now I venture to lay before the reader a paper of kindred character. In the present essay I wish to render accessible to European scholars interested in Asiatic history and geography, some accounts of this subject found in ancient Chinese and Mongol works, and referring to the days of Mongol supremacy in Asia. As I have access to many special sources of information, with respect to eastern Asiatic literature, I have been enabled to gather a considerable amount of additional material bearing on the history and the geographical knowledge of that period. These eastern sources of information will generally prove to be meagre and fragmentary; and sometimes they only become intelligible, when compared with the detailed records left behind by the Arabian and Persian chroniclers; but they have nevertheless a considerable interest, and we shall see, that much fresh light is thrown by Chinese and Mongol writers, in corroboration of the statements of European mediæval travellers across the Asiatic continent, and in elucidating dubious questions with respect to Asiatic history and geography.

The object, which it was originally proposed to accomplish by the publication of this paper, was the explanation of an ancient Chinese map of western and central Asia, and even eastern Europe, dating from the first half of the 14th century. But in commenting on this map, I was induced to examine for the corroboration of my views, the Chinese historical works of the the Mongol period; and I found, that it would be useful for the understanding of the slender information furnished by the ancient map, to give a short but coherent account of the warlike enterprises of the Mongols in the western part of Asia and in eastern Europe, according to the Mohammedan authors, and to add all the information on the same subject, which I have been able to find in Chinese and Mongol works.

I divide my paper into six parts.

In the first, I review the writings of eastern and western authors, to which reference is made in this essay.

In the second, I give a full account of the *Kara-khitai* or *Si Liao*, an interesting nation originating in eastern Asia, who in the 12th century dominated over the whole of central Asia, and was finally destroyed by Chinghiz khan.

In the third, I have attempted to bring together the accounts found in Chinese and Mongol mediæval works with respect to the *Mohammedans*.

The fourth and the fifth parts are devoted to the record of the military doings of the Mongols in the far west.

The sixth part treats of the above-mentioned ancient map of central and western Asia.

It may be the proper place here, for a few remarks regarding the Chinese mode of rendering foreign words and proper names, and my mode of romanizing Chinese sounds. In rendering Chinese sounds, representing foreign words met with in Chinese works of the Yüan period, I have found that to use the Russian mode of spelling (in roman letters), restores the original words more closely than any other of the numerous systems invented by the sinologues of various nations. This is easily understood. The official and other documents, on which the *Yüan shi* or Chinese "History of the Mongol dynasty," and many other Chinese works of that time are based, have been written (in Chinese, or translated into Chinese from the Mongol) in Peking; and the Russian pronunciation of Chinese sounds, established first more than fifty years ago by Father Hyacinth, and adopted subsequently with some insignificant changes by all Russian sinologues, refers to the Peking Mandarin dialect. I have little doubt, that the Peking pronunciation in the days of the Mongols was the same as now. When casting his eyes upon the ancient Chinese map, a facsimile of which is appended to this paper, the reader will admit that with a few exceptions, all the names of countries and places in western Asia are rendered as exactly by the Chinese sounds as the language permits; and when examining the other map, where the Chinese sounds are romanized according to the Russian system, he will easily recognize the Persian or Arabic names intended. It would in some cases be very difficult to identify the names found on the ancient map had I adopted the English or French mode of spelling. Fearing however lest my pleading in favour of the Russian system might prejudice some English linguists, I confess that I am completely ignorant of linguistic theories, and of the rules to be followed in romanizing Chinese and other sounds. I can judge this matter only from a practical point of view.

It is known, that the Chinese, when rendering a foreign word are obliged to represent every syllable by one of their characters, which are all monosyllabic. But it is not always possible to render correctly the sounds of other languages by Chinese characters. This is the case with the syllables terminating in a consonant. With the exception of *n* or *ng*, the Chinese sounds of the Mandarin dialect never have a consonant at the end. Thus the Chinese in rendering the name *Thalas*, *Djand*, *Nakhshab*, *Chach*, are obliged to write 塔剌思 *T'a-la-sze* 兹的 *Djan-di*, 那黑沙不 *Na-hei-sha-bu*, 察赤, *Cha-chi* (see the ancient map). Sometimes again they do not attempt to render the terminal consonant, *e. g. Djambalik*, *Almalik* and *Pulad*, are termed on the map 彰八里

Djang-ba-li, 阿力麻里 *A-li-ma-li* and 普剌 *P'u-la*. It is difficult for a European to pronounce a Chinese character sounding like 耳 or 兒. This sound is rendered *eulh* by French sinologues, which seems to me quite a corrupt spelling; for it is (in Peking at least) the nearest to our *r* (with rattling), and Russian sinologues render it simply by *r*, whilst the English write *urh*. The rule for spelling foreign names adopted by the Chinese of the Mongol period, proves that in some cases, characters like 耳 and 兒 were considered as equivalents for our *r*. Thus they write 馬扎兒 *Ma-dja-r*, 撒麻耳干 *Sa-ma-r-kan*, 帖木兒 *T'ie-mu-r*, for Madjar (Hungaria), Samarcand, Timur. At the present day the Chinese always render our *r*, or the syllables *ri*, *ra*, *ru*, by characters sounding *li*, *la*, *lu*; and occasionally the Chinese of the Mongol period followed the same rule; *e. g.* we read on the ancient map, 朱里章 *Dju-li-djang*, 合剌火者 *Ho-la-huo-djo*, 撒里矛 *Sa-li-ya*, intended for *Djurdjan*, *Kara-khodjo*, *Suria*.

PART I. BIBLIOGRAPHICAL NOTICES.

1. IT has appeared desirable to put at the head of this essay, a critical review of the works, from which the information dealt with in these pages has been derived. I may begin with the Chinese and Mongol literature.

Among the Chinese works extant, treating of the history and geography of Asia in the 13th and 14th centuries, the 元史 *Yüan shi*, or Chinese "History of the Mongol Dynasty" without doubt takes the first rank. It is only to be regretted, that the work has been compiled with great carelessness by the Chinese scholars of the Ming dynasty, who had been entrusted with this task. In the Annals of the *Ming shi* or "History of the Ming," *sub anno* 1369 (a year after the expulsion of the Mongols from China), I find the following statement, with respect to the compilation of the *Yüan shi*. In the above-mentioned year (the Ming) the detailed records of the reigns of the thirteen Yüan emperors (元十三朝實錄) were procured, and the emperor (*Hung-wu*) gave orders to compile the history of the Yüan, under the direction of 宋濂 *Sung Lien* and 王禕 *Wang Wei*. The work, which occupied sixteen scholars, was begun in the 2nd month of 1369, and finished in the 8th month of the same year. But as at that time, the record of the reign of Shun-ti (the last Mongol emperor in China) was not yet received, the scholar 歐陽佑 *Ou-yang Yu* and others, were sent to 北平 *Pei-p'ing* to obtain the required

information.[1] In the 6th month of 1270 the Yüan history was complete.

A new edition of the *Yüan shi* was published during the reign of *Kia-tsing* (1522—1567). The edition to which my frequent quotations from the *Yüan shi* in these pages always refer, bears the date of 1603. There were several other editions of the work issued during the Ming. My friend Mr. Arendt, of the German Legation, possesses a curious copy of the "Yûan History," which has been printed from blocks of different editions, some pages showing the date of 1609, others 1623 and 1630. One part has no date, but judging from the print, the blocks must have belonged to an early period of the Ming.

As far as I know, three editions of the *Yüan shi* have been published during the present dynasty; one in 1659, another about the middle of the last century, and the third in the present century. I may venture a few remarks with respect to the second one, which is an unhappy revision of the former editions.

2. A learned committee, consisting of Chinese, Manchus, Mongols, western Mohammedans, etc. was appointed by the emperor *K'ien-lung* to revise the *Yüan shi*, and especially the foreign names of men, places etc. occurring so frequently in that book. These *savants* in their reformatory zeal, proceeded on the idea, that all the proper names had been incorrectly rendered in the official documents of the Mongols, and had to be changed. They pronounced the same verdict with respect to the histories of the *Liao* and the *Kin*. Thus in the new editions of the histories of the Liao, Kin and Yüan, all the original proper names without exception disappeared, and were replaced by names of a new invention, which generally have little resemblance to the original. For further particulars, compare my *Notes on Chinese Mediæval Travellers*, p. 58, note 1. By this way of corrupting the names of the original histories, which have generally rendered foreign sounds as correctly as the Chinese language permits, the *K'ien-lung* editions of these works have become completely unserviceable for historical and geographical investigations. K'ien-lung was very proud of the happy idea of metamorphosing the ancient proper names, and issued an edict, that in future no Chinese scholar should dare to use the ancient names.

After the three histories had been corrupted, K'ien-lung ordered the same committee to explain the meanings of the new names; and this gave rise to a new work entitled: 遼金元史語解

[1] *Pei-p'ing* was the name of the present Peking, in the beginning of the Ming. It seems the committee entrusted with the compilation of the *Yüan shi* was in session at *Nanking*, which at that time was the capital of the Ming.

Liao kin yüan shi yü kai, or "Explanation of words (proper names) found in the histories of the Liao, Kin and Yüan." In this vocabulary, all the names of men, countries, places, mountains, rivers etc.—of the three histories have been systematically arranged, but according to the new spelling. The original spelling of the name however is always given, and the chapters are indicated where the name occurs. This renders the vocabulary very useful for reference, and we may lay aside the fact, that the principal object in view of the learned committee, was the absurd explanation of the meaning of the newly-invented names. I may give a few examples of the sagacity these *savants* displayed in their etymological commentaries. The city of *Derbend* (the name means "gate" in Persian), situated on the western shore of the Caspian sea, is mentioned in the *Yuan shi*, as a city of Persia, and the name is written 打耳班 *Da-r-ban*. The committee changed the name into 都爾本 *Du-r-ben*, and explain that *durben* in Mongol means, "four." The name of *Bardaa*, a city of Armenia, is rendered in the original *Yuan shi* by 巴耳打阿 *Ba-r-da-a*. The committee will have the name to be 巴勒塔哈 *Ba-le-t'a-ha*, and comment that this name in Manchu means "the neck part of a sable skin." By 別失八里 *Bie-shi-ba-li* in the uncorrupted *Yuan shi*, *Bishbalik* is to be understood. The meaning of this name in Turkish, is "Five cities," and the term 五城 *Wu-ch'eng*, meaning also "Five cities," occurs repeatedly in the *Yuan shi*, as a synonym of Bie-shi-ba-li. The committee however transformed the name into 巴實伯里 *Ba-shi-bo-li*, and state that *Ba-shi* in the language of the Mohammedans means "head" and *bo-li* "kidneys."

The most recent edition of the *Yüan shi* (also with corrupted proper names) is dated 1824, but Archimandrite Palladius has noticed that it was only finished about twenty years later. This edition is not difficult of purchase, and I fancy it is the only edition of the *Yüan shi* found in European libraries. The numerous translations from the "Mongol history," found in Pauthier's *M. Polo*, have all been made from this corrupted text. At the time Klaproth and Rémusat wrote, the *Yüan shi* was unknown in Europe, and it seems, that even the old Catholic missionaries in Peking had not seen it. The old sinologues knew only an extract of the great "Mongol History" (see further on).

3. The *Yüan shi* has been compiled from official documents. Perhaps we must except the biographies, for which the information was probably often derived from private sources. It seems, that the greater part of the documents on which the Chinese history of the Mongols is based, had been drawn up in the Chinese language; but in some cases they appear to have been translated from the

Mongol. I conclude it from the fact that in the *Yüan shi*, places are often mentioned, not as usually by their Chinese names, but by their Mongol names represented in Chinese characters. I may quote a few instances, and select such topics, as will at the same time serve to corroborate the statements of Marco Polo and Rashid-eddin, who, as is known, generally mention places and countries of eastern Asia, by their Mongol names.

The province of 雲南 Yünnan, in the south-western part of China proper, bears this name,—as in our day,—in the Annals of the *Yüan shi*; and in the geographical part of it, we find it mentioned as one of the twelve provinces of China. But Marco Polo and Rashid-eddin always term this province *Carajan* (Yule's *M. Polo*, vol. ii, p. 36; *Cathay &c.* p. 269),—probably a local name, adopted by the Mongols. Polo and Rashid both state, that the capital of this province is called Yachi, which latter place Klaproth tries to identify with 威楚 Wei-ch'u,—Pauthier with 麗江府 Li-kiang fu. Rashid states further (Yule's *M. Polo*, vol. ii, p. 43), that some of the inhabitants of Karâ-jâng are white, and these are called *Chaghan-jâng* by the Mongols. These names are not met with in the Chinese annals, nor in the description of Yünnan in the *Yüan shi* (geographical part). In the latter account Kara-jang and Chagan-jang (Black and White Jang) are rendered by 烏蠻 *Wu man* and 白蠻 *Po man* (Black and White Barbarians). But in the biographies of *Djao-a-k'o-p'an*, *A-r-sze-lan* (*Yüan shi*, chap. cxxiii) and others, these tribes are mentioned under the names of 哈剌章 *Ha-la djang* and 察罕章 *Ch'a-han djang*, as the Mongols used to call them; and in the biography of *Wu-liang-ho-t'ai* (*ibid*, chap. cxxi), the conqueror of Yünnan, it is stated, that the capital of the *Black Barbarians* was called 押赤 *Ya-ch'i*. It is described there as a city surrounded by lakes on three sides.

In the Annals of the *Yüan shi*, the tribe of the *Onguts*,—so called by Rashid (Polo styles them *Ung*, *l. c.* vol. i, p. 250),—is mentioned under its Chinese name 白達達 *Po Ta-ta* (White Tatars), whilst in the biographies it is termed 汪古 *Wang-gu*, sometimes 雍古 *Yung-gu*. There can be no doubt about the identity of the Po Ta-ta and Wang-gu. In the biography of 阿剌兀思剔吉忽里 *A-la-wu-sze T'i-gi Hu-li* (*Yüan shi*, chap. cxviii), it is stated that he was the chief of the tribe *Wang-gu*. Chinghiz khan bestowed one of his daughters on A-la-wu-sze's son as wife.[2] But in the Annals of the *Yüan shi* (*sub anno*, 1203) the same *A-la-wu-sze*

[2] Rashid-eddin (D'Ohsson's *Hist. d. Mongols*, tom. i, p. 84) calls this chief of the Onguts *Alacush tikin kuri*, stating that *tikin kuri* is a title.

is mentioned as the chief of the *Po Ta-ta*, who surrendered to Chinghiz khan.

西夏 *Si Hia* (western *Hia*) or 河西 *Ho-si* (west of the Yellow river), was the Chinese name for the *Tangut* empire. In the Annals of the *Yüan shi* it always appears under these names; but in the biographies, this kingdom and the people are generally termed by their Mongol name, *i.e.* 唐兀 *T'ang-wu*. This name occurs very often; a number of valiant warriors in the Mongol army were of Tangut origin. *M. Polo* (vol. i, p. 184) speaks of the Great Province of *Tangut*.[3]

The name for the *Yellow river* in the *Yüan shi*, is generally 河 *Ho* (meaning simply "the River").[4] The Mongols called it (and call it even now) *Kara muren*, the "Black River." In the narratives of M. Polo and other mediæval travellers, and in Rashid's accounts, the river appears under the name of *Cara muren*. In one instance, this Mongol name is applied to the Yellow river also in the *Yüan shi*, and written there 哈剌木連 *Ha-la mu-lien* (see chap. c. Imperial pasture lands).

4. The *Yüan shi* comprises 210 chapters, in 4 sections. The first section, 本紀 *Pen ki* (47 chapters), contains the biographies of the thirteen Mongol emperors, and the historical records of their reigns, beginning with *Chinghiz*, and ending with *Shun-ti* who was overthrown by the Ming in 1368. The 1st chapter, treats first, of the history of the Mongols before Chinghiz, and then records the doings of the reign of the great conqueror. The 2nd chapter, comprises the reign of *Ogotai*, and the 3rd that of *Mangu*. The next 14 chapters (iv—xvii) are devoted to *Kubilaï khan*. The remainder of the *Pen ki* continues the history of the Mongol empire in China to the fall of the dynasty.

5. The second section 志 *Chi*, "Memoirs," chap. xviii—cv, has two chapters (xlviii, xlix) on "Astronomy," 天文 *T'ien wen*, and two (l, li) on "Elemental influences," 五行 *Wu hing*.

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[3] The country of the Tanguts was known to the Mongols also under the name of *Cashi* or *Coshi* (D'Ohsson, *l. c.* tom. i, p. 95). Rashid reports, that about the time Chinghiz conquered this country, a son was born to Ogotai (the third son of Chinghiz), and he received the name *Cashi*. At another place (quoted by Klaproth, *Nouv. Journ. Asiat.* tom. xi, p. 464) Rashid states, that the country of the Tanguts is called also *Hoa-si*, which means "west of the great river" in the language of the Katayans. It seems that *Cashi* also is intended for the *Ho-si*.

[4] *Ho* is the name by which the Yellow river is designated in the most ancient Chinese topography, found in the chapter *Yü kung* of the *Shu king*. The name 黃河 *Huang ho* (Yellow river) appears first in the *T'ai p'ing huan yü ki*, a description of the Chinese empire, published at the end of the 10th century (see Wylie's *Notes on Chin. Lit.* p. 36).

There, remarkable atmospheric and other phœnomena are recorded.

Chapter lii—lvii are on 歷 *Li*, "Mathematical Chronology and the Calendar."

Chapters lvii—lxiii comprise 地理 *Ti li*, "Geography of the empire," or rather, an enumeration of the provinces, departments, districts, etc. of China proper, a part of Mongolia, and even Manchuria and Corea, accompanied occasionally by some statistical and historical notes.[b] After this, chapter lxiii contains also a dissertation on the sources of the *Yellow river*, 河源 *Ho yüan*, an enumeration of countries and places in central and western Asia, 西北地 *Si pei ti* (see Part VI of this paper), and an interesting account of the 乞里吉思 *K'i-li-gi-sze*, or "Kirghiz." The chapter concludes with an enumeration of the cities of 安南 *An-nan* (the *Anin* of M. Polo, vol. ii, p. 82, now Tong-king) and some neighbouring countries.

Chap. lxiv—lxvi, 河渠 *Ho-kü*, treat of the rivers and canals of China.

Chap. lxvii—lxxi,—禮樂 *Li-yo*, "Rites and Music."

Chap. lxxii—lxxvii, are on 祭祀 *Tsi-sze*, "Sacrifices."

Chap. lxxviii—lxxx comprise 輿服 *Yü-fu*, "Regulations on chariots and official dress."

Chap. lxxxi—lxxxiv,—選舉 *Süan-kü*, "Regulations on appointments to office."

Chap. lxxxv—xcii,—百官 *Po-kuan*, "Government offices."

Chap. xciii—xcvii,—食貨 *Shi-hua*. These two characters are generally translated by "Political Economy." The following matters are treated of under this head :—

Chap. xciii contains 經理 *King-li*, "Cadastre;"—農桑 *Nung-sang*, "Agriculture and Sericulture;"—稅糧 *Shui-liang*, "Custom's regulations;"—科差 *Liao-ch'ai*, "Socage regulations;"—絲科 *Sze-liao*, "Furnishing raw silk and other materials;"—包銀 *Pao-yin*, "Regulations regarding silver;" —海運 *Hai-yün*, "Regulations on transport by sea;" and —鈔法 *Ch'ao-fa*, Paper money."

Chap. xciv contains 歲課 *Sui-k'o*, "Levying of annual taxes;" —鹽法 *Yen-fa*, "Salt regulations;"—茶法 *Ch'a-fa*, "Tea regulations;"—酒醋課 *Tsiu-t'su-k'o*, "Taxes on wine,

[b] A detailed description of the Mongol empire had been compiled during the Yüan dynasty, under the name of 元一統志 *Yüan yi t'ung chi*. It seems this work has now disappeared. Perhaps a copy of it may be found in the Imperial Chinese library. It is often quoted in the *Ji hia kiu wen* (see my *Archæological researches on Peking*).

vinegar, etc."—商稅 *Shang-shui*, "Mercantile dues regulations;"—市舶 *Shi-po*, "Maritime trade regulations;"[6]—額外課 *O-wai-k'o*, "Extraordinary taxes."

Chap. xcv,—歲賜 *Sui-sze*, "Annual expenses for rewards and pensions of the empresses, princes, princesses and meritorious officers.

Chap. xcvi,—俸秩 *Feng-chi*, "Salary of officers;"—職田數 *Chi-t'ien-shu*, treats again on "Cadastre;"—惠民藥局 *Hui-min yao-kü*, "Dispensaries;"—市糴 *Shi-ti*, "Granary regulations;"—賑恤 *Chen-sü*, "Regulations for a time of dearth (compare *M. Polo*, vol. i, p. 393)."

Chap. xcvii contains further regulations on the transport by sea, and regulations with respect to paper money, salt and tea,—being a continuation of the articles under these headings in chap. xciii and xciv. I cannot say why the accounts have been separated.

Chap. xcviii—ci,—兵 *Ping*, "Military regulations," under the following heads:—

Chap. xcviii,—兵制 *Ping-shi*, "Organization of the army."

Chap. xcix,—宿衛 *Su-wei*, "The emperor's body-guard;"—圍宿軍 *Wei-su-kün*, "The guards;"—儀仗軍 *Yi-chang-kün*, "Parade troops;"—扈從軍 *Hu-tsung-kün*, "The emperor's travelling guards;"—看守軍 *K'an-shou-kün*, "Garrisons in the fortresses;"—巡邏 *Sü-lo*, "Patrol guards" (*M. Polo*, vol. i, p. 368);—鎮遏軍 *Chen-o-kün*, "Pickets;"—鎮戍 *Chen-shu*, "Protection of the frontiers."

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[6] It is stated in this article, amongst other things, that in 1277, a superintendent of foreign trade was established in 泉州 *Ts'üan-chou*. Another superintendent was established for the three ports of 慶元 *K'ing-yüan* (the present Ningpo), 上海 *Shanghai* and 澉浦 *Gan-p'u*. These three ports depended on *F'ukien*. Further on, the ports of 杭州 *Hang-chou* and 福州 *Fu-chou* are also mentioned in connection with foreign trade. 漳州 *Chang-chou* is only once spoken of,—and in connection with the salt trade. We meet further, the names of 温州 *Wen-chou* and 廣州 *Kuang-chou* as sea-ports for foreign trade in the Mongol time. But *Ts'uän-chou* in this article on the sea trade seems to be considered the most important of the sea-ports, and it is repeatedly referred to. I have therefore little doubt that the port of *Zaiton* of the mediæval travellers can only be identified with *Ts'uän-chou*;—not with *Chang-chou* as has been suggested by some commentators of *M. Polo*. There are many other reasons found in Chinese works in favor of this view; but this subject lies beyond the field of my investigations. *Gan-p'u* of the Chinese authors is the sea-port *Ganfu* of M. Polo, (vol. ii, p. 149). *Hang-chou* as is known, is Polo's *Kinsay*.

Chap. c,—馬政 *Ma-cheng*, "Administration of the imperial horse pastures;" and—屯田 *T'un-t'ien*, "Military colonies." Chap. ci,[7]—站赤 *Djan-chi*, "Postal communication;" 弓手 *Kung-shou*, "Convoy;"—急遞鋪兵 *Ki-ti-p'u-ping*, "Foot-runners" (compare *M. Polo*, vol. i, p. 389);"—and 鷹房捕獵 *Ying-fang-bu-lie*, "Falconers." A certain class of the falconers are termed 孛蘭鷄 *Bo-lan-gi* (Ferenghi ?).

Chap. cii—cv,—刑法 *Hing-fa*, "Jurisprudence."

6. The third section, chap. cvi—cxiii, is termed 表 *Piao*, and contains genealogical and other tables.

Chap. cvi—后妃 *Hou-fei*, "Table of the Empresses and Concubines."

Chap. cvii,—宗室世系 *Tsung-shi-shi-hi*, "Genealogical table of the Mongol imperial family."

Chap. cviii—諸王 *Chu-wang*, "Princes of the imperial family and their apanages."

Chap. cix,—公主 *Kung-chu*, "Princesses and sons-in-law of the Emperors (駙馬 *Fu-ma*)."

Chap. cx—cxi,—三公 *San-kung*, "The three *Kung*." The three highest offices in the empire,—or rather titles, *e.g.* "Chancellor," in Europe.

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[7] By *djan-ch'i* a Mongol word is rendered. Even in modern Mongol a post-station is called *djam*. Thus the word is pronounced in southern Mongolia. In the north it sounds *dzam*. European mediæval travellers call the Mongol post-stations *Yam* or *Yamb*, and the diarist of the embassy of Shah Rokh to the Chinese court (1420) uses the same name (*Yam khané*) for the post-houses in China (Yule's *M. Polo*, vol. i, p. 388; *Cathay*, pp. ccii, 137). Pauthier suggests (*M. Polo*, p. 335), that this word may be intended for "馹馬 *Yimà qui* signifie *poste aux chevaux*." But *yi-ma* in Chinese means a "post-horse," not a station. There is no Chinese etymology in the word *yam*, which even at the present day is used by the Tatars of Kazan etc. to designate a "post-station;" and the Russian word *yamshchik*, meaning "a coachman carrying the post," has evidently been borrowed originally from the Tatars. There are in the Russian language a good many Tatar words. The Russian linguists generally derive the word *yam* from the Mongol *dzam*, supposing that it was pronounced *yam* in former times. But we have seen that the *Yüan shi* renders quite correctly the Mongol *djam*; and we may conclude that this was the Mongol term for post-station, even in the 13th and 14th centuries;—all the more as the Mongol text of the *Yüan chao pi shi* (a work written in 1240, of which I shall speak further on) also uses *djam-chi* for postal communication. I may observe that the character 站 *d'jan*, by which the Mongol word for station has been rendered in the *Yüan shi*, means also station in Chinese; but the addition of the character 赤 *ch'i* (meaning "red"), which here represents only a sound, proves that *djan-c'hi* was intended to express a foreign word. *Yam* is probably of Turkish origin.

Chap. cxii—cxiii,—宰相 *Tsai-siang*, "List of the Ministers of the Mongol empire." This list begins only with Kubilaï khan's reign.

7. The fourth section,— 列傳 *Lie-chuan*, chap. cxiv—ccviii, is almost entirely devoted to biographies of men of eminence during the Mongol period. It comprises about a thousand biographies.

In chap. cxiv, we find the biographies of the principal Empresses, from the time of Chinghiz down to the last Mongol emperor in China.

Chap. cxv—cxvii give the biographies of the most distinguished of the Mongol princes, viz :—

Chap. cxv,—*T'o-lei* (son of Chingiz), *Chen-kin* (son of Kubilaï), *Gan-ma-la* and *Ta-la ma-ba-la* (both sons of Chen-kin).

Chap. cxvi,—biographies of the wives of the afore-mentioned princes.

Chap. cxvii,—*Bie-li-gu-dai*, Chingiz' elder brother (Bilgutei of Rashid); *Dju-ch'i* (Chingiz' eldest son); *T'u-la*, a great-grandson of Chagatai (second son of Chingiz); *Ya-hu-du*, grandson of T'o-lei; *K'uan-chi bu-hua* and *T'ie-mu-r bu-hua* both grandsons of Kubilaï.

The remainder of the biographies record the lives and doings of eminent statesmen, officers, generals, scholars, artists, priests, and even remarkable women, &c. (chap. cc, cci). The biographical section of the *Yüan shi* contains a great amount of information with respect to the ancient geography and history of Asia. It is not easy however to lay it under contribution, for the accounts, which are scattered over nearly a hundred chapters, are generally short and fragmentary, and have chiefly a value with respect to comparative investigations. The biographies found in the "History of the Mongols" bear evidence to the liberal views of the latter as to the acknowledgment of merit. They seem never to have been influenced by national considerations. Among the prominent men, whose biographies are included in the *Yüan shi*, we meet with representatives of most of the nations of Asia subdued by the Mongol arms, viz. *Chinese*, *K'itan*, *Nüchi*, *Tanguts*, *Onguts*, *Uigurs*, *Kanglis*, *Alans*, *Kipchaks*, *Carluks*, *Merkits*, *Persians*, and other Mohammedans, etc. Some of these foreigners held high offices at the court of the Mongol emperors; others distinguished themselves as valiant captains. The Mongols were conscious of the intellectual superiority of those more civilized nations. Kubilaï, after having established his power in China, did not oblige the Chinese to learn Mongol. He was, on the contrary, a protector of Chinese literature, which was very flourishing in the days of the Mongols. Of course the greater part of the biographical section of the *Yüan shi* is devoted to persons of

Mongol origin; but we are not surprised at finding, that with a few exceptions, all the distinguished Mongols belonged to the army, or were governors *(darugachi)* in the provinces.

8. The fourth section of the *Yüan shi* concludes with some accounts of various foreign nations and countries, east and south of China, and of some sea-ports of India (chap. ccviii—ccx). As these countries are beyond the field of my researches, I will give only the names:—

Chap. ccviii,—高麗 *Kao-li*, "Corea;" 耽羅 *Tan-lo*, a country in the vicinity of Corea; 日本 *Ji-pen*, "Japan."

Chap. ccix,—安南 *An-nan*, "Annam, Tongking."

Chap. ccx,—緬 *Mien*,—now 緬甸 *Mien-tien*, "Burma;" 占城 *Chen-ch'eng*, "Cochin-China;" 暹 *Sien*,—now 暹邏 *Sien-lo*, "Siam;" 爪哇 *Djao-wa*, "Java;" 瑠求 *Liu-k'iu* islands; 三嶼 *San-yu* (near the Liu-k'iu islands); 馬八兒 *Ma-ba-r*, the "Maabar" of *M. Polo*, vol. ii, p. 266, the Coromandel coast; 俱藍 *Kū-lan*, the "Coilum" of *M. Polo*, vol. ii, p. 312; the kingdom of 蘇木達 *Su-mu-ta*; the kingdom of 蘇木都剌 *Su-mu-ta-la*, "Sumatra;" the kingdom of 那旺 *Na-wang*; 須門那 *Sü-men-na*, the "Semnath" of *M. Polo*, vol. ii, p. 334; 僧急里 *Seng-gi-li*, the "Cyngilin" of Odoric (Yule's *Cathay*, p. 75); 南無力 *Nan-wu-le*; 馬蘭丹 *Ma-lan-dan*; 丁呵兒 *Ting-ho-r*; 來來 *Lai-lai*; 急蘭亦解 *Gi-lan-i-te*.

9. In 1828 Father *Hyacinth* translated the first three chapters of the *Yüan shi* into Russian, and published his translation in the *History of the reign of the first four Khans of Chingiz khan's dynasty*. His version is very correct; it is to be regretted however, that this accomplished sinologue translated from the corrupted text of the *Yüan shi*; it is therefore impossible to make use of his version without comparing it with the original Chinese text. A complete translation of the original text of the *Yüan shi* would be a very valuable contribution to our knowledge of the mediæval history and geography of Asia. It would throw much fresh light especially on the history of the Mongols, and be serviceable to explain many dubious questions in the narratives of European mediæval travellers.

10. There is an abridged Chinese history of the Mongol dynasty extant, published in 1699, by 戒山 *Kiai-shan*, under the name of 元史類編 *Yüan shi lei pien*, in 42 chapters. It is known also under the name of 續宏簡錄 *Su hung kien lu, i.e.* "Continuation of the *Hung kien lu*," the latter being a historical work embracing the annals of the *Wu-tai* period, A.D. 907—960, the *Sung, Liao, Hia and Kin*. The *Yüan shi lei pien*, although only

an extract from the *Yüan shi*, is a very valuable book for reference; for the learned author has added a great deal of interesting matter, drawn for the greater part from rare works of the Mongol period. The first 10 chapters comprise an extract from the Annals (*Pen ki*) of the *Yüan shi*, and have been translated by Father *Gaubil*, in his *Histoire de Gentchiscan et de toute la dynastie des Mongous*, 1739. A curious ancient map is found at the head of the *Yüan shi lei pien*. It bears the title of 朔漠圖 *So mo t'u*, "map of the desert," and comprises the Mongol desert and the adjacent countries. The map has the appearance of a reproduction of an ancient map, compiled in the days of the Mongols. There are some names of places marked, especially in the neighbourhood of Karakorum, which are not mentioned in the *Yüan shi*, or in other works; and it is very unlikely that the author of the *Yüan shi lei pien* compiled this map from the descriptions at his disposal.

11. In the year 1866, Archimandrite Palladius made the learned world (in Russia) acquainted with a Chinese (or rather Mongol) historical work of considerable importance. In the 4th vol. of the *Records of the Russian Ecclesiastical Mission at Peking*, he presented a Russian translation of the 元朝秘史 *Yüan ch'ao pi shi*,[8] or "Secret history of the Mongol Dynasty." In the introduction to his translation, Palladius gives a minutely detailed history of the work, from which we learn, that it was originally written in Mongol, and had been finished in A.D. 1240, at the time of a great assembly on the river *Kerulun*. It treats of the early history of the Mongols, the reign of Chinghiz khan, and the beginning of the reign of Ogotai. In the early Ming time, a Chinese translation of it was made. The text translated by Palladius is included in a collection of reprints published in 1848, the same in which the *Si yu ki* is found, of which I have given a translation in my *Notes on Chinese Mediæval Travellers* (pp. 15—56).[9] As stated in the preface to this text of the Chinese *Yüan ch'ao pi shi*, it had been copied from the original, in the Chinese imperial library. The *Yüan ch'ao pi shi* is mentioned in the *Hung wu shi lu*, or "Detailed record of the reign of Hung-wu," under the year 1382. It is stated there, that it had been written

[8] The name is written *Yüan chao mi shi* in the Russian translation; but as the reading *mi* of the character 秘 is only the popular pronunciation at Peking, I prefer to write *pi*, according to the Mandarin dialect, as Palladius does also in his *Elucidations of M. Polo*.

[9] It contains also the 西域記 *Si yü ki* translated by Stan. Julien (*Mémoires sur les Contrées Occidentales*). The title of the collection reads 連筠簃叢書.

in Mongol, in *Uigur* letters, and that a Chinese translation of it was made, to which the Mongol text was annexed,—not in the original letters, but by rendering the Mongol sounds by Chinese characters. After Palladius had published his translation, made from the Chinese text in the afore-mentioned collection, he happened to obtain a MS. copy of the Ming edition of the work, accompanied by the Mongol text (in Chinese characters), for the use of which I have to thank the learned owner. It was found, that the text Palladius had translated, was only an extract of the original work, which comprises 15 chapters, but has no title. Although many archaisms and clerical errors occur in this text, the restoration of the Mongol original presents little difficulty for men acquainted with both Chinese and Mongol; the Mongol text (represented by Chinese characters) being accompanied by the Chinese translation. For all who have made the history of the Mongols their study, this rare document of ancient Mongol literature presents a high interest. It corroborates generally Rashid-eddin's records, and occasionally we find passages in it, which sound like a literal translation of the statements of the Persian historiographer. This proves that Rashid had had the same source of information as the unknown author of the *Yüan ch'ao pi shi*. As to the dates in the latter work, they are generally in accordance with the dates given by the Mohammedan authors; but in a few cases the *Yüan ch'ao pi shi* commits great chronological blunders and misplacements of events, as for instance with respect to the war in the west (see further on).

12. In the *Russian Oriental Record*, vol. i, 1872, Palladius has published the translation of another ancient historical document, recording also the early history of the Mongols. The Chinese name of the book, of which Palladius possesses only a MS. copy (there is no proof of its having ever been printed), is 皇元聖武親征錄 *Huang yüan sheng wu ts'in cheng lu*, a record of Chinghiz khan's warlike doings. It seems to have been compiled from Mongol documents, in the first half of the 14th century; but the author is unknown. The *Huang yüan sheng wu ts'in cheng lu* is repeatedly quoted in the *Yüan shi lei pien*.

13. I may also mention a history of the Mongols, compiled in the middle of the 17th century, by the Mongol prince *Sanan Tsetsen*. The title of this manuscript work is *Sanan Tsetsen u Namtar*. A German translation of it was published in 1829 by J. Schmidt, in St. Petersburg. There is also a Chinese translation of the work extant, known under the name of 蒙古源流 *Meng yüan liu*. It seems that this Mongol history is based principally on traditions, not on official documents; therefore it sometimes

diverges widely from the other more authentic records of Mongol history we know; and with respect to the dates it is quite untrustworthy. Professor Berezin in his translation of Rashid-eddin (see further on) says, that the non-existence of Sanan Tsetsen's history, would be no loss to historical science.

14. Finally, in reviewing the Chinese and Mongol works treating of the history of the Mongols, I ought not to omit mentioning the 輟耕錄 *Chue keng lu*, written in the middle of the 14th century, by the learned 陶宗儀 *T"ao Tsung-i*. It comprises 30 chapters, and contains notes on different matters referring to the time of the Mongol dynasty. There is in it a considerable amount of information with respect to the customs institutions etc. of the Mongols; and we meet also interesting historical and geographical accounts bearing on that period. I have had an opportunity of giving extracts from the *Chue keng lu*, in my *Notes on Chin. Med. Travellers*, and in my *Arcæological Researches on Peking*.

15. As the Chinese and Mongol sources of information, with respect to the Mongol nation, are very little known to European scholars, our historians who have written the history of the Mongols, have relied almost entirely upon the Mohammedan historians of the 13th and 14th centuries, whose conscientious records concerning the Mongol era are indeed, entitled to the greatest confidence. The Chinese and Mongol chroniclers never present so detailed, coherent, and intelligible accounts as do the able Persian historiographers on the same subject. But, as I have stated above, I assign to the authors of the far east, also, a great importance, and especially with respect to comparative historical researches.

The subsequent notices with respect to the Mohammedan authors, who wrote on the Mongols, are borrowed from D'Ohsson's *Histoire des Mongols*, where more detailed accounts on this subject will be found. I mention only the most important Persian works.

16. The *Tarikh Djihan Kushï*, or "History of the conqueror of the world," written by *Alaï-eddin* Atta mulk Djouveïni, records the events of the last ten years of Chinghiz khan's reign. It first gives a detailed account of the conquest of Transoxiana and Persia, by the Mongols. After this, the reigns of Ogotai and Cuyuc, and the beginning of the reign of Mangu are treated of, up to the year 1257, where Alaï-eddin's chronicle concludes. We find also in this history, interesting accounts of the *Uigurs* and the *Kara-khitai*, of which I shall give a translation further on.

Alaï-eddin's work has been continued by *Abd-ullah*, son of

Fazel-ullah, more generally known under his honorific title *Vassaf ul Hazret*, or the "Panegyrist of his Majesty." It bears the title of *Kitab tedjziyet ul emssar ve tezdjiyet ul a'ssar*, "Division of the countries and transition of the centuries," and contains the history of the Mongols from 1257 up to 1327.

17. Among the Persian authors who wrote on the Mongols, and the great political events which shook the different states of Asia in the 13th century, the first rank is incontestably due to the celebrated historiographer *Rashid-eddin*, who in his remarkable work *Djami ut Tevarikh* or "Collection of Annals," gives the most complete and intelligible record of the history of the Mongols. Besides this, we find in his book very valuable and detailed accounts of the nomadic Tartar and Turkish tribes, who in the days of Chinghiz khan lived in Tartary. One chapter is devoted to a very interesting and quite exact description of China proper at the close of the 13th century.

Rashid-eddin was born at *Hamadan* about A.D. 1247, and was a physician by profession.[10] Ghazan khan named him vizier of the Persian empire in 1298, having been retained in this office by Ghazan's successor Oljaitu. But after the death of Oljaitu, Rashid was executed, by order of Abu Said in 1318, which was also the fate of many of the eminent statesmen in Persia. Rashid states, in the preface to his work, written by order of Ghazan khan and finished in 1312, that in compiling it he was considerably aided by the great Noyen *Pulad Chinksank* (a Mongol evidently), generalissimo and minister of the empire, "who knows better than any man living, the origin and history of the Turkish tribes, and of the Mongols especially." Rashid mentions also

[10] I may quote here a curious statement of a Persian author contemporary with Rashid, which makes the celebrated historiographer of Chinese nationality. We read in *Abdallah Beidavi's History of China* (Latin translation by A. Müller, Greiffenhag, 1689, pp. 5, 6) :—"Tempore *Hulagu-chan* magna manus Philosophorum & Astronomorum Chataicorum cum illo huc profecti sunt. Ex his *Fu-mucn-gi* erat, Vir Philosophus, *Sing-sing* cognomento dictus, h. e. Polyhistor. Eodem tempore Dominus, *Nasiro'd Din*, Tuso, (urbe *Chorasanæ*) oriundus de mandatu Hulaguchan *Tabulas Ilchanicas* condidit. Ubi è Polyhistore fundamenta *Astronomica & Chronologica* illorum tradit. Erat item alius tempore *Muslimici Regis*, Gazan Hakan dicti. Ejus, qui sacrosanctam *Chronologiam Gazanicam* conscribi mandaverat. Dominus videlicet *Rexido'd Din*, Vezirius, ê Philosophis Chatajorum, *Litagi & Meksun* nomine. Hi duo *Medicinam*, *Astronomiam & Chronologiam*, sive etiam *Historiam temporum*, apprimè tractarunt & scriptis propagarunt. Iidem quosdam Chatajorum libros secum asportantes, sua ex illorum principiis comprobant." Ibid. pp. 12, 13, we read again :—"Dn. *Rexido'd Din*, Vezirius ille supra laudatus, terris *Hing-ping-xang* oriundus, fidem facit, regnum *Magin* quotannis *nongentos Tumanos* seu Myriades in rationes Imperatoris conferre." These passages leave no doubt that Abdallah takes Rashid to be a Chinese.

important historical documents with respect to the history of the Mongols, preserved in the archives of Ghazan khan, and to which he had access. He speaks further, of the Mongol annals called *Altan depter* (golden book), kept in the treasure house of the khan, and committed to the charge of the senior of the *begs* (*cf.* Prof. Berezin's Russian translation of Rashid-eddin, vol. i, pp. viii, 183).

18. The first attempt to translate Rashid's *Djami ut Tevarikh* was made by a German orientalist, *Hammer Purgstall*, who selected for this purpose, one of the most interesting chapters of the book, the account of China proper. But *Klaproth* found much fault with Hammer's version, especially in the defective decipherment of proper names, and published a new translation in correction of Hammer in 1833, in the *Nouveau Journal Asiatique*, tom. xi.

At about the same time a renowned French orientalist *Quatremère* began to publish in the *Collection orientale*, 1833, his *Histoire des Mongols de la Perse*, translated from the *Djami ut Tevarikh;* but only the fifth part of the history of the Mongol dynasty in Persia appeared.

The most complete translation of Rashid's history of the Mongol empire, we possess, is found in D'Ohsson's *Histoire des Mongols* (see further on). The author however does not always give a literal, coherent translation of the Persian historian, but rather works up Rashid's statements, together with those of other writers, into his elaborate History of the Chinghizkhanides.

A complete Russian translation of Rashid's History of the Mongols, has been undertaken by a learned Russian orientalist, Professor T. N. Berezin in St. Petersburg. It is being published in the *Journal of the Imperial Russian Archæological Society*. The first volume, 322 pages (vol. v. of the *Journal*), comprising Rashid's accounts of the various nations and tribes of Turkish and Mongol origin, living in the eastern part of Asia, was issued in 1858; the second, containing the early history of the Mongols, up to the time of Chinghiz khan's accession to the throne, A. D. 1206, saw the light in 1868 (vol. xiii of the *Journal of the Society*), 239 pages Persian text, and 335 of translation and commentary. As the author informs us, four volumes more are to follow; and supposing he continues to publish a volume every ten years we may hope to see the work finished in A. D. 1908. It seems to me that none of the previous translations of Rashid-eddin can enter into competition with that of Mr. Berezin. Not only has he at his disposal several of the best manuscripts of Rashid's work; but he is also considerably aided in the understanding of the Persian author's records, by his acquaintance with eastern Asiatic languages.

Berezin states in the preface, that Rashid's style is quite easy of understanding, and that the only difficulty the translator meets, is to get the correct reading and pronunciation of the foreign proper names, occurring so frequently in the Persian text, the diacritical points of the letters being often omitted in the manuscripts.

19. In commenting upon geographical names of central and western Asia, mentioned in ancient Chinese and Mongol writings, I was often obliged to refer, for corroboration or elucidation, to the geographical accounts of those countries, as given by western Asiatic authors of the same period. Generally the information drawn from Persian works found in D'Ohsson's *Histoire des Mongols*, proved to be sufficient for my comparative investigations. In some cases only, I felt the want of special Arabic or Persian geographical works for reference, *e. g.* those of *Yakut* (1179—1249), *Abulfeda* (1273—1319), etc., and my *ultimum refugium* was then D'Herbelot's *Bibliothèque Orientale, ou Dictionnaire Universel, contenant tout ce qui fait connaître les peuples de l'Orient, leur histoire, etc., etc.* The first edition was published in Paris in 1697; the second in Maestricht in 1776. I always refer to this second edition in folio. This dictionary of the eminent orientalist, D'Herbelot, is still an indispensable book of reference with respect to Asiatic history and geography, for students in this department who have not access to the original sources, or who are not acquainted with Arabic and Persian. Klaproth calls D'Herbelot, "le père de nos connaissances sur l'orient." The only reproach to wh ch D'Herbelot is open, is that of merely giving translations from Mohammedan authors without venturing any critical remarks, or even taking exception to contradictions in the statements he brings forward. The second edition of the *Bibliothèque Orientale* has a very valuable appendix. *Supplément à la Bibliothèque Orientale par C. Visdelou et A. Galand.* About 200 pages of this supplement are from the pen of Visdelou, and contain a great amount of very valuable information, drawn from Chinese sources, with respect to the history and geography of eastern and central Asia. Claude Visdelou, born in 1656, in Bretagne, went as a missionary to China in 1685, and spent there twenty-two years. I feel no hesitation in asserting, that he was the most accomplished sinologue among the old Jesuit missionaries in China. All his translations shew a profound and critical knowledge of the Chinese language. With respect to China, Visdelou takes the same place, as Klaproth assigned to D'Herbelot with reference to western Asia, and well deserves to be termed the father of our knowledge of Chinese historical records, and especially the history of the nations of central and eastern Asia. In the first part of the Appendix to the *Bibl. Orient.* Visdelou

explains from Chinese sources, a number of proper names and terms, used by the Mohammedan authors with reference to China ;—for instance, *Fugfur, Tencu, Sin, Loukin, Khankou, Namkink, Khathai, Khanbalig, Cara-Cathaian, Van, Ca, Bacouk, Dapikhen, Fenek, Giagh* or *Tchagh*. (The latter seven terms refer to chronology and astronomy.) The second part is entitled *Histoire de la Tartarie*, pp. 18—133, and gives the complete history of the nations and tribes of Mongolia and central Asia ; all the information being drawn from the histories of the Chinese dynasties. We find there, the history of the *Hiung-nu*, the *Wei*, the *Geou-gen*, the *Tou-kiue* (Turks), the *Hui-ho* (Uigurs), the *Sie-yen-to*, the *Kie-kia-sze* (Kirghiz) and many others. The next 43 pages are devoted to the histories of the *K'itan* (Liao) and the *Kin*,—translations from the *Liao shi* and *Kin shi*. On pp. 117—119 we find an interesting dissertation on the invention of gunpowder by the Chinese, and the cannons they made use of in the middle ages. The accounts Visdelou gives of the Yuen or Mongol dynasty, occupy only one page ; the Manchus are treated of in six pages. The third part, contains a dissertation on the term *Khan*. The fourth part, (30 pages) has further explanations of names of countries, places and nations of central and eastern Asia, occurring in the writings of the Mohammedans, viz. *Cara-khotan, Khotan, Aigur*, (Uigur), *Botom, Turk, Ung, Cathay, Tatar, Mogol* and others. Besides this, Visdelou gives a short account of the reigns of the first five Mongol emperors. The fifth part pp. 165—190, is a learned treatise on the Nestorian tablet at Si-an fu.

20. I ought not to omit from my record, an extensive work on the history of Asiatic nations, written last century, by a French orientalist of great repute. It cannot be denied, that *Deguignes* in his *Histoire des Huns*, published in Paris, 1756—1758, in five volumes, has contributed a great amount of new information, drawn from Mohammedan, Chinese and other sources ; but the competent reader will admit, I think, that the vast material brought together has been badly worked up by the author ; who in his conclusions and identifications draws too much on his imagination, and seldom deems it necessary to give any evidence for the correctness of his views. In many cases it is impossible to decide, who is responsible for any given account or opinion,—whether it is Deguignes or the ancient writer he quotes. Thus his researches on Asiatic history have but little claim to be considered scientific investigations ; and it may be said, that he has rather spread confusion than shed light.[11] Unhappily Deguignes still remains an authority with respect to the ancient history of the nations of Turkish origin,

[11] With respect to the value of Deguignes' historical researches, compare also Klaproth's *Mémoires relatifs à l'Asie*, tom. ii, pp. 391, 396.

and all who make this department their study cannot avoid referring to his *Histoire des Huns*, of which even the title implies a great error; for he identifies the Huns with the 匈奴 *Hiung-nu*, a people first mentioned in the Chinese annals in the 3rd century B. C. as living in Mongolia, and who for nearly four hundred years were very troublesome neighbours of the Chinese. In his identification (*l. c.*, tom. i, p. 215), Deguignes was of course only guided by similarity of sound; and Klaproth has already proved that his view is opposed to all that we know regarding the history of the Huns and the Hiung-nu. The same Deguignes has also broached the famous hypothesis, that the Chinese were an Egyptian colony.

21. After Deguignes, a more able and clear-minded orientalist of the present century undertook to write a history of the Mongols. In 1834, the Baron C. D'Ohsson published his *Histoire des Mongols depuis Tchinguiz khan jusqu'à Timour Bey ou Tamerlan*, in four volumes. A map, showing the political divisions of Asia in the 13th century is appended. In this elaborate work, which I shall quote frequently in the subsequent pages, the learned author has gathered all the documents bearing on the history of the Mongols, known at the time he wrote. D'Ohsson's information is drawn principally from the Mohammedan authors, of whose records he gives the most satisfactory translations. D'Ohsson was himself of oriental origin (Armenian), and therefore well versed in Persian, Arabic and Turkish. He was also well acquainted with many European languages. His *Histoire des Mongols* is written in an admirably attractive style. It seems to me, that D'Ohsson has exhausted the sources respecting the history of the Mongols, as far at least as information can be drawn from Mohammedan and other western Asiatic and European mediæval writers. It is only from the ancient records of the Chinese and Mongols that some new light on this subject can be expected.

22. I shall have to quote also repeatedly, in my paper, the narratives of those well-known Christian travellers, who visited eastern Asia in the 13th century. As to Carpini (1246), and Rubruquis (1254), my references invariably are to the pages of the Latin editions in the *Recueil de Voyages et de Mémoires publié par la Société de Géographie*, tom. iv, 1839. Of Haithon's narrative (1254), I shall give an English version at the end of my paper. With respect to Marco Polo and the other mediæval travellers (Odoric, Marignolli, etc.), I rely upon the magnificent works of Colonel Yule, viz. *The Book of Ser Marco Polo*, 1871,[12] and *Cathay and the way thither*, 1866.

[12] I have heard, that Col. Yule has lately published a new edition of his *M. Polo*, but have not yet seen it.

Among the works to which reference will be made in these pages, I may finally mention Karamzin's *History of Russia* (in Russian), published in 1815—1829, in 12 volumes. This extensive work gives the original text of all the ancient Russian annals in Sclavonian. In vols. iii and iv, the invasion of Russia by the Mongols is treated of, principally from Russian sources.

PART II. NOTICE OF THE KARA-KHITAI OR 西遼 *SI LIAO.*

23. *Kara-khitai* is the name applied by the Mohammedan, and other western authors of the 13th century, to a people originating from eastern Asia, who in the beginning of the 11th century, after an audacious expedition westward, subjugated the territories of central Asia, and penetrated even to Transoxiana. For nearly a century the Kara-khitai maintained their power in Turkistan, until their empire was destroyed by Chinghiz khan, who after having subdued the Tartar tribes in Mongolia, and made several irruptions into China and the Tangut empire, directed his armies towards the west; and there it was next the turn of the Kara-khitai—whose dominions then bordered upon the expanding empire of the conqueror—to experience the invincibleness of his arms. The Kara-khitai in the 12th century had caused much trouble in the Mohammedan countries.

It is needless to say that the name of Kara-khitai was not invented in western Asia; it seems to be of Turkish or Mongol origin; for *kara* means "black" in both languages, and *khitai* is intended for *K'itan*, a people whose original seats were in southern Manchuria, and who in the 10th and 11th centuries were in possession of the northern part of China. Their dynasty in the Chinese annals is called *Liao;* and as the founder of the dynasty of the Kara-khitai was a prince of the Liao, the Kara-khitai are always called *Si Liao* or Western Liao by Chinese authors; the other name being unknown to them. The ancient Mongol records style this people *Karakitat;* which is the plural form of *Karakita*. The reason why in the middle ages the Western Liao of the Chinese were termed *Black Kitan*[13] by other Asiatic nations is unknown. The etymology given in the *Bibliothèque Orientale* (p. 231,—"Cara Cathaï ou Cathaï noir, c'est la partie du Cathai qui est la plus couverte de forets") is absurd.

D'Ohsson has made accessible to the learned world, the

[13] I have only once met with the name of Black K'itan in Chinese books. The Chinese mediæval traveller *Ch'ang Te* (1259) mentions the 黑契丹 *Hei K'itan* (Black Kitan) in Kirman (see my *Notes on Chinese Mediæv. Trav.* p. 90).

accounts found in the writings of the Mohammedan authors, with respect to the Kara-khitai. In the first volume of his history of the Mongols, pp. 441—444, he gives translations from the *Tarikh Djihan Kushai* and the *Djami ut Tevarikh* regarding this people and their history. Chinese records on the same subject have been translated by Visdelou, and published in the *Suppl. à la Bibl. Orient.* pp. 10 sqq. and in Du Mailla's *Histoire de la Chine*, tom. viii, pp. 408, 419. Visdelou translates from the "History of the Liao," giving a very correct and literal version. He has however, occasionally omitted some particulars (*e. g.* proper names), considering them probably unimportant. Du Mailla translates from the Chinese Annals *Kang mu*, the compilers of which seem to have made use of information independent of the *Liao shi*.[14]

I shall present in the following, a new and complete translation of the article on the *Si Liao* found in the *Liao shi*, or "History of the Liao," chap. xxx, at the end of the Annals, reign of *T'ien-tso*, A. D. 1101—1125, the last emperor of that dynasty. This translation will be followed by others on the same subject, not published hitherto, and drawn from the histories of the Kin and Yüan, the *Yüan chao pi shi* and other Chinese or Mongol mediæval works.

24. The *Liao shi* (*l. c.*) reads as follows:—"耶律大石 Ye-lü Ta-shi[15] was the founder of the dynasty called *Si Liao*. He was a descendant in the eighth generation of *Tai-tsu* (or *Apoki*, the first emperor of the Liao). The honorific title 重德 *Chung-te* (highly meritorious) had been bestowed upon him. He was well versed in the literature of the Liao, as well as that of the Chinese (漢 *Han*); and besides this, he was a clever horseman and skilful archer. In 1115 he received the degree of 士 *shi* (doctor) and was admitted a member of the *han-lin* (national academy); and as he was 林牙 *lin-ya*[16] in the academy, he was generally called *Ta-shi lin-ya*. Subsequently he was appointed civil and military Governor in the north-eastern provinces. In the year 1120 the emperor T'ien-tso, pressed hard by the Kin, had abandoned his throne and taken to roving about. Ye-lü Ta-shi then assembled the dignitaries of the empire, and placed on the throne 淳 *Shun*, a prince of the imperial family. But Shun fell

[14] There are some differences in these two records with respect to the same events; and for the dates, the *Kang mu* is generally one or two years in advance.

[15] *Ye-lü* was the name of the reigning family of the K'itan or *Liao*. See my *Notes on Chin. Mediæv. Trav.*, p. 109.

[16] *Lin-ya* seems to be a term of the K'itan language. Visdelou translates it by "académicien."

ill and died,[17] and then his wife *Siao Te* was intrusted with the regency and the defence of 燕 *Yen* (the present Peking, at that time the capital of the Liao). When the army of the Kin arrived at *Yen* (in 1220 according to the Annals of the *Liao shi*), *Siao Te* fled to the emperor *Tien-tso*,[18] who grew very angry, ordering her to be put to death, and reprimanded Ta-shi[19] for having raised to the throne the Prince Shun, whilst the legitimate emperor was still alive. Ta-shi then answered :—'Even at the time when the empire was still in full vigour, your Majesty had not been able once to repulse the enemy, but had fled far away, abandoning the people in their calamities; and had I then placed prince Shun on the throne, the reigning family would still have been descendants of our ancestor T'ai-tsu. Has it not been the more dignified course now thus to act, instead of imploring the enemy for mercy?' To this the emperor had nothing to reply. He entertained Ta-shi with a feast and pardoned him; but Ta-shi did not feel himself in safety, and after having killed *Ki-sie* and *Po-li-kuo*[20] he declared himself sovereign. Then at the head of two hundred well-armed horsemen he departed by night (evidently from *T'ien-te*), and proceeded northward.

25. "After a march of three days they crossed the 黑水 *Hei shui*.[21] There *Ta-shi* met with *Chuang-gur*, the chief[22] of the 白達達 *Po Ta-ta*,[23] who offered him four hundred horses, twenty camels, and about a thousand sheep. Thence proceeding westward, he arrived at the city of 可敦 *K'o-tun*.[24] In

[17] In the same *Liao shi*, beginning of chap. xxx, it is stated that Shun was buried on the hill 香山 *Hiang shan*, west of *Yen*. *Hiang shan* is even now the name of a hunting park in the mountains west of Peking, with ruins of ancient palace buildings.

[18] The emperor of the Liao was at that time in 天德 *T'ien-te*, according to the annals of the *Liao shi*, *sub anno* 1120. *T'ien-te*,—the *Tenduc* of M. Polo (vol. i, p. 249), was near the modern *Ku-ku kho-ton* in southern Mongolia, in the vicinity of the great northern bend of the Yellow river.

[19] Some details regarding the retreat of Ta-shi from Peking are given in the history of the Kin (see further on, note 30).

[20] Probably dignitaries at the court of the Liao emperor.

[21] *Hei shui* or "Black river" may be the same as the *Khara gol* or "Black river" of the Mongols, which is marked also on our maps of Mongolia. It discharges into a lake north of the great bend of the Yellow river.

[22] 詳穩 *siang-wen*. It seems to be a K'itan term.

[23] This is the Chinese name for the *Ongut* tribe. See above, note 3.

[24] The existence of a country or city of this name, seems to be corroborated in the *Kin shi*. In the geographical section (see 西京路 *Si-king lu*, the province comprising at that time, the northern part of the present Shansi and the south-western part of Mongolia), 呼敦 *Hu-tun* is mentioned among the nine countries or rather tribes (in western Mongolia), governed by a *siang-wen* (詳穩九處). Compare also note 45, *Ho-tung*.

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北庭都護府 *Pei-t'ing tu-hu-fu*[25] he rested for some time, and assembled the chiefs of the seven 州 *chou* (cities)[26] and the eighteen 部 *pu* (tribes). The seven *chou* are enumerated as follows :—

1. 威武 *Wei-wu* (*Uigurs*,—see further on).
2. 崇德 *Ch'ung-te.*
3. 會蕃 *Hui-fan.*
4. 新 *Sin.* (There is perhaps a character wanting.)
5. 大林 *Ta-lin.*
6. 紫河 *Tze-ho.*
7. 駝 *T'o.*

The names of the eighteen tribes are also given[27] :—

1. 大黃室韋 *Ta-huang shi-wei.*
2. 敵剌 *Ti-la.*
3. 王紀剌 *Wang-ki-la.*
4. 茶赤剌 *Ch'a-ch'i-la.*
5. 也喜 *Ye-si.*
6. 鼻古德 *Pi-ku-te.*
7. 尼剌 *Ni-la.*
8. 達剌垂 *Ta-la-ch'ui.*
9. 達密里 *Ta-mi-li.*
10. 密兒紀 *Mi-r-ki.*
11. 合主 *Ho-chu.*
12. 烏古里 *Wu-ku-li.*
13. 阻卜 *Tsu-pu.*
14. 普速完 *Pu-su-wan.*
15. 唐古 *T'ang-ku.*
16. 忽母思 *Hu-mu-sze.*
17. 奚的 *Hi-ti.*
18. 糺而畢 *Kiu-r-pi.*

"Ta-shi spoke to the assembled chiefs as follows :—'My ancestors had founded a vast empire and had to endure many trials; nine emperors having successively reigned over it for two hundred years. Now the Kin, who are subjects of our dynasty, massacre our people and destroy our cities. Our emperor

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[25] *Pei-t'ing* was situated at about the place where now *Urumtsi* stands (see further on, the article on Bishbalik). To avoid long explanations I may translate *tu-hu-fu* by "seat of a military governor."

[26] The *Kang mu* in recording the same, says :—"西鄙七州 the seven *chou* at the western frontier."

[27] It seems that the tribes here mentioned, occupied the western part and even the east of Mongolia. 室韋 *Shi-wei* (1) is a name applied since the 4th century of our era, to a considerable tribe, divided into many branches, and occupying the land near the lakè Baikal. See "History of the northern Wei" and "History of the T'ang," chap. cclix*b*. *Ti-la* (2) are perhaps the 鐵勒 *T'ie-le* of the Tang history (chap. cclviia) in which name the Telenguts of Rashid may be traced. The *Wang-ki-la* (3) are perhaps the *Cuncrats; Ch'a-ch'i-la* (4), the *Djadjerats;* and *Mi-r-ki* (10), the *Merkits* of Rashid. By *T'ang-ku* (15) it seems the *Tanguts* are meant. The same name appears in the geographical section of the Kin history, Si-king lu (see note 24). There we find also a tribe *Wu-ku-li* (12) mentioned. We shall see further on, from the accounts of the *Kin shi*, that Ta-shi's influence extended over the whole of Mongolia.

T'ien-tso has been constrained to flee shamefully and abandon the empire, being continually in trouble. Now,—relying on the justice of my cause,—I have come to ask your assistance for the extermination of our common enemy, and the re-establishment of our empire. I am sure you will feel compassion for our distress. Can you see without remorse the destruction of the temples of our tutelary genii. No doubt you will help our emperor and father; nor will you look indifferently upon the misery of our people.' The assembled tribes then raised an army numbering more than ten thousand horsemen, and Ta-shi appointed officers and furnished the troops with arms.

"In the following year (it seems 1121 is meant), in the second month, on the day *kia-wu*, Ta-shi, after having sacrificed a black bull and a white horse to Heaven, to Earth, and to his ancestors, put his troops in order and set out for the west. But he had previously sent to the king of the 回鶻 *Hui-hu* (Uigurs), by name 畢勒哥 *Pi-le-ko*, a letter of the following tenor:—'In times past my ancestor, the emperor Tai-tsu, who directed his army to the north, when passing through the city of 卜古罕 *Bu-gu-han*,[28] sent an envoy to your ancestor *Wu-mu-chu*, in 甘州 *Kan-chou*, with the following message:—Do you still cherish the remembrance of your ancient country? I shall occupy it for you, if you wish to return.—But your ancestor thanked the emperor, saying, that his people had left their ancient abodes for more than ten generations, that all were quite happy in their present country, and that there was no desire to return to their original patrimony. This proves that we have been for a long time on good terms with your people. It is now my intention to advance westward to the 大食 *Ta-shi*,[29] and I ask permission to pass through your country. Do not entertain suspicion.' Pi-le-ko having received this letter, immediately went to meet Ta-shi; and on reaching his encampment, three days were spent in entertainment. When Ta-shi started again, the king presented him with six hundred horses, a hundred camels and three thousand sheep; and to prove his sincerity gave some of his sons and grandsons as hostages; and declaring himself a vassal of Ta-shi, accompanied the latter as far as the boundary of his realm.

26. "Thereupon Ta-shi, proceeding further to the west, vanquished all enemies he met on his road, maintaining peace with

[28] *Bu-gu-han* means *Boca khan*, a famous khan of the Uigurs, who had his residence near the place where afterwards Caracorum was built. For further details see the article on the Uigurs, in Part VI.

[29] By this name the *Arabs* were known to the Chinese. See my pamphlet *On the knowledge possessed by the ancient Chinese of the Arabs, etc.*, pp. 6—16. London, Trübner 1871.

those who surrendered voluntarily. Thus the army advanced ten thousand *li*, overthrowing kingdoms and taking innumerable camels, horses, cattle, sheep and goods. The power of Ta-shi's arms increased from day to day, and also the valour of the soldiers. When he arrived at 尋思干 *Sun-sze-kan*,[30] he met the united army of all the western kingdoms, numbering a hundred thousand men, and commanded by the 忽兒珊 *Hu-r-shan*.[31] The two armies were fronting one another at a distance of 2 *li* apart; when Ta-shi addressed his troops in the following terms:—'We see before us a numerous host, but it wants an able commander. When they are attacked in front, the rear will fail to come to the rescue (首尾不救), and there can be no doubt our army will gain the victory.' After this he formed his troops in three divisions, ordering the princes 蕭斡里剌 *Siao Wa-li-la*, 耶律棕山 *Ye-lü Sung-shan* and others, at the head of two thousand five hundred men to attack the right flank of the enemy; whilst the princes 蕭剌阿不 *Siao La-a-bu* and 耶律木薛 *Ye-lü Mu-sie* received orders to lead two thousand five hundred men against the left flank; and Ta-shi himself with the main body of the army, assaulted the centre. These three divisions rushed at the same time upon the Hu-r-shan, whose army was completely defeated; and to an extent of ten *li* the ground was covered with dead bodies. Ta-shi with his army rested in Sünsze-kan ninety days. The 回回王 *Hui-hui wang* (king of the Mohammedans) came to offer his submission, and brought products of his country as tribute. After this, Ta-shi proceeded to the west as far as 起兒漫 *Ki-r-man*.[32] There all his officers, civil and military (文武百官), assembled and proclaimed Ta-shi emperor (帝). This happened on the 5th day of the 2nd month of 1124 (according to the *Kang mu*, 1125). The emperor, who was then thirty-eight years old, assumed at the same time the title of 葛兒罕 *Go-r-han* (Gurkhan of the Moham. authors), and

[30] *Samarcand*, repeatedly mentioned in my *Notes on Chin. Mediæv Travellers*.

[31] *Hu-r-shan* has some resemblance in sound with *Khorazm Shah*. Cutb-eddin Mohamed, 1097—1127, first took the title of Khorazm Shah for his dynasty. He was a vassal of the Seldjucs, who at that time reigned in Transoxiana and Fergana. The Mohammedan authors however do not record a battle at Samarcand between the Kara-khitai and Khovarezm Shah or the Seldjucs, but mention about fifteen years later a great defeat of the Seldjuc sultan *Sangiar* by the gurkhan of Kara-khitai (see note 61).

[32] Evidently Kerman in southern Persia is not meant, as has been suggested by some commentators (Plath's *Geschichte Ost Asiens*, b. i, p. 100),—but *Kermané*, a place situated between Samarcand and Bokhara, and frequently mentioned by Mohammedan mediæval authors. The city of Kermine still exists.

the Chinese title 天佑皇帝 *T'ien-yu huang-ti;* the years of his reign being named 延慶 *Yen-k'ing.* Ta-shi bestowed also honorary titles upon his ancestors and his wife. After this he assembled the officers and spoke to them as follows:—'We have made together a journey of thirty thousand *li;* we have crossed deserts and suffered many hardships by night and by day. That you may share in my glory, I am about to grant honorary titles to your ancestors.' He then conferred posthumous titles upon the ancestors of the prince *Siao Wa-li-la* and on those of forty-nine other distinguished officers. In the year 1226 Ta-shi conducted his army back to the east. After a journey of twenty days on horseback they reached a fertile land, where a capital was founded, and named 虎思斡兒朶 *Hu-sze wa-r-do.*[33] The name of the reign was then changed to 康國 *K'ang-kuo.*

27. "In the same year *Siao Wa-li-la* was appointed commander-in-chief. (I omit the other appointments mentioned in the Chinese text.) An army of seventy thousand horsemen was raised for an expedition to the east. After having sacrificed a black bull and a white horse to Heaven, Ta-shi ordered a banner to be set up, around which he assembled his troops, haranguing them in the following terms:—'Our great Liao dynasty rose under difficult circumstances; and it was due to the merits of my ancestors, (the great work) was accomplished. But their successors were addicted to pleasure and debauchery, and neglected the government of their people; when riots broke out, and our empire was destroyed. Now I wish to conduct you back to the 朔漠 *So-mo* (Mongolian desert), and to re-establish our ancient splendour. This is no country for me and my people to dwell in.' Thereupon Ta-shi enjoined the commander-in-chief Siao Wa-li-la to move out, giving him the following instructions:—'March out now; take care to reward merit and punish those who do not perform their duties. Try to share conscientiously with your troops, fortune and misfortune (甘苦); choose places rich in grass and water for encamping; before giving battle, take care duly to estimate the strength of the enemy. Be ever cautious not to draw down upon yourself a defeat.' Thereupon the army moved out, and made a march of more than ten thousand *li,* without meeting any success. They lost a great number of horses and cattle, and were constrained to return, the troops being exhausted. Ta-shi then said:—'Heaven is not propitious towards me.' He died in the

[33] Visdelou explains the name of *Hu-sze wa-r-do* by "le fort palais." *Wa-r-do* is evidently intended for *ordo,* "residence," *hu-sze* has some resemblance with *ho-sun,* meaning "strength" in Manchu. For further particulars regarding the capital of the Kara-khitai, see note 57.

10th year of *K'ang-kuo*, or A. D. 1135 (according to the *Kang mu*, in 1136), after having reigned twenty years[34]. He was canonized as 德宗 *Te-tsung*.

28. "When Ta-shi died, his son 夷列 *Yi-lie* was not of full age, and Ta-shi's widow, by name 塔不煙 *T'a-bu-yen*, called also 感天皇后 *Kan-t'ien huang-hou*, was intrusted with the regency. The name of her reign was 咸清 *Hien-ts'ing*. Seven years later Yi-lie himself took charge of the government; and the name of his reign was 紹興 *Shao-hing*, which lasted thirteen years (1142—1155). He ordered a census of the people over eighteen years old, when it was found that there were eighty-four thousand five hundred families in all. After death he was canonized as 仁宗 *Jen-tsung*. His son being still a minor, 普速完 *P'u-su-wan*, the younger sister of the late emperor, undertook the regency and reigned fourteen years (1155—1169). The name of her reign was 崇福 *Ch'ung-fu*, and her title was 承天太后 *Ch'eng-t'ien t'ai-hou*. She had married *Siao To-lu-bu*, the son of Siao Wa-li-la (the above-mentioned commander-in-chief), but held illicit intercourse with her husband's younger brother *P'u-gu dji-sha-li*. She conferred upon her husband the title of 東平王 *Tung-p'ing wang*, but subsequently gave orders to kill him; Siao Wa-li-la however, surrounded the palace with troops, and the empress was killed, together with her lover, by arrow shots.

"直魯古 *Dji-lu-gu*, the second son of Jen-tsung was next proclaimed emperor. His reign was named 天禧 *T'ien-hi*, which lasted thirty-four years (1169—1203). It happened in the autumn of 1203 when the emperor was on a hunting excursion, he was made prisoner by 屈出律 *K'ü-c'hu-lü* prince of the 乃蠻 *Naiman*,[35] who had been lying in ambush with eight thousand men. K'ü-c'hu-lü then took possession of Dji-lu-gu's throne, adopting the dress and customs of the Liao. But he left to the late emperor the title 太上皇 *T'ai-shang-huang*, and to the empress the title 皇太后 *Huang-t'ai-hou*. As long as they were alive, K'üch'u-lu visited them twice a day. Some time after, Dji-lu-gu died and with him the Liao dynasty became extinct."

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[34] If we date his reign from 1124,—the year he was proclaimed Emperor,—then he only reigned eleven years.

[35] *Kü-ch'u-lü* is the *Guchluk* of Rashid. He was the son of *T'ai-yang*, khan of the Naimans, overthrown by Chinghiz. In the *Yüan shi* Guchluk is termed *K'ü-ch'u-lü han*. The *Kang mu* places the date of Guchluk's taking possession of the throne of the Si Liao at 1201, in the 8th month; but the *Yüan shi* states, that he fled to the K'itan only in 1208, which latter date is in accordance with the statements of the Mohammedan authors.

29. Besides the above Chinese record, regarding the Si Liao or Kara-khitai, many other fragments on the same subject may be found in Chinese literature, especially of the Kin and Mongol periods. I may quote some of them in order to complete my accounts from Chinese sources.

The *Si Liao* and *Ta-shi's* exploits are spoken of with some detail in the *Pei shi ki*, or "Account of Western Countries by an Envoy of the *Kin* emperor, sent to Tchinguz khan in A.D. 1220." See my translation of this narrative in *Notes on Chinese Mediæval Travellers*, pp. 100 sqq. Some particulars, which the Kin envoy gives, with respect to the peregrinations of Ta-shi, point to the fact, that his way from Mongolia to Transoxiana led through the *Talki* defile, north of the present Kuldja (*l.c.*, p. 103). The diarist of *Chang-ch'un's* travels to the west, as well as the traveller *Ch'ang Te*, and *Ye-lü Ch'u-ts'ai* in his narrative, all, when passing through Turkistan mention the traces of the K'itan empire (*l.c.*, pp. 35, 74, 114).

Interesting notices throwing some new light on the Kara-khitai are found in the "History of the *Kin*," in one of the biographies, which I shall translate presently. The Kin, after having destroyed the empire of the Liao or K'itan in eastern Asia (1125), and established their dynasty in northern China, extending their power also over a great part of Mongolia, being apparently very uneasy about the foundation of a powerful Liao empire in Turkistan, did not let an opportunity slip of gathering information regarding it; and even sent envoys to them. The following account is translated from the biography of 粘割韓奴 *Nien-ko Han-nu*, in the *Kin shi*, chap. cxxi, where some particulars of the intercourse between the Kin and the Kara-khitai in the 12th century are recorded:—

30. "*Nien-ko Han-nu* was a meritorious officer in the army of the Kin (in the first half of the 12th century). The emperor had granted him as a mark of distinction, a harness, a bow and arrows and a war horse." (After these statements, the biographer interpolates a long notice of the Si Liao, to whom Nien-ko Han-nu was subsequently sent as an envoy. This account is as follows:)

"At the time *T'ai-tsu*[36] passed through 居庸 *Kü-yung*[37] *Ye-lü Ta-shi*, a prince of the Liao withdrew through the defile of 古北口 *Ku-pei k'ou*[38] (the capture of Yen—or Peking—by

[36] The first Kin emperor, called also *Aguta* 1115—1123, who overthrew the Liao.

[37] This is even at the present day the name of a defile and a fortress in it, north-west of Peking. The defile is more generally known to Europeans under the name of the *Nan-kou* pass.

[38] The name of an important defile, north-east of Peking.

the Kin, is recorded in the *Liao shi* under the year 1120); but he appeared again, took 奉聖州 *Feng-sheng chou*,[39] and intrenched his troops 25 *li* east of 龍門 *Lung-men*.[40] This intrenchment was taken by *Lou-shi* (a general of the Kin), and Ta-shi with his troops surrendered. *Ts'ung wang* (also a general of the Kin) captured the heavy baggage of the Liao emperor (the text has 遼主), near the place called 青塚 *Ts'ing-chung*,[41] and on this occasion Ta-shi served as guide. The (Kin) emperor pardoned all the princes and soldiers of the Liao who had been made prisoners, and ordered a communication to be made to Ta-shi, that, notwithstanding his having been taken in arms, the emperor acknowledged his merits; especially on account of the service he rendered in guiding the (Kin) troops. This happened in 1121; but subsequently Ta-shi fled, and it was unknown in what direction.[42]

"In the year 1124 a report was received from the chief of some tribes (in Mongolia) who had surrendered to the Kin, stating that Ta-shi had been proclaimed king (王) in the 北方 *Pei-fang* (northern regions),—that his realm consisted of two provinces, a northern and a southern,—that he possessed ten thousand cavalry horses, numerous herds and great riches in products. The emperor gave orders to continue the pursuit of the Liao prince, and not to neglect at the same time to procure authentic information about Ta-shi.

"In the next year, 1125, one of the governors at the frontier reported a rumour, that the 夏 *Hia* (Tangut empire) was in

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[39] Now *Pao-an chou* (north-west of Peking). I may observe here that my identifications of ancient names of places in China proper, Mongolia and Manchuria, are based upon the geographical dictionary 歷代地理志韻編今釋 *Li tai ti li chi yün pien kin shi*, which is very useful for reference. A new edition with maps has been lately published. The identifications in this work are quite reliable, for the author has drawn his information from the geographical sections of the Chinese dynastic histories. *Biot* published in 1842, a dictionary of the ancient and modern names of places in China (*Dictionnaire des noms anciens et modernes des Villes et Arrondissements de premier, deuxième et troisième ordre compris dans l'empire Chinois &c.*), but his book is too incomplete for exact and detailed researches.

[40] There are several defiles of this name (Dragon gate) in the mountains north and west of Peking.

[41] This happened in 1121 according to the Annals of the *Liao shi*.

[42] With respect to Ta-shi's relations with the Kin, the historians of the Liao and the Kin are in contradiction; or at least the *Liao shi* does not say that Ta-shi had been made prisoner by the Kin; but only states that he repaired to the Liao emperor after the fall of Peking. The *Kang mu*, which seems to have been made from special sources of information, records (Du Mailla, *l. c.*), that Ye-lü Ta-shi, after having been captured by the Kin, near the defile of *Kü-yung*, was released and sent by the Kin emperor to find the Liao emperor, who was wandering about in southern Mongolia.

collusion with Ta-shi, and plotting an invasion of the province of Shansi. The emperor again gave orders to inquire into this matter, and at the same time to arm for war.

"In 1129 a report came to hand from a general commanding in 泰州 *T'ai-chou* (in eastern Mongolia), in which he notified that Ta-shi had already succeeded in taking the two military encampments situated in the regions of the northern tribes. He expressed his apprehensions with respect to the security of the pasture lands (for the imperial horses), which were situated not far from the above-mentioned places. The emperor was at first afraid that the tribes in the north might revolt, if troops should be collected in those regions. However in 1130 *Ye-lü Yü-ta*,[43] and two other commanders were sent to pursue Ta-shi. They had been ordered also to raise troops from the tribes (in the north), but these tribes refused to obey. This expedition proceeded as far as the river 兀納 *Wu-na* and then returned. Ye-lü Yü-ta made a report to the staff (元師府), that Ta-shi was said to sojourn in the country of *Ho-chou* (和州之域),[44] and to be in collusion with the *Hia* (Tanguts).[45] Thereupon the emperor sent an envoy to the Hia, to demand an explanation; but they replied that they had heard nothing of Ta-shi, and that their country was not contiguous to Ho-chou.

31. "In the year 1144, envoys from the 回紇 *Hui-ho*[46] came to the capital of the Kin, to pay tribute; and they stated, that Ta-shi was not then alive, but that his people dwelt in their (*i.e.* the Hui-ho's) vicinity. Then *Han-nu* (in whose biography all

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[43] A prince of the Liao, who had deserted and entered the army of the Kin.

[44] *Ho-chou* is the same as *Karakhodjo* near Turfan. See further on, article Karakhodjo in Part VI.

[45] The *Kang mu* in recording the expedition of Ye-lü Yü-ta (Du Mailla, *l. c.*) states, that he started with ten thousand men to look for Ta-shi, who was said to approach Ho-chou. As the Kin did not put absolute trust in Ye-lü Yü-ta, his family were retained as hostages. Yü-ta advanced as far as the city of 曷董 *Ho-tung* north of the desert, more than three thousand *li* distant from *Yün-chung* (the present *Ta-t'ung fu* in northern Shansi). But this expedition missed its aim, and only devastated the provinces of *Yen* (northern Chili), *Yün-chung* and *Ho-tung*, which had to furnish the troops with provisions. (See *Kang mu*, *sub anno* 1131.) The city of *Ho-tung* mentioned here is probably the *K'o-tun* in Ta-shi's itinerary, and the *Hu-tun* of the *Kin shi* (see note 24). The rumour spread about the approach of Ta-shi towards Ho-chou in 1130, as reported in the *Kin shi* and the *Kang mu*, seems to have been in connection with the great, but unsuccessful expedition sent by Ta-shi to the east about the same time (see above, 27,—the translation from the *Liao shi*).

[46] Mohammedans, or perhaps Uigurs are to be understood. Regarding the term Hui-ho, see 41.

these accounts are recorded) received orders to accompany the envoys of the Hui-ho to their country; and the honorary title 武義將軍 *Wu-yi tsiang-kün* (the brave and loyal general) was conferred upon him. He departed, and afterwards nothing more was heard of him. Under the reign of *Ta-ting* 1161—1190, a merchant of the Hui-ho, 移習覽 *I-si-lan* by name, arrived with three companions at the south-western frontier (of the Kin). These merchants gave the following statement:—'Our native country is called 鄒括 *Dsou-gua* (the Chinese biographer adds,—that is the name of a foreign tribe). The name of the capital is 骨斯訛魯朶 *Gu-sze o-lu-do*.[47] The people of this country are not of warlike character, but are engaged in agriculture, and every year pay one tenth of their produce to the government. Old men state, that in times past, when the K'itan arrived, they (*i. e.* the people of Dsou-gua) surrendered without offering any resistance. The encampment (屯營), in which the K'itan live, is so large, that it takes half a day to ride round it.[48] A short time ago the ruler of the K'itan had sent *A-ben-sze*, his son-in-law, with ten thousand men to subdue the 葉不輦 *Ye-bu-lien* and other tribes, but his expedition was not successful. The war however is not yet finished.' The emperor ordered these Hui-ho, who had brought this information, to be settled near 或平府 *Hien-p'ing fu* (now *Tie-ling hien* in southern Manchuria), where settlements of the Hui-ho had existed from olden times. In the same year *Sa-li-ya* chief of the 粘拔恩 *Nien-ba-en*, and 孛古 *Bo-gu* chief of the 康里 *K'ang-li*[49] and other tribes, sent envoys and begged to be admitted as vassals of the Kin emperor. They offered the seal given to them by Ta-shi, and solicited a new seal from the Kin. The emperor gave orders to instruct the governor at the south-western frontier, to send officers to these countries, to inquire into the sincerity of these tribes; whereupon an envoy was dispatched, together with an interpreter. They saw *Sa-li-ya*, who maintained his sincerity; and from him they heard also of the fate of *Han-nu*. Sa-li-ya told them, that many years ago the Kin emperor had sent an envoy named *Han-nu*, by way of 和州 *Ho-chou* (see note 44) to the dominions of Ta-shi. He had met Ta-shi, when he was on a hunting

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[47] Evidently the same as *Hu-sze wa-r-do*. See 26.

[48] Compare, further on (37), the statements of Rubruquis, about the remains of the encampment of the K'itan.

[49] By *K'ang-li*, the *Kankly* of the Mohammedan authors are meant. I shall speak more fully of this people further on (64). I know nothing about the *Nien-ba-en* and *Ye-bu-lien* tribes and the country of *Dsou-gua*, mentioned in this article.

excursion, and had been asked by him why he did not get down from his horse. Han-nu had replied that he was the envoy of the Kin emperor and that it was the place of Ta-shi to dismount, in order to listen to the imperial message; upon which Tashi had ordered Han-nu to be put to death. Such was the information the envoy brought back to China."

32. Let us turn now to the records of *Mohammedan historians* regarding the *Kara-khitai*. (Compare D'Ohsson, *l. c.* tom. i, pp. 441—443.) Rashid-eddin has gathered the following information with respect to this dynasty:—

"After the sovereign of the *Churchés*[50] had destroyed the empire of the *Kara-khitai*,[51] a prince by name *Nushi Taifu*,[52] standing in high esteem in his own country, fled, first to the country of the *Kirghiz*, then passed to the *Uigurs*, and finally arrived in *Turkistan*. Being a man of high intelligence and capacity, he succeeded in rallying a considerable force in these countries and conquered the whole of Turkistan; whereupon he took the title

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[50] The *Churchés* of the Mohammedan writers, are the same as the 女直 *Nü-chi* of the Chinese authors,—a people of Manchu race, who came to power in the beginning of the 12th century, overthrew the empire of the Liao, and founded a dynasty in northern China, Mongolia, etc. under the name of the 金 *Kin* ("Golden" dynasty). The Persian chroniclers heard the name *Churché* probably from the Mongols; for this seems to have bee the proper name of this nation. In the 大金國志 *Ta kin kuo chi*, or "History of the Kin nation" (see Wylie's *Notes on Chinese Literature*, p. 24), I find a statement, that the Nü-chi or Kin were properly called 朱里眞 *Chu-li-chen*. The name Nü-chi, was also known to the Mohammedan authors. We read in Abdallah Beidavi's *Historia Sinensis*, p. 15:—"Conterminus est hisce alius ruricola populus. Quem Chataji *Niu-che* vocant. Mogolibus vero aliisque populis *Hurge* dictum. Ex his vir exiit, cui *Huonyen Agudai* nomen erat; *Dai-gim* agnomen." Here *Dai-gim* is evidently intended for 太金 *T'ai kin*, the "Great *Kin*." The name of the founder of the Kin dynasty is written 阿骨打 *A-gu-da* in the *Kin shi*.

[*Huonyen* is the Nü-chi word for "Prince,"— 完顏 *Wán-yen*, in constant use through the Kin history.—Ed. Com.]

[51] Rashid terms the *Liao* dynasty in eastern Asia also *Kara-khitai*.

[52] On page 163 (tom. i) D'Ohsson states, that Rashid terms the founder of the dynasty of the Kara-khitai *Tushi Taifu*. Thus *Nu-shi* must be a misprint or a clerical error in the Persian MS. *Tushi* seems to be the correct reading, for it is nearer to *Tashi*, which as we have seen was the name of the founder of the Si Liao dynasty, according to the *Liao shi*. D'Ohsson states (*l. c.*), evidently on the authority of some sinologue, that *Taïfu* in Chinese means "général en chef." This view is not correct. 太夫 *T'ai-fu* (lit. meaning "great man") now means a physician, but only in the popular language;—it is rarely met with in books. But 大夫 *Ta-fu* (meaning also "great man") is an old term, an honorary title, applied however, not to military, but only to civil officers.

of *gurkhan*, meaning 'great khan.' These events took place in 1128 and 1129.[53]

"After Nushi Taifu's death, his son, who was then only seven years old, was proclaimed gurkhan. He lived to the age of ninety-five and died about 1213. When Chinghiz was born, the gurkhan was thirty-four years old, and had already reigned twenty-five years."[54]

33. The author of the *Tarikh Djihan Kushai* gives more detailed accounts of the Kara-khitai. He records as follows:—"The khans of Kara-khitai derive their origin from *Khitai*. The founder of this empire had a great reputation among his own people; but had been constrained by political events to leave his native country. He assumed the title *gurkhan*, meaning 'universal khan.' It is reported that when he left Khitai he was accompanied by only sixty followers;[55] but some assert, that he was at the head of a numerous army. These emigrants first reached the frontier of the *Kirghiz*, making incursions upon their territories; but after the latter had taken measures to repulse the aggressors, the Khitai withdrew to the country of *Imil*,[56] where they founded a city, of which the ruins are still to be seen. The tribes of the *Turks* submitted to the Khitan prince, who after a short time found himself at the head of forty thousand families. He conducted his army to *Bela-sagun*, a city which is now called *Gu-balik* by the Mongols.[57] The sovereign of this country, who

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[53] Four or five years earlier (1124) according to the *Liao shi*.

[54] According to the Chinese authors (*Liao shi*), Ta-shi was succeeded in turn by his son and grandson. The latter was on the throne thirteen years, 1169—1203. Thus Rashid has omitted one of the gurkhans; but he may be more correct than the *Liao shi*, in stating that the last gurkhan of the Kara-khitai died about 1213. The *Liao shi* puts this event earlier. As to the dates in the history of the Kara-khitai, the *Yüan shi* is in accordance with Rashid. See note 35.

[55] By two hundred, according to the *Liao shi*.

[56] *Imil* or *Emil* is even in our day the name of a river in Russian Turkistan. I shall speak more fully of this country in Part VI.

[57] It may be the proper place here, to say a few words on *Bela-sagun* and its position, as far as it can be ascertained from the fragmentary accounts of this place given by the Mohammedan, Mongol and Chinese authors. We shall see further on (see the article on the Uigurs), that according to the *Tarikh Djihan Kushsi*, the city of Bela-sagun had been founded by a khan of the Uigurs (in the 10th century it seems), in a well-watered plain of Turkistan, with rich pastures. The *Bibl. Orient*, p. 891, art. *Turcs*, mentions Bela-sagun as the capital of Turkistan in the first half of the 11th century. We read in the same work, p. 690, art. Otrar (on the Yaxartes), that this city was not very far from Bela-sagun; and p. 166, that Bela-sagun lies beyond the Sihon (or Yaxartes), and less distant from it than Cashgar. Deguignes states (*Hist. des Huns*, tom. iii, p. 252), that the khan of Turkistan, who had his residence at Bela-sagun and was dethroned by the Kara-khitai, was a Uigur prince, by name Illik-khan. The Mohammedan authors also

was descended from *Efrassiyab* (a mythical king of the Turks, spoken of in the ancient Persian chronicles), at that time had lost

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mention Bela-sagun as the capital of the Kara-khitai in the 12th century and the beginning of the 13th; and for this period we find many notices in Chinese and Mongol works, pointing to the position of this place. We have seen, that according to the *Liao shi*, the founder of the western Liao dynasty had established his residence twenty day's journey east of *Kermané* (the latter place being situated between Samarcand and Bokhara). This residence is named there *Hu-sze wa-r-do*. We have further seen, in the report of some Mohammedans, who came to China from the country of the western Liao in the second half of the 12th century, that mention is made of a city *Gu-sze o-lu-do* in the vicinity of the encampment of the Kara-khitai. Hu-sze wa-r-do and Gu-sze o-lu-do are evidently the same name. *Ye-lü Ch'u-t'sai* (1219; —see my *Notes on Chin. Mediæv. Trav.* p. 114) states, that *Hu-sze wo-lu-do* the capital of the Si Liao is situated west of the river *I-lie* (Ili). In the *Yüan shi*, chap. cxx, biography of *Ho-sze-mai-li*, the same name is spelt *Gu-dse wa-r-do* (*Chin. Med. Trav.* p. 114, note 24). I have little doubt that these names, applied by the Chinese authors to the capital of the Kara-khitai, are identical with Bela-sagun. In the *Yüan ch'ao pi shi*, we find a more precise indication of the position of this place; for it is stated there (Palladius' translation, p. 72), that *Ung khan* had fled (close of the 12th century) to the gurkhan of the Kitan, who lived on the river *Chui*. This river, marked on our maps as *Chu* or *Choo* (on modern Chinese maps it is still styled 吹 *Ch'ui* takes its rise in the mountains west of lake Issikul, and is also connected with that lake. In Ch'ang-ch'un's narrative (*Chin. Med. Trav.* p. 50), the *Ch'ui* river is also noticed. As the *Chu* or *Chui* river and its numerous tributaries now belong to Russian Turkistan, it may be expected, that some vestiges of the ancient capital of the Kara-khitai will be discovered by Russian archæologists. In the *Transactions of the Russian Geograph. Soc.* 1871, vol. ii, p. 365, it is stated, that the best pasture land in Turkistan is found on the river *Chui*. This agrees well with the statement in the *Tarikh Djihan Kushai* (D'Ohsson, tom. i, p. 433) that Bela-sagun had been founded in a well-watered plain within rich pastures. I am inclined to suppose, that the name of *Bela-sagun*, or *Balasgun* as it is sometimes spelt, is a corruption of *balgasun*, which in Mongol means "city." It is not unlikely, that this word was used also with the same meaning by the Turkish tribes. The author of the *Tarikh Djihan Kushai* states (*l. c.*), that the Mongols of his time designated Bela-sagun by the name of *Gu Balik*. It seems to me that this latter name presents some resemblance to the Chinese *Gu-tse wa-r-do*, for *balik* and *ordo* ("city" and "residence") have nearly the same meaning. It is worthy of note, that *Mr. Spruner*, who, I should think, had not access to the afore-mentioned Chinese and Mongol accounts of the capital of the Kara-khitai, has placed Bela-sagun on the river Chu. Compare his *Historical Maps of Asia*, No. 5. Klaproth was not aware of the position of Bela-sagun; at least he did not mark it on the maps accompanying his *Tabl. Hist. de l'Asie*. Col. Yule, on the map appended to his *Cathay etc.* puts Bela-sagun (with a ? however) between Bishbalik and Caracorum. It is not improbable that ancient Bela-sagun was situated at the same place, where according to the "History of the T'ang" (*T'ang shu*, chap. cclvb *sub fine*) the khan of one branch of the western *T'u-küe* (Turks) had his residence, in the 8th century. It is stated there, that his residence was on the river 碎葉 *Sui-ye*. A century earlier, the Buddhist monk *Hüan-tsang* proceeded from China to Samarcand, by a route south of the Celestial mountains, and along the southern border of the 清池 *Ts'ing ch'i* (Limpid lake). The descrip-

his power, and had ceased to reign over the tribes of the *Karluks* and *Kankalis*, who even made incursions upon his territories. When the Kara-khitai approached his country, the sovereign sent envoys to their chief, and invited him to take possession of his realm.[58] The Khitan prince then arrived at Bela-sagun, and the descendant of Efrassiyab abdicated, merely reserving the title *Ilk Turkan*, or 'Chief of the Turks.' After this the gurkhan of Kara-khitai appointed governors in all the provinces of his empire, from *Kum-kidjik* to *Barser-djan* and from *Taras* to *Tamidj*.[59] Subsequently he

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tion he gives of the lake leaves no doubt that he passed by the lake Issikul). A hundred *li* north-west of it he arrived at 素葉水城 *i. e.* "the city on the river *Su-ye*," where the merchants of different countries met. Hüan-tsang's river *Su-ye* is the same as the *Sui-ye* of the T'ang history, and only the *Ch'ui* (or *Chu*) river can be meant. In the same *T'ang shu.*, chap. cclviii*b*, article 石 (Shash, Tashkand), we read that the city of *Sui-ye* was west of the lake 熱海 *Jo-hai* (hot lake) which does not freeze even in winter. I am not aware, whether the *Balkash* or the *Issikul* is meant. In the same article it is stated, that the river *Sui-ye* has a length of a thousand *li*, and that the city of *Sui-ye* was destroyed A. D. 748, by a Chinese governor of 北庭 *Pei-t'ing* (the present Urumtsi).

[58] Compare the report of the Mohammedan merchants found in the *Kin shi* (see above, 31), that Gu-sze o-lu-do had surrendered to Ta-shi without offering resistance.

[59] With the exception of Taras, the places or countries here noticed are unknown to me. *Kum* means "desert." With respect to *Barser-djan* I may mention, that Du Halde, in the map of China appended to his history of China, 1734, places "*Bersagian la Haute ou Sairam*,"—I am not aware on what authority,—on the river Talas. A city of *Taras* or *Talas* is often mentioned by the Mohammedan mediæval writers, and also by the Chinese authors. Talas is still the name of a river in Russian Turkistan, and the city of the same name seems to have been situated on that river; at least this may be concluded from the narratives of the Chinese mediæval travellers *Ch'ang-ch'un*, *Ch'ang Te* and *Ye-lü Ch'u-t'sai*, all of whom went through Turkistan by the same route. The first, mentions the crossing of the river *Tala-sze*; the others, speak of a city of this name which they passed through. (compare my *Notes on Chin. Med. Trav.* pp. 34, 75, 114). Talas was situated on the great highway leading from Mongolia to Persia. Thus Haithon, king of Little Armenia, on his way home from Mongolia in 1255, also passed through Talas, and saw there the prince Hulagu, who was on his way to Persia (see Haithon's narrative at the end of this paper). Mr. *Vivien de St. Martin*, in his geographical commentary on Stan. Julien's translation of the *Si yü ki* (*Mém. s. l. Contrées Occident.* tom. ii, pp. 267—273) places the city of 呾羅私 *Ta-lo-sze*, mentioned in the itinerary of Hüan-tsang, near the Yaxartes. Hüan-tsang states, that proceeding from the river *Su-ye* (the *Chu* as we have seen) 400 *li* westward, one arrives at a well-watered country called 千泉 *Ts'ien-ts'üan* (the name means "thousand springs"), which on the south is bordered by snowy mountains, and on the three other sides by plains. About 150 *li* further to the west is the large city of *Ta-lo-sze*. M. Vivien de St. Martin at first identifies Ts'ien-ts'üan with a place, *Ming bulak*, found on our maps of Asia, south of the lake Karakul, into which the river Talas

subdued the *Kankalis.*[60] His troops conquered *Kashgar* and *Khotan;* he sent also an expedition against the *Kirghiz. Bishbalik* was taken, and *Fergana* and *Transoxiana*[61] submitted. Thus the

empties itself. It seems Mr. Vivien has been guided in his views, only by the fact that Ming bulak also means "thousand springs" (in Mongol and other languages); but as I have been assured by a friend, who has travelled much in Russian Turkistan, Ming bulak is a quite frequent name for places there. It is the same with respect to Mongolia. It seems to me that Hüan-tsang's "Thousand springs" bordered on the south by snowy mountains, must be rather looked for somewhere on the northern slope of the high mountain range, stretching from Lake Issikul westward, and marked on Russian maps as *Alexander's chain.* Many rivers and torrents, tributaries of the Chu, run down from these mountains, which are very rich in watercourses. The great highway from Kuldja to Tashkand crosses all these rivers, and also the *Talas* at *Au-lie-ata;* and I have little doubt that Hüan-tsang's way from the river Chu to *Chash* (Tashkand) followed the same direct route along the northern slope of Alexander's chain. But Vivien carries the traveller far north to Ming bulak, and then locates his Ta-lo-sze near the Yaxartes, a little east of Otrar (see Vivien's map). Thus he makes the traveller take a round-about way. Klaproth suggests (*Nouv. Journ. Asiat.* tom. xii, p. 283) also, that the city of *Taras* was situated on the Yaxartes, and ought not to be confounded with the city of *Talas* on the river of the same name. But as neither Vivien nor Klaproth have produced evidence for their views, that ancient Taras was situated on the Yaxartes, I maintain my supposition that *Taras* and *Talas* of the Mohammedan authors are the same, and that the *Ta-lo-sze* of the Chinese is also the same place. Rashid states (D'Ohsson, tom. iii, p. 126) that *Argun*, the Mongol governor in Persia, on his way home to Mongolia (1248 or 1249) passed through *Taras*, where he heard of the death of Cuyuk khan. There is no necessity for assuming that Argun went from Persia to Mongolia by another way than the afore-mentioned *Chinese* mediæval travellers and king Haithon, who all speak of a city *Ta-lo-sze* or *Talas* on their route. As the ancient Chinese itineraries agree in locating *Ta-lo-sze* on the direct road from *Almalik* (Kuldja) to *Sairam*, the city was probably situated near the place, where on the Russian maps *Au-lie-ata* is marked. The most ancient mention of a place called *Talas* occurs, it seems, in the narrative of Zemarchus' embassy to the khan of the Turks, in the 6th century (Yule's *Cathay*, p. clxv). A century later, the name appears in Hüan-tsang's narrative and also in the Chinese annals. In the *T'ang shu*, chap. cclviii*b*, article 石 *Shi* (Chash,—Tashkand) we find 怛邏斯 *Ta-lo-sze* mentioned as a city situated west of the river *Sui-ye* (*Chu*, — see above, note 57). The king of Shi is stated to have kept a garrison there. Compare also Deguignes, *l. c.* tom. ii, p. 500. The Mohammedan authors often associate *Taras* with *Belasagun.* It seems the distance between these cities was not great. Compare also Deguignes, tom. iii, pp. 219, 229. Rubruquis mentions a city and a kingdom of *Talas*, but he was not himself there. As he states (p. 280) he was told, when proceeding from the Volga to Cayalic, that the city of *Talas*, situated in the vicinity of mountains, was distant six day's journey from the route he followed. On page 279 he says :—"Quesivi etiam de *Talas* civitate in qua erant *Teutonici* servi *Buri*, *etc*" (on these Germans and Buri, see 81, and article *P'u-la* in Part VI.

[60] Compare the Chinese records above (32). The *Kang-li* offered the seal of the Kara-khitai to the Kin emperor.

[61] The *Bibl. Orientale*, p. 741, states, that the Seldjuc sultan *Sandjar* (who reigned over Transoxiana, Fergana, etc.) conducted his host against the

predecessors of Sultan *Osman* (of Samarcand) became the gurkhan's vassals. After having accomplished these conquests, he sent his general *Ernuz* against *Khorasm*, who carried fire and slaughter through this country. *Atsiz Khorasm shah* offered his submission and paid a large tribute; when Ernuz withdrew. Some time after, the gurkhan died, and his widow *Kenyunk* occupied the throne. She was subsequently convicted of an illicit intercourse, and killed together with her lover.[62] One of the two brothers of the deceased was then placed on the throne.[63] The sultan *Tacash*, successor of Atsiz, continued to pay tribute to the gurkhan of Kara-khitai, and was on good terms with him. He also recommended his son and successor to follow the same policy in regard to the gurkhan, whose empire was a strong barrier to protect Khorasm from the dreaded people of the east."

34. The Mohammedan authors do not record the names of the gurkhans of Kara-khitai, as the *Liao shi* does; but they give detailed accounts of the reign of the last khan of this dynasty, who was dethroned by the Naiman prince *Guchluk*. The following are the chief points of the Mohammedan records on this subject, translated by D'Ohsson, *l. c.*, tom. i, pp. 105—166:—

"*Guchluk*,—after his father *T'ai-yang*, khan of the Naimans had been slain, and the power of the Naimans had been broken by Chinghiz khan,—made a league with *Tucta*, khan of the *Merkits*, A. D. 1208. Chinghiz' army attacked Guchluk and Tucta,—who had rallied their active force on the river *Irtysh*,—and defeated them near the river *Djem*.[64] Tucta was slain, but Guchluk escaped and fled, at first to *Bishbalik*, then to *Kudja*, and finally arrived, in 1208, in the dominions of the gurkhan of Kara-khitai,[65] where he found shelter, and was well received

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Gurgiasb (probably Gurkhan is the correct reading) of the *Karakatai* (in 1141 according to Deguignes); but he was defeated and the Karakatai captured his harem. Sandjar fled to *Termed*.

[62] Evidently *Pu-su-wan*, the younger sister of the successor of Ta-shi (see the Chinese accounts above, 28) is meant. She was in fact killed together with her lover.

[63] A grandson of Ta-shi according to the Chinese authors.

[64] The Annals of the *Yüan shi*, *sub anno* 1208, report the same, without mentioning the river where the battle took place. But in the biography of *Ba-r-dju a-r-te te-gin*, king of the Uigurs (*Yüan shi*, chap. cxxii, where the war with Guchluk and Tucta is also recorded), the river in question is styled 襜 *Ch'en*. In the biography of *Su-bu-t'ai* (*ibid.* chap. cxx), it reads 蟾 *Shen*. In the *Ts'in ch'eng lu*, it is 嶄 *Ts'an*. Probably one of the affluents of the upper Irtysh, in the Mongol period had a similar name.

[65] As I shall prove further on, ancient *Bishbalik*, the capital of the Uigurs was located near the site of the present *Urumtsi*. D'Ohsson identifies *Kudja* with *Kucha*, a place south of the Celestial mountains, west of Kharasha. The *Yüan ch'ao pi shi* (Palladius' translation, p. 110) states that *Guchuluk*, after

at the court. The gurkhan even gave him his daughter in marriage; but some time after, Guchluk formed a plot to dethrone his benefactor. Having obtained the permission of the gurkhan, to receive in his empire the remnants of the Naiman tribes, who were scattered over the countries of Bishbalik, Imil, and Cayalic, Guchluk collected a considerable force, consisting of Naimans and Merkits, and entered into league with Mohammed, sultan of Khovaresm, and Osman prince of Samarcand, both vassals of the gurkhan. Mohammed and Osman attacked the Kara-khitai; and Guchluk tried at the same time to take the capital, *Bela-sagun;* but his troops were defeated by the Kara-khitai near the river *Chinbudje*, and Guchluk was obliged to retreat. At the same time the troops of Mohammed and Osman entered the dominions of the gurkhan, and gained a victory over him beyond the city of *Taras;* when Guchluk taking advantage of this event, succeeded in dethroning his father-in-law. This happened in 1211 or 1212, two years after which, the old gurkhan died. He was however treated with great respect by Guchluk to the end of his days. After having strengthened his authority on the throne of Kara-khitai, Guchluk marched against *Ozar* prince of *Almalik* and ordered his execution. The people of *Kashgar* and *Khotan*, who had withdrawn allegiance from the usurper, were reduced to obedience by Guchluk's troops, who during several years devastated these countries. Guchluk was a cruel persecutor of Islam. He was himself a Nestorian Christian, as most of the Naimans were; but after his marriage with the daughter of the gurkhan of Kara-khitai, he became Buddhist."

Destruction of the empire of the Kara-khitai by the Mongols in 1218.

35. With respect to the events above spoken of, the Mohammedan authors give the following short account (D'Ohsson, tom. i, p. 172):—

"When Chinghiz prepared his expedition to the Mohammedan countries in western Asia, he dispatched a body of twenty thousand men under the command of the *Noyen Chebé*,[66] in 1218,

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having lost the battle (on the *Djem* river) fled through the countries of the *Weiwu* (Uigurs) and the *Kharlu* (Karluks) to the river *Ch'ui*, where he made a league with the gurkhan of the *Khara kita*. The date 1208, given by the Mohammedan authors for the arrival of Guchluk in Kara-khitai, is in accordance with the *Yüan shi*.

[66] *Noyen* is a Mongol title. It occurs frequently in the *Yüan shi*, where the term is spelt 那顏 *No-yen*. *Che-bé* was a famous general in Chinghiz khan's army. His name will be met with frequently in these pages.

against Guchluk, who at that time was in *Kashgar*. When Chebé approached, Guchluk fled. The Mongol general proclaimed religious liberty, and the people massacred Guchluk's soldiers. After this the Mongols pursued Guchluk, and captured him in the mountains of *Badakhshan*. Chebé ordered him to be beheaded."

36. The accounts of the Chinese and Mongol authors regarding the same events, although only fragmentary, corroborate the statements of the Persian historians, and even throw some new light on the subject.

In the biography of *Ho-sze-mai-li* (Ismael?),—*Yüan-shi*, chap. cxx,—it is stated, that "he was a native of 谷則斡兒朶 *Gu-dse wa-r-do* (see note 57), and a confidant of the 闊兒罕 *kuo-r-han* (gurkhan) of the *Si Liao* (or Kara-khitai). He governed the two cities 可散 *Ko-san* and 八思哈 *Ba sze-ha*, subject to Gu-dse wa-r-do. At the time of Chinghiz khan's expedition to the west, he surrendered, together with the chiefs of these cities,[67] and then entered the avant-guard commanded by 哲別 *Dje-bie* (Noyen Chebé;—see note 66). When the *Nai-man* were attacked, Ho-sze-mai-li killed their khan 屈出律 *Kü-ch'u-lü* (*i. e.* Guchluk), and Dje-bie ordered him to take the head of the victim, and carry it through the cities of his empire (*i. e.* the empire of Kara-khitai). After this, the cities of *K'o-shi-ha-r* (Kashgar), *Ya-r-k'ien* (Yarkand) and *O-duan* (Khotan) surrendered to the Mongols."

The *Yüan ch'ao pi shi* states (Palladius' translation, p. 131):—"Chinghiz ordered Djebie to attack *Guch'uluk*. Djebie pursued him to the country called *Salikhkun*,[68] killed him and then returned."

According to Rashid, who narrates some anecdotes in the life of this hero, he belonged to the Mongol tribe of the *Yissuts* (D'Ohsson, tom. i, p. 172). In the *Yüan shi*, where mention is repeatedly made of his exploits, the name is written 哲伯 *Dje-bo* or 哲別 *Dje-bie*. It is strange that his biography has been omitted from the *Yüan shi*, whilst those of all the other illustrious men of the Mongol period are found there. See further on, 61, on Chebé's death.

[67] When commenting upon *Ye-lü Ch'u-ts'ai's* travels (*Notes on Med. Trav.* p 114), I translated a part of this notice, suggesting that the city of *K'o-san* mentioned in it, may be identical with the city of the same name marked on the ancient Chinese map, appended to this paper; north-east of Marghinan. But now I see the possibility of another identification, which at the same time would corroborate M. Polo's account of Badakhshan. The great traveller mentions in this country, or about it, the province and town called *Casem*, subject to a count (vol. i, p. 145); and at page 155, the province of *Pashai* (Ibn Batuta writes the same name *Bashai*). I am inclined to see in the cities *K'o-san* and *Ba-sze-ha* of the *Yüan shi*, M. Polo's *Casem* and *Pashai*. It is true, it is nowhere stated that Badakhshan was subject to the Kara-khitai; but it is not impossible that it was so; especially as according to the Persian authors, Guchluk, when pursued by the Mongols fled to Badakhshan.

[68] As the Mohammedan authors record, that Guchluk was captured and

The *Yüan ch'ao pi shi* records this event erroneously under the year 1206; but the *Ts'in ch'eng lu* agrees with Rashid, in placing the destruction of the empire of the Kara-khitai under the year 1218. (Palladius' translation, p. 191). It is stated there, that Chinghiz sent the great general Dje-bie against *K'ü-chu-lu ko-han*. He pursued him to the place *Sa-li-huan*, where K'ü-chu-lu was defeated.

37. *Plano Carpini*, who passed through the country of the Kara-khitai in 1246, gives in his narrative, p. 648, some details regarding the struggle between this people and the Mongols. We read there:— "*Naimani* etiam et *Kara-Kitai*, id est *nigri Kitai*, ex adverso plurimi in quandam vallem strictam inter duos montes, per quam nos euntes ad Imperatorem eorum transivimus,[69] similiter convenerunt: et commissum est prælium, in quo Naimani et Kara-Kitai a Mongalis sunt devicti, et major pars eorum fuit occisa, et alii qui evadere non potuerunt in servitutem redacti sunt."

It may be concluded from Carpini's report, that the battle of which he speaks took place in western Turkistan. The Mohammedan authors do not mention this expedition.

Rubruquis, who saw the country of the Kara-khitai a few years later, states (pp. 259 sqq.), that the *Caracatay* or *niger* Catay inhabited in former times certain mountain pastures, which he passed through; and in certain plains among these mountains their *Coir chan* dwelt, who was deposed by a *Naiman* chief (Guchluk). On p. 280, he mentions the country of the Caracatay again, with a great river in it (the *Chu*), and a valley with old intrenchments of earth.

38. It is a fact worthy of notice, that some descendants of the people of Kara-khitai still exist, it seems, in Fergana. At least *Mir I'zzet Ullam*, who visited central Asia in 1812, mentions a city called *Kara-khatai*, between Marghinan and Kokand, inhabited by Kara-khatai people, who are Mohammedans (Klaproth, *Magazin Asiatique*, tom. ii, p. 45). This Kara-khatai is probably identical with *Kitai*, marked between Marghinan and Kokand on the map of Turkistan, Kokand etc. in Petermann's *Mittheilungen*, 1874, vi.

PART III. CHINESE MEDIÆVAL NOTICES OF THE MOHAMMEDANS.

39. It was under the emperor *Wu-ti* of the great Han dynasty

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executed in Badakhshan, we have to look for *Salikhkun* or *Sa-li-huan* in this country.

[69] The Chinese traveller *Ch'ang Te* (see my *Notes on Chin. Med. Travellers*, p. 74) mentions a place, *Yi-tu* situated between two mountains in the country of the Kara-khitai. He passed *Yi-tu* four days before reaching *Talas*.

(B. C. 140—86), that the Chinese first became acquainted with the countries west of the Bolor mountains. About B. C. 122 the adventurous Chinese general 張騫 *Chang Kien* returned,—after having been absent for more than ten years,—from the countries of the Yaxartes and Oxus. After he had opened up communication between China and the kingdoms of the far west, the intercourse of the Middle kingdom with western Asia by water or overland, was maintained with short interruptions during many centuries, by the several dynasties which successively reigned over the whole of China or a part of it. Thus the Chinese were acquainted with the nations who now profess Islam, long before Mohammed had made his appearance. The *Parthians* (dynasty of the Arsacides B. C. 242—A. D. 228) were known to them under the name of 安息 *An-si*. From the middle of the 5th century of our era, mention is made in the Chinese annals, of the country or people of 波斯 *Po-sze;* and the notices given of it leave no doubt, that *Persia* is meant. Many embassies from Po-sze to China are recorded in Chinese history from the 5th to the 7th century, and in the "History of the T'ang" we find even some particulars on *Yi-sze-sze* (Yezdejerd III) the last king of the Sassanides, who was slain by the Arabs.

The *Arabs* are spoken of in the Chinese annals, soon after the rise of Islam. The great T'ang dynasty, 618—907, was contemporary with the rise and prime of Arabian power. In the "History of the T'ang," the Arabs are always styled 大食 *Ta-shi*. By these two characters the ancient Chinese represented doubtlessly a foreign name, probably *Tazy*. According to D'Ohsson (*l. c.* tom. i, p. 217), this was the name by which the Arabs were known to the ancient Persians. The Arabian legends regarding Mohammed are recorded by the Chinese authors quite in accordance with Mohammedan tradition; and the accounts of the first conquests of the Arabs are also reported by them with tolerable correctness. The *T'ang shu* notices also several embassies of the califs to the Chinese court in the 7th and 8th centuries; namely of *Han-mi mo-mo-ni* (a Chinese corruption of *Emir al mumemin*, "Prince of the Believers," a title which was assumed by *Othman*); —*A-bo-lo-ba* (Abul Abbas);—*A-p'u ch'a-fo* (Abu Djafar);—*A-lun* (Harun al Rashid). It is known from Chinese sources, as well as from the accounts given by Arabian travellers to China, that in the 8th century there were great factories of Arabian merchants in Canton.

The intercourse between the Arabs and the Chinese continued still by land and sea during the 10th, 11th and 12th centuries. The "History of the *Sung*," 960—1280, mentions twenty embassies of the *Ta-shi* or Arabs. The Sung did not reign over the whole of

China; for the northern provinces were subject at first to the *Liao*, and afterwards to the *Kin*. The Liao had also communications with the Arabs in the north. In the *Liao shi*, chap. ii, it is recorded, that the first emperor of the dynasty (*A-pao-ki*, 916—927) received an embassy from the *Ta-shi* in 924, at the time he sojourned near the ancient capital of the Uigurs (where afterwards Karakorum was built).

For further details regarding the intercourse between the Arabs and China, see my pamphlet *On the knowledge possessed by the ancient Chinese of the Arabs and Arabian colonies*. London, Trübner, 1871.

40. Archimandrite Palladius in his article on "the Mohammedans in China" (*Records of the Eccles. Miss. in Peking*, vol. iv, p. 438) states, that in *Si-an fu*, where the well-known Nestorian tablet of the time of the T'ang was dug up, another ancient monument has been discovered, referring to the introduction of Islam into China. This Mohammedan tablet is said to bear the date A. D. 742, and records that during the reign of the Sui emperor *K'ai-huang* (581—600), Islamism first penetrated to China. Palladius gives no details about this tablet; but he has kindly informed me, that it is spoken of in several Chinese works on Mohammedanism. I find in the *Ming yi t'ung chi*, the great geography of the Ming empire, published in 1461, the following statement, referring evidently to that alleged inscription. In chap. xc, fol. 12, we read, under the head of *Mo-de-na*, the realm of the ancestor of the Mohammedans (默德那囘囘祖國), that during the reign of *K'ai-huang* of the *Sui* dynasty, *Sa-ha-ba Sa-a-di Gan-go-sze* a man who had arrived from that country, first taught his doctrine in the Middle Kingdom (隋開皇中其國撒哈八撒阿的幹葛思始傳其教入中國). But at the time assigned here to the introduction of Islamism into China, Mohammed was still an obscure merchant.

[As to the Arabic names in the above-quoted Chinese statement, *Sa-ha-ba* represents evidently "Saheb" which according to the *Bibl. Orient.* p. 721, means:—"a companion, a master, a professor." *Sa-a-di* is probably "Saad" a favourite Arabic name of persons. I cannot say what words or names are intended by *Gan-go-sze*.]

Palladius quotes also from a biography of Mohammed, written by a Chinese Mohammedan, in which it is stated, that in A. D. 587, the emperor of China sent an embassy to Mohammed in Arabia, to invite him to China. The latter refused, but sent his portrait, which however subsequently disappeared from the canvas, in order that it might not become an object of worship.

In another Chinese Mohammedan work, the 回回原來 *Hui*

hui yüan lai (Mr. Wylie, in his *Notes on Chinese Literature*, p. 145, calls it "an apocryphal narrative of the introduction of Mohammedanism into China, bearing date 1754"), it is recorded that in the year A. D. 628, the emperor of China sent an envoy with a letter to the king of the Mohammedans; and when this embassy returned, it was accompanied by a turbaned Mahommedan priest and three thousand followers. These are said to have formed the foundation of the Mohammedan colonies in China (Palladius, *l. c.*).

These tales are not corroborated by the chroniclers of the Sui and T'ang periods. There can, however, be no doubt, that at the time of the T'ang, many Mohammedans were settled in China.

41. In early times, when the Chinese began to extend their power over the countries west of China proper, they denominated them by the general term 西域 *Si-yü* (western countries). It seems this name came first into use, when Chang Kien had returned from western Asia. In the "History of the anterior Han" (*Han shu*, chap. xcvi), where the countries of the Si-yü are first described, it is stated, that the Si-yü begins at the Chinese fortresses 玉門關 *Yü-men kuan* and 陽關 *Yang kuan* (both were situated in the western part of the present Kansu, west of the 嘉峪關 *Kia-yü kuan*, one of the principal gates of the Great wall). The name Si-yü is still applied in a general sense to the same regions of central and western Asia, inhabited by Mohammedan people. Up to the 12th century, the Mohammedans are not designated by a general name in Chinese history. In the "T'ang History," where they are first mentioned, they go under the name of *Ta-shi*, which term as we have seen was applied to the Arabs. 回回 *Hui-hui* is now the common Chinese name for all professors of Islamism. It seems this term occurs first in the *Liao shi*, at the beginning of the 12th century. In the article on the Si Liao above translated (26), it is recorded that the 回回王 *Hui-hui wang* or "king of the Mohammedans" paid tribute to the chief of the Si Liao. The "History of the Kin" also once uses this name, stating, that in the 12th century there was a regiment of the *Hui-hui* in the army of the Kin, who were able to cast inflammable substances (see Archim. Palladius' above-quoted article on "the Mohammedans in China," p. 439). In the *Yüan shi*, the term 回回 *Hui-hui* for Mohammedans is met with in only a few instances; they being generally styled there 回紇 *Hui-ho* or 回鶻 *Hui-hu*. These latter denominations have given rise to a great confusion in Chinese history; for at the time of the T'ang, and even in the 12th century, only the *Uigurs* were designated by these names (see further on, Part VI). Compare also (25) above, the article on the Si Liao, where it was stated that Ye-lü Ta-shi sent a letter to the

king of the *Hui-hu* in *Kan-chou*. There Hui-hu can only mean *Uigurs*. The *Yüan shi* however, applies to the Uigurs a new name, which reads 畏兀兒 *Wei-wu-r*, and the terms *Hui-ho* or *Hui-hu*, when met with in the *Yüan shi* have always to be translated by *Mohammedans*. I am not prepared to give a satisfactory explanation of the origin of this strange denomination of the professors of Islamism by the Chinese. (Compare on this subject my *Notes on Chin. Med. Trav.* p. 31, note 68).

In the Mongol text of the *Yüan ch'ao pi shi* (13th century), the Mohammedans are always termed *Sartol*. The Chinese translation of the same work, made in 1388, renders Sartol always by *Hui-hu*. The *Sartol* of the Mongols are evidently the same as the *Sarti* of Carpini, p. 710. Even now the people of Transoxiana are known in western Asia under the name of *Sarti* (Ritter's Asia, vol. v, p. 725). D'Ohsson is wrong in stating (*l. c.* tom. i, p. 216), that the Mongols called the Mohammedans *Tadjiks*. But Tadjik even at the present day means the same people as Sarti, according to Burnes (*Trav. into Bokhara*, vol. ii, p. 268).

In a few cases the Chinese writers of the Mongol period call the *Mussulmans* by this very name. In the *Yüan shi*, chap. v, we read, that in 1262 an imperial decree was given, that young men belonging to the families of the 木速蠻 *Mu-su-man*, 畏吾兒 *Wei-wu-r* (Uigurs), 也里可溫 *Ye-li-k'o-wen* (Christians), and 達失蠻 *Da-shi-man* (Mollahs), are to be employed in military service.

The Nüchi traveller *Wu-ku-sun*, 1220 (see my *Notes on Chin. Med. Trav.* p. 104), speaks of the 沒速魯蠻回紇 *Mu-su-lu-man Hui-ho* in Persia.

In *Ch'ang-ch'un's* narrative (*ibid.* p. 33) we find a realm of the 鋪速滿 *P'u-su-man* noticed, the ruler of which seems to have had his residence at Almalik. P'u-su-man is evidently the same as the *Bussurman* in the ancient Russian annals, by which name the Mohammedans are always to be understood (Karamzin, vol. iv, p. 304). Carpini, Rubruquis and M. Polo generally term the Mohammedans—*Saracens;* but in Carpini's narrative we find also the Besermans.

Carpini states, pp. 749, 750:—"De terra *Cangitarum* (Kankalis, see further on, 64) intravimus terram *Biserminorum*. Isti homines linguam *Comanicam* (Kiptchak;—see Part VI) loquebantur, et adhuc loquuntur; sed legem Sarracenorum tennent, etc."

Benoit, Carpini's travelling companion, identifies the country of the Beserman with *Turkya* (*ibid.* pp. 777 and 502).

42. I may quote a statement from the *Yüan ch'ao pi shi* pointing to the fact, that even before the rise of Chinghiz khan, Mohammedan merchants carried on trade with the nomade tribes in

the most eastern part of Mongolia. Compare Palladius' translation, p. 95:—"When Chinghiz was encamping on the lake *Baldjuna* (1203),[70] a Mohammedan (the Mongol text has *Sartatai, i. e.* a native of the country of the Sarti) by name *Asan* (Hassan), arrived from *Alahushi digit huri*[71] of the tribe *Wangut*. He took along with him a thousand sheep and a white camel, for his passage down the river *Ergunie*,[72] to barter for sable and squirrel skins. When he stopped at the lake to water his sheep he met with Chinghiz."

The conquests of Chinghiz and his successors had opened a highway of communication between the east and the west of Asia; and western people began to frequent the far east, and even to settle there. The Mongol emperors patronized the colonization of China by foreigners; and with respect to the Mohammedans, it seems, that since Hulagu khan the brother of Mangu khan, ruled over western Asia, emigration from Persia to China had considerably increased. I think it not unlikely, that the Mohammedans now scattered over the whole of China proper, and forming large communities especially in the provinces of Kansu, Shansi and Chili, are for the greater part descendants of those Saracens mentioned by M. Polo in the same provinces. Rashid-eddin states, in his description of China (Yule's *Cathay*, p. 269), that in his time all the inhabitants of *Karadjang* (or Yunnan) were Mohammendans; and I feel tolerably certain also, that the Mohammedan power, which suddenly rose in the Chinese province of Yunnan, about ten years ago, may be traced back to the time of the Mongol emperors.

43. The *Yüan-shi* gives many biographies of distinguished Mohammedans in the service of the Mongols. A number of them occupied high offices. I may quote the names of the *Hui-ho* met with in the history of the Mongols, and notice occasionally some particulars from their biographies.

In chap. cxxv, we find the biography of 賽典赤瞻思丁 *Sai-dien-ch'i shan-sse-ding*, called also 烏馬兒 *Wu-ma-r*. He was a *Hui-hui* and a descendant of the 別蒼伯爾 *Bie-an-bo-r*.[73] In his country *Sai-dien-ch'i* has the same meaning as 貴族 (noble family) in Chinese. There is a long biography of *Sai-dien-ch'i*,

[70] The Mohammedan authors also mention Chinghiz' encamping there, but they speak of a *river Baldjuna* (D'Ohsson, tom. i, p. 72). The Baldjuna lake or river seems to have been somewhere near the Kerulun river. D'Ohsson locates it too far northward.

[71] *Alacush tikin curi* of Rashid, chief of the tribe of the Onguts (D'Ohsson, tom, i, p. 84). See also above, 3.

[72] The river *Argun*, a tributary of the *Amur*. It comes out from the northern corner of the lake *Kulon nor*, into which the Kerulun empties itself from the south.

[73] *Peighamber* in Persian means "prophet."

from which we learn that he submitted to Chinhiz when the latter waged war in western Asia, and entered his life-guard. Under Ogotai and Mangu khans he was governor, and held other offices. Kubilaï khan appointed him minister (see also the list of the ministers, in the *Yüan shi*, chap. cxii). He died in Yunnan, where he had been governor. Five sons of Sai-dien-ch'i are mentioned, viz. 納速剌丁 *Na-su-la-ding* (Nasr-uddin), 哈散 *Ha-san* (Hassan), 忽辛 *Hu-sin* (Hussein), 善速丁兀默里 *Shan-su-ding wu-mo-li* and 馬速忽 *Ma-su-hu*. All these held high offices.

Na-su-la-ding has a separate biography in the same chapter. He was governor in Yunnan, and distinguished himself in the war with the southern tribes of 交趾 *Kiao-chi* (Cochin-china) and 緬 *Mien* (Burma). He died in 1292, the father of twelve sons, the names of five of which are given in the biography, viz. 伯顏察兒 *Bo-yen ch'a-r*,[74] who had a high office, 烏馬兒 *Wu-ma-r*, 答法兒 *Dje-fa-r* (Djafar), 忽先 *Hu-sien* (Hussein) and 沙的 *Sha-di* (Saadi).

The *Sai-dien-ch'i* of the Chinese authors is without doubt the same personage spoken of by Rashid (D'Ohsson, tom. ii, p. 467) under the name of *Sayid Edjell*. According to the Persian historian, he was a native of Bokhara, and governor of Karadjang (Yunnan) when Kubilaï entered the country, under the reign of Mangu. Subsequently he was appointed vizier, and in the beginning of Kubilaï's reign he had charge of the finances. His son *Nasr-uddin* was appointed governor in Karadjang, and retained his position in Yunnan till his death, which Rashid, writing about A. D. 1300, says occurred five or six years before (according to the *Yüan shi*, *Na-su-la ding* died in 1292). Nasr-uddin's son *Abubeker*, who had the surname *Bayan Fenchan* (evidently the Bo-yen ch'a-r of the *Yüan shi*), was governor in *Zaitun* at the time Rashid wrote. He bore also his grandfather's title of Sayid Edjell, and was minister of Finance under Kubilaï's successor (D'Ohsson, tom. ii, pp. 476, 507, 508). Nasr-uddin is mentioned by M. Polo, who styles him *Nescradin* (vol. ii, p. 66).

44. In chap. cxxiii of the *Yüan shi*, we find the biography of 阿剌瓦而思 *A-la-wa-r-sze*, who is stated there to have been a *Hui-ho* and a native of 八瓦耳 *Ba-wa-r* (probably *Baurd* a city of Khorassan of which I shall speak further on, in Part VI). He was commander of a thousand in his own country. When Chinghiz arrived at Ba-wa-r, he surrendered and entered his army. His son *A-la-wu-ding* (Alaï-eddin) was a valiant warrior in Kubilaï's

[74] This *Bo-yen* is not to be confounded with the eminent general of the same name, who was a Mongol, and who is mentioned as *Bayan Chincsan* by M. Polo (vol. ii, p. 107). The biography of this valiant captain is found in the *Yüan shi*, chap. cxxvii. He is also spoken of by the Persian historians.

army. He died in 1292, at the age of a hundred and two. His son *Djan-sze-ding* had five sons, namely, *Wu-ma-r*, *A-san-bu-bie*, *Hin-djo-lan-cha*, *A-ha-ma* (Ahmed) and *O-tu-man* (Othman).

Other Hui-ho, or Mohammedans, whose biographies have been incorporated in the *Yüan shi* are the following:—

Chap. cxxxiv: *San-gi-sze.*

Chap. cxciv: *Na-su-la-ding* (not the above-mentioned son of Sayid Edjell), the son of *Ma-ho-mu* (Mahmud).

Chap. cxcvi: *T'ie-li-mi-shi.*

Chap. ccv: 阿合馬 *A-ho-ma* (Ahmed). His biography is placed in the *Yüan shi* under the rubric 姦臣 "Villainous Ministers." This is the "certain Saracen named Achmath," to whom M. Polo has devoted a long chapter entitled "Oppressions of Achmath" (vol. i, p. 370).

Another Mohammedan, who held high offices in China under Chinghiz and his successors, was *Mahmud Yelvadj*. His son *Massóud* was governor in Turkistan. Both are spoken of by the Persian authors as well as in the *Yüan shi*. For further details on these personages, see my *Notes on Chin. Med. Trav.* p. 110.

The Annals of the *Yüan-shi* mention further, a Mohammedan named 奧都剌合蠻 *Ao-du-la-ha-man*, to whom Ogotai khan had leased on rent all the revenues of his empire. He is stated in the Chinese annals to have caused indirectly the death of Ogotai, by making him a present of wine. The khan, who was given to drinking, found it so delicious, that he drank until midnight, and the next morning expired, in December, 1241 *(Yüan shi, sub anno)*. D'Ohsson (tom. ii, p. 189) calls this man *Abdur Rahman*. It seems he quotes the name from the Persian authors.

45. In the biographies of the following, where the 西域 *Si-yü* is given as their native country, evidently Persia is meant.

Chap. cxx: 扎八兒火者 *Dja-ba-r huo-djo*, a valiant companion in arms of Chinghiz. In his biography it is stated, that he was a native of 賽夷 *Sai-yi*,[75] which country (or tribe) is said there to be in the *Si-yü*. He was the chief of his tribe; wherefore he bore the name *Huo-djo*, which in their language is the name of an office.[76] He was of a tall figure, had a splendid beard, large eyes (方瞳) and a broad forehead. He was brave, and a skilful rider and archer. Chinghiz khan accidentally seeing this man in his army, was surprised at his appearance, and became interested in him. This must have happened at an early period of Chinghiz khan's career, for further on *Dja-ba-r* is stated to have been with the conqueror when he waged war with *Wang han* (Ong khan of

[75] Perhaps *Seyistan* is meant.

[76] Pauthier (*M. Polo*, p. cxxvii, note 2) translates the Persian title Khôdjah by "'un homme de distinction,' un 'gouverneur.'"

the Keraits), A. D. 1203. Thus it seems that Mohammedans served in the Mongol army, even before the rise of Chinghiz. The biography states also, that *Dja-ba-r* had been intrusted by Chinghiz with a mission to the celebrated Taouist monk *Kiu Ch'ang-ch'un*, who lived among the mountains of 崑崙 *K'un-lun*.[77] Ch'ang-ch'un asked Dja-ba-r which he would prefer,—honors and splendor, or a numerous posterity? Dja-ba-r answered, "After a hundred years, riches and splendor will be of no value to me; but I should wish my sons and grandsons to be prosperous, and to continue my lineage." Ch'ang-ch'un said—"Your wish shall be realized." And indeed it was so; Dja-ba-r died at the age of a hundred and eighteen, and several of his descendants are mentioned in his biography.

Chap. cxxxiii: *K'ie-lie.*

Chap. cxlii: *Che-lie t'ie-mu-r*, a native of 阿魯溫 *A-lu-wen* in the *Si-yü* (A-lu-wen is perhaps *Holvan* between Kirmanshah and Bagdad).

Chap. cciii: 阿老瓦丁 *A-lao-wa-ding* (Alaï-eddin), a man from 木發里 *Mu-fa-li* in the *Si-yü* (Mu-fa-li is probably intended for *Moaferin*, a fortress north-east of Diarbekir, taken by the Mongols in 1260). 亦思馬因 *I-sze-ma-yin* (Ismael), a man from 旭烈 *Hü-lie* in the Si-yü. (Although by *Hü-lie* the Chinese text seems to indicate a place, 西域旭烈人, it is possible however, that originally "a man belonging to Hulagu" was intended; for in the *Yüan shi* Hulagu's name is always written 旭烈兀 *Hü-lie-wu*). Both A-lao-wa-ding and I-sze-ma-yin were Persian engineers, expert at the construction and working of catapults. They had been sent from Persia to China in 1271, and their machines were employed at the siege of Siang-yang fu.

The biography of I-sze-ma-yin's son *I-ho-di-ya-r-ding* is found in chap. cxxxvii.

In chap. xlviii,—on Astronomy,—mention is made of 扎馬剌丁 *Dja-ma-la-ding*, a Persian astronomer, who in 1267 brought a number of astronomical instruments from the Si-yü to the Mongol capital *Ta-tu* (Peking). The instruments are enumerated by their Persian names, and a description is also given.

46. The historians of the Ming, always term the Mohammedans 回回 *Hui-hui*, and as I have stated above, this is the name also by which all professors of Islam in China proper as well as in central and western Asia, are known to the Chinese of our day.

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[77] Not to be confounded with the great mountain chain *K'un-lun* in central Asia. The mountains here spoken of, are in the province of Shantung, the native country of Ch'ang-ch'un, south-east of *Ning-hai chou*. They are marked on modern Chinese maps. With respect to Ch'ang-ch'un, compare my *Notes on Chin. Med. Trav.* pp. 15—17. In 1220 Chinghiz sent a second time to invite the sage, who then set out to meet the emperor in western Asia.

In concluding my notices of the Mohammedans, I may venture to make a few remarks on the *Dungen* or *Tungan*, a name applied by the nations of Turkish race in Asia to the Chinese Mohammedans. It is known that in 1862, the Mohammedans in the Chinese dominions revolted against Chinese (Manchu) authority. The central seat of this rebellion was (and seems to be still) the province of Kansu; whence the insurrection spread rapidly over the whole of eastern Turkistan, and in 1864 reached the province of *Ili*, bordering on Siberia. Some years later, the Tungan made themselves masters of Ili, but were subsequently expelled by the Russians (by a single cannon shot as I have been told by an eye-witness), who in 1870 took possession of Kuldja, the capital of Ili. Since the outbreak of the Mohammedan insurrection in Ili, the name of *Tungan* has become more generally known in Russia, and has given rise to many conjectures by Russian and other orientalists and ethnologists, as to the origin of the people and the etymology of the name. Some have tried to trace the origin of the Tungan back to Alexander the Great; others suggest that they have been left in central Asia by Tamerlane; alleging in favour of their view, that *Turmak* in Turkish, means "to leave behind" (sic!). Compare General *Heins'* article on the Dungen in the *Proceedings of the Russian Geogr. Soc.* 1866, vol. ii, p. 77. General Heins states, that the Dungen call themselves *Turgen*. Prof. Vambery translates *Tungan* by "a convert" (in Turki). See Col. Yule's *M. Polo*, vol. i, p. 255. But the strangest hypothesis with respect to the name Tungan,—which I may quote as a curiosity,—has been put forward by Mr. Hoyer in the Russian military journal (*The Invalid*, 1869, No. 98). He states, that soon after Islamism had spread over central Asia (*i. e.* in the 9th or 10th century), the Chinese government, apprehensive of the increasing power of the Mohammedans, transferred a number of them from Turkistan to the Chinese province of Kansu, whence they spread gradually over the whole of China; wherefore the Chinese termed the Mohammedans *T'ung Kan-su*, meaning "the same as the (Mohammedan) people of Kansu" (sic!!). Mr. Hoyer intends probably 同甘肅 *T'ung Kan-su*;[78] but the name Tungan is completely unknown to the Chinese, who designate all Mohammedans of Asia by the name of *Hui-hui*.

All attempts to explain the word *Tungan* and its origin have proved to be unsatisfactory. We know only that the Tungan are Mohammedans, that they speak Chinese, and are dressed in the Chinese fashion (at least in Ili). Compare General Heins, *l. c.* p. 80. It is also impossible to say at what time the name Tungan first appeared in central Asia. Among European travellers, *Putimtzeff*

[78] I may observe that *Kan-su* as the name of a Chinese province, appears first in the Mongol period (see *Yüan shi*, geographical part).

seems to be the first who mentions the Tungan. This Russian traveller, who in 1811 visited *Kuldja*, published his interesting narrative, in Russian, in a Siberian periodical. Klaproth in his *Magazin Asiatique*, tom. i, pp. 174, 594 sqq. has given a French translation of it, *l. c.* p. 215, in which we read :—"Les principaux habitants de Gouldja sont les Chinois appelés *Kara-kitat-Nogontûk*,[7 8a] et des *Tougean*. Ces derniers se regardent comme les descendans des guerriers de *Témir-aksak* ou *Tamerlane*. Ils sont rigides sectateurs de l'Ilamisme, mais ils parlent Chinois. Ils sont aussi bourrus, grosiers et hautains que les Chinois, dont ils ont empruntés l'habillement, les usages et les vices."—I have no doubt that *Tougean* was a misprint in the Russian text (to which I have not access) for Tungan, all the more so as, on p. 216 in the same translation Klaproth writes the name of the same people *Toupgan* :—"Les Chinois de Gouldja exercent différens métiers. . . . Les *Toupgan* cultivent des jardins, tiennent auberges et font dans les marchés le commerce de détail." The Toupgan are mentioned also in several other parts of Ili, in Putimtzeff's narrative. Here Klaproth probably took the Russian *n* (which is written н) for a *p* (п), or perhaps the misprint was in the Russian text. At the time Klaproth wrote, the name Tungan was completely unknown in Europe; the great orientalist therefore could give no explanation on this subject. However at p. 210, Klaproth in his translation writes correctly :—"Un Mahométan nommé *Toungan*, . . . qui tenait auberge, nous invita chez lui."

The *Tungan* are mentioned also by some Mecca pilgrims, who visited Yarkand, as carrying on trade in that city. Compare Wathen's "Memoir on Chinese Tartary and Khoten" in *The Journ. of Asiat. Soc. of Bengal*, 1835, iv. The same pilgrims report, that the principal seats of the Tungan are in *Salar* and *Seiram*.

Burnes, who in 1832 visited Bokhara, gathered some information there from merchants of Yarkand about the *Tungan*, who are represented by him, as Mohammedans from the adjacent provinces (of Chinese Turkistan it seems), being dressed in the Chinese fashion, and employed for garrisoning the cities of eastern Turkistan.

This is all that I have been able to gather with respect to the *Tungan*. I may finally say a few words concerning the places *Salar* and *Seiram*, mentioned by the Mecca pilgrims. By the latter, probably *Sairam* or *Sairim* in eastern Turkistan west of Kuche is meant. This place is marked on modern Chinese maps as

[7 8a] As I was informed by a Russian gentleman, who lately had been in Kuldja, the Chinese there are indeed called *Kara-kitai* (by the Kirghiz ?). This name has no connection with the Kara-khitai of the middle ages. *Nogontuk* in Mongol means "the green banner," in Chinese 綠營 *lu ying*. This is the name for the troops formed exclusively of Chinese.

賽里木 *Sai-li-mu* and 回城 *Hui-ch'eng* (Mohammedan city). It is not to be confounded with *Sairam* in Russian Turkistan. There is also a lake north-east of Kuldja, which bears the name *Sairam*.

With respect to *Salar*, Archimandrite Palladius in his article on "the Mohammedans in China," *l. c.* p. 443, gives a detailed account, drawn from Chinese sources, of the Mohammedans of *Salar* and their origin. We learn from this article that they were originally Uigurs from Khamil. Since the last century, Salar has always been the hotbed of Mohammedan anti-Chinese machinations, and this place also sustained an important *rôle* in the last Mohammedan insurrection. The Mohammedan community of 撒剌二 *Sa-la-r* belongs to the district of 河州 *Ho-chou* in Kansu. On Chinese maps it is marked a little north-west of the city of 循化 *Sün-hua*.

PART IV. CHINGHIZ KHAN'S EXPEDITION TO WESTERN ASIA, A. D. 1219—1225.

47. The material, which hitherto has been worked up by our historians dealing with the conquest of western Asia and eastern Europe by the Mongols, is almost exclusively derived from western, and principally Persian sources. It is only in a few cases, that D'Ohsson in his *Histoire des Mongols* quotes, with respect to these events, Father Hyacinth's above-mentioned translation of the first three chapters of the *Yüan shi*, where the doings of the Mongols are recorded up to the year 1260. It is not to be wondered at, when D'Ohsson, although he possessed a knowledge of the Russian language, has not been able to find in Hyacinth's translation, corroborations of the Persian records; the former being made from a corrupted edition of the *Yüan shi*, as I have stated above. I can also understand it, when D'Ohsson says with respect to the *Si shi ki* (see my *Notes on Chin. Med. Trav.* p. 57) of which he saw Rémusat's translation:—"Cet itinéraire n'a rien ajouté à nos connaissances" (D'Ohsson, *l. c.*, tom. iii, p. 138). A correct translation of this ancient narrative, and a translation of an uncorrupted edition of the *Yüan shi* would have furnished him with many arguments for his historical researches. I am however far from assigning to the Chinese and Mongol historical accounts regarding the warlike enterprises of the Mongols in the west, a high historical value. These fragmentary and aphoristic notices can often only be understood, when comparing them with the more detailed western records. But it is needless to say that every ancient historical document is calculated to throw some new light, all the more when bearing upon a subject repeatedly ventilated by European savants.

Proceeding from this point of view, I shall present in this part and in the next, comparative notices of western and eastern authors with respect to the Mongol invasions of the countries of the west. I omit the review of Hulagu's expeditions to Persia, Syria, etc. 1258—1260; for this subject has already been treated of in my *Notes on Chin. Med. Trav.* pp. 60 sqq.

48. I begin with a sketch of the records of Mohammedan writers regarding Chinghiz khan's invasion of western Asia; my notes being an abstract from D'Ohsson's work (tom. i, chap. 7), to which I shall add my remarks.

Mohammed Khorazm shah, on his return from an expedition to Irak Adjem in 1218, received at *Bokhara* some envoys from Chinghiz khan (who however were all subjects of the shah,—it seems Mohammedan merchants returning from Mongolia). They brought presents and a peaceful message, with a proposal of the Mongol khan, to establish regular commercial intercourse between Mongolia and the dominions of the shah. Mohammed apparently received them with cordiality, but felt that it would be to his prejudice to form an alliance with Chinghiz, acknowledging his supremacy. After this Chinghiz dispatched a caravan consisting of four hundred merchants, all Mohammedans, to Khorazm; who were also intrusted with diplomatic messages. But when they arrived at *Otrar* they were plundered and put to death, by order of the governor of that place, by name *Inaldjuc gaïr khan*;[79] and this was the origin of the war. Before beginning hostilities, Chinghiz sent a Turk named *Bagra*, accompanied by two Mongol officers, to ask satisfaction for these outrages; but Bagra was executed by order of Mohammed, and the two Mongol officers were sent back after having been shaved. Some time subsequently, Mohammed began hostilities by attacking a body of Mongols, who had pursued the Merkits to the territories of the Kankali. This battle took place north of the city of *Djend* on the lower Sihon.

Towards the end of 1218 Chinghiz left his ordo, intrusting his younger brother *Udjukin* with the government of his states. The Mongol army spent the whole summer of 1219 on the river *Irtysh*, in order to equip anew and to complete the cavalry.[80] Chinghiz was joined there by the prince of the *Uigurs* (Bardjuc) by

[79] As to the number of merchants sent by Chinghiz to Khorazm, and killed in Otrar, the Mohammedan authors do not agree in their statements. Some assert, that there were only four. Ye-lü Ch'u-ts'ai, who in his narrative (*Notes on Chin. Med. Trav.* p. 115) speaks of the catastrophe of Otrar, states that several envoys of Chinghiz and several hundreds of merchants had been murdered on this occasion. The *Yüan ch'ao pi shi* (Palladius' translation, p. 143) says, with respect to the same event:—"The Sartol had killed Chinghiz khan's envoy *Wu-hun*, and put to death a hundred men in all."

[80] See my *Notes on Chin. Med. Trav.* p. 111, note 7.

Signac Tekin prince of Almalik, and by *Arslan* khan of the *Karluks*. The army marched out in autumn; and no resistance was opposed to the Mongol arms, until the *Sihon* (Yaxartes) had been reached.[81]

49. When the army had arrived at *Otrar* (end of 1219 it seems), it was divided into four corps, the first of which, commanded by Chinghiz khan's sons *Ogotai* and *Chagatai*, invested Otrar. The second, under the command of Chinghiz' eldest son *Djuchi*, was directed to the right, against the city of *Djend*. The third corps, conducted by the Mongol generals *Alac*, *Sugtu* and *Togai*, marched up the Sihon upon *Benaket* (written also *Fenaket*). Chinghiz himself with the main army advanced upon *Bokhara*.

After a five months' siege, *Otrar* was captured and pillaged; its governor *Gaïr khan* was taken prisoner, and afterwards put to death by having melted silver poured into his ears and eyes.

Djuchi on his way towards Djend arrived at *Signac*. The town was captured after having been stormed for seven days. *Ozkend*, *Barkhalighkend* and *Eshnass* suffered the same fate. Djuchi then marched against *Djend*, which was also stormed. One division was dispatched to take *Yenguikend*. All these cities were situated on the Sihon; the last at a distance of two days' journey from the *lake* of *Khorazm* (Aral). The Uigur troops, numbering ten thousand men, were then allowed to return home,[82] and were replaced by ten thousand Turkmans.

The left flank of the Mongol army was also successful in its operations. *Benaket*, which was garrisoned by *Turk-Kankalis*, surrendered. The Mongols then attacked *Khodjend*, whose governor was the valiant *Timur-melik*. Being constrained to abandon Khojend, he retired with a thousand men to a castle on an island in the Sihon, where he held out for a long time. But having lost the greater part of his troops, he was at length forced to fly, and succeeded in reaching Khorazm, where he joined *Djelal-eddin*, the son of Mohammed shah, from whom he did not separate until the death of that prince.

Meanwhile Chinghiz, accompanied by his son *Tului*, had advanced into Transoxiana, and in March of 1220 appeared at *Bokhara*,[83] which was then a large and magnificent city. After

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[81] The Mohammedan authors give no details regarding the march of Chinghiz from the Irtysh to the Sihon. I have translated from Ye-lü Ch'u-ts'ai's narrative, the itinerary of the way followed by the Mongol armies proceeding to the west (see my *Notes on Chin. Med. Trav.* p. 108).

[82] This statement does not agree with the *Yüan shi*; for in the biography of the prince of the Uigurs, it is stated, that he assisted at the storming of Ni-sha-bu-r (see further on, Part VI, article "Uigurs").

[83] This is the first date D'Ohsson gives after the starting from the Irtysh

several days' siege, the garrison tried to force its way through the Mongol lines, but was almost destroyed. The city surrendered, but the citadel held out twelve days.

Chinghiz next advanced along the fertile valley of the *Sogd (Zarafshan* river of our maps) towards *Samarcand*, which was then garrisoned by forty thousand men, most of whom were Kankalis. Samarcand surrendered in April, 1220, when the greater part of the inhabitants were slaughtered.

50. Whilst the Mongols devastated Transoxiana, Mohammed shah behaved with the greatest indifference. He was at Samarcand, when the enemy entered Transoxiana, and then fled to *Nakhsheb*. He was at first disposed to repair to *Ghazna;* but when he had reached *Balkh*, he was persuaded by one of his viziers to retreat to Irak Adjem. On the 18th of April he halted at *Nishabur;* but after a rest of three weeks was obliged to start again, being informed of the approach of the Mongols through Khorassan. He then took the road to *Kasvin*, where his son Rokn-eddin was said to have rallied about thirty thousand troops.

When sojourning at Samarcand, Chinghiz had sent two corps in pursuit of Mohammed, under the command of *Chebé* (see note 66) and *Subutai bahadur*.[84] They crossed the *Djihun* (Oxus,—Amu-daria) at *Pendjab*, and advanced into *Khorassan*. Chebé took the way through *Nishabur* to *Mazanderan*, whilst Subutai proceeded through the *Cumuss* to Irac Adjem, passing through *Kabushan*, *Thus*, *Esferain*, *Damegan* and *Simnan*. Both corps met at *Rayi* (near the present Teheran).

Mohammed trying to flee to Bagdad, was near being taken by the Mongols; but he succeeded in escaping, and retired through the mountainous country of *Ghilan* to *Mazanderan*. The Mongols however were already masters of that country, and *Amol* and *Asterabad* had been sacked. Mohammed arrived in Mazanderan almost alone, and hid himself for some days in a village on the shore of the Caspian, till his asylum was betrayed, when he fled to a small island in the sea of *Absukun* (D'Ohsson. tom. i, p. 255),[85] where he subsequently died from an attack of pleurisy.

(autumn, 1219). The military events above related must have taken place in the beginning of the year 1220.

[84] I shall speak more fully of this valiant Mongol general (see note 103). *Bahadur* is an honorific title meaning "brave" in Turkish (D'Ohsson, tom. i, p. 35). The Russian *bogatyr*, "a valiant man,—a champion," seems to have the same origin. We meet this title frequently in the *Yüan shi*, where the term is generally rendered by 拔都兒 *Ba-du-r*. See chap. cxxiii,—biography of *Shan-che ba-du-r*.

[This is probably the same root as the Manchu honorific title *Baturu*, meaning "brave,"—now conferred as a military distinction.—Ed. Com.]

[85] Ebn Haukal (10th century) states that *Absukun* is a town on the

Turkan khatun, the mother of Mohammed, had at that time left *Keurcandje* the capital of Khorazm, and hid herself with the princesses in the castle of *Ilal* among the mountains of Mazanderan; but she was discovered and obliged to surrender. Compare *Ye-lü Ch'u-t'sai's* notice of Turkan khatun, in my *Notes on Chin. Med. Trav.* p. 117.

51. After the fall of Samarcand, Chinghiz encamped his army in the country between this town and *Nakhsheb*, and spent the whole summer of 1220 there. In autumn the military operations recommenced. One army, commanded by Chinghiz' sons Djuchi, Ogotai and Chagatai, was sent against *Keurcandje*, or *Orcandje*, the capital of Khorazm, which at that time had no ruler; for owing to a revolt of the troops, Djelal-eddin had been constrained to leave, and had fled to *Ghazna*. He was accompanied by the valiant Timur-melik (see above). Tului, the fourth son of Chinghiz, received orders to devastate Khorassan; whilst Chinghiz himself directed the main army to the south, beginning this expedition with the siege of *Termed*, situated on the north bank of the Sihon; which was captured after ten days' storming. Chinghiz then wintered (1220—1221) in the district of *Seman*, whence *Badakhshan* was invaded.

In the spring of 1221, Chinghiz crossed the Sihon with his army. The city of *Balkh* surrendered; but being afraid to leave it, Chinghiz slaughtered the inhabitants and reduced the city to ashes. Hence he advanced upon the fortress of *Nussretkuh*, situated in the mountainous country of *Talecan*. This place had been ineffectually besieged by one of his generals for six months; but was captured when Chinghiz' army arrived.

Meanwhile Tului, executing the orders of his father, had invaded *Khorassan*, and sent his brother-in-law *Togachar* with the avant-guard to *Nessa*. After having sacked this place he advanced upon *Nishabur* (Nov. 1220), but was killed on the third day of the siege. Tului directed his main army, numbering seventy thousand men, upon *Meru shahidjan*, which was captured in February, 1221, and then marched upon *Nishabur*. The latter place was taken by assault, and the destruction of the city occupied fifteen days (April, 1221). Thence Tului pursued his way to *Herat* (more generally styled *Heri* in the middle ages). A detachment of his forces destroyed the tomb of the calif Harun al Rashid near the town of

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shore of the Caspian, and the sea-port of the city of *Djurdjan*. Massudi (10th century) speaks also of this city, which he styles *Abisgun*, as situated on the sea of Khazar, and plundered by the Russians in the 10th century. Compare Klaproth's *Magaz. Asiat.* tom. i, p. 277. The ruins of the port of Abisgun can still be seen at the mouth of the river *Djurdjen* (*Transactions of the Russian Geogr. Soc.* 1871, vol. iv, p. 103).

Thus; and the country of *Kuhistan*, through which Tului's way lay, was laid waste. The Mongols arrived at Herat, and after eight days' attack, and the death of its governor, the city offered to capitulate. On the capture of this place, Tului joined his father in Talecan.

At that time *Orcandje*, the capital of Khorazm had also been taken by the other sons of Chinghiz, after a siege of more than six months. The capture of the place had been partly retarded owing to a disagreement, which had arisen between Djuchi and Chagatai. When Chinghiz heard of this quarrel, he grew very angry and ordered Ogotai to take the command. After the fall of Orcandje, Ogotai and Chagatai both came to join their father. Only Djuchi remained in the country north of the Sihon.

52. Chinghiz after spending the summer of 1221 among the mountains surrounding *Talecan*, recommenced operations and advanced towards *Ghazna*, where Djelal-eddin had rallied considerable forces. The Mongols were detained a whole month by the siege of the fortress of *Kerduan*. After the place had surrendered, Chinghiz crossed the Hindu-kush and attacked *Bamian*. There one of his favourite grandsons was killed, and to avenge his death, he ordered the city to be destroyed and the whole district to be made a desert.

The Mongol general *Shiki Cutucu* had been posted with a corps of observation on the mountainous frontiers of Cabul and Zabelstan, to cover the operations of Chinghiz. This corps was defeated by Djelal-eddin in the plain of *Beruan;* but the latter was not able to profit by his victory, being abandoned by a part of his troops; he therefore determined to retreat towards the river *Sind*. He was pursued rapidly by Chinghiz, who arrived at Ghazna fifteen days after the sultan had left it. Djelal-eddin had not yet crossed the river when the Mongols arrived. A desperate battle was fought, in which the sultan's troops were defeated. The sultan jumped into the river with his horse and swam across it. This happened in December, 1221. Some time after, Djelal-eddin was said again to rally some forces beyond the Sind. Chinghiz then sent his two generals *Bela* and *Turtai* in pursuit of the sultan, who retired towards *Delhi* (in spring of 1222). They proceeded to invest *Multan;* but as it held out bravely, and they were afraid of the terrible heat there, they retired again to Ghazna, after ravaging the provinces of Multan, Lahore, Peshawur and Melikpur.

On the defeat of Djelal-eddin, Chinghiz sent Ogotai to destroy *Ghazna*, and the general Ilchikadai received orders to punish *Herat*, which had revolted. After a siege of six months Herat was taken, on the 14th of June, 1222, and destroyed. Besides this, *Meru*

was plundered for the second time. Ogotai after having destroyed Ghazna, asked permission to attack the city of *Sistan;* but Chinghiz objected owing to the excessive heat, and recalled his son.

Chinghiz spent the summer of 1222 in the plain of *Beruan* with his troops;[86] and when Bela and Turtai returned from India, the whole army set out again. Ogotai joined the main army with his corps near the fort *Gunaun kurgan.* The Mongols wintered in the mountainous country of *Buya-ketwer,* about the sources of the *Sind.*

In the spring of 1223, Chinghiz determined to return home to Mongolia by way of *India* and *Tubet.* The army indeed moved out in this direction, but was obliged to return to *Peshawur,* owing to the great difficulties the route presented. Having crossed the mountains of Bamian, the conqueror passed the summer of 1223 in the district of *Bacalan,* where he had left the heavy baggage. In the autumn he started again; and on passing *Balkh,* ordered the extermination of the population, who in the meanwhile had reoccupied the ruins. He then crossed the Sihon and advanced to Bokhara.

The winter of 1223—1224 was spent near *Samarcand.* In the spring of 1224 the army marched out again. On the river Sihon, Chinghiz was joined by his sons Ogotai and Chagatai, who had been engaged in hunting near Bokhara. In the summer of the same year he encamped in the district of *Calan tashi,* and passed his time in hunting excursions. In February of 1225 Chinghiz reached his ordo in Mongolia.[87]

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[86] See my *Notes on Chin. Med. Trav.* p. 43, note 118.

[87] It is not without interest that we compare these records of the Persian historians regarding Chinghiz' expedition to western Asia, with the *Si yu ki* or narrative of Ch'ang-ch'un's journey to the conqueror, who was then encamped among the Hindu-kush mountains (see my *Notes on Chin. Med. Trav.*). The diarist of Ch'ang-ch'un's expedition writes as an eye-witness, and his dates receive a stamp of authenticity by the fact, that the data he gives for the occurrence of a total solar eclipse they observed on their route, is in perfect accordance with the truth, as has been proved by Mr. A. Wylie's investigations on this subject (see the Appendix to my *Notes on Chin. Med. Trav.*). It may be said, that all the details in the narrative with respect to Chinghiz and the war in western Asia, agree well with the statements of the Persian authors, with the exception, that according to the latter, Chinghiz sojourned a year longer in western Asia than Ch'ang-ch'un's narrative will admit. I shall point out this discrepancy. With respect to the date of Chinghiz' starting from Mongolia, both the *Si yu ki* and the *Djami ut Tevarikh* agree. The latter states, that the Mongol army, after having passed the whole summer of 1219 on the Irtysh, moved out in autumn of the same year. In the *Si yu ki* we read (*l. c.*, p. 17) that in the 5th month of 1219 Chinghiz was in the country of the Naimans, who as is known dwelt on the Irtysh. In April, 1220, when Ch'ang-ch'un arrived at Peking, he was informed that Chinghiz had left for the west. On the 29th of October, 1221, Ch'ang-ch'un met, between

53. Let us turn now to the Chinese and Mongol records concerning the events related in the foregoing pages. In the Annals of the *Yüan shi* we read *sub anno* 1219 :—

"In summer, in the 6th month (of the preceding year), the envoys of the emperor had been killed in the *Si-yü* (see above, 48), and the emperor determined to lead an army in person against these countries. He captured the city of 訛塔剌 *O-t'a-la* (Otrar), and the chief of this place, by name 哈只兒只闌禿 *Ha-dji-r dji-lan-to*,[88] was made prisoner.

"*Ibid. sub anno* 1220, in the 3rd month of spring, the emperor took the city of 捕華 *Bu-hua* (Bokhara), and in the 5th month 尋思干 *Sün-sze-kan* (Samarcand). After this he pitched his camp at 忽石的石 *Ye-shi-di-shi*.[89] In autumn 斡脫羅兒 *Wo-t'o-lo-r* was captured.

"*Ibid. sub anno* 1221, in spring, the emperor besieged the cities of

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Talas and Sairam, a Chinese envoy returning from Chinghiz' encampment, who had seen the conqueror in the beginning of June of the same year, and who reported that he was pursuing the sultan to India (*l. c.* p. 35). According to Rashid, Chinghiz spent the summer of 1221 among the mountains of Talecan, and arrived at Bamian it seems only in autumn. In December, 1221, Djelal-eddin was defeated on the Sind. Ch'ang-ch'un after his arrival at Samarcand on December 3rd, 1221, went twice to the encampment of the emperor. The first time he started from Samarcand on April 26th, 1222, crossed the Amu-daria on May 10th, saw the emperor on the 16th, and went with him to pass the summer on the snowy mountains. According to Rashid, Chinghiz was at that time in the plain of Beruan by the Hindu-kush (north of Cabul). In June Ch'ang-ch'un returned to Samarcand, set out for the second time on September 14th, and arrived in fourteen days at the encampment of the emperor, which seems then to have been at a distance of only three days' journey from the Amu-daria; for according to the *Si yu ki*, the emperor set out for the north on October 3rd, and crossed the Amu-daria on the 6th. Ch'ang-ch'un accompanied Chinghiz on his way to Samarcand, where they arrived in November, 1222. Chinghiz' encampment was 30 *li* east of the city. In March of 1223, Ch'ang-ch'un was with the emperor east of the Sihon, it seems near Tashkand, when the latter was hunting on the mountains to the east; and on the 9th the emperor remarked to the sage :—"In three or five days my sons will arrive." The events there reported are all corroborated by Rashid's records; only there is a discrepancy of just a year between the dates in the two accounts. As I have stated above, according to Rashid, it was only in the spring of 1223 that Chinghiz determined to return home; he spent the winter 1223-1224 near Samarcand. In the summer of 1224, after having crossed the Sihon, he was hunting in the district of Calan tashi, which answers it seems to Tashkand. I am inclined to assume, that Ch'ang-ch'un's narrative gives the correct dates, and that the Persian authors have been mistaken in retaining Chinghiz a year longer in western Asia.

[88] Here evidently *Inaldjuc gaïr khan* (see 48) is meant. Mr. Berezin in his translation of the *Djami ut Tevarikh*, vol. ii, p. 74, writes his full name and title, *Hal Sultan Inaldjuc, Gaïr Sultan*.

[89] According to the Persian authors, Chinghiz encamped in the summer of 1220 between Samarcand and Nakhsheb.

卜哈兒 *Bu-ha-r* and 薛思迷干 *Sie-mi-sze-kan.*[90] 朮赤 *Dju-ch'i*, the (eldest) son of the emperor, took the cities of 養吉干 *Yang-gi-kan* and 八兒眞 *Ba-r-djen.*[91] In summer in the 4th month, the emperor moved out to an encampment near the 鐵門關 *T'ie-men-kuan* (Iron-gate pass).[92] Here he gave audience to an envoy of the Kin, etc.[93] In autumn the city of 班勒紇 *Ban-le-ho* (Balkh) was taken.[94] The princes 朮赤 *Dju-ch'i*, 察合台 *Ch'a-ho-tai* and 窩闊台 *Wo-k'uo-t'ai* captured the city of 玉龍傑赤 *Yü-lung-gie-ch'i* (Orcandje or Urgendj, the capital of Khorazm), and other places. In winter, in the 10th month, the prince 拖雷 *T'o-lei* took the cities of 馬魯察葉可 *Ma-lu-ch'a-ye-k'o.*[95] 馬魯 *Ma-lu (Meru, Merv)* and 昔剌思 *Si-la-sze.*[96]

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[90] The Chinese historians, who compiled the *Yüan shi* from official documents, have evidently been misled by the different spellings of the names of the same cities in different reports; for *O-t'a-la* and *Wo-t'o-la-r* both mean Otrar, *Bu-hua* and *Bu-ha-r* are both intended for Bokhara, and *Siin-sze-kan* and *Sie-mi-sze-kan* (Semiscant) for Samarcand. Thus they report the capture of the cities of Otrar, Bokhara and Samarcand twice under different years. Owing to this mistake some chronological confusion has crept into the *Yüan shi* with respect to the first Mongol expedition to western Asia. The events, however, are recorded in the *Yüan shi* with tolerable correctness.

[91] According to the Persian authors, Djuchi took *Yenguikend* and *Barkhalighkend;* the former of which was situated on the Sihon. *Levshin*, in his Description of the country of the Kirghiz Kaisakhs (in Russian), vol. i, p. 212, speaks of the ruins of *Yenguikend*, known also under the name of *Djanikend.* They are found at a distance of one hour's journey from the left bank of the Sir-daria, and one day's journey from the mouth of this river. D'Ohsson (tom. i, p. 223) places ancient Yenguikend (meaning "new city") on the right bank of the Sihon (see his map), and states (evidently on the authority of the Persian authors) that it was distant two days' journey from the lake of Khorazm (Aral). Yenguikend is mentioned by Abulfeda (14th century). It is not known at what time it was founded. We read in Carpini's narrative, pp. 749, 750:—"De terrâ Cangitarum intravimus terram *Biserminorum* (see above, 41) ..... In hâc terrâ invenimus urbes innumeras subversas, et castella diruta, et villas multas desertas. In hâc terrâ est quidam fluvius magnus, cujus nomen ignoramus (the *Sihon*), super quem est civitas quædam que vocatur *Ianckint*, et alia quæ vocatur *Barchin*, et alia quæ vocatur *Ornas* (other reading *Orpar*), etc." It seems that Carpini's Ianckint represents Yenguikend, and his Barchin appears to be the same as the Ba-r-djen of the Chinese and the Barkhalighkend of the Persian authors. The commentators of Carpini have been much puzzled as to the identification of *Ornas* (Orpar), and there are some contradictions in his narrative. Probably he meant *Otrar.*

[92] The Iron-gate is a defile in the mountains south of Samarcand. For further particulars, see my *Notes on Chin. Med. Trav.* p. 41, note 111.

[93] For further particulars regarding this audience, see my *Notes on Chin. Med. Trav.* p. 106.

[94] In the Chinese annals *Kang mu*, 迭里密 *Tie-li-mi* (Termed) is mentioned (before Balkh) among the cities captured by Chinghiz.

[95] *Maruchak*, a district subject to Merv. D'Ohsson, tom. i, p. 280.

[96] *Serakhs*, to the south-west of Merv. D'Ohsson, tom. i, p. 281.

"*Ibid. sub anno* 1222, the prince *T'o-lei* took the cities of 徒思 *Tu-sze* (Thus) and 匿察兀兒 *Ni-ch'a-wu-r* (Nishabur); and when returning he devastated the kingdom of the 木剌夷 *Mu-la-yi*.[97] *T'o-lei* next crossed the river 揣撕闊 *Ch'o-ch'o-lan* (it may also be read *Shuo-shuo-lan*),[98] captured the city of 也里 *Ye-li*[99] and other places, and then joined the emperor. Together they stormed the fortress of 塔里寨 *T'a-li-han* (Talecan); and in order to avoid the great heat of the summer, the emperor pitched his camp near that city.[100] 扎闌丁 *Dja-lan-ding* the king of the *Si-yü* (see 41) joined (or was joined by) 滅里可汗 *Mie-li k'o-han*.[101] The (Mongol) general 忽都忽 *Hu-tu-hu*,[102] who gave them battle, was defeated. Then the emperor in person directed his host against the enemy. *Mie-li k'o-han* was defeated and *Dja-lan-ding* fled. The general 八剌 *Ba-la* (Bela of the Persian authors) was sent in pursuit, but he was unable to capture him."

54. In the biography of *Su-bu-tai*,[103]—*Yüan shi*, chap. cxxi,—some particulars are found regarding the pursuit of Mohammed shah, with which, according to the Persian authors, the

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[97] The Mulahida or Ismaëlians in Kuhistan. See my *Notes on Chin. Med. Trav.* p. 63.

[98] The name of a city *Chukhchelien* occurs in the Mongol annals. See *Notes on Chin. Med. Trav.* p. 104, note 15.

[99] Herat, or *Heri* as it was generally called in the middle ages, known to the ancients under the name of *Aria*. On the Catalan map of the year 1375, Herat is styled *Eri*. On Col. Yule's map of the Nestorian metropolitan sees (*Cathay*, p. ccxlv), the name is written *Harah*.

[100] As we have seen, the Persian authors also state that Chinghiz spent the summer among the mountains of Talecan, but record this fact under the year 1221.

[101] *Djelal-eddin* the son of Mohammed shah, and *Melik khan*. By the latter name probably the intrepid *Timur-melik* is meant, the faithful companion of Djelal-eddin.

[102] The *Shiki Cutucu* of the Mohammedan authors. He was defeated by Djelal-eddin in the plain of Peruan (see above, 52).

[103] *Su-bu-tai* was one of the most distinguished generals in the Mongol army. He is repeatedly mentioned by the Persian authors, as well as in the *Yüan shi;* and his name is met with even in the ancient Russian annals. Rashid, treating of the *Uriankhits*, states that Subutai belonged to that Mongol tribe (Berezin, *l. c.* vol. i, p. 145). In the *Yüan shi* he has a long biography, in which all his exploits in China, western Asia, Russia and Hungary are recorded with some detail. I shall give successively in the proper places, translations from his biography. The *Yüan shi* states that 速不台 *Su-bu-t'ai* belonged to the 蒙古 *Men-gu* (Mongol) tribe of the 兀良合 *Wu-liang-ho*. His ancestors were hunting together with the ancestors of Chinghiz on the river 薛難 *Wa-nan* (the *Onan* in north-eastern Mongolia, an affluent of the *Shilka*,—*resp.* the *Amur*). Su-bu-tai entered Chinghiz' army in the beginning of the 13th century.

generals *Chebé noyen* (see note 66) and *Subutai bahadur* had been intrusted. Mohammed in this biography is erroneously called Melik, and it seems is confounded with Timur-melik.[104] We read there:—"When the emperor invaded the kingdom of the *Hui-hui* (Mohammedans), the ruler of it 滅里 *Mie-li* fled and abandoned his throne. Then *Su-bu-t'ai* and *Dje-bie* received orders to pursue him. They arrived at the river 灰里 *Hui-li*, (?) where Dje-bie attacked the enemy, but without success. Then Su-bu-t'ai made a great fire on the eastern bank of the river, to mislead the enemy with respect to the (Mongol) forces. Mie-li was struck with fear, and fled the same night. Su-bu-t'ai with a host of ten thousand men went in pursuit, passed 不罕川 *Bu-han ch'uan*[105] and the city of 必里罕 *Bi-li-han*.[106] He pursued *Mie-li* uninterruptedly day and night through countries destitute of water (the deserts of Khorassan). Finally, when he was about to catch him, Mie-li fled to an island in the sea, where he died a month after (compare above, 50). Su-bu-t'ai captured all his treasures, precious stones, silver vessels, etc. and sent them to the emperor."

55. In the *Yüan shi*, Annals, 1223, we read:—"In order to avoid the heat of the summer, the emperor moved to the valley (or river) 八魯灣 *Ba-lu-wan* (the plain of *Peruan* in Rashid's record); after which he was joined by the princes *Dju-ch'i*, *Ch'a-ho-t'ai* and *Wo-k'uo-t'ai*, and the general *Ba-la*, on their return from their expeditions.[107] When the conquered realms in the *Si-yü* were pacified, 達魯花赤

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[104] In the biography of the Uigur prince *Ba-r-dju a-r-te di-gin*,—*Yüan shi*, chap. cxxii,—Mohammed shah is termed *Han mie-li su-tan* (Khan Melik sultan). See further on.

[105] *I. c.* the valley or river of *Bu-han*. I am not prepared to identify either the *Hui-li* or the *Bu-han* river. Probably the names are misspelt. One of them is evidently intended for the *Amu-daria* (Oxus, Sihon) which however is generally styled 阿木 *A-mu* or 暗木 *An-mu* by the Chinese (or Mongol) authors of that period. Compare *Yüan shi*, Annals, A. D. 1251, and the biography of Kao Pao-yü,—chap. cxlix,—where the crossing of the Oxus by the Mongols is spoken of. See also *Notes on Chin. Med. Trav.* pp. 42, 77 (暗不 *An-bu*) and 117.

[106] *Bi-li-han* is probably Balkh. According to the Persian authors, Subutai and Chebé crossed the Sihon at Pendjab, and proceeded to Balkh.

[107] The Chinese annals *Kang-mu* state, *sub anno* 1223, that the emperor spent the summer on the river *Ba-lu-wan*, and sent his troops to subdue the neighbouring tribes. When he subsequently had moved out and reached the fort of 可温 *K'o-wen*, he was joined by his generals. K'o-wen is probably the *Gunaun kurgan* of the Persian authors. Perhaps the *Khewek* pass in the Hindu-kush,—noticed by sultan Baber,—is meant. See Col. Yule's map in his *Cathay, etc.*

da-lu-hua-ch'i (Mongol governors)[108] were appointed to govern them."

Ibid. 1224 :—"The emperor advanced as far as 東印度國 *Tung yin-du kuo* (the kingdom of eastern *Yindu* or *Hindu*), where he met the 角端 *küe-tuan*[109] and then turned back."

Ibid. 1225 :—"In spring, in the first month, the emperor returned (from western Asia) to his *king-kung* (ordo)."[110]

56. In the *Yüan ch'ao pi shi* we find a more detailed description of the military doings of Chinghiz in the west. The events however are not recorded there in chronological order, and there is some confusion also in its statements. I do not wish to trouble the reader with a complete translation, and will therefore confine myself to quoting from this ancient Mongol record only such passages as may present special interest.

The year 1219 is given also in the *Yüan ch'ao pi shi* as the date of Chinghiz' departure for the countries of the west, in accordance with the statements of the Persian authors and the *Yüan shi*. Chinghiz intrusted his brother *Ochegin*,[111] it is said, with the government of the Mongol empire, and took with him his wife *Hulan*;[112] *Djebe* having command of the avant-guard, and *Subut'ai* the rear.

The following names of places occur in the record in connection with the first Mongol expedition to western Asia:—*Udarar* (Otrar), *Bukhar* (Bokhara), *Siemisyien* (Samarcand) and *Niesgiab* (Nakhsheb).

Djochi, Djaadai (Chagatai) and Ogedai received orders to cross the river *Amuy* (Amu-daria or Oxus) and attack the city of *Urungechi* (Orcandje the capital of Khorazm). When they had reached the city, they sent to Chinghiz to ask who should take the supreme command. Chinghiz ordered Ogodai to take it.[113] Tului took

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[108] See my *Notes on Chin. Med. Trav.* p. 6.

[109] By *küe-tuan* (upright horn) the Chinese chroniclers understand an animal (of course a fabulous one) which is said to have advised the conqueror to go back and cease his conquests. Further particulars regarding it may be seen in the *Yüan shi*, chap. cxlvi, biography of *Ye-lü Ch'u-ts'ai*.

[110] This date is in complete accordance with the statements of the Persian authors (see above, 52).

[111] Compare *Notes on Chin. Med. Trav.* p. 18, note 12.

[112] Palladius' translation, *l. c.* p. 146. We read in the same *Yüan ch'ao pi shi* (*l. c.* p. 109), that in 1204 *Daïr usun* of the tribe *Horze Mierke* surrendered to Chinghiz, and gave him his daughter *Hulan*. In the list of the empresses,—*Yüan shi*, chap. cvi,—忽蘭 *Hu-lan* appears as the second wife of Chinghiz. Compare also D'Ohsson, tom. i, p. 90. Rashid states, that *Daïr assun*, chief of the *Uhus Merkits* surrendered to Chinghiz on the river *Tar*, and gave him his daughter *Culan*. Further on (*l. c.* tom. i, p. 418), Culan is mentioned by Rashid as the emperor's second wife.

[113] The Persian authors speak of the quarrels of Djuchi and Chagatai

the cities of *Isiepur* (Nishabur), *Chukhchelien* (*Ch'o-ch'o-lan* of the *Yüan shi*), *Ilu* (Heri or Herat) and *Sisten* (Sistan).

We read further in the *Yüan ch'ao pi shi*:—

"The prince *Mielik* (Timur-melik) fled and joined *Djalalding*, the king of the *Sartol*. When they intended to attack Chinghiz, the latter ordered *Shigi Hutuhu* (Shiki Hutuku of Rashid;—see note 102) to command the avant-guard; but he was defeated by Djalalding, who pursued him near to the place where Chinghiz was encamped. Chinghiz then sent *Djebie*, *Subietai* and *Tohuchar*[114] against Djalalding, who was beaten. He tried at first to escape towards *Bukhar*; but not succeeding, he fled to the river *Shin* (Sind), to which point he was pursued. Nearly all his troops were drowned in the river; but Djalalding and Mielik escaped. *Bala* who was sent in pursuit, crossed the river *Shin* and proceeded to the country of *Hindu*. Not being able to find Djalalding, he captured a number of camels and sheep, and returned."

Chinghiz went up the river *Shin*, took the city of *Batkesie*, (?) arrived at the rivers *Ekie horohan* and *Geun horohan*,[115] and pitched his camp at *Baruan keher*.[116] According to the *Yüan ch'ao pi shi*, Chinghiz spent one summer (it is not clear in what year) in the mountains *Altan horhuan*, where the king of the Mohammedans was accustomed to encamp. Finally we read in the *Yüan ch'ao pi shi*, that Chinghiz, in the seventh year after he had left Mongolia, in the autumn of 1225, returned to his principal encamping place, *Karatun*[117] on the river *Tula*.[118]

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interfering with the progress of the siege of Orcandje. Chinghiz appointed his younger son Ogotai to superintend the siege.

[114] This is an erroneous statement; for Chinghiz himself went to attack Djelal-eddin. Subutai and Chebé at that time were in the countries near the Caucasus. As to Toguchar, he had been killed before, as Rashid records, at the siege of Nishabur in 1220.

[115] Probably Rashid's *Gunaun kurgan* (see note 107) near the sources of the Sind.

[116] Here doubtlessly the plain of *Peruan* is meant. *Keher* in Mongol means "a steppe."

[117] The Chinese text of the *Yüan ch'ao pi shi* renders *Karatun* by 黑林 *Hei-lin* (black forest); and in the *Yüan shi*, *Hei-lin* is also frequently mentioned as the favorite encamping place of Chinghiz. Rashid-eddin terms the same place *Caraun cabdjal*, explaining that it means "black forest" (D'Ohsson, tom. i, p. 73). Indeed *kara* in Mongol means "black" and *oi* (genitive =*oin*) "forest." *Cabdjal* means "defile." Thus *Caraun cabdjal* = "defile of the black forest."

[118] The river Tula has the same name even at the present day. It passes near the city of *Urga*. Another favourite resting-place of Chinghiz was on the river *Kerulun*; and according to Palladius' researches (*Elucidations of M. Polo's travels*, p. 12), the tomb of the conqueror was near the river Kerulun

57. The accounts given in the *Ts'in cheng lu* (see above, 12) of Chinghiz' conquest of western Asia are remarkable for their strong accordance with Rashid's records. There is only a difference in the dates, the *Ts'in cheng lu* being a year in advance. I shall give a complete translation of the respective accounts, *i. e.* I translate from Palladius' Russian version of the *Ts'in cheng lu*:—

"In the year 1219 Chinghiz moved out at the head of a great host to subjugate the western countries. He spent the summer of 1220 on the river *Yerdishi* (Irtysh). In autumn he started again and captured all the cities on his way. Thus the army arrived at *Otolar* (Otrar). Chinghiz left his second and third sons to invest this place, which was soon taken by assault, and in 1221 marched himself, with his fourth son, upon *Bu-ha-r* (Bokhara). This city was captured, and also *Sie-mi-sze-kan* (Samarcand). The eldest son of Chinghiz captured the cities of *Yang-gi-kan* (Yengikand), *Ba-r-djin* (see note 91) and others. Chinghiz spent the summer in the summer residence of the *su-wan-tan* (sultan) of the *Si-yii*.[119] Subsequently he ordered *Hu-tu no-yen* to take command of the avant-guard.[120] In autumn of the same year he sent his eldest, second and third sons with the right flank of the army, to attack *Yü-lung-kie-chi* (Orcandje) and *Bu-djin ye-ha-da* (probably a misspelt name). Chinghiz' third son was intrusted with the chief command. The emperor himself with the main army marched upon the *Iron-gate*, captured *Tie-r-mi* (Termed), destroyed *Ban-le-ho* (Balkh), and then besieged *Ta-li-han* (Talecan). In winter, the fourth prince took the cities of *Ma-lu-ch'a-ye-k'o* (Maruchak), *Wu-lu* (probably misspelt for *Ma-lu*, or Meru), *Si-la-sze* (Serakhs), *Ni-sha-u-r* (Nishabur) and *Ye-li* (Heri or Herat).

"In the spring of 1222, the fourth prince captured *T'u-sze* (Thus) and *Ni-sha-u-r* (Nishabur).[121] At the beginning of the hot season he received orders to make haste to join his father; but before doing so, he made an incursion into the country of the *Mu-la-di* (see note 97), devastated it, crossed the river *So-so-lan* (see note 98) and sacked *Ye-li* (Herat). When the fourth prince had joined the emperor, they attacked *Ta-li-han* in concert. Chinghiz' three eldest sons had at that time taken the city of *Yü-lung-kie-chi*, and the eldest prince had arrived at his father's camp.[122]

[119] In the *Yüan ch'ao pi shi*, the mountains of *Altan horhuan* are mentioned as the summer residence of the sultan.

[120] See note 102. *Cutucu*, the foster-son of Chinghiz (D'Ohsson, tom. i, p. 304).

[121] The name of Nishabur occurs here for the second time. Indeed according to the Persian authors, this place was twice sacked.

[122] According to the Persian authors, Djuchi, the eldest son of Chinghiz, after the quarrel with his brother, did not return to his father; but died in 1225, without having seen Chinghiz khan. The *Yüan ch'ao pi shi* however,

The second and third sons came only after the fortress had been destroyed.[123]

"Meanwhile *Dja-lan-ding*, the *su-li-t'an* of the *Si-yü* had fled. Chinghiz had sent *Dje-bie*,—who commanded the avant-guard,—in pursuit; and despatched another corps, under *Su-bu-t'ai*, to assist Dje-bie. *T'o-hu-ch'a-r* commanded the rear. Dje-bie proceeded to the city of *Mie-li k'o-han*,[124] but passed without attacking it. Su-bu-tai did the same; but T'o-hu-ch'a-r had a skirmish with the troops outside the city. Mie-li k'o-han was then struck with fear, left the city and fled. *Hu-du-hu no-yen* went in pursuit; but Mie-li k'o-han succeeded in joining Dja-lan-ding. The latter then attacked *Hu-du-hu* and defeated him. A courier was despatched to Chinghiz with a report; whereupon Chinghiz, with a corps of *élite* troops left the mountains of Ta-li-han and marched rapidly upon the enemy, pursued him to the river *Sin-tze su*,[125] made Mie-li k'o-han prisoner, and destroyed his army. Dja-lan-ding escaped, jumped into the river and swam across it. Chinghiz sent a corps under *Ba-la no-yen* in pursuit of him. Bala was not able to catch the prince, but captured half of the *Hindus*, and returned.

"In the spring of 1223, Chinghiz moved out with his army and proceeded northward, following the course of the Sin-tze su." (Here is a break in the MS.)

"The third prince reached the city of *Bu-si-sze-dan* (probably *Bost* in Seyistan is meant;—see D'Ohsson, tom. i, p. 298), and asked permission of Chinghiz to attack it, but the emperor recalled his son in view of the hot season commencing. Chinghiz spent the summer with his troops on the river *Ba-lu-wan* (Peruan), and defeated the enemy in the adjacent countries. After the arrival of the corps of Ba-la, the army moved to the west, (it seems a mistake for east); and when they had reached the fort of *Ke-un* (see note 107), the third prince also arrived. After Chinghiz had conquered the western countries, he placed a *da-lu-hua-ch'i* (Mongol governor) in every city.

"In the year 1224, Chinghiz started on his homeward route, and in the spring of 1225 reached his native land, after an absence of seven years."

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states, in accordance with the *Ts'in cheng lu*, that after the fall of Orcandje, Djuchi, Chagatai and Ogotai repaired to the camp of their father.

[123] See note 113.

[124] I am not able to say what place is meant here by the city of Melik khan. The accounts are somewhat confused, but they may be made consistent by means of the records of the Persian authors.

[125] *Sin-tze su* means the *Sind*. *Su* is "river" in Mongol.

Expedition of the Mongol Generals *Subutai* and *Chebe* to western Persia and the region of the Caucasus, a. d. 1220—1224.

58. I may again commence with the records of the Mohammedan authors (D'Ohsson, tom. i, p. 444). We have seen, that in 1220 Chinghiz had sent out two corps under the command of Subutai and Chebé in pursuit of Mohammed shah. They ravaged Irac Adjem and Mazanderan; and after the miserable end of Mohammed they continued to carry fire and slaughter over Irac Adjem. The cities of *Rayi*, *Kum*, *Hamadan*, *Kasvin* and *Zendjan* were sacked. The two generals then advanced on *Tebriz*, the capital of Azerbaidjan, which province was ruled by the atabeg Euzbeg, a Turkish prince. He bought off the Mongols by rich presents, who then evacuated Azerbaidjan and wintered in the plain of *Mogan* on the shore of the Caspian. In the beginning of the year 1221 they advanced into Georgia, nearly as far as *Tiflis*, and defeated the Georgian army. After this they returned to Tebriz, levied a second contribution upon that city, and then attacked *Meraga*. Meanwhile the inhabitants of *Hamadan* had killed the Mongol governor placed there; whereupon the Mongol army proceeded to that city, which was taken and destroyed. Returning to the north, the Mongols captured *Erdebil*, and appeared for the third time at Tebriz. Euzbeg fled to *Nakhshevan*, and Tebriz again paid ransom. After this the Mongol host was directed against Georgia, and an army of thirty thousand Georgians was destroyed. Having ravaged the latter country, they turned upon *Shirvan* and captured *Shamakha* its capital. Rashid, the shah of Shirvan, had taken refuge in the citadel of *Derbend*. The Mongols had no difficulty in taking the city, but could not capture its citadel. As they intended to cross the Caucasus, they were in need of good leaders; and by means of cunning and force, they obliged the envoys of Rashid to guide them across the mountains. On the other side of the Caucasus they found the *Alans* or *Ases*, the *Lerguiz*, the *Circassians* and the *Kipchaks* leagued together against them. A battle was fought, but the victory remained undecided. The Mongols then had recourse to craft, and persuaded the Kipchaks to desert their allies, who were attacked and vanquished. After this the city of *Terki* was sacked, and the Mongols invaded the land of the Kipchaks, who dispersed without offering any resistance. A great number of them fled to the Russians; and the Mongols took possession of their country consisting of vast steppes, and

advanced as far as the rich city of *Sudac*,[126] which was subject to the Kipchaks.

In 1223 the Mongols undertook an expedition against the Russians, who had made a league with the Kipchaks. The united host of the Russians and Kipchaks marched out to meet the enemy before they had entered the Russian territories. The Mongols employed their usual stratagem; they first retreated, and after having been followed twelve days by the Russians and Kipchaks, lay in ambush and suddenly rushed out upon the enemy. A battle was fought with great slaughter, which continued several days; but finally the Mongols got the victory, the Russians and Kipchaks being utterly defeated.[127] After that, the Mongols entered Russia, and carried fire and slaughter over the country.

At the close of the year 1223, the Mongols evacuated Russia and invaded the land of the *Bulgars*. The host sent by the latter to repulse the invaders was defeated with great slaughter. The Mongols then took the route by *Saccasin*[128] to join Chinghiz khan.

59. The Russian annals (see Karamzin, vol. iii, pp. 221 sqq.) give of course a more detailed account of the Mongol invasion of Russia than the Mohammedan authors. Russia was at that time divided into several principalities, of which the chief was that of Vladimir, whose grand-duke, to a certain degree, was accepted as feudal lord by the rest. The residence of the grand-duke was first in *Kiev;* but after 1169 he dwelt in *Vladimir*. Amongst the *Polovtsy* (thus the Russian annals term the Kipchaks) who had fled to Russia, there was a prince *Kotian* (Kutan in the Hungarian annals), who persuaded his son-in-law the prince *Mstislav* of *Galich* of the necessity of taking measures against the Mongols. Mstislav then assembled the princes of southern Russia, who agreed to make common cause with the Polovtsy agains the *Tatars* (thus the Mongols are always styled in the ancient Russian annals). The princes of *Kiev, Chernigov, Galich* (all three had the name *Mstislav*) and others, having rallied their troops, marched out and first met the Tatars near the river *Khortitsa* (an affluent of the Dnieper apparently). Having gained the victory, the Russians

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[126] *Sudac* or *Soldaya*, situated on the south-eastern coast of the Crimea, and on the Khazarian sea (Black sea).

[127] The author of the *Kamil ut Tevarikh*, from which the above account is borrowed, means evidently the battle at the river *Kalka* (see further on).

[128] The Persian geographer *Bakuy* (14th cent.) states, that *Saccasin* is a large city in the country of the Khazars (D'Ohsson, tom. i, p. 346). The Russian annals (Karamzin, vol. iii, p. 270) mention a people called *Saxiny*, who in 1229 first informed the Russians of the approach of the Mongols. The *Saxi* of Plano Carpini (p. 710) are probably the same.

crossed the *Dnieper*, and pursued the Mongols nine days to the river *Kalka*. The prince of Galich with his troops joined the Polovtsy, imprudently crossed the river and engaged the enemy. They were defeated by the Mongols, who then rushed upon the remaining part of the Russian army and completely destroyed it. This is the famous battle of the *Kalka*, which took place in 1223 or 1224.[129] The Mongols pursued the Russians as far as the Dnieper. Some of the Russian princes, who had been made prisoners were fastened to planks, upon which the Mongols sat to perform a drinking bout.

The Russian annals mention also some other nations, who had been subdued by the Mongols at the time they crossed the Caucasus, namely the *Yasy*, the *Obezy*, the *Kassogy*, etc., seven nations in all (Karamzin, vol. iii, pp. 542, 228). By *Yasy* doubtless the *Asi* (Ases) or *Alans* are to be understood (see further on, Part VI). Carpini (p. 709) has *Alani* sive *Assi*. The Obezy of the Russian chroniclers are identical with Carpini's *Obesi* sive *Georgiani*. But Carpini apparently commits an error in identifying the Obesi with the Georgians; for his Obesi are the same as the *Abazi* or *Abkhazi* (of the Byzantine authors), a people found at the present day, in the western part of the Caucasus. Comp. Klaproth's *Asia Polyglotta*, pp. 129, 131. The *Kassogy* are the same as the *Cherkess*, who according to Klaproth (*l. c.* p. 130) were formerly called *Kassakh*.

60. Chinese fragmentary accounts of the Mongol expedition under Subutai and Chebé are found in the *Yüan shi*, in the biographies of two distinguished Mongol generals.

In the biography of *Su-bu-t'ai*, already quoted (see note 103) we read (after the pursuit of Mohammed has been recorded) :—

"*Su-bu-t'ai* asked the favour to be allowed to conquer the country of the 金察 *Kin-ch'a* (Kipchak). He conducted his army round the sea *K'uan t'ien-gi-sze*,[130] and arrived at the mountains

[129] It is strange that the Russian chroniclers are not in accordance with respect to the date of this battle. The annals of *Wossnessensk* give the 16th of June 1224; the annals of *Novgorod*, the 31st of May of the same year, as the day when the battle took place. In other Russian annals, the battle is recorded under the year 1223 (Karamzin, vol. iii, p. 545). This latter date would agree with the year the Mohammedan authors give for the first invasion of Russia by the Mongols. The river *Kalka* (some Russian chroniclers write *Kalak*) is identified by Karamzin (vol. iii, p. 232) with the river *Kaletsa* near *Mariupol* (on the sea of Azov).

[130] 寬田吉思海. The characters *t'ien-gi-sze* here are evidently intended for *denjhiz*; for this was the name applied by the Turks to the Caspian sea (*Bibl. Orient.*, p. 152*a*). *Denghiz* means "sea." The character *k'uan* in Chinese means "large;" but we cannot translate here, "the large sea." At least the Chinese scholars, whom I have consulted in regard to this phrase, agree that *kuan* forms part of a foreign proper name, and is not

太和嶺 *T'ai-ho ling*,[131] through which an artificial road was cut. On the other side, Su-bu-t'ai met the chiefs (of the *Kin-ch'a* it seems) named 玉里吉 *Yü-li-gi* and 塔塔哈兒 *T'a-t'a-ha-r*, who had rallied their troops on the river 不租 *Bu-dsu*.[132] The son of *Yü-li-gi* was wounded by an arrow, and fled into the forest. His slave came (to the Mongols) and betrayed his master. Subsequently all submitted; and after the country of the Kin-ch'a had been conquered, Su-bu-t'ai penetrated as far as the river 阿里吉 *A-li-gi*, where he met the chiefs of the 斡羅思 *Wa-lo-sze* (Russians;—see further on, Part VI), and the great and the little 密赤思老 *Mi-ch'i-sze-lao*. A battle was fought, when the latter were defeated and surrendered;[133] after which Su-bu-t'ai subdued the 阿速 *A-su* (the Asi or Alans), and then returned home, taking with him the slave, who had betrayed his master. When the emperor had heard his story, he said to Su-bu-t'ai,—'We can scarcely expect fidelity from this man,'—and ordered him to be put to death. On the proposal of Su-bu-t'ai, a special corps was formed, consisting of 蔑里乞 *Mie-li-k'i* (Merkits), 乃蠻 *Nai-man* and *Kin-ch'a* (Kipchaks), who accompanied that general on his return home. He proceeded by the way of 也迷里 *Ye-mi-li* and 霍只 *Ho-dji*."[134]

61. In the biography of *Ho-sze-mai-li*,—*Yüan shi*, chap. cxx (see above, 36),—the Mongol expedition to western Persia and the countries near the Caucasus is also shortly recorded. We read there (after the pursuit of Mohammed shah to Mazanderan has been related):—"The emperor (Chinghiz) sent *Dje-bo* (see note 66) to attack the *Kin-ch'a* (Kipchaks), and Ho-sze-mai-li received orders

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to be translated. Perhaps there is one character omitted in the Chinese text, and *Abgun denghiz* was originally intended. *Absukun* or *Abgun* was an important port on the Caspian sea, which was known also under the name of the sea of Absukun (D'Ohsson, tom. i, p. 255; and *Bibl. Orient.* p. 10). The same name *K'uan t'ien-yi-sze* for the Caspian, occurs once more in the *Yüan shi* (see further on, 68).

[131] *T'ai-ho ling*, literally "the mountains of great peace," denotes evidently the *Caucasus*.

[132] According to the Russian annals, one of the khans of the Polovtsy (Kipchaks), by name *Yury Konchakowich* was killed by the Mongols in 1223 (Karamzin, vol. iii, p. 228).

[133] Perhaps the river *A-li-gi* denotes the *Kalka*; for it is certain that the Chinese author, by the great and the little Mi-ch'i-sze-lao, means the princes *Mstislav*. As we have seen, three princes of this name fought in the battle of the Kalka.

[134] *Ye-mi-li* denotes doubtless the city of *Emil* or Imil, repeatedly mentioned by the Persian authors. The name has survived in that of a river (near Chuguchak). As to the place *Ho-dji*, I know nothing about it. A city 忽只 *Hu-dji* is mentioned in the itinerary of *Ye-lü Hi-liang* (see Appendix to this paper) together with *Ye-mi-li*.

(from Dje-bo) to march against the 曲兒忒 *K'ü-r-t'e*[135] and 失兒灣沙 *Shi-r-wan sha*,[136] and to advance upon several cities, summoning them to surrender. Ho-sze-mai-li then proceeded to the country of the 谷兒只 *Gu-r-dji*,[137] and marched against another nation called 阿速 *A-su* (Asi), capturing the city of 黑林 *Hei-lin*.[138] After this the *Wa-lo-sze* (Russians) were defeated at 鐵兒山 *T'ie-r-shan*,[139] and their king 密只思臘 *Mi-dji-sze-la* (Mstislav) was taken prisoner. Dje-bo ordered Ho-sze-mai-li to convey Mi-dji-sze-la to the emperor's (eldest) son *Dju-ch'i*, who put him to death. Subsequently the 康里 *Kang-li*[140] were attacked, the city of 孛子八里 *Bo-tze-ba-li* was captured, and the king of this country 霍脫思罕 *Ho-t'o-sze-han* defeated. When the *Kin-ch'a* (Kipchaks) had been subdued, the (Mongol) army returned and *Dje-bo* died.

PART V. EXPEDITION OF THE MONGOLS TO THE COUNTRIES NORTH OF THE CASPIAN SEA AND WEST OF THE VOLGA,

A. D. 1235—1242.

62. In this chapter, I shall review the invasion of the countries of the *Kipchaks*, the *Asi* and the *Bulgars*, as also the ravaging of *Russia*, *Poland*, *Silesia* and *Hungary* by the Mongols; comparing, western accounts with the statements of the Chinese and Mongols, as I have done in the previous chapter.

After Chinghiz and his generals had ravaged Persia, the countries of the Caucasus and southern Russia, A. D. 1220—1224, the warlike enterprises of the Mongols towards the west were stopped for some years; the armies being occupied in the east, with the conquest of the *Kin* empire, in northern China. In the beginning of 1234, the dynasty of the Kin was overthrown, and Ogotai khan

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[135] Probably the *Kurds* are meant. The Mohammedan authors report (D'Ohsson, tom. i, p. 327), that the Turcomans and the Kurds entered the service of the Mongols; and when the latter invaded Georgia, the Turcomans and Kurds formed the avant-guard.

[136] Perhaps the shah of *Shirvan*, who fled to Derbend, is meant (see 58).

[137] *Gu-r-dje* is the Persian name for the Georgians (*Bibl. Orient.* p. 378).

[138] *Hei-lin* in Chinese, means "black forest." But it may be, that here a foreign name is rendered by Hei-lin. I can give no explanation regarding this place.

[139] As *shan* in Chinese, means "mountain," or "hill," the name may also be read "the hill of *T'ie-r*." I may observe, that the Mohammedan authors mention a city *Terki*, north of the Caucasus, sacked by the Mongols at the time spoken of here. On the Catalan map (see Yule's *Cathay*) a place *Terchi* on the north-western shore of the Caspian, not far from the mouth of the *Edil* (Volga), is marked. Astrakhan on the same map is termed *Agitarchan*.

[140] The Kankalis;—see 64, further on.

(1229—1242) then resumed the conquest of the countries in the west, commenced by his father.

The *Tarikh Djihan Kushai* states (D'Ohsson, tom. ii, p. 15), that already in 1229, Ogotai had sent an army of thirty thousand men, under the command of the generals *Gueuktai* and *Sunodai* (perhaps a clerical error for *Subutai*), to conquer the countries of the *Kipchaks*, *Saccasins*[141] and *Bulgars*. This expedition seems to be alluded to in the Russian annals. Karamzin, vol. iii, p. 270, states :—"After the battle of the Kalka, for six years nothing was heard of the Mongols; but in the year 1229, certain *Saxiny*, fugitives of the *Polovtsy*, and some *Bulgars* posted at the river *Yaik*, arrived in Bulgaria, bringing the news that the Mongols were again approaching; but they tarried, for it was not till six years later that *Baty* appeared at the Volga and wintered near the capital of the Bulgars."

63. The *Yüan ch'ao pi shi* says (Palladius' translation, p. 149) : —"The emperor ordered the valiant Subietai to subdue the *eleven* nations (who were not yet subject to the Mongols), viz. the *Kanglin*, the *Kibcha*, the *Ubadjigi*, the *Ulusu*, the *Madjar*, the *Asu*, the *Siesu*, the *Sierkesu*, *Keshimir*, *Bular* and *Lala*,—to cross the two rivers *Djayakh* and *Idil*, and to march directly upon the cities *Kiwamien* and *Kermien*."

These eleven nations, and the cities against which Subietai directed his host, are twice more mentioned in the *Yüan ch'ao pi shi* (Pall. transl., pp. 152, 155) with some variations in the spelling of the names. There appear also two new names, *Miegie* or *Meketmeng* and *Kelie*. I will try to identify these names as far as my acquaintance with the mediæval geography of the regions here spoken of may enable me.

64. The *Kanglin* of the *Yüan ch'ao pi shi*, are without doubt the same as the *Kankalis*, or *Kankly* of the Mohammedan authors. According to Rashid-eddin (D'Ohsson, tom. i, p. 197), this people dwelt—at the beginning of the 13th century—on the steppes north of the sea of Khorazm (Aral), and north-east of the Caspian sea. The Kipchaks were their western neighbours.

Plano Carpini, after having quitted the country of the *Comani* (same as the Kipchaks ;—see further on, Part VI), entered the deserts of the *Cangitæ*, by which name he means the Kankalis; page 749 :—"Post hoc terram intravimus Cangitarum quæ magnam habet in pluribus locis penuriam aquarum; in quâ etiam homines pauci morantur propter aquæ defectum. . . . . Et tàm Comani quàm Cangitæ non laborant, sed tantùm de animalibus vivebant; nec ædificabant domos, sed in tabernaculis habitabant.

[141] See note 128.

Istos etiàm Tartari deleverunt, et habitant in terram ipsorum; et illi qui remanserunt redacti sunt in servitutem eorum."

Rubruquis terms the same people *Cangle;* p. 265 :—"Quidam Comani qui dicebantur Cangle;" and p. 274 :—"*Cangle*, quedam parentela Comanorum."[142]

In the Chinese historical works of the Mongol period, the *Kankalis* are repeatedly spoken of, but the information the Chinese authors give about this people is very meagre. The name is generally spelt there 康里 *K'ang-li* or 康禮 *K'ang-li*,—sometimes also 杭里 *Hang-li*. The K'ang-li were known to the *Kin*, as early as the 12th century (see above, 31), a khan of that nation being desirous of becoming a vassal of the Kin emperor. In the *Yüan shi* the name K'ang-li occurs repeatedly, and especially in the biographies. As they were a warlike nation, the Mongol khans used to place them in their army, and many brave generals of the Mongol empire belonged to the K'ang-li.

不忽木 *Bu-hu-mu*, whose biography is found in chap. cxxx of the *Yüan shi*, was a K'ang-li. It is stated there, that this nation derived its origin from the 高車 *K'ao-kü*,[143]a people mentioned in the "History of the Han." Bu-hu-mu's son 蔜蔜 *K'ui-k'ui* has a separate biography,—in chap. cxliii.

In chap. cxxxvi, we find the biography of 阿沙不花 *A-sha-bu-hua*, who was a prince of the reigning family of the K'ang-li. The armies of Chinghiz had ravaged the country of the K'ang-li. When the king died, he left a widow, belonging to the tribe of 苫滅古麻里 *Shan-mie gu-ma-li;* and owing to the ruined state of her affairs, she was for a long time unable to leave her country (she was evidently desirous to proceed to the Mongol court). Subsequently however, through some miraculous agency, she was surprised on one occasion by the appearance of some richly laden camels. Consequent on this, she set out with her two sons 曲律 *K'ü-lü* and 牙牙 *Ya-ya* for the residence of the emperor; and after two years returned home, leaving her sons with Ogotai. Thirteen years later she again proceeded to the court of

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[142] The Kankalis and the Kipchaks, or Comans, belonged indeed to the same race (Turks).

[143] The character 車 is also read *ché*. The German orientalist Hammer, who was scarcely aware of the Chinese form of the name here translated, also identifies the *Kao-ché* with the *Kankalis* (Ritter's *Asia*, vol. v, p. 595). *Kao-ché* in Chinese means "high cart;" and in the "History of the Wei" (in the 5th century of our era), the name of this people is explained by the high wheels they used to put on their carts. Hammer was probably led to his identification by a statement of Rashid-eddin (Berezin, *l. c.* vol. i, p. 18), that *kankly* in Turkish means "a cart," and that this name was applied to these people because they had first invented carts.

Mengu khan at 和琳 *Ho-lin* (Karakorum), to see her sons.[144] A-sha-bu-hua, in whose biography these details are found, was the grandson of this lady, and the son of Ya-ya. A-sha-bu-hua who was a general in Kubilaï khan's service, died in 1301. His brother 脫脫 *T'o-t'o* was also a distinguished officer in Kubilaï's life-guard. He had the title of 雲中王 *Yün-chung wang*. T'o-to's son *T'ie-mu-r-ta* was minister under the last Mongol emperor Shun-ti. See his biography in chap. cxl. Ya-ya had also a son 斡禿蠻 *Wa-t'o-man* (Othman).

Besides this, the name of K'ang-li appears in the biographies of the following distinguished personages, natives of that country:

Chap. cxxiii: 艾貌 *Ai-mo*, belonged to the tribe 拔都康里 *Ba-du K'ang-li*. He accompanied Su-bu-t'ai no-yen, when the latter waged war in the country of the *K'in-cha* (Kipchaks). His son 也速台兒 *Ye-su-t'ai-r* distinguished himself at the conquest of the Chinese province of Fukien, and at the expedition to *Ji-pen* (Japan), and died in 1288.

Chap. cxxxiii: *Ye-su-de-r*, the son of *Ai-bo Bo-ya-wu*.

Chap. cxxxiv: *T'u-hu-lu*,—in the service of Kubilaï, was the ninth son of *A-li-ta-shi*, who was a grandson of the K'ang-li prince *I-na*.

In the same chapter is the biography of 斡羅思 *Wa-lo-sze*,[145] who was the secretary of Kubilaï khan's successor. His father *Ming-li T'ie-mu-r* had held the same office under Kubilaï; and his grandfather *Hai-du* had served in Mangu khan's army. His great-grandfather 哈失伯要 *Ha-shi Bo-yao*[146] had surrendered in early times to the Mongols (probably when Chinghiz conquered western Asia), and had been appointed superintendent of the herds belonging to Kubilaï khan's mother. Wa-lo-sze's son *K'ing-t'ung*, who served under the last Mongol emperor Shun-ti, has a separate biography,—in chap. cxlii. Thus the Kankali Ha-shi Bo-yao and his descendants held office in the Mongol empire from the beginning to the end.

Chap. cxxxv: *T'a-li-ch'i*,—served under Kubilaï; his father

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[144] Archimandrite Palladius states (*Record of Eccles. Miss.* vol. iv, p. 249), that her adventures have furnished the material for a Chinese drama.

[145] The name of this man is rendered by the same Chinese characters which in the *Yüan shi* generally represent *Russia*.

[146] The two characters *Bo-yao* are perhaps intended for *Bayaut*. This was, according to the Mohammedan authors (D'Ohsson, tom. i, p. 197), the name of a branch of the *Kankalis*, to which Turkan khatun, the mother of Mohammed shah of Khorazm belonged. There were a great number of Kankalis in Khovaresm when the Mongols first invaded the country. The above-mentioned *Ai-bo Bo-ya-wu* was probably also a Bayaut.

Ye-li li-bo having surrendered to Chinghiz. *Ibid: Ming-an*,—was also a Kankali in Kubilaï's service.

Finally, in chap. ccv, is the biography of 哈麻 *Ha-ma*, placed under the rubric of "Villanous officers."

Mr. Schott, the well-known sinologue, in an article published in 1844, in the *Abhandl.d.kgl. Akad.d. Wissensch.* of Berlin, tries to identify the *Kankali* with the 康居 *K'ang-kü* of the Han dynasty, and the *Kanggar* of the Byzantine authors of the 10th and 11th centuries. As to the latter identification he may be right; but in regard to K'ang-kü there is no evidence but some similarity of sound. In the "History of the T'ang," chap. cclviii*b*, article "K'ang" or "K'ang-kü," we read that this country is also called 薩末鞬 *Sa-mo-gien*, and the kingdom mentioned in the itinerary of Hüan-tsang under the name of *Sa-mo-kien* is without doubt Samarcand (Julien's *Mém. s. l. Contrées Occid.* tom. i, p. 18).

65. As regards the other countries, cities and rivers, enumerated in the above-quoted passages of the *Yüan ch'ao pi shi*, I may offer the following elucidations.

Kibcha denotes *Kipchak*. Of this people more detailed accounts will be given in Part VI.

Ubadjigi seems to be intended for Abkhazi; see above, 59.

The *Ulusu* (Orusze) of the *Yüan ch'ao pi shi* are the Russians.

The *Asu* (the name is sometimes written *Asut*, which is the Mongol plural of Asu) are the Asi or Alans of western mediæval authors.

The *Madjar* are the Magyars or Hungarians.

The *Sierkesu* are the Cherkess.

The *Bular* (the name is written also *Pular* and *Pularman*) are the Bulgars.

The *Siesu* (termed also *Sasu*) are probably the Saxiny or Saxi (see note 128), or perhaps the Sassans of the Mohammedan authors;—the Saxon colonies in Transylvania (see further on, note 172).

The name *Keshimir* occurs also among the names of countries, with the conquest of which Subutai had been intrusted. The celebrated Cashmir lay far out of his way; and according to the *Yüan shi*, it was only in 1253 that a Mongol corps was sent to that country. I may however mention, that Plano Carpini,—whose information was gathered in 1247,—in enumerating the countries conquered by the Mongols, has noticed *Casmir* in his list (*l. c.* p. 708).

We meet further the name *Lula* among the eleven nations or countries mentioned in the *Yüan ch'ao pi shi*. This name is replaced by *Kelie*, where the list is given for the second time (*l. c.* p. 152). It seems to me that by *Kelie*, the *Kelar* of the Mohammedan authors is intended. Thus they term the king of Hungary,

as we shall see further on. By a misunderstanding, the chronicler of the *Yüan ch'ao pi shi* may have taken Kelar for the name of a country. Sometimes Rashid also takes *Kelar* for a country. Compare Prof. Berezin's transl. vol. ii, p. 74:—"Ogotai khan conquered Khatai and the countries of *Kelar, Bashkurt, Pula, Desht Kipchak, Russ, Cherkess, As,* etc." Again, *l. c.* vol. i, pp. 2, 51, Kelar appears as the name of a country, and Rashid always associates it with *Bashkurt,* by which name properly the Bashkirs are meant; but the same author applies this name to the Hungarians also (D'Ohsson, tom. ii, p. 621). I cannot therefore agree with Prof. Berezin, who suggests that Kelar may have been a country near the Ural.

The *Yüan ch'ao pi shi* mentions two rivers which Subutai had been ordered to cross, viz. the *Djayakh* and *Idil.* The Djayakh is the *Ural* of our day, which discharges into the Caspian sea. It is mentioned by Zemarchus (6th cent.) under the name of *Daich* (Yule's *Cathy,* p. clxvi), and is called *Gëech* by Constantine Porphyrogenitus. Carpini (p. 743) styles the river *Jaec;*—Rubruquis (p. 274), *Jagac;* Haithon also writes *Jaic;* the Catalan map terms it *Jayech. Idil* or *Atel* was the mediæval name for the *Volga.* It is known that the ancients called this river *Rha* (Ammianus Marcellinus, 4th cent.) or *Ra potamos* (Ptolemy). Atel or Idil is not a proper name, but means "river" in the Turkish dialects (Klaproth, *Mém. rel. à l'Asie,* tom. ii, p. 374). The Mohammedan authors write *Atil;* Rubruquis (p. 258) calls the Volga *Etilia.* Carpini (p. 743) gives also the name Volga:—"tercium Volga, istud flumen est valdè magnum, super quod vadit Bati." The Catalan map terms the river *Edil.* There was also a city Athel on the Volga, in the 10th century, and the capital of the Khazars, according to Massudi (Klaproth, *Magazin Asiatique,* tom. i, pp. 266, 276).

It remains to identify the three cities mentioned in the *Yüan ch'ao pi shi* in connection with Subutai's expedition. *Miegie* (the name is also spelt—erroneously it seems,—*Meketmeng)* is probably identical with the city of *Mie-k'ie-sze* or *Mai-k'o-sze,* mentioned in the *Yüan shi,* among the cities north of the Caucasus captured by Mangu khan (see further on, 71).

By *Kiwamien* (the name is also written *Keibie* and *Kiwa;* the latter reading seems to be preferable) evidently the city of *Kiev,* the capital of Russia up to the year 1169, is meant. Kiev was taken by the Mongols in 1240. On the Catalan map, Kiev is styled *Chiva.*

I am not prepared to say what place is intended by *Kermien;* the name is written also *Kerman.*

66. According to the *Tarikh Djihan Kushai* and the *Djami ut*

Tevarikh (D'Ohsson, tom. ii, pp. 619 sqq), it was resolved at the second *kuriltai* convoked under the reign of Ogotai, that a vast army should be raised in order to subdue the countries of the *Asi*, *Bulgars*, *Kipchaks* and *Russians*, all bordering upon the territories allotted to *Batu*,[147] the son of Chinghiz' eldest son Djuchi. Ogotai designated the following princes to assist Batu in the command: *Kuyuk* and *Kadan*,[148] sons of Ogotai; *Mangu* and *Budjec*,[149] sons of Tulei; *Buri*[150] and *Baidar*, sons of Chagatai; *Kulkan*,[151] brother of Ogotai; and *Orda*, *Tangut* and *Shiban*,[152] brothers of Batu. The renowned general *Subutai bahadur* took part also in this expedition, which was set in motion in February, 1236.

A. Beginning of the campaign. Invasion of the country of the Asi and the Bulgars, a. d. 1236—1237.

67. The Mohammedan authors report (D'Ohsson, tom. ii, pp. 619 sqq), that after having marched during the whole summer, the Mongol army arrived in autumn at the *ordo* of the sons of Djuchi, in the neighbourhood of the realm of the *Bulgars*, at the river.... (the name is illegible in the Persian MS. probably the Volga is meant). In the winter of 1236—1237, the Mongol princes detached Subutai bahadur to invade the country of the *Asi* and the *Bulgars*. This general proceeded to the city of .... (the name is illegible in Rashid's record, but the *Tarikh Djihan Kushai* states, that in this campaign the celebrated city of *Bulgar* was first captured, and its inhabitants massacred or dragged away in slavery). Rashid mentions two chiefs,—apparently Bulgarian,—*Bayan(?)* and *Chiku, (?)* who came in person to render homage to the princes, and

[147] The Mohammedan authors call him always *Batu*. In the *Yüan shi* his name is written 拔都 *Ba-du*;—in the *Yüan ch'ao pi shi*, *Batu*. To the Russian chroniclers, the conqueror of Russia is known under the name of *Baty*. Carpini also writes *Baty*.

[148] 貴由 *Gui-yu* and 合丹 *Ho-dan* in the *Yüan shi*, chap. cvii, Geneal. tables. Kuyuk was afterwards elected Mongol emperor (1246-1248). Kadan is also called Kadan Ogul by Rashid (D'Ohsson, tom. ii, p. 99).

[149] 蒙哥 *Meng-k'o* in the *Yüan shi*. Mangu was afterwards Mongol emperor, 1251—1259. Budjie is termed 撥綽 *Bu-ch'o* in the *Yüan shi*, and *Buigec* by Carpini, p. 667.

[150] *Buri* is mentioned in the *Yüan ch'ao pi shi* (see further on, 81).

[151] 闊列堅 *K'uo-lie-kien* in the *Yüan shi*, chap. cvii, Geneal. tables. Kulkan was killed in Russia (D'Ohsson, tom. ii, p. 625).

[152] Orda is termed 斡魯朵 *Wa-lu-do* in the *Yüan shi*. He is mentioned in the Annals of that work *sub anno* 1236, together with his brother Ba-du. Shiban's name (昔班 *Si-ban*) is met in Subutai's biography;—see further on, 80.

were then released; but they afterwards revolted, and Subutai was sent again to subdue them.

The Russian annals state (Karamzin, vol. iii, p. 270), that *Baty* wintered near the Volga in 1236—1237, not far from the capital of the Bulgars, which was destroyed in the autumn of 1237.

The *Yüan shi* says nothing about the invasion of Bulgaria. In the biography of Subutai, where all the military doings of this famous general are related, no mention is made of Bulgar. But on an ancient Chinese map of the 14th century (see Part VI of this paper), 不里阿兒 *Bu-li-a-r* is marked to the east of Russia.

B. Expedition against the Kipchaks, Bokshas and Burtasses, A. D. 1237.

68. Rashid says (*l. c.* tom. ii, p. 623):—"The Mongol princes after deliberation, determined to extend their army and to proceed in a vast line, as is generally done at a *battue*. Mangu, who commanded the left flank near the (Caspian) sea, captured *Bachman*, one of the most valiant chiefs of the *Kipchaks*, who belonged to the tribe of *Olerlik, (?)* and *Kachar Ogola*, who belonged to the people of . . . . (probably *Asi*). Bachman, who had for a long time evaded his pursuers, had collected a troop of robbers and fugitives, and was a constant source of trouble to the Mongols, sometimes carrying off considerable booty from them. As he frequently changed his abode, and hid himself in the forests bordering on the river Atil (Volga), it was difficult to catch him. Mangu gave orders to prepare a squadron of two hundred boats, and to put a hundred men in each boat. The prince himself with one part of the squadron, went along one bank of the river, beating the adjacent forests; whilst his brother Budjek, with the rest of the boats, ransacked the opposite bank. At one place the Mongols found vestiges of a recently abandoned encampment, and an old woman informed them that Bachman had retired to an island. As they had no boats near that place, they were unable to pursue Bachman, when suddenly a high wind arose, causing the water to go down. The Mongol troops forded the river, and he was taken *a l'improviste;* his men being either drowned or killed. The Mongols returned with a large booty, without having lost a single man. Bachman solicited the favour to be killed by Mangu's own hand; but this prince ordered his brother Budjec to cut the Kipchak chief through the middle; and Kachar Ogola, the chief of the Ases was also killed. The Mongol princes passed the summer of 1237 in that country. In the same year Batu, Orda, Barkai, Kadan, Buri and Kulkan attacked the *Bokshas*[153] and the *Burtasses*."

[153] By *Bokshas* we have probably to understand the *Mokshas*. This is

The *Yüan shi* also reports the capture of Bachman. In the records of the emperor Mangu, in chap. iii we read:—

"In the 3rd month of 1237, Meng-k'o invaded 金 察 *Kin-ch'a* (Kipchak), and approached the sea called 寬 田 吉 思 *K'uan-t'ien-gi-sze* (the Caspian sea;—see note 130). The chief of the Kin-ch'a, named 八 赤 蠻 *Ba-ch'i-man* fled with his family to an island in the sea. Meng-k'o, when informed of this fact, proceeded immediately with his troops to capture him. Happily a strong wind arose, which caused the water to fall, so that it could be forded; and Meng-k'o said—'Heaven opens up my way.' Ba-ch'i-man's troops were massacred, and he was made prisoner. Meng-k'o ordered him to kneel down; but he replied—'I have been myself a king, and do not fear death; I am not a camel, that I should kneel.'"

After this he put the Mongols in mind of the rising of the flood, and advised them to think of returning; and indeed part of the troops were obliged to reach the opposite shore by swimming. In the biography of Subutai (*Yüan shi*, chap. cxxi) the same story is reported, and there the merit of the seizure of Ba-ch'i-man is attributed to this general.

C. Invasion of Northern Russia, a. d. 1237—1238.

69, I may begin with the accounts found in the Russian annals, which of course give the fullest information regarding these events. Compare Karamzin, vol. iii, pp. 272 sqq. The following are the chief events found in the Russian records regarding the second Mongol invasion.

After the city of Bulgar had been destroyed, the Mongols appeared, towards the end of 1237, on the frontiers of Russia, then bounded on the east by Bulgaria. The cities of *Pronsk*, *Bialgorod* and *Ijestaivets* were captured, and they arrived at *Riazan*, where the prince *Yury* (George) had shut himself up. This prince was not able to resist the Mongol arms; Riazan was taken by assault on December 21st, 1237, when there was a general massacre of the inhabitants, in which the prince Yury with his family perished. The city of *Kolomna*, defended by Yury's brother *Roman*, shared the same fate as Riazan. *Vladimir* the son of the grand-duke *Yury* of Vladimir had been intrusted with the defence of *Moscow;* but he was also defeated by the Mongols and made prisoner. The grand-duke *Yury* now becoming alarmed, left Vladimir, and posted his army on the banks of the *Siti* (an affluent of the *Mologa*). He determined to wait there for auxiliary troops promised by his brothers Yaroslav of Kiev and Sviatoslav; his

even now the name of a people of Finnish race near the Volga. The Burtasses are probably identical with the *Mordvins*, living also on the Volga.

sons *Vsevolod* and *Mstislav* having been left meantime to defend the capital Vladimir. On the 2nd of February, 1238, the Mongols invested *Vladimir;* and led on by the prince, they summoned the city to surrender. One Mongol detachment had been sent to *Suzdal;* and after having sacked this place, joined the main army at Vladimir. On the 8th of February the city surrendered, and according to the Mongol custom, the inhabitants were put to the sword; the whole family of the grand-duke having perished on the occasion. After this the Mongol troops were divided into several corps, which moved about in different directions, sacking the cities and ravaging the country. Thus in February, 1238, the cities of *Voljsky, Gorodets, Kostromskoi Galich, Pereslav, Rostoff, Yaroslav, Yurieff* and *Dmitroff* were plundered or destroyed. The grand-duke Yury, still on the river *Siti* awaiting succour from his brothers, was attacked by the Mongols on the 4th of March, and killed with most of his troops. Another Mongol corps had turned towards Novgorod, and after having taken *Volok Lamsky* and *Twer* they invested *Torjok*, which city surrendered on the 5th of March, after a siege of two weeks. When Baty had arrived at a distance of a hundred versts from the rich city of *Novgorod*, he suddenly marched back (the reason of his return is unknown), and directed his host against *Kozelsk* (in the province of Kaluga). This insignificant city was able to resist the Mongols for seven weeks, owing to the heroism of its inhabitants. Finally they were obliged to surrender, and suffered the common fate of those who opposed the Mongols. The Russian chroniclers report, that Baty, after having massacred all the inhabitants of the city, named it "the bad city."[154] After this the Mongols returned to the country of the Polovtsy (Kipchaks); and Yaroslav prince of Kiev, the brother of Yury, who had been killed in the battle on the *Siti*, went to Vladimir and was proclaimed grand-duke.

70. The above-related invasion of Russia by the Mongols is spoken of in the following terms in the *Tarikh Djihan Kushai* (D'Ohsson, tom. ii, p. 619):—

"After the city of Bulgar had been taken, the Mongol armies invaded Russia, and conquered that country as far as the city of *Mocoss;* the inhabitants of which were numerous as ants and locusts. The army was obliged to pass through vast forests, so dense that not even a serpent could penetrate them. The Mongol princes therefore ordered roads to be cut across, wide enough for three carts to pass abreast. Catapults were set up to demolish the wall of Mocoss; and after a siege of several days the place surrendered, when immense booty was taken. Orders were given to

[154] Probably he named it *mao balik*, as the Mongols—according to Rashid—called a bad city ("mauvaise ville;"—D'Ohsson, tom. i, p. 430).

cut off the right ears of all the corpses; and thus it was found that the number slain amounted to two hundred and seventy thousand."[155]

Rashid-eddin gives a more detailed account of this expedition; but it is to be regretted, that the names of the greater number of the places mentioned in Russia cannot be ascertained, owing to the want of diacritical marks in the Persian text. He says:—"In the autumn of 1237, the Mongol princes marched all together against the Russians. Kuyuk, Mangu, Kulkan, Kadan and Buri besieged the city of *Ban, (?)* and took it after three days. They then stormed the city of *Iga, (?)*—where Kulkan was mortally wounded;—and defeated and killed *Urman* (the prince Roman of Kolomna) one of the chiefs of the Russians. The city of . . . . was captured after a siege of five days (probably Moscow is meant) and the emir *Ulaï-timur* (Vladimir, who defended Moscow) killed. It took eight days to capture the city of the *great Yurki* (*Yurki busurgh*;—probably Vladimir the capital of the grand-duke Yury or George). The city of *K...r Nikla* (illegible;—D'Ohsson has St. Nicolas), the capital of the country of . . . . (illegible;—D'Ohsson has Venceslav) was taken after only five days' siege. The sovereign of this country, the great Yurki, who had hidden himself in the forests, was made prisoner and executed.[156] The Mongol princes now held a *kuriltai*, where it was determined to proceed to the interior of Russia by different routes; and the Mongols took all the cities and fortresses they met with on their way. Batu besieged the city of *Kil Acaska* for two months[157] without success; but when he had been joined by the princes Kadan and Buri, the city was taken by assault in three days. After this the princes cantoned their troops and took rest for some time."

The information found in the *Yüan shi* with respect to the second invasion of Russia is very meagre. In the records of the emperor Meng-k'o (chap. iii) it is stated, that after Ba-ch'i-man, chief of the Kin-ch'a, had been killed (see above, 68), Meng-k'o accompanied Batu in the expedition against the 斡羅思 *Wa-lo-sze* (Russians). At the siege of the city of 也烈贊 *Ye-lie-dsan*[158]

[155] D'Ohsson identifies Mocoss with *Moscow*. He may be right; I would however observe, that Moscow at the time spoken of was not a large and populous city. It had been founded in 1147 by the grand-duke Yury Dolgoruky, but was destroyed in 1176 by a prince of Riazan.

[156] There is some confusion in these accounts regarding the names.

[157] It seems *Kozelsk* is meant; which place, according to the Russian annals, resisted for seven weeks.

[158] It seems that by *Ye-lie-dsan*, Riazan is meant; and I suppose that by a mistake the character *ye* has been connected with the name; for *Lie-dsan* would be just the proper Chinese spelling of the name Riazan.

he fought in person, and it was due to his bravery that the city was taken.

D. Expedition to the regions of the Caucasus, A. D. 1238—1239.

71. Rashid reports, that "in the autumn of 1238.... and Kadan marched against the *Circasses*, and in winter killed their prince *Tu-kan. (?)* Shiban, Budjec and Buri made an incursion upon the country of the *Merims*, a portion of the nation called *Chinchak*. Barkai defeated the Kipchaks and made the chief of the *Mekrits* prisoner.

"In the winter of 1238—1239, ... (probably Mangu's name is to be supplied) with Buri and Kadan invested the city of *Mangass* (the name may be read also *Mikess*), which was taken after six weeks' siege. In the spring of 1239, Kukdai was sent to capture *Timur kahalia* (lit. "the Iron gate;" *Derbend* on the Caspian sea is meant), and to take possession of the adjacent countries."

A corroboration of the above-mentioned account of the siege of Mangass or *Mikess* seems to be given in the *Yüan shi*. In the Annals, *sub anno* 1239, we read:—"*Meng-k'o* (Mangu) invested the city 阿蘇濮怯思 *A-su Mie-k'ie-sze* and took it after three months' siege" It appears to me that by A-su Mie-k'ie-sze is to be understood *Mie-k'ie-sze*, a city of the *Asu* (Asi or Alans). The same name, or nearly the same, occurs several times in the *Yüan shi*. Thus in chap. cxxii, in the biography of *Si-li gan-bu* (a Mongol general of Tangut extraction, who took part in the western expeditions under Batu), it is stated, that in 1239, in the 11th month, the city of *A-su Mie-k'ie-sze* was reached by the army. It was well fortified and difficult to storm. In the spring of 1240 however, Si-li gan-bu conducted an assault, which was successful, and the city was taken. In chap. cxxxii,—biography of *Ba-du-r*,—the storming of a city 麥各思 *Mai-k'o-sze* by Meng-k'o is related. A similar name of a city, 麥怯斯 *Mai-k'ie-sze* is also mentioned in chap. cxxviii, in the biography of the Kipchak prince *T'u-t'u-ha*. We have seen, that the name of a city *Mie-gie* appears also in the *Yüan ch'ao pi shi* (see above, 63). I have little doubt that the *Mie-k'ie-sze* or *Mai-k'o-sze* of the *Yüan shi*, and the *Miegie* of the Mongol annals, are identical with the *Mikess* of Rashid; but as to the position of this place I can give no information. I may however quote a statement of Professor Grigorieff (*Russian Oriental Record*, vol. i, p. 64), mentioning a city *Mokhsi* or *Mokhshi* in the dominions of the khans of the Golden Horde. This may perhaps be the Mie-k'ie-sze of the Chinese authors. But Professor Grigorieff says, that the existence of that city is known only from some ancient coins struck there.

E. The ravaging of Southern Russia by the Mongols, a. d. 1240.

72. I may again begin with the accounts drawn from the Russian annals (Karamzin, vol. iv, pp. 6 sqq).

The grand-duke Yury of Vladimir and his sons had all perished by the sword of the Mongols; and after the latter had retired, Yaroslav of Kiev, the brother of Yury, took possession of the throne of Vladimir, ceding Kiev to Michael of Chernigov. Baty, after having reduced the Polovtsy, again invaded Russia, ravaged the country of the *Mordvins*, plundered *Murom* and *Gorokovets*, and threatened the grand-dukedom of Vladimir; but suddenly he turned his host southward to the rich countries of southern Russia, and destroyed *Pereslav*. One corps of the Mongol army was directed against *Chernigov;* which city, defended by the valiant prince Mstislav Glebovich, the cousin of Michael of Kiev, was taken by assault and destroyed. Mstislav however succeeded in making his escape to Hungary.

After this the Mongols proceeded to *Kiev*, which Mengu khan had previously reconnoitred. He had advanced as far as the city of *Piassochny* on the Dnieper, and was much delighted on getting sight of the magnificent city of Kiev, where his envoys had been killed. When the Mongols approached, Michael fled to Hungary, and the boyar Dmitry took upon himself the defence of the city; while Baty arriving with his immense host, invested it on all sides.

I may here give the translation of a passage of the contemporary Russian annals of Woskressensk (Karamzin, vol. iv, p. 285), referring to the siege of Kiev:—

"Like dense clouds the Tatars[159] pushed themselves forward towards Kiev, investing the city on all sides. The rattling of their innumerable carts, the bellowing of camels and cattle, the neighing of horses, and the wild battle cry were so overwhelming as to render inaudible the conversation of the people inside the city. A Tatar named *Tavrul* had been captured, and he reported that *Baty* himself was before Kiev;—that his brothers (relations) were all valiant captains; *Urdiu* (Orda, brother of Batu), *Baidar* (son of Chagatai), *Biriu* (Buri, also a son of Chagatai), *Kadan* (son of Ogotai), *Bechak* (Budjek;—see note 149), *Mengu* (son of Tulei) and *Kiuyuk* (Kuyuk, son of Ogotai). When the news of the khan's (Ogotai's) death reached Kuyuk, he returned and became himself khan.[160] There was also *Sebediai bogatyr*,—who did

[159] The Mongols are always termed *Tatars* in the Russian annals, as well as by the Hungarian and other western chroniclers. The name *Mongol* was little known at that time in the west.

[160] The latter statement must have been added a few years later; for the

not belong to the khan's relatives, but who was considered his first general,—and another by name *Burundai*. These two had conquered the whole country of Bulgar and Suzdal."[161]

Notwithstanding the stout resistance of the Russians, Kiev was finally taken by assault and destroyed; the brave Dmitry was made prisoner. Batu spared his life, but took him along with him. Dmitry is said to have subsequently persuaded Batu to leave Russia and invade the rich country of Hungary; but before proceeding thither, Batu sacked and plundered the cities of *Vladimir* in *Volhynia, Galich, Ladyjin* (in Podolia) and *Kamenets*. At *Kremnets* however the Mongols suffered a defeat.

73. The account given by Rashid-eddin of the invasion of southern Russia in 1240, is very confused, and some of the proper names cannot be pronounced. The Persian historian states (*l. c.* tom. ii, p. 627):—

"After the princes Kuyuk and Mangu had left the army in the autumn of 1239, the prince Batu with his brothers, and the princes Kadan, Buri and Buchek, marched against the *Russians* and the *Karakalpaks* (black caps). In nine days they took the great Russian city of *Mingerkan, (?)* and after this all the cities of *Uladimir* (Vladimir). After having ravaged the land to a great extent, and sacked all the cities on their way, they invested the city of *Uch-ogul Vladimir* (in Turkish—"the three sons of Vladimir") with their united forces, and captured it in three days."

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siege of Kiev took place in 1240, but Ogotai died only at the end of 1241, and Kuyuk was elected khan in 1246 (Chinese annals). There are some discrepancies between the statements of western and eastern authors, as to the date when Kuyuk was recalled by his father, and also respecting the time when Ogotai died. Rashid states (D'Ohsson, tom. ii, p. 118):—"The princes Kuyuk and Mangu, having received orders from the emperor Ogotai to return, left the army in the autumn of 1239. When they arrived in Tartary, Ogotai had already departed this life." But this does not agree with the *Yüan ch'ao pi shi*, which reports, with many details, Kuyuk's reception by his father, when he had arrived from the west (see further on, 81). According to the Annals of the *Yüan shi*, in 1240 Kuyuk was still with the army in the west. We read there under this year:—"The prince *Gu-yu* had conquered the countries in the west; but there were still some nations who resisted, and he dispatched a courier with a report." D'Ohsson, tom. ii, p. 155, quotes a passage from Roger's *Miserabile carmen*, in which it is stated that the Tatars suddenly left Hungary, owing to the arrival of a courier bringing the news of the great khan's death. The precise date of the arrival of the courier is not given, but it may be concluded that it happened in the winter of 1241—1242. This agrees with the Chinese annals.

[161] Sebediai bogatyr is Subutai bahadur, repeatedly spoken of in this paper. I cannot understand why Karamzin will have the name Sebediai to be read *Sudaï*, and changes Burundai into *Bastyr* (*l. c.* vol. iii, p. 11). Burundai of the Russian chroniclers is doubtless the general *Buruldaï* of Rashid's record, who distinguished himself in Poland and Hungary (see further on, 75).

As to the Chinese accounts of these events, they are also meagre and unintelligible. In the biography of Subutai, in the *Yüan shi* it is stated, that in the year 1241,[162] the emperor Ogotai ordered Batu and the other princes to attack 也里班 *Ye-li-ban*, king of the 兀魯思 *Wu-lu-sze* (Russians). They then proceeded to invest the city of 禿里思哥 *T'u-li-sze-k'o*, which for a long time could not be taken;[163] but when Ye-li-ban had been made prisoner, the city was taken by assault. After this the Russians all surrendered and the army returned.

F. Expedition of the Mongols to Poland, Silesia, and Moravia, a. d. 1240—1241.

74. The following outline of this expedition is drawn from D'Ohsson, who quotes Polish and other European annals (tom. ii, pp. 120 sqq). After the death of Boleslaus III, in 1139, Poland was divided among his four sons; and when the Mongols proceeded from Russia westward, they found there four realms.

Boleslaus IV, pudicus, reigned over Krakow and Sandomir. Conrad ruled Mazovia and Kuyavia; his residence being in Polotsk. Henry II possessed lower Silesia and the provinces of Gnesen, Posnania and Kalish; residing himself in Vratislav or Breslau. The dukedoms of Oppeln and Ratibor belonged to Miecislav.

The Tartars first appeared in Poland in the year 1240, plundered the province of *Lublin*, and then retired to *Galicia*. The next winter, 1240—1241, they crossed the *Vistula* on the ice, ravaged *Sandomir*, advanced to within seven miles of *Krakow* and returned again to Galicia. Vladimir, palatine of Krakow, went in pursuit, and succeeded in rescuing the prisoners and recovering a part of the booty that had been taken; but after a short time the Mongols reappeared, desvastating *Sandomir*, *Lencisc* and *Kuyavia*. The Polish army endeavoured to oppose them, but was defeated near *Szydlow*, on March 18th, 1241. Boleslaus and all the nobles fled to Moravia, Hungary and Germany; and when the Mongols arrived at Krakow, they found it deserted.

After this the Mongols entered *Silesia;* and as the bridges over the Oder had been burnt, they crossed the river at *Bativor*, swimming, or on extemporized bridges. Miecislav retired to *Lignitz*, where his cousin Henry rallied an army. The Mongols marched first

[162] The date 1241 is a mistake for 1240; for the events reported in the biography under the year 1241, are placed there before the expedition to Hungary, which as is well ascertained, took place in 1241.

[163] I can give no explanation about the king *Ye-li-ban* and the city of *T'u-li-sze-ko*.

upon *Breslau*, the city having been burnt by the inhabitants, who had shut themselves up in the citadel. The Mongol army did not stay there, but proceeded to *Lignitz*, where Henry of Silesia had succeeded in raising a host of thirty thousand men,—Poles and Germans. Among the latter were the knights of the Teutonic order commanded by Poppo von Osternau. The commander-in-chief of the Mongols is called *Peta* by the Polish chroniclers. D'Ohsson thinks that *Baidar*, the son of Chagatai is meant. The Mongols were superior in number to their adversaries. On a great plain near Lignitz, subsequently called *Wahlstatt*, on the 9th of April, 1241, that memorable battle was fought which terminated in the complete defeat of the Poles and Germans, and in which Henry was killed. The Mongols remained for some time in the country, and then invaded *Moravia*, which belonged to the states of Venceslav of Bohemia. The latter sent five thousand men under the command of Yaroslav von Sternberg to defend *Ollmütz*. This valiant captain not only succeeded in holding out in the fortress, but caused great damage to the Mongols by a sally he made. Finally, they withdrew to join the main body of the army, which had been directed to Hungary.

75. Rashid-eddin's account of this expedition is very incomplete and confused (D'Ohsson, tom. ii, p. 621). He states that Batu, Shiban and Buruldai marched upon the *Polo* (Poles) and *Bashguirds* (Hungarians;—see further on, 78). The *Polo* were a very powerful nation who professed the Christian faith, and whose territories bordered on the country of the *Franks*. After this, Rashid describes the expedition to Hungary, confounding the Poles with the Hungarians.

An allusion to the Mongol invasion of Poland and Silesia is found also in the *Yüan shi*, chap. cxxi, in the biography of Wu-liang-ho-t'ai (the son of Subutai). It is stated there that Wu-liang-ho-t'ai accompanied Batu, when he invaded the countries of the *Kin-ch'a* (Kipchaks) and *Wu-la-sze* (Russians). Subsequently he took part also in the expedition against the 孛烈兒 *P'o-lie-r* and 捏迷思 *Nie-mi-sze*.[164]

[164] I have little doubt, that by *Po-lie-r* the Poles are meant, and by *Nie-mi-sze* the Germans. In the Russian annals, from the 11th century, the Germans are always termed *Niemtsy*. This name occurs first, in the annals compiled in the beginning of the 12th century, the authorship of which is attributed to *Nestor*, the father of Russian history, who lived in the second half of the 11th century (see Schloezer's *Russian Annals of Nestor*, Russian edition, vol. i, p. 37). Nestor gives the names of the nations living in Russia and around it in the 11th century. His information is partly drawn from Byzantine sources. Even now the Germans are designated in Russia by the same name, and it is a general belief there, that *niemtsy* (singular = *niemets*) is derived from *niemoi*, "dumb;" and that this name was originally given to the

G. The invasion of Hungary, A. D. 1241—1242.

76. Compare D'Ohsson, tom. ii, pp. 132 sqq, for information drawn from the Hungarian annals.

At the time the Mongols ravaged eastern Europe, *Bela IV* reigned in Hungary. His states were bounded on the north by the Carpathian mountains, and stretched southward to the gulf of the Adriatic. In 1239 he sheltered in his dominions, *Kutan*, khan of the *Kumans*,[165] with forty thousand families who had fled from the Mongols. The princes of Russia, Poland, etc. who had escaped the Mongol sword, had also emigrated to Hungary. Kutan had embraced the Christian religion; but his people, unable to resist their natural tendencies, having plundered the country they were traversing, and thus irritated the Hungarians, Kutan being suspected of collusion with the Mongols, was massacred by the mob in 1241. The Kumans, thus brought into the position of declared enemies of the Hungarians, withdrew to Bulgaria on the Danube, ravaging the country on their way.

Whilst one part of the Mongol army devastated Poland, Silesia and Moravia, the main army, conducted by Batu himself, marched upon Hungary, in 1241. But previous to this he had dispatched an exiled Englishman who was in the Mongol service, to summon Bela to surrender. *Batu* entered the dominions of Bela in March, 1241, by the so-called *Russian gate*, a defile in the Carpathian mountains. *Peta*, who proceeded with his troops from Moravia, reached Hungary some time later, by the defile known as the *Hungarian gate*. The prince *Kadan* and the general *Subutai* directed their corps at the same time through Kumania (Moldavia) to Hungary. Bela sent his family to the Austrian frontier, and remained himself in his capital. Batu made

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Germans, on account of their ignorance of the Russian language. This view has also been adopted by the eminent Russian scholar *Dahl* (see his Russian etymological dictionary). But it seems to me, that such a derivation has no foundation. The French might as well suggest that "Russe" is derived from *rusé*. *Niemets* or *Niemtsy* is not a Russian word, and has no more meaning in Russian than in *German*. It seems to be of Byzantine Greek origin. Compare Sophocles' *Greek lexicon of the Roman and Byzantine periods from* B. C. 146 *to* A. D. 1100. Boston, 1870. There we find on p. 770, "*Nemitzi*. Austrians, Germans." *Pseudo Theophyl.* b. iv, 1217, *c.* The Byzantines would hardly have borrowed from the Russians a name for designating the Germans. I may observe that the Hungarians call a German "Német;" and to the Turks also, the Germans are known under the name of *Niemcsi*. Col. Yule in his *M. Polo*, vol. ii, p. 423, quotes the *Masálakal-Absár*, an Arabic mediæval geography, in which it is stated, that the country of the Kipchak extended from the Irtysh to the country of the *Nemej*.

[165] The *Kumans* are the same as the *Kipchaks* of the Mohammedan authors, and the *Polovtsy* of the Russian annals. *Kutan* is termed in the Russian annals, *Kotian* khan of the Polovtsy.

directly for Pesth, ravaging the country through which he passed. When he reached the capital, the Hungarians were not yet ready for battle. The archbishop of Kolocha, however, ventured a sally from Pesth; but was defeated by the Mongols, and escaped with difficulty. When the archbishop of Varadin had arrived with his troops, it was determined to attack the enemy again. According to their favourite stratagem, the Mongols retired by the way they had come; and the Hungarians then marched out. Bela pitched his camp on the western border of the river *Sayo*,[166] near the place where this river was spanned by a bridge. As it was believed that this bridge was the only place where the Mongols could cross the river, which was bordered by large swamps, a thousand men were posted there for defence. But the Mongols, who at first had encamped at a distance of five miles, suddenly arrived in the night. One part of them waded through the river, while another forced the bridge, by means of a battery of five catapults. At day-break, the Hungarians found themselves attacked from behind; they were defeated, and for the greater part massacred. Bela however succeeded in escaping, and fled to the castle of *Thurocz* in the Carpathian mountains. A few days later the Mongols took *Pesth*.

77. Whilst these events were taking place in the heart of Hungary, the prince *Kadan* advanced through Transylvania. After marching three days through forests, he appeared suddenly at *Rudan*, a German city situated in the mountains.[167] The city was captured, and the count of Ariscalde and six hundred German troops were made prisoners. After this, Kadan marched upon *Waradin*, which was easily taken and destroyed. The Mongols met some difficulty however in storming the citadel. Further on, they reached *St. Thomas*, and then the great city of *Perg*, which surrendered after a week's siege. The Mongols forced the captive Russians, Hungarians and Kumans to take part in the assault. A few days later Kadan took the monastery of *Egresh*. After this he probably joined Batu; but the annals are silent on the subject.

The whole summer and autumn of 1241, the Mongols encamped on the plain of Hungary, without undertaking any military operation. The following winter, when the Danube was frozen, they crossed the river, and attacked and destroyed the city of *Gran;* but they could not force the citadel, which was defended by the count Simeon. The thaw which then happened obliged them to withdraw. But there was another reason for their retreat. While they were besieging the fort St. Martin, a courier arrived, bringing news of the Great khan's death, with orders for them to return to Mongolia.

[166] The *Sayo* is an affluent of the *Theiss*. It is distant about a hundred English miles north-east from Pesth.

[167] A city of the Saxons settled in Transylvania. See note 172.

Thus the Mongols left Hungary in 1242; only one corps, under the command of Kadan, being left behind to pursue the king Bela. The latter had quitted Thurocz and repaired to his family in Austria. Thence he proceeded to *Zagrab* (Agram), where he passed the summer of 1242; but when informed of the approach of Kadan, he fled to Dalmatia, going first to *Spalatro* and then to *Trau*. Finally, he hid himself on a small island situated near that place.

Kadan hastened through Sclavonia and Croatia, appeared at Spalatro, besieged the fort *Clissa*, and spent the whole month of March (it seems of 1243) on the sea-shore opposite the island to which Bela had retreated. After this the Mongols sacked the cities of Cattaro, Suagio and Drivasto. Finally, Kadan went by the route of Serbia to join Batu's army.

78. The author of the *Tarikh Djihan Kushai*, as well as Rashid, and Casvini also in his geography, terms the Hungarians *Bashguirds*. But the name *Madjar* is also found in Rashid's record. It was the generally adopted view apparently, in the middle ages, that the Hungarians in Europe sprang from the *Bashguirds* or *Bashkirs*, a people of Turkish race, who dwelt north-east of the river Jaik or Ural, where they are found even at the present day. I may quote the passages from the narratives of Carpini and Rubruquis, which refer to the Hungarians and the Bashkirs.

Carpini calls Hungary by the same name as it is now known to us. On page 667 he enumerates the Mongol princes, who took part in the expedition to Hungary:—"Ordu, fuit in Poloniâ et in Hungariâ; Bati, Cadan, Syban, Burin, et Buigec, isti omnes fuerunt in Hungariâ." On pages 677, 708, he speaks of the *Bascart* (Bashkirs) near great Bulgaria, stating that Bascart is the same as "magna Hungaria."

Rubruquis (p. 327) places the country of the *Pascacier* (or Pascatir), west of the *Kerkis* (Kirghiz) and the *Orengai*.[168] *Ibid*, p. 231, we read:—"Pascatir, que est major Hungaria;" and on p. 274 it is stated, that the great river *Jagac* (see above, 65) comes from the country of the Pascatir in the north, which borders upon "Major Bulgaria." Rubruquis states also:—"Ideoma Pascatur et Ungariorum idem est." This latter statement conflicts with the results of modern research regarding the languages of the Bashkirs and the Hungarians; one being a Turkish, the other a Finnish language. It is certain however, that the Hungarians were aborigines of Asia. They arrived in Europe in the 9th century; and then called themselves *Magyar* (to be pronounced Modjor) as they do

[168] The Orengai, are the same as the *Uranguites bishe* (*sylvestres*) of Rashid (D'Ohsson, tom. i, p. 421).

to the present time. It is difficult to explain the origin of the names *Hongarian*, *Ungar*, etc. In the Russian annals of the middle ages, they are always termed *Ugry*. The Persian geographer Yacut (13th century), in his *Geographical dictionary*, art. "Bashguirds," calls the Hungarians, *Hongross*. In the Chinese and Mongol annals they appear under the name of 馬扎兒 *Ma-dja-r*.

I may finally observe, that there was also, in the 13th and 14th centuries, a city of *Madjar* on the river *Kuma*, north of the Caucasus. It is mentioned by Ibn Batuta (Yule's *Cathay*, p. 401), and by Wadding in the 14th century (*Ibid.* p. 233). The latter terms it *Mager*. M. Polo's *Menjar* (vol. ii, p. 421) seems to denote also Madjar. A city of *Modjary*[169] is spoken of also in the Russian annals (Karamzin, vol. iv, pp. 176, 404). The Russian grand-duke Michael, executed by order of Euzbeg khan (of the Golden Horde), in 1319, near Derbend, was buried in Modjary. Probably Madjar was a city founded by the *Magyars*, who at one time dwelt north of the Caucasus, but subsequently were forced by the *Pechinegs* to emigrate to the west. The ruins of ancient Madjar may still be seen on the river Kuma. See *Beiträge f. kennt. d. Russ. Reichs*, b. iv, p. 55.

79. The *Tarikh Djihan Kushai* describes the Mongol invasion of Hungary as follows (D'Ohsson, tom. ii, p. 620):—

"After the Russians, the Alans and the Kipchaks had been exterminated, Batu directed his hosts against the *Bashguirds*, a considerable Christian nation, who are said to border upon the country of the *Franks*. The expedition commenced in the beginning of 1241, when an army of four hundred thousand men marched to make head against the Mongols. Batu despatched his brother Shiban with ten thousand men to reconnoitre the forces of the enemy. After a week Shiban returned, reporting that the enemy had a superior force. When the two hosts faced each other, Batu ascended a hill, where he retired for a day and a night without speaking to anybody, imploring divine protection. He had also ordered all the Mussulmans in his army to pray to Heaven. Next day the troops prepared for the fight; the two armies being separated by a large river (the *Sayo* apparently is meant). In the night Batu detached one part of his troops, commanded by Shiban, to cross the river and attack the enemy; but the attempt was unsuccessful, on account of the great numbers on the defence. The main body of the Mongol army then rushed upon the Bashguirds, and penetrated to the camp of the *kelar*, cutting the ropes of his

[169] Modjary is the Russian plural form of Modjar. The Russians are accustomed to use the plural form for names of places.

tent. When the Bashguirds saw the tent of their kelar falling down, they took to flight; but only a small number of them escaped, the whole country giving way before the invaders. This victory is one of the most glorious exploits of the Mongols."

Rashid copies the *Tarikh Djihan Kushai*, concerning the war in Hungary. Probably by a clerical error in Bashid's record, the name of the *Bashguirds* is replaced by that of the *Polo* (Poles). But further on Rashid speaks of both nations, distinctly stating that though the countries of the *Polo* and the *Bashguirds* are very large and have many fortresses, they have nevertheless been conquered by the Mongols. These nations however, subsequently revolted, and in Rashid's time (about A. D. 1300) they were not completely subdued; having still their own kings, whom they called *kelar*.[170]

Rashid gives yet another description of the Mongol invasion of Hungary (D'Ohsson, tom. ii, p. 627), with reference, it seems, to Kadan's march through Transylvania (see above, the Hungarian record) and the pursuit of Bela to the Adriatic; but the events are confusedly reported, thus:—

"In the spring of 1240 (rather 1241) the princes crossed the mountains . . . . and entered the countries of the *Bular*[171] and the *Bashguirds*. Orda, who marched on the right flank, traversed the country of *Ilaut*, and vanquished *Bezerenbam(?)* who had ventured to oppose the Mongol army. Kadan and Buri entered the country of the *Sassans*,[172] and defeated them in three battles. Budjec traversed the mountains of this country and entered the *Kara-Ulag* (D'Ohsson understands that Transylvania and Walachia were intended), vanquished the people of the *Ulag* (Wallachians), crossed the mountains . . . ., and invaded the country of *Misheslav,(?)* who was also defeated. The princes then marched by five different routes upon the countries of the *Bashguirds*, *Madjars* and *Sassans*, and the king *Kelar* took to flight. The Mongol armies passed the summer on the river *Tissa* (Theiss) and *Tonha* (Danube;—in German *Donau*). Kadan moved out with his troops, conquered the country of *Malcut,(?)* and pursued the sovereign of these countries,—the

[170] In Hungarian *király* (to be pronounced *kiral*) means "king."

[171] The author evidently does not mean Bulgaria east of the Volga (the *magna Bulgaria* of Carpini's narrative, p. 708), but *Bulgaria* on the *Danube*, the inhabitants of which had formerly emigrated from their original seats near the Volga. The Catalan map (of A. D. 1375;—see Yule's *Cathay*) is quite in accordance with modern charts for the territories south of the lower Danube, but locates a country *Burgaria* on the north of the same river, where Wallachia is marked on our maps.

[172] Probably the *Saxons* in Transylvania are meant. As is known, the Saxons from the lower Rhine had settled there in A. D. 1143. Michov, *Cronica Polonorum*, states .—"Partem orientalem Hungariæ, quam Almani inhabitabant, *Cadan* introivit et eam destruxit."

Kelar,—as far as the sea. The latter embarked at the seaport . . . .,[173] and fled seaward. Kadan then returned; and captured . . . . and . . . .—who had determined to resist,—in the city of *Ulakut*. These events took place before he had received the news of the khan's death."

80. Chinese accounts of the Mongol expedition to Hungary, and even some details regarding the battle on the river Sayo, are found in the *Yüan shi*, in the repeatedly quoted biography of Subutai. After narrating the war against the Russians (see above, 73), the biographer continues:—

"The (Mongol) army crossed the mountains 哈 咂 里 *Ha-ts'a-li*,[174] and attacked the 怯 憐 *K'ie-lien*,[175] or king of the 馬 扎 兒 *Ma-dja-r*;[176] advancing in five corps by five different roads.[177] *Subutai* was with *Batu*, and commanded the avant-guard. The other corps were conducted by 呼 里 兀 *Hu-li-wu*,[178] 昔 班 *Siban* and 哈 担 *Ha-dan*.[179] The K'ie-lien being reputed for his valour, Subutai had recourse to stratagem (*i. e.* he turned the enemy's flank). When the army had arrived at the river 漼 寧 *T'un-ning*,[180] the corps of prince Batu crossed the stream in its upper course, where it was shallower, and where there was also a bridge. Subutai, who had to cross it lower down, where the water was considerably deeper, constructed a bridge by fastening beams

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[173] Evidently the name of the city of *Trau* is to be supplied. See above, 77.

[174] The Carpathian mountains are obviously meant. I cannot however explain the name Ha-ts'a-li. It may be, that "mountains of Galicia" is intended, or perhaps Khazaria (*Gazari* of Carpini, p. 709). Rashid, it seems, speaks of the same mountains mentioned in the Chinese record, but the name is illegible.

[175] *K'ie-lien* is evidently the same as *Kelar* of the Persian authors (see note 170), and *Kelic* of the *Yüan ch'ao pi shi* (see above, 65), *i. e. király*, the Hungarian name for "king."

[176] The name of *Ma-dja-r* denoting Magyar or the Hungarians, occurs for a second time in the *Yüan shi*, chap. cxxxiv, in the biography of *K'u-o-li-gi-sze*, whose great-grandfather *Ba-sze bu-hua* is stated there to have taken part in the expeditions against the *Kin-ch'a* (Kipchaks), *Wa-lo-sze* (Russians) and 馬 扎 兒 *Ma-dja-r*.

[177] Rashid also states, that the Mongols when marching upon Hungary, entered the country by five different roads.

[178] I do not know for whom this is meant. Rashid mentions a Mongol general *Ilaudar* (*l. c.* tom. ii, p. 629). He may be the *Hü-li-wu* of the Chinese authors.

[179] Si-ban and Ha-dan are evidently identical with the princes *Shiban* and *Kadan* in Rashid's record, and in Carpini's narrative, p. 667. Carpini states, that the princes Bati, Cadan, Syban, Burin, and Buigec, were all in Hungary.

[180] As will appear from the subsequent narrative, the river *Sa-yo* must be meant; although the name given to the river by the Chinese has no resemblance to the Hungarian one.

together. In the meanwhile Batu had been engaged by the enemy, and had lost thirty men, and one of his adjutants, by name *Ba-ha-t'u*, had also been killed. Batu began to get discouraged and proposed to retreat; but Subutai said:—'Prince, if you wish to retreat, I cannot hinder you; but as for myself, I am determined not to return before having reached the river 禿納 *T'u-na* (the Danube;—in German *Donau*), and the city (capital) of the 馬茶 *Ma-ch'a, i. e. Pesth.*' After this he advanced with renewed ardour, and Batu also rushed upon the enemy, who was defeated in the struggle; and the Mongol army reached the capital. Some time later, at a great meeting, Batu ventured to reproach Subutai, saying:—'When we were fighting together on the river *T'un-ning*, I lost my Ba-ha-t'u owing to your tarrying.' Subutai replied:—'Prince, you know well, that the river at the place where you crossed it was shallow, and you had also a bridge ready-made before you. You have forgotten that where I was obliged to pass, the water was deep, and the construction of a bridge was necesaary.' At another meeting, when Batu had drunk a great quantity of *kumiss* and wine made from grapes, the same matter was again discussed; but then Batu did Subutai justice, acknowledging that the successful issue of the war against the *K'ie-lin* was to be ascribed altogether to Subutai. After the death of Ogotai, a great meeting of all the princes was convoked, in the year 1243. Batu refused to go, when Subutai persuaded him, saying:—'You are now the eldest among the princes; it is not wise to refuse.' Batu accordingly left next year to attend the meeting.[181] When Kuyuk was raised to the throne, in 1246, Subutai had arrived at court, and afterwards returned to his native country on the river 禿剌 *T'u-la*,[182] where he died in 1246, sixty years of age.

H. Conclusion.

81. After the Mongols had left Hungary, in 1242, they proceeded eastward and remained several months in the countries north of the Caucasus; where some battles were fought with the Kipchaks. Rashid states, that after passing a summer and winter on the road, the princes arrived at their territories in 1243.

The *Yüan ch'ao pi shi* speaks of a quarrel which had broken out,

[181] The Mohammedan authors also state (D'Ohsson, tom. ii, p. 195), that Batu, after the death of Ogotai, refused to attend the great meeting; for he was on bad terms with Kuyuk, who was about to be placed on the throne (see further on, 81, on their quarrels). Afterwards Batu consented to go, but did not carry out his intention; nor did he ever again see his native soil. He died on the banks of the Volga, about 1256.

[182] The river *Tura* in northern Mongolia. The city of *Urga* is situated on this river.

at the time of the western war, between Batu and some of the other princes. We read in Paladius' translation, *l. c.* p. 155, that Batu sent an envoy from *Kibcha* to Ogedai with the following report:—

"By the favour of Heaven and an auspicious fate, Oh emperor my uncle! the eleven nations (see above, 63) have been subdued. When the army had returned, a banquet was arranged, at which all the (Mongol) princes were present. Being the eldest, I drank one or two cups of wine before the others. *Buri* and *Guyuk* were incensed, left the banquet and mounted their horses; at the same time reviling me. Buri said:—'Batu is not superior to me; why did he drink before I drank? He is an old woman with a beard. By a single kick I could knock him down and crush him.' Guyuk said:—'He is an old woman with bow and arrows. I shall order him to be thrashed with a stick.' Another proposed to fasten a wooden tail to my body. Such is the language that was used by the princes, when after the war with the different nations, we had assembled to deliberate on important matters; and we were obliged to break up without discussing the affairs. Such is what I have to report, Oh emperor, my uncle."

Ogotai on hearing this report got very angry, and at first refused to see Guyuk (who had in the mean time arrived from the west); but when those around him interceded, Ogedai severely rebuked his son, and gave him to understand, that the subjugation of some tribes of *Orusi* (Russians) attributed to him, afforded no reason for boasting;—the whole merit being due to Subutai. As to Buri's case, Ogotai ordered, that Batu should apply to Chahadai (Chagatai, Buri's father) for judgment.

The conflict between Buri and Batu is alluded to also by Rashid-eddin (D'Ohsson, tom. ii, p. 269). The Persian historian states, that *Buri*, who had taken part in the conspiracy against Mangu khan, was delivered to Batu in 1252, who ordered him to be executed; and thus took vengeance on him for some injurious speeches once uttered against Batu in a state of drunkenness.

It may not be without interest to cite also what Rubruquis says respecting this case. This traveller, who passed through Turkistan, in 1254, says (*l. c.* pp. 279, 280):—"Quesivi etiam de *Talas* civitate (see note 59) in qua erant Teutonici servi *Buri*, de quibus dixerat frater Andreas, de quibus etiam quesiveram multum in curia Sartach et Baatu. Nihil poteram intelligere, nisi quod Buri, dominus eorum, fuerat interfectus tali occasione: Ipse non erat in bonis pascuis, et quadam die, dum esset ebrius, loquebatur ita cum hominibus suis: 'Nonne ego sum de genere Chingis Chan sicut Baatu? (et ipse erat nepos Baatu vel frater) Quare non vadam super ripam Etilie sicut Baatu, ut pascam ibi? Que verba fuerunt relata Baatu. Tunc ipse Baatu scripsit hominibus illis, ut adducerent

ei dominum ipsorum vinctum, quod et fecerunt. Tunc Baatu quesivit ab eo si dixisset tale verbum, et ipse confessus est. Tamen excusavit se, quia ebrius erat, quia solent condonare ebriis. Et Baatu respondit: 'Quomodo audebas me nominare in ebrietate tua?' Et fecit ei amputare caput."

PART VI. EXPLANATION OF A MONGOL-CHINESE MEDIÆVAL MAP OF CENTRAL AND WESTERN ASIA.

A. *PRELIMINARY NOTICES.*

82. An interesting ancient document, shewing the geographical knowledge possessed by the Chinese (or rather Mongols), in the 13th and 14th centuries, of the countries west of China, has come down to us in the form of a rude map, which has survived from a large work, treating of the institutes of the Mongol empire, and published in the first half of the 14th century. It may serve as a pendant to the curious *Catalan map*, of the year 1375, reproduced in Col. Yule's *Cathay, etc.* The ancient Chinese map, which forms the subject of my investigations in the present chapter, is given in two forms in these pages. One is the true reproduction of the original. The only change I have made, for the convenience of European readers, is to represent it upside down; for in Chinese maps anterior to the arrival of the Jesuits, *south* is always at the *top* and *north* at the *bottom*. On the second sheet, the reader will find the names of the places marked on the Chinese map, rendered in European spelling.

I have seen two copies of this ancient map. One is in manuscript, in the possession of Archimandrite Palladius, and copied from the original in the Chinese imperial library. It is made on a large scale, being about five feet in length; but I fancy the original was not so large. The other is a reproduction of the same original apparently, and is found in the first edition of the 海國圖志 *Hai kuo t'u chi*, 1844, a modern Chinese work on the historical geography of Asia. This map is about the same size as the Chinese map accompanying this paper. In comparing the reproduced copy in the *Hai kuo t'u chi* with Palladius' manuscript, I have found some slight differences, owing evidently to clerical errors in both; and the comparison has enabled me to correct the erroneous characters which have crept in, and to supply the omissions.

The *Hai kuo t'u chi* is a book well known to European sinologues. Pauthier, in his *M. Polo*, quotes it frequently; and Julien, in his *Mélanges de Géographie Asiatique*, tom. i, pp. 124 sqq. gives a long review of it, and explains the numerous historical maps of Asia found at the beginning of the work, with the only exception of that curious map, upon which I am about to comment. Julien

passes it over in silence, although it is the only interesting map in the book; the rest of the historical maps the Chinese author produces being pure inventions of his fancy, without any value. The great sinologue was apparently puzzled to know what to say of this map;[183] and indeed, when seeing it for the first time, without other indications, it is very difficult to guess what it is intended to represent. I should never have been able to recognize in it a map of central and western Asia, if my attention had not been drawn to it by a short note of Archimandrite Palladius (*Record of Eccles. Miss.* vol. iv, p. 435), in which the learned author states, that this map, compiled about 1330, represents the dominions of the Mongols in Turkistan and Persia. Palladius reproduces also the map in Russian spelling, without however offering any identification of the geographical and other proper names found in it.

More than a *hundred* names of places and countries of central and western Asia, and even eastern Europe, are specified on the map in Chinese characters; and we shall see that with the exception of about five, all these names can be easily identified with the geographical names of Asiatic places, as met with in the writings of the Mohammedan authors of that period, or in the narratives of European mediæval travellers. I feel little doubt, that the names for which I have not been able to find mediæval corroboration, owing to the want of the necessary works, might be found in the great geographical dictionaries of *Yacut* or other Mohammedan geographers.

83. The title of our ancient map is 元經世大典西北鄙地理圖 *Yüan king shi ta tien si pei pi ti li t'u*, or "Map from the *King shi ta tien* of the Yüan dynasty, representing the countries to the north-west (of China proper)." The *King shi ta tien* was an extensive work on the institutes of the Mongol dynasty. It seems that only fragments of it have survived. The library of the Russian Ecclesiastical Mission was in former times in possession of one part of this work (a manuscript copy), containing an enumeration of the post roads and stations in China proper and a part of Mongolia, during the Yüan dynasty. This copy is now in the possession of the library of the (Rumiantsoff) Museum at Moscow. As the author of the *Hai kuo t'u chi* states, the map from the *King shi ta tien* which he reproduces in his book, is found in the gigantic cyclopædia compiled by order of the Ming emperor *Yung-le* in the beginning of the 15th century, and known under the name of 永樂大典 *Yung le ta tien* (22,877 books in the whole;—see Wylie's *Notes on Chin. Liter.* p. 149).

[183] I have heard that the map in question is omitted in the second and third editions of the *Hai kuo t'u chi;* but Julien's review refers to the first edition, which is the one I possess.

At the end of the geographical part of the *Yüan shi*, in chap. lxiii, there is an Appendix entitled 西北地 *Si-pei-ti*, *i. e.* "The countries to the north-west (of China proper)." It consists of an enumeration of names of countries and places. Occasionally some descriptive details are added. Even a superficial comparison proves, that the *Si-pei-ti* and the ancient map from the *King shi ta tien* correspond, the former being an enumeration of the countries and places marked on the map. There are however in the *Si-pei-ti* some places, which are omitted from the map; and a few names appearing on the map are not found in the *Si-pei-ti*. In my review of the map, I shall mention all the geographical names found either in the one or the other.

I feel little hesitation in claiming for my ancient Chinese map, a higher antiquity than can be proved for any other mediæval map of Asia extant, constructed either in Europe or China. As to the maps made in Europe however, my conclusion is only based upon Colonel Yule's able review of ancient maps (*M. Polo*, pp. cli sqq.). With respect to the Chinese, there is no doubt that they possessed maps of China, and even of the countries west of China, in early times. Julien, in his *Mélanges de Géographie Asiatique*, pp. 199 sqq. mentions several Chinese works of the 7th century, treating of the countries west of China and accompanied by maps; *viz.* the 隋西域圖紀 *Sui Si yü t'u ki*, "Description of the countries in the west, accompanied by maps," published A. D. 606, during the *Sui* dynasty. A similar work, entitled 唐西域圖志 *T'ang Si yü t'u chi*, also with maps, was published A. D. 650; but these treatises have long been lost, and only fragments of them have survived as quotations in other works. I have not been able to find in Chinese books of more recent date, any mention of the existence of copies of these ancient maps. The historical maps of western and central Asia presented by the author of the *Hai kuo t'u chi*, are all his own invention, and therefore mere nonsense, without any value. He used no ancient historical map; nor does he even mention the above-quoted ancient works on western countries. Thus the map of the countries in the west, at the time of the Yüan, as given in the *Hai kuo t'u chi*, and translated by Pauthier in his *M. Polo*, is not a genuine map of the Mongol period, as he seems to believe.[184]

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[184] Pauthier however does not represent the configuration of the original map of the *Hai kuo t'u chi*; but adapts it to our geographical ideas. The original map has not the slightest resemblance to the truth. Pauthier speaks also (*l. c.* p. 170) of a *genuine* map of the Mongol Chinese empire, found in the *Ku kin chung wai t'u* (古今中外圖); but he is mistaken there also, as the historical maps of that work are modern compositions.

84. The Chinese mediæval map on which I venture to comment in this paper, although very interesting as an ancient document, has no high claim to correctness and completeness. At first sight it is even difficult to recognize that a geographical map (in our modern western sense) has been intended. We find no rivers, lakes, or mountains marked. The whole sheet appears covered by regular squares formed by straight rectangular lines. Some of these squares contain Chinese characters. Besides the above-mentioned straight (fine) lines, we observe on the map also some thicker lines, stretching irregularly, and intended evidently to mark political divisions. Thus the map appears divided into three parts, each of the parts being provided with a denomination in large characters. In the same way the list of geographical names in the *Si-pei-ti* is divided into three parts, with the same names respectively as on the map, *viz*:—the most eastern part has the characters 篤來帖木兒 *T'u-lai t'ie-mu-r*; the north-western division is termed 月祖不 *Yüe-dsu-bu*; the south-western, 不賽因 *Bu-sai-yin*.

I have stated above, that the map in question belonged originally to the *King shi ta tien*, a work apparently corresponding to the 大清會典 *Ta ts'ing hui tien* of the present dynasty, which treats of the various institutes of the government. I find in the *Yüan shi*, Annals, *sub anno* 1331, the following statement:—"The emperor ordered the *savants* of the *Han-lin yüan* (National Academy) and others, to collect all the documents referring to the institutes of the (Mongol) dynasty, and to publish a work on the model of the 會要 *Hui yao* of the *T'ang* and the *Sung* (see Wylie's *Notes on Chin. Lit.* p. 56), and to entitle it *King shi ta tien*." This is all I have been able to gather respecting this work. The date of its publication, 1331, or a few years later, aids us to explain the above-mentioned three names on the map, *viz*: *T'u-lai tie-mu-r*, *Yüe-dsu-bu* and *Bu-sai-yin*, which can easily be recognized as the names of the Mongol khans reigning, according to the Persian authors, at the time spoken of, in *Turkistan*, *Kipchak* and *Persia*, *viz*. *Dure timur*, *Uzbeg* and *Abu said*;[185] and thus we are enabled to see that the map is intended to represent the three Mongol

[185] I may observe that *Abu said* Ilkhanè of Persia, 1317—1335, is called *Bussay* by the Archbishop of Sultaniah (*The Book of the Estate of the great Caan*, 1330;—see Yule's *Cathay*, p. 238). Pegoletti, who wrote about the same time, terms him *Bonsaet*. He is called *Busaid* by some Arabic writers, and on some Mongol coins. The Pope in addressing him, calls him *Boyssethan* (*i. e.* Busain khan). Compare Yule, *l. c.* p. 299; D'Ohsson, tom. iv, p. 716. *Uzbeg*, 1312—1342, is called *Ozbiak* in the Russian annals, and *Usbech* by the Archbishop of Sultaniah. The Uzbegs of our day derive their name from Uzbeg khan.

empires west of China, governed by the descendants of Chinghiz khan. All the other names on the map,—written in smaller characters,—denote countries or cities situated in these tracts, and we meet especially with such names as are mentioned by the Mohammedan authors in connection with the wars of that period. The greater part of them do not appear in the Chinese or Mongol annals; whilst others spoken of in these annals have been omitted from the map.

If we take into consideration the time when this cartographical attempt was executed in the far east, and the great distance from China of the countries represented, we must of course be indulgent of the topographical blunders which occasionally appear on the map. Apparently it has been constructed in China, and that only from hearsay. Hence the relative positions of the places are not always in accordance with fact. It is remarkable however, that the names, when compared with the same as given by the Persian writers, show as close an approximation as the Chinese language is capable of. It is needless to state, that the principal value of the map consists in its high antiquity, and in the picture it gives us of the geographical knowledge the Mongols and Chinese possessed in the middle ages, of the countries west of China.

85. Before commenting upon the places and countries mentioned on the map, or in the Si-pei-ti, it may be well to say a few words on the origin and history of the three great Mongol monarchies in the western half of Asia, which, together with the dominions of the Great khan (China proper, Mongolia and Thibet), formed the vast empire conquered by Chinghiz khan and his successors.

According to the instructions given by Chinghiz khan, his empire, after his death was divided among his sons, *Ogotai*, *Djuchi* and *Chagatai*. Ogotai, with the title of Great khan, then reigned over China proper, Mongolia, Thibet, Annam, etc; Chagatai in Turkistan and Transoxiana; whilst the countries north of the Caspian and around the lake of Khorazm (Aral), Russia, with Poland, etc. had been bestowed upon Djuchi, the eldest son of Chinghiz, or, as he died before his father, these dominions fell to the share of his sons. This dynasty is generally called the *Golden Horde* (Russian annals) or *Desht Kipchak* (Mohammedan authors). The khans resided in *Serai*, on the banks of the Akhtuba, a branch of the Volga. The author of the *Tarikh Djihan Kushai* states (D'Ohsson, tom. ii, p. 2), that the dominions of Djuchi stretched to the west, as far as the soil had been trodden by Tartar horses. Tului, the third son of Chinghiz, obtained by inheritance only an apanage between the mountains of *Caracorum* and the sources of the *Onan;* and also his father's private property. But after the death of Ogotai's son Kuyuk (Great khan 1246—1248),

Tului's son Mangu was placed on the throne of China, in 1251; and thus the descendants of Tului became the reigning branch in China. Ogotai had originally his apanage on the river *Imil* (south of the present Chuguchak), but when the princes of this branch had revolted against Mangu khan, they forfeited their possessions. *Kaidu*, the grandson of Ogotai, however, subsequently conquered a part of Turkistan, and for thirty years disputed the suzerainty with the Great khan, Kubilaï.

The tract assigned by Chinghiz, in the distribution of his provinces, to his son Chagatai, embraced Mawar-al-nahar (Transoxiana), and part of Khorazm, the Uigur country, Kashgar, Badakhshan, and the province of Ghazna to the banks of the Sind. *Bishbalik* (near the present Urumtsi) north of the T'ien shan, was at first the head-quarters of the khans; which was afterwards transferred to *Almalik* (near the present Kuldja). At an early date however, in the history of Chagatai's dynasty, the claims of *Kaidu* to the supreme khanship seem to have led to a partition of the Chagatai territory; for Kaidu, who as I have stated was of the lineage of Ogotai, being a son of Kashi,[186] held under his own immediate sway a large tract, the greater part of which belonged apparently to the former apanage as originally constituted. It is not very clear, what were the limits between Kaidu's territory and that of the Chagatai khans; but it may be gathered, that Kaidu's dominions included Kashgar and Yarkand, and all the cities bordering on the south side of the T'ien shan as far east as Karakhodjo, as well as the valley of the Talas river; and all the country north of the T'ien shan from lake Balkash eastward to the lake Chagan-nor (somewhere in western Mongolia), and in the further north between the Upper Yenisei and the Irtysh. During a great part of Kaidu's struggles, he found a staunch ally in *Dua*, the son of Borak, whom he had set upon the throne of Chagatai, in 1272. After Kaidu's death, in 1301, his son and successor *Chabar*[187] joined with Dua in rendering submission to Timur, the successor of Kubilaï; but before long, the two former princes having quarrelled, Dua seized the territory of Chabar, and thus substantially reunited the whole of the original apanage of Chagatai, as it had been before the schism of Kaidu (compare Yule's *Cathay, etc.* p. 522).

At the time our map was composed (1330), there seems to have

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[186] Kaidu is called 海都 *Hai-du* in the *Yüan shi*, and his father, 合失 *Ho-shi* (chap. cvii, Genealogical table). Hai-du's name is met with very often in the Annals of the *Yüan shi*,—reign of Kubilaï.

[187] Dua's name in the *Yüan shi*, reads 篤哇 *Du-wa*; Chabar is called 察八兒 *Ch'a-ba-r* there. The latter had the Chinese title 汝寧王 *Ju-ning wang* (*Yüan shi*, chap. cvii, cviii, Genealogical tables).

been only one empire in central Asia, ruled by a khan of the lineage of Chagatai; for the map, and also the Si-pei-ti include all the places of Uiguria, Turkistan, Transoxiana, Kabul, etc., in the empire of *T'u-lai t'ie-mur* (Dure timur, a son of Dua). Colonel Yule has brought forward proofs (*l. c.* p. 524), that in the 14th century a new schism took place, the middle empire (Chagatai) being again divided.

86. The countries west of the Djihun (Persia), conquered by Chinghiz, were,—after the death of the conqueror—at first considered as common property by his sons, and accordingly governed by mutual agreement (D'Ohsson, tom. iii, p. 104). When however Hulagu, the brother of Mangu khan, had conquered the rest of Persia, and overthrown the calif of Bagdad in 1258, he was invested by his brother with the title of *Ilkhan*, and governed Persia, Mesopotamia, Babylon and Armenia. He was the founder of the Mongol dynasty known under the name of *Ilkhani*, which maintained itself in those countries (partly at least) up to the time when Tamerlane over-ran western Asia (end of the 14th century).

It may be concluded from the records of the Mohammedan authors, that on the west the Chagatai or middle empire was separated from the dominions of the Ilkhans by the Djihun or Oxus, and the boundary seems to be thus represented also on the ancient map; only there is a discrepancy respecting Kabul, Ghazna and Badakhshan. The map assigns these countries to the middle empire, whilst the Persian history of the Ilkhans seems to point to the fact, that, at least in the beginning of the 14th century, they were subject to Persia. We read in D'Ohsson, tom. iv, p. 568, that in 1316 Oeldjaitu (of Persia) invested Yassawur, a prince of the Chagatai branch,—who had emigrated from Transoxiana,—with the land between Balkh and Kabul. Subsequently Yassawur revolted and invaded Khorassan and Mazanderan, but was defeated.

87. Thus we have in the first half of the 14th century, three great Mongol monarchies west of China. Nominally the khans of these empires owned a supreme head in the Great khan reigning in China; but practically they are generally considered to have been nearly independent. We know however from letters of the Persian khans Argun and Oeldjaitu, addressed to the king of France in 1289 and 1305, that they continued to use the Chinese seals of state, which the Great khan bestowed upon them (Pauthier's *M. Polo*, pp. 777, 781). They stamped also the name of the Great khan upon their coins (Yule's *M. Polo*, p. xli), and designated themselves merely as *daruga* or "governors" (D'Ohsson, tom. iii, p. 410).

It is also worthy of notice, that the khans of Turkistan and Persia, and even those reigning over the territories east and west

of the Volga (Golden Horde), had their apanages in China, and that up to the 14th century, as we may fairly assume from the evidence I shall produce from the *Yüan shi.*

In the *Yüan shi,* Annals, *sub anno* 1236 (northern China then had just been subdued by the Mongols), we read:—"The emperor granted to the empress dowager, the princes and princesses, apanages in China (they are all enumerated, and also the apanages, of which I will only mention three). 斡魯朶 *Wa-lu-do* and 拔都 *Ba-du* (Orda and Batu, both sons of Djuchi) received the department of 平陽 *P'ing-yang* (in Shansi); and *Ch'a-ha-dai* (Chagatai), the department of 太原 *T'ai-yüan* (also in Shansi). Ye-lü Ch'u-ts'ai (the minister of Ogotai) presented a report, pointing out the inadequacy of such a management; whereupon the emperor ordered *da-lu-hua-ch'i* (*daruga* or Mongol 'governors') to be appointed over the places given as apanages, and that the princes and others should merely receive the revenues from their lands." A whole chapter in the *Yüan shi,*—xcv (歲賜 *Sui-sze*), is devoted to the pensions and revenues from apanages, which the princes, princesses, sons-in-law of the emperor and meritorious officers, annually drew from the public treasury; and there we find the names of princes of all branches of Chinghiz khan's house. In chap. cviii, under the head of 諸王 *Chu-wang,*[188] we find again the names of the Mongol princes under different reigns, and their apanages also enumerated. Sometimes they are entitled 王 *wang* (prince or king), sometimes 大王 *ta wang* (great prince). When they had an apanage in China, the name of it is prefixed to the title *wang, e. g.* 汝寧王 *Ju-ning wang.*

To elucidate the question of the dependency of the Mongol khans,—of the Golden Horde,—of Persia,—and of the middle empire, I may quote some statements of Mohammedan and Chinese authors, giving an insight into the relations between these rulers and the Great khan in China, in the 13th and 14th centuries.

Wassaf records two embassies from the khans of Persia to the emperor of China. We read in D'Ohsson, tom. iv, p. 320:—"In 1298 *Ghazan khan* sent two ambassadors, the Melik Moa'zzam Fakhr-eddin Ahmed and Bocaï Ilchi, to the court of the Great khan Timur, his suzerain. They carried with them magnificent presents,—big pearls and other rare things of great value. They brought also some hunting leopards (compare *M. Polo,* vol. i, p. 353).....Ghazan provided the ambassadors with a large sum of money to buy for him certain productions of China.....They arrived

[188] *Chu-wang* means "princes of the imperial family." Even the khans reigning over Persia, Turkistan and Kipchak are always termed *chu-wang* in the *Yüan shi.*

at Taidu and were kindly received by the Great khan, who gave orders also to pay to the Persian khan in silk stuffs his share in the imperial manufacture, which had not been paid since Hulagu had left Mongolia (1253). Ghazan's embassy remained four years in Taidu."

The *Yüan shi* also speaks of an embassy sent by Ghazan to the emperor of China, but records it a few years later than Wassaf. Another embassy may be meant. We read there, in the Annals, *sub anno* 1304:—"In the 7th month an embassy from the 諸王 *chu-wang* (prince) 哈贊 *Ha-dsan* in the *Si-yü* (western Asia;—see above, 41) arrived at the court with tribute." Ghazan reigned 1295—1304. This is probably the embassy to which Monte Corvino alludes in his letter of 1306 (see Yule's *Cathay*, p. 204). Monte Corvino states in this document, that he had previously sent a letter to the father vicar and the friars of Gazaria, by a certain friend who was attached to the court of the lord *Kathan Cham* (Ghazan khan), and who had come to his Majesty the Cham (the friend had taken the letter when returning to Persia).

The second embassy of a Persian khan to the Great khan, recorded by Wassaf, was sent about 1312 (see D'Ohsson, tom. ii, p. 535). The Chinese emperor Ayur bali batra[189] after his accession to the throne, sent two ambassadors, Ayadji Chinksank and Devlet shah, to Persia. They arrived at Bagdad,—where the sultan Oeldjaitu spent the winter,—in February 1312, when they delivered the presents of the Great khan with letters written in the kindliest terms. Subsequently Oeldjaitu (he reigned in Persia 1304—1317) on his part sent an embassy to the Great khan. I may here quote D'Ohsson's original translation:—"Les ambassadeurs que le sultan de Perse envoya en Orient, à cette occasion furent chargés de vérifier la comptabilité des terres qu'il possédait, comme part héréditaire de sa branche, et d'en percevoir le produit, depuis plusieurs années."

The Annals of the *Yüan shi* record, *sub anno* 1332, an embassy sent by *Bu-sai-yin*, prince (or king) of the *Si-yü* (西域諸王不賽因), to the emperor *Wen-tsung* (Tob timur). The name of the ambassador was 合只怯馬丁 *Ho-dji k'ie-ma-ding*. He brought as tribute, seven precious stones and other articles. Bu-sai-yin is Abu said, khan of Persia, 1317—1336, the same whose name appears on the ancient map (see above, 84).

88. In the biography of *Dju-ch'i*, the eldest son of Chinghiz (*Yüan shi*, chap. cxvii), it is stated, that his dominions were

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[189] 愛育黎拔力八達 *Ai-yü-li ba-li ba-da* in the *Yüan shi*. His ancestral designation was 仁宗 *Jen-tsung*, 1312—1320.

situated very far to the north-west, more than ten thousand *li* distant from the capital (of China). One of Dju-ch'i's successors 月卽別 *Yue-dsi-bie*,[190] sent an embassy in 1336 to the emperor, soliciting the payment of the money due for his apanages in China,—namely 平陽 *P'ing-yang* (in Shansi), 晋州 *Tsin-chou* (in Chili), and 永州 *Yung-chou* (in Hunan),—this money being required for the establishment of post-stations to facilitate the movement of the troops. The ambassador also reminded the emperor that the post-stations in Yüe-dsi-bie's dominions were not kept in repair by the central government in China, but that he himself had to meet the expense.

The *Yüan shi*, Annals, 1312, records that the prince 也先不花 *Ye-sien bu-hua* sent an embassy to the Chinese court. This is evidently *Issen buca* of the Mohammedan authors, who ascended the throne of Chagatai in 1309. Under the year 1315, it is reported in the Annals of the same *Yüan shi*, that the people in the dominions of the prince 脫列鐵木兒 *T'u-lie t'ie-mu-r* being afflicted with dearth, the emperor gave orders to assist them with money. T'u-lie t'ie-mur is the same as Du-lai t'ie-mu-r on the ancient map (see above, 84) and *Dure timur* of the Mohammedan authors, khan of the Chagatai empire, about 1330. See D'Ohsson's Genealogical table III. Dure timur's successor was,—according to the Persian historians,—*Tarma shirin*. The exact time of his reign is not given. In the *Yüan shi*, Annals, *sub anno* 1332, an embassy of the princes 塔兒石里 *T'a-r shi-li* and 哈兒蠻 *Ha-r-man* to the Chinese court is recorded (by the first name, Tarma shirin seems to be intended). They sent as tribute, fine western horses, wine made of grapes, and 金鴉鵲 gold-coloured *Ya-hu*.[191] On the same page, the death of the prince 也先鐵木兒 *Ye-sien tie-mur* is recorded. Here probably *Issen timur* of the Mohammedan authors is meant, a grandson of Dua (see D'Ohsson's list).

89. In the genealogical table of the Mongol imperial family (*Yüan shi*, chap. cvii; compare also chaps. cviii and xcv), we find the pedigrees of the branches of *Djuchi* and *Chagatai*, and of *Hulagu's* dynasty in Persia. The greater part of the names we find in these lists, can easily be identified with the names of the genealogical tables, drawn up by D'Ohsson from the information given by the Persian authors. I shall give the pedigrees of the above-mentioned branches, according to the *Yüan shi*. The names in

[190] By Yüe-dsi-bie, without doubt is meant *Uzbeg* khan of the Golden Horde, 1312—1343; his name is spelt *Yüe-dsu-bo* on the ancient map.

[191] *Ya-hu* means the precious stone *yakut*, on which see *Notes on Chin. Med. Trav.* p. 95.

parentheses are taken from D'Ohsson's tables. There is some confusion in the Chinese list regarding the degree of kindred.

Branch of 朮赤 *Dju-ch'i* (Djuchi,—Chinghiz' eldest son).[192]

拔都 *Ba-du*, 大王 (Batu,—Djuchi's son, the conqueror of Russia).

撒里答 *Sa-li-ta*, 大王 (Sartac,—son of Batu, 1256; Sartach of Rubruquis).

忙哥帖木兒 *Mang-k'o t'ie-mu-r*, 王 (Mangu timur, 1265—1280;—grandson of Batu).

脫脫蒙哥 *T'u-t'u meng-k'o*, 王 (Tuda mangu, 1280—1287;—grandson of Batu).

脫脫 *T'u-t'u*, 寧肅王 *Ning-su wang*, 1308 (Tuctuca, 1291—1312;—son of Mangu timur).

寬撒 *K'uan-sa*, also *Ning-su wang* (perhaps the *Conchi* of *M. Polo*, vol. ii, p. 410).

伯忽 *Bo-hu*, 大王 (perhaps Tula buca, 1287—1291;—great-grandson of Batu).

月卽別 *Yüe-dsi-bie*, 大王 (Uzbeg, 1312—1342;—grandson of Mangu timur).

札尼別 *Dja-ni-bie* (Djanibeg, 1342—1356;—son of Uzbeg).

Thus in this Chinese list, almost all the reigning khans of the Golden Horde are enumerated, up to the year 1356.

Batu had many brothers. The Mohammedan authors mention *Orda*, *Tangut*, *Shiban*, *Shinkur*, *Barkai*, *Toca timur*. Orda is termed *Wa-lu-do* in the *Yüan shi* (see above, 87); Shiban's name is there written 昔班 *Si-ban* (see note 179). The Mohammedan authors report (D'Ohsson, tom. ii, p. 251), that when Mangu was elected Great khan, Batu sent his brothers *Barkai* and *Toca timur* to attend this solemnity. We read in the Annals of the *Yüan shi*, *sub anno* 1251:—"At the great meeting on the river 斡難 *Wa-nan* (Onon), in the sixth month, the princes of the western side (西方諸王) were represented by 別兒哥 *Bie-r-k'o* and 脫哈帖木兒 *Tu-ha t'ie-mu-r*.

Branch of 察合台 *Ch'a-ho-t'ai* (Chagatai,—second son of Chinghiz).

也速蒙哥 *Ye-su meng-k'o*, 王 (Yissu mangu, 1247—1252;—son of Chagatai).

[192] In the biography of Dju-ch'i,—*Yüan shi*, chap. cxvii, and also in the genealogical tables, some of Dju-chi's grandsons and great-grandsons are erroneously represented as his sons.

哈剌旭列 *Ha-la hü-lie*, 大王 (Kara Hulagu, 1242—1247;—grandson of Chagatai).

阿魯忽 *A-lu-hu*, 大王 (Algu, 1260—1266;—grandson of Chagatai).

八剌 *Ba-la*, 大王 (Borac, 1268 (?);—great-grandson of Chagatai).

買住韓 *Mai-dju-han*, 竟王, 1310.

阿只吉 *A-dji-gi*, 威遠王.

忽都鐵木兒 *Hu-du t'ie-mu-r.*

赤因鐵木兒 *Ch'i-yin t'ie-mu-r.*

禿剌 *T'u-la*, 越王, 1306.[193]

帖木而不花 *T'ie-mu-r bu-hua*, 王.

南答失里 *Nan-t'a shi-li.*

It seems that only the first part of the names found in this Chinese genealogical table refers to the reigning branch of the Chagatai lineage. As to the rest of the names, I find no corroboration in D'Ohsson's list. But as I have shown above, note 187, *Dua* the son of Borac, *Issen buca*, *Dure timur* and *Tarma shirin*, all sons of Dua and reigning khans of the Chagatai empire in the first half of the 14th century,—according to the Mohammedan authors,—are mentioned in other parts of the *Yüan shi* (see above, 88).

Branch of 旭烈兀 *Hü-lie-wu* (Hu-la-gu, 1258—1265, in Persia).

阿八哈 *A-ba-ha*, 王 (Abaca, 1265—1282;—son of Hulagu).

阿魯渾 *A-lu-hun*,[194] 大王 (Argun, 1284—1291;—son of Abaca).

哈贊 *Ha-dsan*, 靖遠王, 1300 (Ghazan, 1295—1304).

The rest of the names in this Chinese genealogical table cannot be identified with the names of the Persian khans in D'Ohsson's list. Probably the *Yüan shi* gives the names of a lateral branch of Hulagu. Thus the name of *Abu said*, 1317—1335, repeatedly mentioned in other parts of the *Yüan shi* (see above, 87), does not appear in the Chinese genealogical table of Hulagu's branch.

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[193] See *T'u-la's* biography,—*Yüan shi*, chap. cxvii.

[194] In the biography of *Ai-sie*,—*Yüan shi*, chap. cxxxiv, it is stated, that Ai-sie was sent with a message to 西北宗王阿魯渾, *i. e.* to *A-lu-hun*, prince (or king) in the north-west. In the Annals of the *Yüan shi*, *sub anno* 1284, the name is 阿兒渾 *A-r-hun.*

B. *IDENTIFICATION OF THE GEOGRAPHICAL NAMES OF THE ANCIENT CHINESE MAP.*

I. Countries and Places east and south of the Middle Empire (Chagatai).

As the *Si-pei-ti* mentions only countries and places belonging to the three empires of the descendants of Chagatai, Djuchi and Hulagu, the following six names of the ancient map are omitted from the list given in that work.

沙州 *Sha-chou.*

90. *Sha-chou* means "sand city," or "sand district," in Chinese. It was a district city, situated in the western part of modern Kansu, west of the gate *Kia-yü kuan*, in the great wall, and at the eastern border of the great desert, known to the Chinese from remote time as 流沙 *Liu-sha* (lit. "moving sand"). M. Polo crossed this desert when proceeding from the city of *Lop* to China (*l. c.* vol. i, p. 180), and states (*Ibid.* p. 184):—"After you have travelled thirty days through the Desert as I have described, you come to a city called Sachiu, lying between north-east and east; it belongs to the Great Kaan." In ancient times, the great highway from China to central Asia passed through Sha-chou, and not only the Lop-nor route, taken by M. Polo, but also the northern road leading through Hami touches Sha-chou, as may be proved from ancient, and even more recent Chinese itineraries.

The city of Sha-chou dates from A. D. 622, when it was founded by the first emperor of the T'ang dynasty. But there was at the same place, or near it, an important out-post of China even in the 2nd century B. C. The Han emperor Wu-ti, B. C. 140—86, had established there a fortified town, and a district called 敦煌郡 *Tun-huang kün.* This was the starting point of the early expeditions of the Chinese towards the west. A city (縣 *hien*) *Tun-huang* is marked on modern Chinese maps, north-east of 故沙州城 *Ku Sha-chou ch'eng,* (the ancient city of Sha-chou); but according to Archimandrite Palladius, who has special sources of information, ancient Sha-chou was situated on the spot where the present Tun-huang hien stands (see his *Elucidations of M. Polo's Travels,* p. 5). The part of Kansu west of the gate Kia-yü kuan is completely unknown to Europeans, and therefore all the information we possess regarding this tract, is drawn from Chinese sources.

In the Mongol period, *Sha-chou* was a 路 *lu, i. e.* "circuit" or

"department." At the time of the Ming it was a 衛 *wei*, or "military station" (*Ming shi*, chap. cccxxix, fol. 22).

柯模里 *Ko-mu-li* = *Kamul*.

91. This is without doubt the *Camul* of M. Polo. That traveller states (vol. i, p. 189), that this province belonged to the Great Kaan, and thus corroborates the map, which locates Ko-mu-li beyond the middle empire, but close to the frontier. Rashid-eddin, who wrote about the close of the 13th century, when the middle empire was for the greater part in the possession of Kaidu (see above, 85),—then engaged in a struggle with Kubilaï,—records (Yule's *Cathay*, p. 275), that Karakhodjo (see further on, 111), a city of the Uigurs, lies between the two states and maintains neutrality. Karakhodjo is placed on the ancient map opposite Ko-mu-li to the west, but inside the middle empire.

M. Polo is the first western author who mentions Camul, but he did not himself visit the place. Marignolli was in Kamul in 1342 (Yule's *Cathay*, p. 390), and seems to have spent some considerable time there. Kamul appears to have been the see of a Nestorian bishop; for a bishop of Kamul is mentioned as being present at the inauguration of the Catholicos Denha in 1226 (Yule's *M. Polo*, vol. i, p. 190). The place is styled *Camull* on the *Catalan map*. Shah Rokh's embassy, when proceeding to China, passed through *Camul* (Yule's *Cathay*, p. cc), and the Persian merchant Haji Mohammed, 1550, states (*l. c.* p. ccxvii), that from *Succuir* (Su-chou) to *Camul* is fifteen days' journey. Colonel Yule is correct in refuting the view of Foster, that Camexu (Camechu) in Pegoletti's notices of the land-route to Cathay (*l. c.* p. 288) is to be identified with Camul or *Ha-mi chou* (哈密州) of the Chinese. Camexu denotes Kan-chou in Kansu. In Chinese books, Kamul never appears as Ha-mi *chou;* but in the "History of the Ming," chap. cccxxix, fol. 1, it figures as Ha-mi *wei* (*i. e.* "fortified place Hami"). Benedict Goez, in the beginning of the 17th century, proceeding from India through central Asia to China, went from the fortified town *Turphan* to *Aramuth*,[195] and then to *Camul*, another fortified town (*l. c.* p. 578).

Kamul is the Turkish name of the place. In Chinese works it

[195] I possess a detailed Chinese itinerary, of the 15th century, of the route from *Kia-yü kuan* through central Asia to the Mediterranean. There I find a city 剌木 *La-mu* mentioned between 哈密 *Ha-mi* (Kamul) and 土魯番 *T'u-lu-fan* (Turphan). *La-mu* may be the *Aramuth* of Goez. However the same Chinese itinerary also mentions a place 阿剌木 *A-la-mu* west of Turphan.

is generally termed 哈密 *Ha-mi*, which name however appears for the first time, not earlier than the Mongol period. In ancient times it was known to the Chinese by other names. It is first mentioned in Chinese history in the first century of our era, under the name of 伊吾盧 *I-wu-lu*. See the "History of the later Han," chap. cxviii, *Si-yü*, where it is stated, that I-wu-lu was an important place 1000 *li* north of the fortress *Yü-men kuan* (see above, 41), and the key to the *Si-yü*, or "western countries." I-wu-lu, situated in a very fertile country, belonged originally to the 匈奴 *Hiung-nu* (the ancient inhabitants of Mongolia). It was taken by the Chinese, A. D. 73; who then established military colonies there. During the T'ang period and later (7th to 11th centuries), I-wu-lu bore the name 伊州 *I-chou*. Thus the place is termed also in the narrative of *Wang Yen-te*, who in 981 went from China to Kao-chang (see Julien's *Mél. de Géogr. Asiat.* p. 90).

In the *Yüan shi* we first meet with the present Chinese name of the place 哈密 *Ha-mi*. See the biography of the Uigur prince Ba-r-dju a-r-té di-gin, chap. cxxii. But the *Yüan shi* writes the name more generally 合迷里 *Ho-mi-li* (or *Ko-mi-li*;—see Annals, *sub anno* 1286). The emperor bestowed money and cattle upon the impoverished people of *Ko-mi-li* and *Ha-la-ho-djo* (Karakhodjo, see 111). In the year 1289, the people of Ko-mi-li are stated to have been again afflicted with dearth. The emperor then ordered corn to be sent from Kansu to Ko-mi-li. In the biography of *T'a-ben* (chap. cxxiv) we read, that he was a man from *I-wu-lu*; the most ancient name for Kamul being used there. In the biography of *Bi-lan* (chap. ccii), the name of the realm 感木魯 *Kan-mu-lu* (apparently Kamul is meant) is found associated with 北庭 *Pei-t'ing* (the present Urumtsi;—see below, 108).

In the "History of the Ming," chap. cccxxix, fol. 1, 哈密 *Ha-mi* appears as a fortified place (衛 *wei*), 1600 *li* distant from Kia-yü kuan, situated on the most important road leading to the western countries. The population is stated to consist of 回回 *Hui-hui* (Mohammedans), 畏兀兒 *Wei-wu-r* (Uigurs) and 哈剌 *Ha-la* (a people unknown to me). At the present day the Chinese term Kamul also *Ha-mi*, as in the preceding centuries.

塔失八里 *T'a-shi-ba-li* = *Tashbalik*.

92. Probably by these four Chinese characters, *Tashbalik* (meaning "Stone city" in Turkish) is intended. The place is marked on the ancient map, east of Kamul. I have not been able to trace this name in any western or eastern author applied to a city near Kamul. I may however mention, that the above-quoted

traveller *Wang Yen-te* (A. D. 981), proceeding from China to Kao-chang, before arriving at *I-chou* (Kamul) passed through 小石州 *Siao Shi-chou* or "Little stone city."

土伯特 *T'u-bo-t'e* = *Tibet.*

93. The Chinese characters here without doubt render *Tubot*, which even now is the Mongol name for Tibet.

Mr. Hodgson ("The Literature and Religion of the Buddhists," in *The Phœnix*, 1871, p. 94) states respecting Tibet:—"*Bhot* is the Sanscrit, and Tibet the Persian name of the country. The native name is *Bod*, a mere corruption of the Sanscrit appellation, proving that the Tibetans had not reached a general designation for their country, when the Indian teachers came among them."

The names we use in Europe to designate the mountainous country bordering upon China proper on the west (*Tibet, Tübet, Tebet*), are all apparently derived from the Arabic; for the name of Tibet among western authors first occurs in the narrative of those Arabian travellers who visited China about the middle of the 9th century. Compare Reinaud, *Relation des Voyages faits par les Arabes et les Persans dans l'Inde et á la Chine dans le* ix^e^ *siècle*, p. 60, where it is recorded that *Tibet* and the *Tagazgaz* are the western neighbours of China. Col. Yule (*Cathay*, p. cx) quotes an Arabian geographer who was contemporary with the earlier of the two compilers of the *Relation*, and who states that China is bounded by the sea, by *Tibet* and by the country of the Turks. . . . . .

The most detailed accounts of the history of Tibet are to be found in Chinese books, and especially in the histories of the different Chinese dynasties. Father Hyacinth, in his "History of Tibet and Kukonor" (in Russian, 2 vols. and a map, 1833), has translated from Chinese authors, all the historical records respecting these countries; but his history concludes with the beginning of the 12th century.

In the most ancient times the tribes living west of China proper, in the present Tibet and Kukonor, are comprised in the general name 羌 *K'iang* or 西羌 *Si K'iang* (western Kiang). These names are met with in the Chinese classics. Since the 7th century of our era, Tibet is termed 吐蕃 *T'u-fan* in the Chinese annals. This name in the "History of the T'ang" (*T'ang shu*, chap. cclvi) is applied to a powerful kingdom, which during the T'ang period caused much trouble to China. The T'ang history, in the beginning of the article T'u-fan, states that this people originated from the *K'iang*, and especially from a tribe called 發羌 *Fa K'iang;* and then explains that the character 發 is

very similar in sound to 蕃. Thus the *T'ang shu* tries to explain the origin of the name *T'u-fan* (Hyacinth, *l. c.* vol. i, p. 125). According to Dr. Williams' *Dictionary*, 發 was in ancient times pronounced *bat*, and 蕃 *bam*. It seems to me that the original Chinese reading of *T'u-fan* was *T'u-bot*. Perhaps the second character of the name was originally written with another radical: *e. g.* 播, which in the present day is pronounced *bo*, the ancient sound being *bot*. The above-mentioned Arabian travellers in the 9th century, heard of course the name *Tibet* from the Chinese, who in their annals of that time spell the name of the same country 吐蕃. In the history of the Sung, which ruled over the greater part of China, 960—1280, Tibet is also termed *T'u-fan*; whilst the historians of the Liao dynasty, in northern China, and contemporary with the Sung, style the same country 鐵不德 *T'ie-bu-te*. We read in the *Liao shi*, chap. xx, that in 1047, an envoy from the kingdom of *T'ie-bu-te*, arrived at the court of the Liao, to solicit help against the 夏 *Hia* (Tangut empire). Father Hyacinth (*l. c.* vol. ii, p. 164) quotes a passage from the Sung history in which it is stated, that about A. D. 1060, the emperor of the Liao bestowed a princess of his house upon the son of the king of *T'u-fan*. The same event is reported in the "History of the Liao," where that kingdom is termed 塗孛特 *T'u-bo-t'e*.

In the *Yüan shi*, Tibet is mentioned under different names. Sometimes the Tibetans are called there 西番 *Si-fan*, which is a Chinese name meaning literally the "western Barbarians." This name occurs in the Chinese annals as early as the beginning of the 11th century. Hyacinth thinks, that the authors of the Mongol period, by Si-fan especially understood the people of the Tibetan province Amdo (*l. c.* Preface, p. ix, and vol. ii, p. 133). During the Ming period, the southern part of Kansu, Kukonor, and the northern part of Tibet, were comprised under the appellation *Si-fan*. (See *Ming shi*, chap. cccxxx, fol. 1—12, 西番諸衛 *Si-fan chu wei*, *i. e.* "The fortified places in Si-fan," and 安定衛 *An-ting wei*, which place is stated there to have been situated 1500 *li* south-west of Kan-chou; to the south, it bordered upon Si-fan). In the *Yüan shi*, the name *Si-fan* appears in chap. ccii,—biography of *Dan-ba*. He was a man from *T'u-gan-sze dan-ma* in *Si-fan*.

Sometimes the *Yüan shi* uses the ancient name *T'u-fan*, to designate Tibet. In the Annals, *sub anno* 1251, we read:—"Mangu khan intrusted *Ho-li-dan* with the command of the troops against *T'u-fan*." *Sub anno* 1254 it is stated, that Kubilaï (who at that time was still the heir apparent), after having subdued the tribes of Yünnan, entered *T'u-fan*, when *So-ho-to*, the ruler of the country

surrendered. Again, *sub anno* 1268:—"The emperor ordered Meng-gu-dai to invade *Si-fan* with six thousand men." *Sub anno* 1275:—"The prince A-lu-chi (seventh son of Kubilaï) led an expedition to *T'u-fan*." *T'u-fan* is further mentioned in the *Yüan shi*, as the native country of 八思巴 *Ba-sze-ba*, the Lama priest who invented Kubilaï's official alphabet (see chap. ccii,—his biography). The Chinese text has 土番薩斯迦八 *i. e.* "a man from *Sa-sze-kia* in *T'u-fan*," or perhaps by *Sa-sze-kia jen*, "a man of the doctrine of the Sakia-muni (Buddha)" is meant. In chap. cxxii, biography of An-dja-r, we find Tibet disignated by 拓跋 *T'o-bo*; and in chap. cxxiii, in the biography of *Djao-a k'o-pan*, it is stated, that he belonged to the people of 土波思烏思藏掇 *T'u-bo-sze wu-sze-dsang-do*. In this name we recognize again Tibet in *T'u-bo*. The name 烏思藏 *Wu-sze-dsang* occurs once more in the *Yüan shi*. In chap. lxxxvii, it is mentioned in connection with the Mongol troops cantoned there. According to the *Ming shi*, chap. cccxxxi, fol. 1, *Wu-sze-dsang* was situated west of Yün-nan; and thus formed a part of Tibet, and belonged to the 大寶法王 *Ta-pao fa-wang*, which was the title of Ba-sze-ba and his successors, as heads of the Lamaite church in Tibet.

At the present day, Tibet is termed 西番 *Si-fan* by the Chinese; but it is more generally known under the name of 西藏 *Si-dsang*.

As I have stated above, Tibet was known to the Mongols in the middle ages, as it is now, under the name of *Tubot*. In the Mongol text of the *Yüan ch'ao pi shi* (Palladius' translation, p. 148), in one case, the valour and fierceness of the Mongols, are compared with those qualities in the dogs of Tubot.[196]

As to the Mohammedan and European authors, who mention Tibet in the middle ages, I may quote,—besides the above-noticed Arabian travellers in the 9th century,—the Arabian geographer Edrisi (middle of the 12th century), who calls the country *Tobbat*. In Rashid-eddin's "History of the Mongols," the name of *Tibet* appears repeatedly. The Persian historians also state (D'Ohsson, tom. i, p. 82), that Singun, the son of Ong khan, after the latter had been defeated by Chinghiz, fled to *Buri-tibet*. The existence of a similar name is corroborated, not only by Carpini (p. 658), who mentions the conquest of the country *Burithabet* by the Mongols, but also in the *Ts'in cheng lu*, compiled from Mongol documents, where we read (Palladius' translation, p. 176), that

[196] The Chinese translator (14th century) renders "dogs of Tubot" by 西番狗 *Si-fan kou*. Compare *M. Polo*, vol. ii, p. 32, on the mastiff dogs of Tebet as big as donkeys.

Ong khan's son fled to the people of *Bo-li t'u-fan* (Bori Tibet;—for T'u-fan is the same as Tibet).

Rubruquis, after having spoken of the *Tanguts*, says also a few words about the Tibetans; p. 289:—"Post istos sunt *Tebet*, homines solentes comedere parentes suos defunctos, ut causa pietatis non facerent aliud sepulcrum eis nisi viscera sua etc."—*Ibid.* p. 329:—"Thebet scribunt sicut nos, et habent figuras valde similes nostris."

In M. Polo's narrative, two long chapters are found concerning the province of *Tebet*, in vol. ii, pp. 26 sqq. and in vol. i, p. 265, he speaks of the sorcerers of Tebet and Kesimur at the court of the Great khan.

Col. Yule states (*l. c.* vol. ii, p. 29), that it is not very clear how Tibet came under subjection to the Mongols, no conquest of their armies being related by either the Mohammedan or the Chinese historians. Indeed, it seems, that with the exception of the above-quoted passages, in the Chinese annals, respecting Tibet, nothing more is said of the warlike enterprises of the Mongols against this country.

天竺 *T'ien-chu* = *India.*

94. T'ien-chu is the name by which India was known to the Chinese from the beginning of our era. See the "History of the Posterior Han," chap. cxviii. But the most ancient Chinese name for India is 身毒 *Shin-du.* This name first appears in the Chinese annals about B. C. 120, after the expedition of Chang Kien to western Asia (see above, 39). The Chinese authors, of the Mongol period generally call India 欣都思 *Hin-du-sze* (*Yüan shi*, Annals, *sub anno* 1253), or 印毒 *Yin-du* (see my *Notes on Chin. Med. Trav.* pp. 35, 39, 89, 104, 117).

乞失迷耳 *K'i-shi-mi-r* = *Cashmere.*

95. Respecting Cashmere,—for evidently this country is intended,—I have only a few words to say. It was known to the Chinese under about the same name during the T'ang period. See *T'ang shu*, chap. cclviii*b*, article 箇失密 *K'o-shi-mi.* Under the name of 迦濕彌羅 *Kia-shi-mi-lo* it appears in the narrative of Hüan-tsang, in the 7th century (comp. Julien's *Mém. s. l. Contrées Occidentales*, tom. i, p. 167). The Chinese traveller Ch'ang Tę (1258) also speaks of the Buddhist kingdom *K'i-shi-mi*, to the north-west of Yin-du (India). See my *Notes on Chin. Med. Travellers*, p. 81. With respect to Cashmere, see also above, 65.

II. Countries and Places in the Empire of Du-lai T'ie-mu-r (the Middle Empire).

畏兀兒 *Wei-wu-r = Uigurs.*

96. The map has only the characters *Wei-wu-r;* but in the list of the Si-pei-ti, the character 地 *ti*, "country" is added to the name. There is also a short note, stating that in the year 1283, post-stations were established in four places (cities) of that country, and also a treasury was founded for the exchange of paper money (交鈔庫).

The name *Wei-wu-r* was applied in the days of the Mongols to the *Uigurs*, a nation who before the time of Chinghiz, had played an important *rôle* in the history of central Asia. In the 7th century they had their abode in the western part of Mongolia; and in the 8th century, their capital was near the place where afterwards Karakorum was built. It seems that at the time of their greatest power, the Uigurs extended their rule far to the west, and their dominions reached the Caspian sea. In the middle of the 9th century, the power of the Uigurs in Mongolia was broken by the Kirghiz, and they were dispersed. But some time later, there were again Uigur kingdoms in Kan-chou and in the country south and north of the eastern T'ien shan. In the latter tracts especially, the Uigurs were known to the Mongols as *Weiwur*. Very little is known about the western Uigurs. The Mohammedan authors of the 11th and 12th centuries seem to comprise them under the general name of eastern Turks. The name *Uigur* is first found in the writings of the Mohammedan authors in the 12th century; and in the same period the name *Wei-wu-r* first appears in the Chinese annals. Before that time, the Chinese termed them 回紇 *Hui-ho*, by which, in the Mongol period, the Mohammedans were generally designated. Thus the question regarding the names by which the Uigurs and Mohammedans were known to the Chinese is somewhat complicated.

As the Uigurs originate from eastern Asia, we have of course to look for their history to the Chinese historical records, where bulky articles are devoted to them. It is not my intention here to give a complete translation of these accounts, which would be very tedious to the reader. The history of the Uigurs from Chinese sources has long been made accessible to European savants. A good translation of these accounts has been given by Visdelou in the *Suppl. à la Bibl. Orient.* Father Hyacinth in his work "The Nations of Central Asia" (in Russian), gives the most detailed information on the history of the Uigurs; but his accounts conclude with the 10th century. Besides these, Klaproth

has written several very able articles on the Uigurs (*Mémoires relatifs à l' Asie*, tom. ii, pp. 301 sqq.—*Tableaux Historiques de l'Asie, etc.*) in which he proves convincingly, that the *Hui-ho* of the Chinese authors (anterior to the Mongol period) are identical with the Uigurs;—that the idiom of this people belongs to the stock of the Turk languages;—and that the Mohammedan authors are right in classing the Uigurs among the eastern Turks.

Thus I may confine myself to a brief summary of the leading facts in the history of the Uigurs; but I shall occasionally dwell longer upon topics not previously published, and upon questions not yet satisfactorily elucidated.

97. In the "History of the T'ang dynasty" (618—907), a long article is devoted to the 回紇 *Hui-ho* or Uigurs (chap. cclviiα). It is there stated, that at the time of the Northern Wei (386—558), the same people were called 高車 *Kao-ché* (it may also be pronounced *Kao-kü*). During the *Sui* dynasty (589—618), they were known under the name of 韋紇 *Wei-ho*. They were sometimes also termed 烏紇 *Wu-ho*, 烏護 *Wu-hu* and 袁紇 *Yüan-ho*. Properly it was only one of the tribes of the Kao-ché, called *Yüan-ho*, from which, according to the T'ang history, the Hui-ho derive their origin.[197] They were at first tributaries of the 突厥 *T'u-küe* (Turks); but from the beginning of the 7th century the Hui-ho formed an independent kingdom. Their dominions were then situated north of the 薛延陀 *Sie-yen-t'o* (another tribe of the Kao-ché). They had their capital on the river 娑陵 *So-ling* (probably the *Selenga* is meant, a southern affluent of lake Baikal). It was distant 7,000 *li* from the capital of the T'ang (*C'hang-an*, the present *Si-an fu* in Shensi). 俟斤 *Sze-gin* was the name of the ruler of the Hui-ho, who declared himself independent. He had the title 特健 *T'e-gien*.[198] His successor 菩薩 *Pu-sa* established his residence on the river 獨樂 *Tu-le* (the *Tura*, an affluent of the Orkhon, which discharges into the Selenga). In the year 629, he dispatched an envoy to the emperor of China. His successor *Hu-lu-sze-li-fa-tu-mi-du* subdued the tribe of the *Sie-yen-t'o* (see above), crossed the mountains 賀蘭山 *Ho-lan shan*,[199] arrived at the Yellow river, and in

[197] In the "History of the Northern Wei" it is said, that the 高車 *Kao-ché* (these two characters mean "high cart" in Chinese; and the *Wei shu* explains the name, by the big wheels of their carts) originally dwelt south of the Mongolian desert, and west of the Yellow river; but towards the end of the 4th century of our era, they emigrated to the northern verge of Gobi.

[198] *Teghin* was in ancient times the title of the rulers of the Turks;—*e. g. Alpteghin, Sebegteghin* of the Ghaznevid dynasty (10th century).

[199] The mountain of *A-la shan* near the left bank of the Yellow river,

630, sent an envoy to the emperor of China in acknowledgment of his supremacy; whereupon the Chinese considered the kingdom of the Hui-ho as a vassal state. About twenty khans of the Hui-ho are mentioned in the T'ang history, and many particulars regarding their wars etc. are given there. I shall only speak of the most distinguished rulers.

裴羅 P'ei-lo (or *Ku-li P'ei-lo*) came to the throne in 742. He destroyed the empire of the *T'u-küe* (Turks) in 744, and then ruled over the territory of the ancient *Hiung-nu* (see above, 91). His dominions stretched to the east, as far as 室韋 *Shi-wei*,[200] and westward to the 金山 *Kin shan* (Altaï mountains), while they were bounded by the desert on the south. The Chinese emperor bestowed upon P'ei-lo, the title 骨咄祿毘伽闕可汗 *Gu-du-lu P'i-k'ie-k'üe k'o-han*.[201] P'ei-lo established his residence among the 烏德鞬 *Wu-te-kien* mountains on the river 昆 *Kun*,[202] where previously the *T'u-küe* (Turks) had dwelt.

98. We learn further from the *T'ang shu*, that the Hui-ho nation was divided into nine tribes, viz. *Yo-lo-ge*,—which was the tribe of the family of the khan (可汗之姓),—*Hu-du-go*, *A-wu-ch'ai*, *Le-wu-go*, *Du-lo-wu*, *Go-sa*, *Hi-ye-wu*, *Mo-go-sze-go* and *Huwen-so*.

The Hui-ho were at first on good terms with China, but subsequently when they grew stronger, they often disturbed the Chinese frontier by their predatory incursions. 磨延啜 *Mo-yen-djo*, called also 葛勒可汗 *Go-le k'o-han* (perhaps gurkhan;—see above, 33), the successor of P'ei-lo, came to the throne in 756. He was a valiant warrior and gave assistance to the Chinese emperor against the rebellion raised by *An-lu-shan*. The emperor bestowed upon him a Chinese princess, by name 寧國 *Ning-kuo*. The princess was accompanied by a Chinese envoy to the court of the Hui-hui, where she was handed over to the khan. Mo-yen-djo

visited a few years ago by Colonel Przewalsky. On modern Chinese maps this mountain is still termed *Ho-lan shan*.

200 A people of the same stock as the K'itan.

201 *Kutluk*, in Turkish means "happy," *k'o-han* is evidently intended for *khan*, the title of the Turkish sovereigns in Asia. See *Bibl. Orient* p. 502, where this term is translated by "Grand et puissant seigneur." I may observe, that in the Chinese annals, the title *khan* appears for the first time under the year A. D. 312. It is there stated that in this year the *Han* 汗 *I-li* of the tribe *T'o-ba* (afterwards the dynasty of *Northern Wei*) gave assistance to the Chinese against the Hiung-nu.

202 As we shall see further on, Rashid-eddin states, that the Uigurs dwelt near the mountains of Karakorum and on the river *Orkun*. One of their tribes was called *Utekien*. This latter name sounds like the Chinese Wu-te-kien. The Kun river of the Chinese authors may be identified with the Orkun, or *Orkhon* river.

died the year after this marriage, and the princess returned to China; but her younger sister, who had accompanied her, became the wife of Mo-yen-djo's successor 移地健 *I-di-gien*, called also 牟羽可汗 *Mou-yü k'o-han*, A. D. 762. After the death of this khan in 779, this princess lived for many years apart from the court of the Hui-ho, and died in that country in 790. In 788 another Chinese princess, named 咸安 *Hien-an*, was given as wife to the khan of the Hui-ho. She lived twenty years at the court, having been the wife of four khans in succession.

In the year 788, the Hui-ho solicited the permission of the Chinese emperor to change their former name Hui-ho into 回鶻 *Hui-hu*, which would better answer their warlike character (*hu* means a falcon in Chinese). The emperor acceded to this request, and some years later the Hui-hu assisted the Chinese in their war against the *T'u-fan* (Tibetans;—see above, 93), by expelling the latter from *Pei-t'ing* (the present Urumtsi;—see further on, 108), which had been previously captured by the Tibetans, while they sent the prisoners to the emperor of China. Again, in the year 822, a Chinese princess, by name 太和 *T'ai-ho*, was given in marriage to a khan of the Hui-hu. His name and title were 登羅羽錄沒密施句主錄毗伽崇德可汗 *Deng-lo yü-lu-mo mi-shi Gü-dju-lu P'i-kie ch'ung-te k'o-han*.[203] A Chinese envoy accompanied the princess to the capital of the Hui-ho. She kept her own court there and was assisted by two ministers. In the year 840, the 黠戛斯 *K'ie-gia-sze* (Kirghiz) destroyed the empire of the Hui-hu. Their capital was taken and the khan slain, while the people were all dispersed. One of the ministers of the late khan, named 龐特勒 *P'ang-t'e-le*, at the head of fifteen tribes (of the Hui-hu) fled to the 葛邏祿 *Ko-lo-lu* (probably the Karluks;—see further on, 121). The rest of the Uigurs emigrated to the south, and finally established themselves near the mountain 錯子山 *T'so-tze shan*, where they elected a new khan. After this they frequently disturbed the Chinese frontier, and even succeeded in taking 天德 *T'ien-te* (see note 18), 雲中 *Yün-chung* (the present Ta-t'ung fu in Shansi), and 朔方 *So-fang* (also in Shansi). But in 847 the Hui-hu suffered a total defeat by the Chinese army. The last khan fled to the west; and such of his people as were left went over to *P'ang-te-le*, who in the mean time had taken possession of 甘州 *Kan-chou* (in Kansu)

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[203] *Gü-dju-lu* in this long name and title is probably *Guchluk*, a name of Turkish (?) origin. As we have seen (above, 34), the Naiman prince who usurped the throne of Karakhitai, in the beginning of the 13th century, was called Guchluk. *P'i-k'ie* seems to represent the Turkish *Buku* (see further on, 103). Ch'ung-te is a Chinese honorary title meaning "Highly virtuous."

and of the cities west of the stony desert (磧西諸城).[204] He was finally recognized as khan by the emperor of China. The Hui-hu however, could never again recover their strength. Such is a short *résumé* of the accounts regarding the Hui-hu, given in the *T'ang shu*.

99. In the Wu-tai period (first half of the 10th century), the Hui-ho of Kan-chou sent several envoys to the Chinese court. In the *Liao shi*, chap. ii, it is stated, that when *A-pao-ki*, the first emperor of the Liao, in 923, was encamped near the ancient capital of the Hui-hu (see note 237), the khan of the Hui-hui came to pay tribute (it is not said from what part; but further on we read in that record, that in the same year, A-pao-ki captured one of the governors of the Hui-hu of Kan-chou, and sent one of his officers to the khan,—probably to summon him to submit).

In chap. xxx of the *Liao shi*, the khan of the Hui-hu of Kan-chou is again spoken of. When Ye-lü Ta-shi, the founder of the Si Liao dynasty (Kara-khitai), had quitted his native country, in 1221, *Pi-le-ko*, the khan of the Hui-hu of Kan-chou came to meet him and made rich presents, etc. (see above, 25).

Mention is made also of the Hui-hu of Kan-chou in the "History of the Sung dynasty" up to the year 1126. In 1128 the *Hia*, or Tanguts, took Kan-chou, and subsequently also other cities of the Hui-hu; from which time this branch of the Uigurs is no more heard of in Chinese history. It seems that in the "History of the Kin" (12th century), nothing is recorded of the Hui-hu.[205]

100. In the *Yüan shi* we read again of the Uigurs, but now they are mentioned by another name and in another country.

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[204] See my *Notes on Chin. Med. Trav.* p. 28, note 53.

[205] I may notice here a curious tradition recorded by Chinese authors, that in the time of their power, the Hui-hu once made prisoner one of the chiefs of the K'itan (Liao) and forced him to tend cattle. I do not remember in what Chinese book I saw the original account; but allusion is made to this tradition in the narrative of Wang Yen-te; who was sent by the Sung to Kao-ch'ang (the present Karakhodjo) towards the end of the 10th century. He notices a valley through which he passed (somewhere south-east of Kamul), in which, according to tradition, the K'itan had tended the herds of the Hui-hu (see Julien's *Mélanges de Géogr. Asiat.* p. 90). I notice this insignificant record, because it seems to me that the story M. Polo relates in two chapters (*l. c.* vol. ii, p. 9—12) about the Golden king taken prisoner by Prester John, and forced to look after cattle, might perhaps be traced back to this old Chinese tradition; M. Polo having merely changed the names. It is impossible to reconcile Polo's story with the history of the Kin. It is not without interest to observe, that the *Yüan ch'ao pi shi* relates the same story; but the Mongol tradition represents *Wang khan* (Ung-khan, the same as Prester John, according to M. Polo, vol. i, p. 204) as having been made prisoner, together with his mother, by the Tatars, who forced them to tend their cattle (Palladius' transl. p. 76).

They are termed 畏兀兒 *Wei-wu-r* in the "History of the Mongols;" and this name was applied in the Yüan period, to the people living about the present Urumtsi, Turphan, Karakhodjo, etc.[206] The accounts of the Uigurs found in the *Yüan shi*, consist generally of fragmentary statements scattered over the whole work, but met with especially in the biographies of distinguished Uigurs in the service of the Mongol emperors. Interesting details of their ancient history are given in chap. cxxii, in the biography of 巴而朮阿而忒的斤 *Ba-r-dju a-r-té di-gin*,[207] prince of the Uigurs in the days of Chinghiz. As the traditions related there show a remarkable coincidence with the accounts of the Mohammedan authors regarding the Uigurs; and as the Persian historians profess to have derived their information from the Uigur annals, there can be no doubt that the biographer of the Uigur prince was also acquainted with the historical records of the Uigurs. The biography of *Ba-r-dju a-r-té di-gin* reads as follows:—

"亦都護 *I-du-hu*[208] is the title of the kings of 高昌 *Kao-ch'ang* (see further on, 111, and note 220), who in former times dwelt in the country called 畏兀兒 *Wei-wu-r*. There was in that country (where the Uigurs originally lived) a mountain called 和琳 *Ho-lin*,[209] from which two rivers take their rise, the 禿忽剌 *T'u-hu-la* and the 薛靈哥 *Sie-ling-k'o*.[210] It happened once in the night time, that a stream of light fell from heaven upon a tree standing between the two rivers; whereupon the tree began to swell like a pregnant woman, and after nine months and ten days, gave birth to five boys. The youngest received the name 不可罕 *Bu-k'o-han*. He was afterwards elected king, and subdued the neighbouring countries.[211] The thirtieth of his succes-

[206] It is not however in the *Yüan shi*, that the name *Wei-wu-r* appears for the first time. In the "History of the Liao," chap. lxix, the tribes tributary to that dynasty are enumerated, and among them we find 畏兀兒城 the city of the *Wei-wu-r*. In chap. xxx, where the wanderings of *Ye-lu Ta-shi* are recorded, 威武 *Wei-wu* is mentioned among the seven cities, which had sent their chiefs to *Ye-lu Ta-shi* at Pei-t'ing (see above, 25). Ch'ang-ch'un, when travelling to the west, in 1221, met the ruler of Djangbalik, who was a 畏午兒 *Wei-wu-r* (see further on, 114, and also my *Notes on Chin. Med. Trav.* p. 31).

[207] Compare note 198.

[208] The same title reads *Iduhut* in the *Yüan ch'ao pi shi* (see note 245), and *Idicut* in the *Djami ut Tevarikh* (see further on, 105). Compare also 98 *supra*, *I-di-gien*. Thus the *T'ang shu* calls one of the Uigur khans.

[209] *Ho-lin* is the Chinese name for Karakorum. In speaking of the ancient territory of the Wei-wu-r, the Chinese biographer means the country about Karakorum.

[210] Evidently the river *Tura* and *Selenga* are meant.

[211] *Bu-k'o-han* seems to be the same as the *P'i-k'ie k'o-han* of the *T'ang*

sors[212] was called 毡倫的斤 *Yü-lun di-gin*. He was valiant and powerful, and frequently engaged in war with the T'ang emperor, who tried to form an alliance with him by marriage. A Chinese princess, named 金蓮 *Kin-lien*, was given in marriage to 葛勵的斤 *Go-li di-gin*, the son of *Yü-lun di-gin*. She lived near *Ho-lin*, at a place called 別力跛力答 *Bie-li bo-li da*, meaning "the hill, where the spouse lives." There was also another mountain called 天哥里于答合 *T'ien-ko-li yü da-ho*,[213] meaning "mountain of heavenly reason." South of it stood a mountain 胡里荅合 *Hu-li da-ho*,[214] or "mountain of happiness." When the envoy of the T'ang arrived at the frontier of the *Wei-wu-r*, he was told, that the supremacy of Ho-lin depended on the possession of the Mountain of Happiness;—if the T'ang could destroy it, the power of the Uigurs would be broken. The Chinese envoy accordingly asked from the khan of the Uigurs, merely the Mountain of Happiness, as a price for the Chinese princess given in marriage; to which the khan agreed. As the hill was big, the Chinese made a great fire around and then poured vinegar on it. After it had been broken into pieces, it was placed on carts and carried away to China. Subsequently beasts and birds began to utter plaintive cries predicting mischief. Yü-lun di-gin died seven days after, and the empire was troubled by the outbreak of rebellions and calamities of all kinds. Several generations later, the dynasty of the Wei-wu-r was extinguished, and the people were compelled to emigrate.[215] They removed their abodes to 交州 *Kiao-chou*, which is the same as 火州 *Huo-chou*, and occupied the whole country comprised under the name of *Bie-shi-ba-li* (Bishbalik).[216] Their dominions then stretched to the north as far as 阿尤 *A-shu* (unknown to me), and south as far as 酒泉 *Tsiu-*

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shu (see above, 97), and the *Buku khan* of the Mohammedan authors (103).

[212] Thirty is probably a misprint.

[213] *Tengri*, in all Turkish dialects means "Heaven;" *tagh*, means "mountain;" *yuz*, means "modus, ratio" (compare Klaproth's *Mém. rel. à l'Asie*, tom. ii, p. 341).

[214] *K'ol* in Turkish means "accident heureux" (Klaproth, *l. c.*).

[215] Comparing this Uigur tradition with the statements in the T'ang history on the same subject, we find that they agree in the chief points; although there are some differences between them respecting the names of the khans and the Chinese princesses. Besides this, the Uigur accounts present some anachronisms. *Goli digin*, who—according to Bardju's biography—married the Chinese princess, is probably identical with the *Go-le k'o-han* of the *T'ang shu*.

[216] 遷于交州卽火州統別失八里之地. On Bishbalik and Huo-chou (Karakhodjo), see further on, 109, 111.

ts'üan;[217] on the east they bordered upon 兀敦 *Wu-tun* and 甲石哈 *Gia-shi-ha*,[218] and on the west were contiguous to 西番 *Si-fan*.[219] There they dwelt more than nine hundred and seventy years,[220] up to the time of Ba-r-dju a-r-té di-gin.

"Ba-r-dju was a vassal of the *K'itan* (Kara-khitai), but after hearing (1209) that Chinghiz was about to move on an expedition to 朔方 *So-fang*,[221] he ordered the officers of the K'itan who were stationed in his country to be slain, and sent to Chinghiz to offer his submission. The emperor then sent envoys to the *I-du-hu*,

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[217] An ancient name for the present *Su-chou*, in Kansu. The district of Tsiu-ts'üan was established during the Han.

[218] It seems to me that by *Wu-tun*, the same country is meant as the *Hu-tun* of the *Kin shi* (see note 24). Regarding *Gia-shi-ha* I may observe, that, according to Rashid, the Mongols called the Tangut empire *Ka-shi* (D'Ohsson, tom. i, p. 95).

[219] Tibet (see above, 93). At the time here spoken of (10th or 11th century), the dominions of the Tibetans extended much further north than they do now.

[220] There seems to be a mistake again in the figure, owing to which Klaproth has fallen into a historical error respecting the early history of the Uigurs. Klaproth suggests, that, according to the Chinese authors, the country of 車師 *Ché-shi* (pronounced also *Kü-shi* or *Kü-sze*), termed also 姑師 *Ku-she* (Ku-sze), first mentioned in the Han history before our era, and known under the name of 高昌 *Kao-ch'ang* at the time of the T'ang dynasty, was the seat of the Uigurs two centuries before our era (see *Mém. rel. à l'Asie*, tom. ii, pp. 321—351). Klaproth always considers Ku-sze and Kao-ch'ang to be identical with the Uigurs; but no corroboration of this view can be found in Chinese works. The Chinese historians anterior to the Mongol period, call the Uigurs *Hui-ho* or *Hui-hu;* and in recording the history of the Ku-sze and Kao-ch'ang, they do not mention this people. As we have seen, the *Yüan shi* clearly states, that the Uigurs emigrated to Kao-ch'ang, only after the extinction of their empire in Mongolia. Klaproth was misled by Chinese statements of more recent date, that the country of the *Wei-wu-r* in the days of the Mongols, was the same as the *Kao-ch'ang* of the T'ang and the *Ku-sze* of the Han. This statement is quite correct, but it does not involve the occupation of this country by the Uigurs at so early a date. Julien in his *Mél. de Géographie Asiat.* p. 103, gives a translation of the history of Kao-ch'ang, and always identifies this name with the country of the Uigurs. In the Chinese text he translated (from the *Wen hien t'ung k'ao*) however, the name of the Uigurs appears only once. Ma Tuan-lin, the author of the *Wen hien t'ung k'ao*, who wrote in the 13th century, states, that Kao-ch'ang was also called the country of the Hui-hu; for many Hui-hu or Uigurs were settled there. But he speaks of a time posterior to the T'ang and the destruction of the empire of the Hui-hu in Mongolia. At the time of the T'ang dynasty, Kao-ch'ang belonged to China, not to the Uigurs; and the Chinese changed the name into 西州 *Si-chou* (see article Kao-ch'ang in the *T'ang shu*, chap. cclviii*b*). There is no doubt, that in the 10th century, Kao-ch'ang was inhabited by Uigurs. The "History of the Sung" records, under the year 965, that the khan of the *Hui-hu* of *Si-chou* sent a Buddhist priest with presents to the emperor of China.

[221] So-fang means "the northern regions (of China)."

who was much delighted, and dispatched another embassy to Chinghiz with the following answer:—"Your servant has heard of Your Majesty. I hate the K'itan, and for a long time I have entertained the desire to submit to your power. Now that the message of Your Highness has reached me, I am happy to have an opportunity of accomplishing my desire; and I shall rejoice to hear, that all nations have acknowledged Your Majesty's supremacy." Chinghiz then attacked *T'ai-yang han* (khan of the Naimans) and *T'o-t'o* (khan of the Merkits).

"After the latter had been slain, his four sons (their names are given in the text) fled with the head of their father to the river 也兒的石 *Ye-r-di-shi* (Irtysh). Then Ba-r-dju a-r-té di-gin joined (the Mongol army), and defeated and killed the four sons in a battle on the river 嶄 *Ts'an* (Dsan).[222] After this he sent envoys with valuable presents to the emperor; and when Chinghiz was encamped on the river 怯綠連 *K'ie-lu-lien* (Kerulun), the *I-du-hu* arrived himself (in the spring of 1211, according to the Annals of the *Yüan shi*), and solicited permission to make a present of horses and dogs to the sons of the emperor. Chinghiz was moved by the I-du-hu's words; bestowed upon him his daughter 也里安敦 *Ye-li an-dun*,[223] and received him as his son. Subsequently Ba-r-dju a-r-té di-gin accompanied *Dje-bie no-yen* (see note 66) in the war against 罕勉力鎮潭 *Han Mien-li so-tan* (Khan Melik sultan) the chief of the Mohammedans.[224] He distinguished himself at the siege of 你沙卜里 *Ni-sha-bu-li* (Nishabur), and (after returning from the west) took part in the expedition to 西河 *Ho-si* (the Tangut empire). He had previously crushed a rebellion of ten thousand men of his troops, who had been unwilling to submit to the new institutions. After his death the title of *I-du-hu* passed successively to his (eldest) son, grandson, etc. (I omit the details regarding his successor)."[225]

101. There are many other biographies in the *Yüan shi*, devoted to Uigurs of eminence in the service of the Mongol emperors. I will give their names, as they may perhaps present some interest

[222] See above, 34, and note 64.

[223] Rashid-eddin calls this princess *Altun bigui* (D'Ohsson, tom. i, p. 111). In the *Yüan ch'ao pi shi*, her name is written *Ale altun* (see note 245). The title *bie-gi*, occurs also in the *Yüan shi* as a title of princesses. Compare chap. cix, Table of the princesses, where another daughter of Chinghiz is styled 火臣別吉 *Huo-chén bie-gi*. Rashid terms the same princess *Hu-djin bigui* (Berezin, *l. c.* vol. i, p. 152).

[224] It seems that Mohammed, sultan of Khorazm is meant.

[225] It is known, that after Chinghiz' death, the country of the Uigurs belonged to Chagatai's dominions. The Uigur princes were probably appointed governors there, with the title *I-du-hu*.

in connection with the Uigur language, of which so little is known.

Chap. cxxiv: *Ha-la-yi ha-ch'i bei-lu.* In this biography some details are found concerning the country of the Uigurs and their intercourse with the Kara-khitai. *Ibid.: A-lien t'ie-mu-r. Ibid.: T'a-t'a-t'ung-k'o.* He was at first, minister at the court of the Naimans. His biography has been translated by Rémusat, from the *Yüan shi lei pien*, and published in his *Nouv. Mél. Asiat.* tom. ii, p. 61. *Ibid.*: T'a-t'a-t'ung-k'o's sons, *Yü-hu mi-shi, Li-hun mi-shi, Su-lo-hai.*

Chap. cxxv: *Bu-lu hai-ya.* His father *Gi-t'ai hai-ya*, and his grandfather *Ya-r-ba hai-ya.*

Bu-lu hai-ya's son *Lien-hi-sien* has a separate biography in chap. cxxvi.

Chap. cxxviii: *A-li hai-ya.* He distinguished himself at the siege of Siang-yang fu in 1272.

Chap. cxxx: *A-lu-hun sa-li.* His grandfather *A-ta'i sa-li.* His brothers *Wei-u-r sa-li* and *Dao-wa-ch'i sa-li.*

Chap. cxxxi: *I-hei mi-shi.* He was in the life-guard of Kubilaï, and took part in the expedition to Java.

Chap. cxxxiii: *Ye-sien-nai.* His father *Kien hai-ya. Ibid.: T'o-li shi-guan.* His father *T'ie-k'o-shu.*

Chap, cxxxiv: *Si-ban.* His father *K'üe-li-bie wa-ch'i. Ibid.: T'ang-jen-dsu.* His grandfather *T'ang-gu-dji. Ibid.: Siao-yin-shi t'o-hu-lien.* His son *Ba-dan.*

Chap. cxxxv: *Ye-gü-lien-ch'i hai-ya.*

Chap. cxxxvii: *A-li hai-ya* (not to be confounded with the A-li hai-ya in chap. cxxviii). His father *T'o-lie,* and his brother *Ye-na.*

Chap. cxcv: *Bo-yen bu-hua di-gin.*

Other names of distinguished Uigurs will be found further on (see articles Bishbalik, Karakhodjo, etc.).

102. Let us turn now to the western mediæval accounts of the Uigurs. As to the records of the Persian historians on this subject, I invariably depend upon the excellent translations of D'Ohsson.

Assemani, the celebrated orientalist (1768), in his *Bibliotheca Orientalis Clementino Vaticana*, states, that in the history of the Nestorians, the name of *Ighur* or *Iaghur* is often mentioned, and denotes the *eastern Turks* of *Khatai* (Klaproth, *l. c.*).

Abulfaradj or *Bar Hebræus* (1226—1286), in his chronicle (written in Syriac, and published in Latin in the middle of the 17th century at Oxford, under the title *Historia compendiosa dynastiarum*), p. 32, speaks of the prince of the Ighurs, who submitted to Chinghiz, and adds, that the Ighurs are a numerous tribe of the eastern Turks belonging to Khatai.

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It seems that the Uigurs were not known by this name in western Asia before the beginning of the 13th century; but as Klaproth has proved, that long before this time they had extended their power far to the west, it may be assumed, that by the *Turks* and the khans of Turkistan,—who according to the Mohammedan authors were often at war with the Samanids, Ghaznevids and Seldjuks in the 10th, 11th and 12th centuries,—we are to understand the western Uigurs.[226]

In Deguignes' *Hist. des Huns*, tom. iii, p. 29, we read (he translates apparently from Abulfaradj), that in A. D. 993, *Bogran Khan Harun*, khan of the Turks, whose residence was at Belasagun,—who reigned also over Kashgar, Khoten and Taras, and whose dominions stretched as far as the frontier of China,—took Bokhara from Noe, sultan of the Samanids. His son *Illik ilkhan* waged war with the Ghaznevids (who had overthrown the Samanids), and in 1006, together with another khan called *Cadar*, advanced as far as Balkh (Deguignes, tom. iii, p. 163). Finally, Deguignes speaks (tom. iii*b*, p. 252) of a khan of the Uigurs, *Illik*, residing in Bela-sagun, when the Kara-khitai arrived in 1125.[227]

It seems that the Persian and Arabian historians of the 13th century applied the name *Uigur*,—which in Mohammedan writings is first met with about this time,—only to that branch of the Uigurs known to the Chinese and Mongols under the name of *Wei-wu-r*, and established in the eastern part of eastern Turkistan (Urumtsi, Turphan, etc.). The statements of the Mohammedan authors regarding the Uigurs, are as we shall see, in substantial accordance with what the *Yüan shi* records of the history of the Wei-wu-r.

103. The *Tarikh Djihan Kushai* gives accounts of the Uigurs in great detail. I present in the following, an English version of D'Ohsson's translation (tom. i, pp. 430 sqq.), omitting however, some unimportant particulars. The author of the *Tarikh Djihan Kushai*

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[226] The Turks, mentioned by the Mohammedan authors of the 6th to the 8th century, are the 突厥 *T'u-küe*. That nation, according to the Chinese authors, was in power in Mongolia and central Asia from the 5th to the 8th century. Their empire was destroyed by the Hui-ho or Uigurs, and the *T'ang shu* records, that about the middle of the 8th century, the Hui-ho conquered the land of the *western T'u-küe* and took their capital, situated on the river *Su-ye* (Chu). Compare note 57, on Bela-sagun and the Chu river.

[227] Here, as usual, it is impossible to make out where Deguignes' information is drawn from. He feels no hesitation in asserting: "Illik khan que les Chinois appellent *Pi-le-ko*." He means the khan of the Hui-hu, who came to meet Ye-lü Ta-shi when he started from Pei-t'ing (Urumtsi) and proceeded westward (compare above, 25). But the *Liao shi*, in the narrative of Ye-lü Ta-shi's wanderings, seems to intimate that Pi-le-ko resided in *Kan-chou*, not in Bela-sagun.

first states, in the introduction of the article, that his information has been drawn from Uigur books; but signifies his disbelief in these tales, which he quotes only as a curiosity. After that he continues as follows:—

"The Uigurs have a tradition, that they originally dwelt on the banks of the river *Orkun*,[228] which takes its rise in the mountains called *Karakorum*,[229] whence the name of the city, recently built by the khan (Ogotai), has been derived. Thirty rivers take their rise among these mountains, and thirty tribes dwelt on their banks.[230] These Uigurs, who had their abodes in the valley of the Orkun, were divided into two tribes. After having considerably increased in number they elected a king, and five hundred years later *Buku khan* appeared. People say, that he is the same as *Efrassiab*.[231] There is among the mountains of Karakorum an ancient pit, called the pit of *Pijen*.[232] The vestiges of a city and a palace are to be seen on the banks of the Orkun. The ancient name of this city was *Ordu balik*, but it is known now under the name of *Mao balik*.[233] Before the palace are found some stones covered with inscriptions, which we have seen. In the reign of the khan (Ogotai) these stones were removed, when a pit was discovered, in which was a great stone tablet with an inscription. The emperor ordered it to be examined by people of different nations; but no one was found who could read it.

"Finally, the khan sent to China for men, who are called (the name is wanting in the manuscript;—D'Ohsson supplies *kames*;—see further on, 104). The inscription, which proved to be in their language and character, was as follows:—

"'At a place called *Kumlandju*, situated at the junction of the rivers *Tugola* and *Selinga*,[234] which take their rise in the mountains of Karakorum, there were two trees close together; one of them a *fistuk* tree, resembling a pine, evergreen like a cypress, and with cone-like fruit;[235] the other, a wild pine. Between these two trees

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[228] The Orkhon of our maps. Probably the *Kun* river of the T'ang annals is the same. See note 202.

[229] See note 209.

[230] The mountains around Karakorum in fact abound in water. All these rivers belong to the system of the Selenga.

[231] *Efrassiab* is the name of a (mythical) king of the Turks, mentioned by the ancient Persian authors.

[232] *Pijen* is the name of a Persian hero, who was taken prisoner by Efrassiab and kept for some time in a well. He was delivered by the famous Rustem.

[233] *Ordu balik*, means "the city of the ordu, or residence of the khan." D'Ohsson translates *Mao balik* by "mauvaise ville,—ville ruinée."

[234] The rivers Tura and Selenga;—see above, 97.

[235] *Fistuk*, in Arabic means the "pistacia tree;" but the description given

a hillock appeared, upon which a stream of light descended from heaven; whereupon the hillock began to grow, and marvellous things were seen about it. Just after the lapse of the period of a woman's pregnancy, the hillock opened, and five hillocks resembling tents were seen. In each tent was a little boy; and to these boys the people paid the greatest respect. The youngest of them, called *Buku tegin*, was very intelligent, and subsequently the Uigurs made him their khan. The reign of *Buku khan* was very prosperous, and he was marvellously assisted by three ravens sent by Heaven. They knew all the languages of the world, and brought news whencesoever it was required. It happened once, that a spirit under the shape of a maid appeared to Buku khan in a dream, and conducted him to the mountain *Kut tag*.[236] There they had conferences every night for seven years six months and twenty-two days. On the last night the maid took leave, and revealed to Buku that he would rule over the whole world. He then rallied his troops and sent his brothers to wage war against the Mongols, the Kirghiz, the Tanguts and the Khitai. All returned to the river Orkun with great booty and a large number of captives. After this the city of *Ordu balik* was built.[237] Buku khan had

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here does not agree with *pistacia vera*. Besides, this tree is not found in Mongolia.

[236] Probably the same as the *Hu-li da-ho* or "Mountain of Happiness" in the Chinese records;—see note 214.

[237] In the T'ang annals it is stated (see above, 97), that *Gu-du-lu P'i-k'ie-k'ie k'o-han*, in the middle of the 8th century established his residence on the river *Kun* (Orkun of the *Tarikh Djihan Kushai*). I have no doubt that *P'i-k'ie k'o-han* is the Buku khan of the Persian records, and the *Bu-k'o han* of the *Yüan shi* (see above, 100). The ancient map of Mongolia in the *Yüan shi lei pien* (see above, 10), marks 孛哥罕城 or the city of *Bo-ko han* north-east of Karakorum. The existence of the ancient capital of the Uigurs, near the place where Karakorum was built, and of the ancient inscriptions there, is corroborated by the narrative of an expedition of the first Liao emperor to the north, recorded in the *Liao shi*, chap. ii. We read there:—"*T'ai-tsu* (*A-pao-ki*, 916—925), in 923, undertook an expedition through the ancient territories of the 單于 *Shan-yü* (the khans of the ancient *Hiung-nu* in Mongolia). On the first day of the 9th month he encamped near the ancient city of the 回鶻 *Hui-hu*, where he ordered a marble tablet to be erected, with the accounts of his victories engraved.....He gave orders also to take water from the 金河 *Kin ho* (Golden river), and stones from the 烏山 *Wu shan* ("black hills;"—probably the Karakorum mountains), and carry them home on carts to the river 潢河 *Huang ho* (the Shara muren in eastern Mongolia) and the mount 木葉 *Mu-ye* (a sacred mount of the Liao, situated at the junction of the *Lo-ha* river and the Shara muren), to build a monument for posterity, to prove that the rivers and the mountains have come to offer tribute..... On the 29th of the same month (the emperor sojourned still at the same place), he ordered the ancient monument of 闢渴

another dream, in which he saw a man dressed in white, who gave him a piece of *jade*, in the form of a pine tree, and said to him:—As long as you are able to keep this piece of jade in your possession, you will rule over the four quarters of the globe. His minister had the same dream. Buku khan then directed his armies to the west, and arrived in Turkistan, where he established his residence on a beautiful plain, abounding in water and pasture. There he built the city of *Bela-sagún*, now called *Gu balik* (see above, note 57). In the space of twelve years Buku khan succeeded in subduing the whole world. His armies advanced as far as the regions where the people resembled brutes; and they were informed, that no inhabitants were to be found beyond. The kings of all the subdued countries were carried to Buku khan, who received them with benevolence; with the single exception however of the king of India, to whom an audience was refused, owing to his extreme ugliness. All were allowed to return to their countries after tribute had been imposed upon them. When Buku khan had completed this great enterprise he left Bela-sagun and returned to his native country.'

104. "As to the religion of the Uigurs at the time spoken of, they had certain magicians, which they called *kam*.[238] The same are found even now among the Mongols. These magicians say, that they are possessed by demons, who inform them of everything they wish to know. Even now the greater part of the descendants of Chinghiz have the firmest faith in them. Nothing of importance is undertaken without consulting the astrologers. These *kams* also cure maladies. The Uigurs sent to the khan of Khitai—an idolatrous country—for the men called *numi*. These have a sacred book called *num*,[239] which is their moral code,—a collection of fables and tales interpersed with good precepts. Amongst many things it is enjoined, to abstain from injuring other persons, or even dumb animals. There are several sects of the *numi*, who differ in their dogmas. The most wide-spread is the sect believing in the doctrine of metempsychosis, etc. When the *numi* had arrived from Khitai, the Uigurs arranged a discussion between them and

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汗 *P'i-k'o han* to be restored. Besides this, an inscription was made in letters of the *K'i-tan*, *T'u-küe* and Chinese, to glorify the feats of P'i-k'o han.

[238] There can scarcely be any doubt that by *kam*, the *shamans* are meant, who up to this time sustain an important *rôle* in Mongolia and Siberia. As far as I know, the term *kam* is unknown at the present day; it was probably a Uigur word, and its existence at the period and in the regions here spoken of by the Persian author, is corroborated by the "History of the T'ang." In chap. cclix*b*, article *K'ie-gia-sze* (Kirghiz), we find a statement that in this country the fortune-tellers (or diviners) are called *Kan* (呼巫爲廿).

[239] D'Ohsson renders *numi*, by "lamas." He may be right. In modern Mongol, *nom* means "a sacred book."

the *kam*, in order to test the respective merits of the two religions; but after the *numi* had read some chapters of their books, the *kam* could say nothing in reply. The Uigurs thereupon embraced the religion of the *numi*. Among all the idolaters of the east, these are the bitterest enemies of Islamism. We have not given more than the hundredth part of the absurdities found in the Uigur books, in order to show the ignorance and stupidity of this people. One of my friends told me, that he had read in a book, the above-related story of the two trees;—with the explanation, that a man had scooped out the trunks of these trees, put his boys in the cavities, and placed a light in the vicinity.

"Buku khan was happy to the end of his life, and was succeeded by one of his sons. Subsequently the Uigurs observed, that all beasts, domestic as well as wild, and even the little children, uttered the words *ghech, ghech,*[240] which means 'go away.' They took this for a divine command and emigrated; but the same sounds continued to be heard by the Uigurs, until they had arrived at the plain, where subsequently the city of Bishbalik was founded.[241] There they settled and established *five* divisions, which they called *Bishbalik* (five cities).[242] From that time the descendants of Buku khan have continued to rule over this country, and their kings bear the title *Idikut*. The above-mentioned trees were placed in their temples."

105. Rashid-eddin gives some new information in his account of the Uigurs. The name *Uigur*, which means "allies,—auxiliaries" in Turkish, he explains by the tradition, that Oghuz khan, the progenitor of all the Turk tribes, had bestowed this name on some of his relatives, who adhered to him when he was attacked by the others. Rashid states further:—

"It is reported, that in the (ancient) country of the Uigurs, there are two ridges of mountains; one is called *Bukratu turluk;* the other *Uskun luk tangrim*. Between them are the mountains of *Karakorum*, the name of which has been given to the city built by Ogotai khan. Near the two chains there is yet another mountain called *Kut tag* (see note 236). There is in these regions,—occupied

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[240] *Ghech*, in Turkish is the imperative of the verb *ghechmek* "to go away" (Klaproth, *Mém. rél. à l'Asie*, tom. ii, p. 341).

[241] It is not stated in the record of the Persian historian, at what time this emigration of the Uigurs took place; but as according to the Chinese accounts of the Uigurs, *P'i-k'ie k'o-han* or Buku khan, lived in the middle of the 8th century,—and the empire of the Hui-hu or Uigurs was destroyed in 840 by the Kirghiz,—they probably emigrated to the T'ien shan after this event.

[242] I am not aware what D'Ohsson intended by,—"ils bâtirent cinq quartiers auquels ils donnèrent le nom de Bishbalik;"—it is not clear whether he means one city with five divisions, or five separate cities.

anciently by the Uigurs,—a country irrigated by *ten* rivers, and another with *nine* rivers. Those tribes who dwelt on the borders of the *ten* rivers were called *On Uigurs;* those who settled in the valleys of the *nine* rivers, *Tokuz Uigurs.*[243] The following are the names of the Ten-rivers tribes, called also *On Orkun:*[244]—

Ishkil, in some MSS. *Ishlik.*

Oniguer (perhaps the river *Onghin*, south of Karakorum).

Tukaïr.

Uzkaïder, in some MSS. *Askander* (perhaps the *Adsirga gol*, one of the sources of the *Selenga*).

Bular (Bula is the name of an affluent of the *Khara gol*, which empties itself into the Orkhon). Berezin, vol. i, p. 125, however, writes this name *Tulu.*

Badar (in some MSS. *Tardar).*

Ader (one of the sources of the Selenga is called *Eder).*

Ukh tabin.

Kamlandju (a place of the same name is mentioned in the *Tarikh Djihan Kushai*, at the junction of the Tura and Selenga;—see 103).

Utikian (the name of a mountain *Wu-te-kien*, near the river *Kun* or Orkhon is mentioned in the T'ang history;—see above, 97).

Besides those tribes, who dwelt on the above-named rivers, there were a hundred and twenty other tribes of the Uigurs."

In accordance with the *Yüan shi*, Rashid-eddin reports (D'Ohsson, tom. i, p. 109;—Berezin, vol. i, p. 127), that the Uigurs were tributary to the gurkhan of Kara-khitai, who appointed his governors in their country. But (in 1209) *Bardjuk*, Idikut of the Uigurs *(Ba-r-djų a-r-té di-gin* in the *Yüan shi)* gave orders to kill the Kara-khitai governor in the city of Karakhodjo (see further on, 111), named *Shukem*, who was much disliked on account of his extortions. When Chinghiz had heard of this event, he dispatched two of his officers, *Alb utuk* and *Derbay*, to the Idikut. Bardjuk then sent two envoys to Chinghiz. (I may here quote D'Ohsson's original translation from the *Djami ut Tevarikh):*—

"L'Idicut fit partir deux envoyés chargés de dire à Tchinguiz-khan que, sur la renommé de sa grandeur et de sa puissance, il allait lui envoyer des ambassadeurs, pour l'instruire de ses nouvelles

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[243] *On*, in Turkish means "ten;" *tokuz* means "nine" (D'Ohsson).

[244] My identifications of the rivers here enumerated, refer to the excellent map of western Mongolia in Petermann's *Geograph. Mitth.* 1872, tab. 17. In the "History of the T'ang" (see above, 98) *nine* tribes of the Uigurs are enumerated. As these names have no resemblance to the names given by Rashid, it may be assumed, that the T'ang history records the names of the *tokuz*, or Nine-rivers Uigurs. The *Yi t'ung chi*, or "Great geography of the Chinese empire" states, that the *Selenga* has six sources and three affluents; but only the principal sources and affluents are enumerated there. The system of the Selenga abounds in watercourses.

relations avec le Gour-khan de Cara-khitai, lorsque l'arrivée inattendue de ses envoyés lui avait causé la plus agréable surprise;—'que, de même que les nuages laissent voir, en se dissipant, le soleil brillant d'un nouvel éclat, ou que la glace, lorsqu'elle était brisée, découvrait l'onde pure et limpide, de même son abattement venait de faire place à l'allégresse la plus vive; qu'il lui livrait son pays et qu'il aspirait à devenir son fils et son serviteur.'"[245]

Chinghiz had been previously informed, that the Idikut had refused to harbour the brother and four sons of *Tucta* (khan of the Merkits), after their defeat on the river *Djem* (see above, 100), and accordingly the envoys were kindly received. Chinghiz invited the Idikut to come in person to render homage, and to bring as presents the most precious things found in his treasury. When Bardjuk arrived, he was received with the greatest cordiality by Chinghiz, who promised him his daughter *Altun bigui* in marriage; but the princess died before the marriage had been consummated. Subsequently Ogotai khan intended to bestow the princess Aladji bigui upon the Idikut, when the latter died; whereupon this princess was given in marriage to his son Kishmain.

106. *Abdalla Beidavi*, in his "History of China" (see above, note 10) terms the Uigurs, *Igurs;* and states that they are Buddhists; p. 40:—*Xecmuni Berchan*[246] quidam erat. Hunc *Indi, Kismirani, Tibetenses, Chataji, Tangutani* & *Igurœi* pro Prophetâ habebant." On p. 69, mention is made of the "*Chronologi Igurœ.*"

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[245] I have quoted this passage, because it sounds like a literal translation from the *Yüan ch'ao pi shi*, and furnishes evidence,—which indeed might be fortified by many other examples,—that the author of the Mongol history of Chinghiz, has drawn his information from the same sources as Rashid-eddin. The Chinese translation of the *Yüan ch'ao pi shi*, regarding the Idikut's relations with Chinghiz khan runs as follows (chap. xi, fol. 4):—

委吾種的主亦都兀
差使臣成吉思汗處乞剌
等來見皇帝的沐消了
悒得成吉思汗的聲名說
黑悒不得已將公主
你的女子忽都合別吉
水如雲般淨好生歡喜
若得一女子名曰忽都
五子出氣力願做第
子說第是亦都兀
思你於是銀子
拜見成吉思汗
勒阿勒
與了

[246] *Sakiamuni Burkhan*, or Buddha. *Burkhan*, in Mongol means "God."

It is a curious fact, worthy of notice, that Carpini takes the Uigurs to be Nestorian Christians. He states on pp. 650, 651, "Chingis prædictus, præparavit se rursùs ad prælium et contrà terram *Huiurorum* processit ad bellum; isti homines sunt christiani de sectâ Nestorianorum: quos etiam bello devicit; et illorum litteras acceperunt, nàm priùs scripturam aliquam non habebant; nunc autem appellant eandem litteram Mongalorum."[247]

Rubruquis, pp. 282, 283, gives the following account of the Uigurs, when speaking of the idolaters of Asia:—"Primi sunt *Iugures*, quorum terra contiguatur cum predicta terra *Organum*,[248] inter montes illos versus orientem; et in omnibus civitatibus eorum sunt mixti Nestorini et Saraceni, et ipsi etiam sunt diffusi versus Persidem in civitatibus Saracenorum. In predicta civitate *Caalac*[249] habebant ipsi tres ydolatrias, quarum duas intravi ut viderem stultitias eorum. In prima inveni quemdam qui habebat cruciculam de atramento super manum suam, unde credidi quod esset christianus, quia ad omnia que querebam ab eo respondebat ut christianus. Unde quesivi ab eo: 'Quare ergo non habetis hic crucem et ymaginem Jhesu Christi?' Et ipse respondit: 'Non habemus consuetudinem.' Unde ego credidi quod essent christiani, sed ex defectu doctrine omitterent. Videbam enim ibi post quamdam cistam, que erat eis loco altaris, super quam ponunt lucernas et oblationes, quamdam ymaginem habentem alas quasi sancti Michaelis, et alias quasi episcoporum tenentes digitos sicut ad benedicendum."[250]

After this Rubruquis gives a detailed account of the worship of the Uigurs.

Haithon (the historian) in his *Historia Orientalis* (edition of Müller, Greiffenhag, p. 3), applies the name *Tarsæ*[251] to the country of the Uigurs, whom he terms *Iogurs*:—

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[247] With reference to the Uigur written characters, see Colonel Yule's *Cathay*, p. 205.

[248] The country of Organum, of Rubruquis, seems to be identical with the present *Ili*. See my *Notes on Chin. Med. Trav.* p. 62.

[249] I think Colonel Yule is right in stating (*Cathay*, p. ccxii) that *Kayalik* or *Cailac*, may be placed near the modern Russian city of *Kopal*. See also note 271.

[250] These particulars, recorded by Rubruquis, of the idol-worship of the Uigurs, explain Carpini's view, that they were Christians.

[251] *Tersa* is a name applied properly by the Persians to the Christians. Colonel Yule thinks that its application to the Uigurs indicates the extensive prevalence of Nestorian Christianity among them. John of Monte Corvino, in a letter written in the beginning of the 14th century at Peking, and referred to by Rémusat in his *Nouv. Mél. Asiat.* tom. ii, p. 198, speaks of *Tarsic* characters, meaning evidently Uigur letters. Archimandrite Palladius has proved (Russian *Oriental Record*, p. 23) that the term 迭屑 *Tie-sie*, of frequent occurrence in Chinese works of the Mongol period, is intended to render the word *Tersa*. In Ch'ang-ch'un's narrative (*Chin. Med. Trav.* p. 31), a chief of the *Tie-sie* is mentioned in the Uigur country.

"In regno *Tarsæ* sunt tres provinciæ quarum dominatores se reges faciunt appellare. Homines illius patriæ nominantur *Iogur*, semper idola coluerunt et adhuc colunt omnes, præter decem cognationes illorum regum, que per demonstrationem stellæ venerunt adorare nativitatem in Betlehem Judæ. Et adhuc multi magni et nobiles inveniuntur inter Tartaros de cognatione illa qui tenent firmiter fidem Christi . . . . . Istud regnum Tarsæ ex parte orientis suos habet confines cum regno Cathay, ex parte occidentis cum regno Turquestan, ex parte septentrionis cum quodam deserto,[252] ex parte vero meridiei cum quadam ditissima provincia quæ vocatur *Sym*, quæ inter regnum Indiæ et regnum Cathay habet citum. Et in illa provincia inveniuntur lapides adamantis."

107. In the Ming period, 1368—1644, the Uigurs were known to the Chinese under the name of 畏兀兒 *Wei-wu-r*, as in the days of the Mongols, and they then lived in the same countries as in the 13th century. The "History of the Ming," in the section on foreign countries, gives some particulars regarding their location. They are mentioned as living in *Ha-mi* or *Kamul* (see above, 91), in *Huo-chou* and *Liu-ch'eng* (see further on, 112), and also as inhabitants of the three military stations or districts (衞 *wei*) 安定 *An-ting*, 阿端 *A-tuan* and 曲先 *K'ü-sien*. The position of these three *wei* is indicated in the *Ming shi* (chap. cccxxx, pp. 12—16); the first, 1,500 *li* south-west of Kan-chou; K'ü-sien, to the east of An-ting; and A-tuan, formed originally a part of An-ting. It is further stated there, that An-ting at the time of the Yüan was called 撒里畏兀兒 *Sa-li wei-wu-r*. This name occurs only once in the *Yüan shi*, in Subutai's biography (*Yüan shi*, chap. cxxi).

Carpini, on p. 615, mentions *Sari-Huiur* among the countries conquered by Chinghiz.

It seems that even in our day, the Uigurs still live in the same countries they inhabited seven hundred years ago. At least the *Yi t'ung chi* of the present dynasty speaks of some *begs* of the *Yugur* (see Klaproth, *Mém. rel. à l'Asie*, tom. ii, p. 346). These countries are still unexplored; and all that we know of them is from Chinese sources.

別失八里 *Bie-shi-ba-li* = *Bishbalik*.

108. Respecting Bishbalik, we may infer from the statements of Persian authors, as also from Chinese accounts, that there was a city of this name in the middle ages; and at the same time it is clear that during the Mongol period, Bishbalik was a general term applied to the country of the Uigurs, comprising, as I have shown,

[252] This desert, north of the country of the Uigurs, was crossed by Ch'ang-ch'un in 1221 (see *Notes on Chin. Med. Trav.* pp. 28, 29).

the present *Urumtsi*, the cities of *Huo-chou*, *Luktsin*, and other places south of the Celestial mountains. In the "History of the Ming" however, chap. cccxxxii, fol. 9, Bie-shi-ba-li is spoken of, in the 15th and 16th centuries, as a great kingdom in central Asia, bordering westward on the kingdom of Samarcand, southward on *Yü-tien* (Khotan;—see 129), eastward on *Huo-chou* (see 111), and northward on 瓦剌 *Wa-la* (the Eleuths). It comprised also Kara-shar and Kuché. It is further stated there that Bie-shi-ba-li is distant north-west from *Kia-yü kuan* (see above, 41) 3,700 *li* (here probably the capital of the kingdom is meant). Bie-shi-ba-li, in the Ming period, had frequent intercourse with China, and several embassies of the khans of that kingdom are recorded.

By *Bie-shi-ba-li* on the ancient map, and in the list of the *Si-pei-ti*, the city of Bishbalik seems to be meant;—not a country. A note explanatory of this name is found in the Si-pei-ti as follows:—

"In the year 1278, *Ba-sa-ch'a-li* received a tiger tablet, investing him with authority to direct the military post-stations in *Bie-shi-ba-li*, the (other) cities of the country of the *Wei-wu-r* (Uigur) and 子里 *Tze-li* (a place unknown to me). In 1280 the *wan-hu* (commander of ten thousand) *K'i-kung-chi* (see his biography, *Yüan shi*, chap. clxv) was sent (by the emperor Kubilaï) to guard the frontier at Bie-shi-ba-li. In 1281, the prince 阿只吉 *A-dji-gi*[253] requested, that thirty new post-stations might be established between the mountains 太和嶺 *T'ai-ho ling*[254] and *Bie-shi-ba-li*. In 1283, the emperor appointed a governor for Bie-shi-ba-li, Huo-chou and the other places (of Uiguria).[255] In 1284, the prince *A-dji-gi* sent an envoy to the emperor with a memorial, stating that among the twenty-four cities formely under the command of 只必帖木兒 *Dji-bi t'ie-mu-r*,[256] there were two, namely 察 *C'ha* and 帶 *Dai*, then governed by *da-lu-hua-ch'i (daruyachi*,—"Mongol governors") and annexed,—not to (the province of) Bie-shi-ba-li, but to 闊端 *K'uo-duan* (probably Khotan;—see further on, 129). He prayed that they might be restored to Bie-shi-ba-li; to which the emperor acceded. In 1287, a military colony was established at Bie-shi-ba-li formed of a thousand of the troops which had recently

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[253] *A-dji-gi* was,—according to the *Yüan shi*, Geneal. tables, chap. cvii, cviii,—a grandson of *Chagatai*, a son of *Ha-la hü-lie* (Kara Hulagu of Rashid). Adjigi is not mentioned by Rashid.

[254] In the biography of Subutai, the name T'ai-ho ling (Mountains of Great peace) is applied to the Caucasus (see above, 60); but I do not think that the Caucasus can be intended here.

[255] 立別失八里和州等處宣慰司

[256] Dji-bi t'ie-mu-r,—according to the *Yüan shi*, chap. cvii, Geneal. tables,—was a grandson of Ogotai, and a son of *K'uo-duan* (Cotan of Rashid).

surrendered; to which also the commandery in chief (元師府) for the whole country (of the Uigurs) was transferred.

Bie-shi-ba-li is repeatedly mentioned in the *Yüan shi*. This place it seems, played an important *rôle* in the war between Kubilaï khan and the revolted prince Kaidu. Compare *Yüan shi*, Annals, under the years 1278 and 1284. Sometimes we meet in the *Yüan* history, the phrase, "Bie-shi-ba-li and the other places." It seems, that the other cities of the Uigur country are meant, viz. Karakhodjo, Lu-gu ch'en, Ch'ang-ba-li, Ta-gu-sin, etc. (see further on). The term 五城 *Wu-ch'eng* (five cities), which is a literal translation of Bishbalik, meaning "Pentapolis" in Turkish, occurs also occasionally in the *Yüan shi*, to designate this place or country. Compare the note on A-li-ma-li, in the Si-pei-ti, where it is stated, that six thousand *li* north-west of *Shang-tu* (Kubilaï's summer residence, in southern Mongolia) is 畏兀兒五城 *Wei-wu-r wu-ch'eng (five* cities of the Uigurs), which at the time of the T'ang was called 北庭 *Pei-t'ing*, and was the seat of a governor-general (都護府). The term *Wu-ch'eng* or "Pentapolis" is found also in the biography of *T'ie-k'o-shu*, chap. cxxxv.

109. Klaproth has already proved *(Mém. rel. à l'Asie*, tom. ii, pp. 355 sqq.) from Chinese sources, that *Bishbalik* of the mediæval authors is to be identified with the present *Urumtsi*, a city situated near the northern slope of the eastern T'ien shan. But I think this identification must not be taken *à la lettre*, for all that can be proved is, that Urumtsi, a place still known only from Chinese descriptions, lies not very far from the spot where ancient Bishbalik stood. Klaproth's view is based upon a statement found in a modern Chinese work, that Urumtsi and Pei-t'ing of the T'ang are the same, and upon a passage in the *Si shi ki*, stating that the Ulungur river is five hundred *li* north of Bishbalik (see my *Notes on Chin. Med. Trav.* p. 69). It is corroborated by several ancient Chinese itineraries. *Wang Yen-te's* narrative of a journey to Kao-ch'ang permits us to determine the position of *Pei-t'ing* (see the translation of this narrative in Julien's *Mélanges de Géographie Asiatique*, pp. 86 sqq.). In A. D. 983, Wang Yen-te was sent by the Sung emperor T'ai-tsung to the king of *Kao-ch'ang*. The envoy, after crossing the desert, passed through 伊州 *I-chou* (Kamul;—see 91), and arrived at 高昌 *Kao-ch'ang* (Karakhodjo; —see 111). The king of Kao-ch'ang is called 獅子王 *Shi-tze wang* in the narrative; and Ma Tuan-lin states, that in the language of the country his name reads 阿厮蘭漢 *A-sze-lan han*.[257]

[257] *Ma Tuan-lin*, the author of the well-known work *Wen hien t'ung k'ao*, where Wang Yen-te's narrative is found in chap. cccxxxvi, lived in the

Owing to the great heat the king had retired to *Pei-t'ing*, and Wang Yen-te was invited to visit him in his summer residence. Before arriving at this place he had to cross a high mountain covered with snow (T'ien shan), by the pass called 金嶺 *Kin-ling*. The traveller states, that Pei-t'ing is situated in a long wide valley. In the time of Chinghiz khan and his successors, the great highway from Mongolia to western Asia passed through Bishbalik. Thus this place is mentioned by Ch'ang-ch'un in 1221, as a city on the northern slope of the T'ien shan (*Notes on Chin. Med. Trav.* p. 30). He was told by the people that its ancient name was *Pei-t'ing*. *Ye-lü Ch'u-ts'ai* in 1219 (*l. c.* p. 112) also passed through Bishbalik. He states that *Huo-chou* (Karakhodjo) lies five hundred *li* south of this place. Haithon's route (1254) likewise led through Bishbalik (see Appendix to this paper). Neither Carpini, Rubruquis, nor M. Polo speaks of it. Polo's way lay south of the country of the Uigurs; but the other two mediæval travellers probably saw the capital of that country. The name of Bishbalik appears in Ibn Batuta's narrative (Yule's *Cathay*, p. 506). He states that when he arrived at Khanbalik, the khan was absent; for he had gone forth to fight Firuz, the son of his uncle, who had raised a revolt against him in the territory of *Karakorum* and *Bishbalik*.

The name of Bie-shi-ba-li is repeatedly mentioned in the biographies of the *Yüan shi*. Sometimes it appears under its ancient name *Pei-t'ing*.

In chap. cxxiv, we read in the biography of *Meng-su-sze* that he was a *Wei-wu-r*, and that his ancesters lived in *Bie-shi-ba-li*.

In chap. cxxxvii,—*T'o-lie-hai-ya* a *Wei-wu-r*, was from *Bie-shi-ba-li*. *Pei-t'ing* is given as the native country of *Bai-kiang* (chap. cxxxi), *Ch'a-han t'ie-mu-r* (chap. cxli), *Bu-lia-dun* (chap. cxcv), and *Bi-lan-no shi-li* (chap. ccii).

110. I may finally say a few words on modern *Urumtsi*. This is a Dzungar name which appears first in the Chinese annals in 1717. Compare the 三州輯畧 *San chou tsi lio*, a topographical and historical description of the three districts of *Hami*, *Turphan* and *Urumtsi*. The Chinese write the name 烏魯木齊 *Wu-lu-mu-ts'i*. After the army of the emperor K'ien-lung had conquered Dzungaria, in the middle of the last century, Urumtsi became better known to the Chinese; and the emperor built a new city at a distance of eight *li* from the ancient capital. In 1775 it received the Chinese name 迪化州 *Ti-hua chou*.[258] On the great Chinese

12th and 13th centuries. *Shi-tze wang* in Chinese, means "lion king." Arslan khan, in the Uigur language, has the same meaning.

[258] Compare the 西域聞見錄 *Si yü wen kien lu*.

map of the empire, *Wu-lu-mu-ts'i* bears also the Chinese name 鞏甯城 *Kung-ning ch'eng;* but this seems to be a mistake, for in Col. Wenyukoff's "Review of the Russian frontier in Asia," an itinerary from Kuldja to Urumtsi is given (according to Russian merchants), in which *Kung-ning* is located twenty-two versts north-west of Urumtsi. On the same Chinese map, 迪化州 *Ti-hua chou* is marked about twelve *li* south of Urumtsi, and a third city *Ti-hua ch'eng*, about twelve *li* south-east of Ti-hua ch'ou. There may be some confusion about these names. Klaproth (*l. c.* tom. ii, p. 356) gives the latitude of Urumtsi 43° 60′ N. (sic!), the longitude 87° 1′ E. Paris; but Biot (*Dictionnarie des noms anciens et modernes des villes etc.*) has 43° 45′ N. lat. and 86° 40′ E. lon. Paris, for the same place. In the great Manchu calendar published every year in Peking, and also in the *Ta ts'ing hui tien*, published in 1818, 43° 27′ is the N. lat. assigned to Urumtsi, and 27° 56′ the W. lon. Peking. I do not know from what source these figures are taken. As far as I am aware, Urumtsi is not mentioned among the places astronomically determined by the old Catholic missionaries.

合剌火者 *Ho-la-huo-djo = Karakhodjo.*

111. Karakhodjo is frequently mentioned by Rashid-eddin, as a place in the country of the Uigurs. Bardjuk, when he determined to submit to Chinghiz, gave orders to kill the Kara-khitai governor in Karakhodjo (see above, 105). At the end of his notices of Kathai, Rashid states (Yule's *Cathay*, p. 274), that one of the bodies of troops protecting the frontier of the Great khan is posted in the vicinity of Karakhodjo, a city of the Uigurs, which lies between the dominions of Kubilaï and those of Kaidu and Dua (the rebellious princes), and maintains neutrality.

The Chinese name of Karakhodjo in the Mongol period was 火州 *Huo-chou* (fire city); sometimes the name is also written 合州 *Ho-chou* or 和州 *Ho-chou*. In the *Si yu ki*, and also in the *Si yu lu* (*Notes on Chin. Med. Trav.* pp. 29, 113), Ho-chou is stated to be situated five hundred *li* south of Bishbalik (beyond the T'ien shan), and is identified in the latter narrative with 高昌 *Kao-ch'ang* of the T'ang (see note 220). In the *Yüan shi*, the same place is noticed several times under its different names. In the Annals, *sub anno* 1286, it is recorded, that Kubilaï ordered cattle and corn to be given to the people of *Ho-la-huo-djo* and *Ho-mi-li* (Kamul), who suffered from dearth. Karakhodjo is further mentioned in chap. cxxviii, in the biography of *A-shu*, who was a grandson of the famous Subutai. A-shu had been sent, in 1286, against a rebellious prince, and died in 哈剌霍州 *Ha-la-ho-djou*.

In the biographies of the following distinguished Uigurs of the Mongol period, *Kao-ch'ang* (as I have stated, the ancient Chinese name for Karakhodjo) appears as their native country:—

Chap. cxxxv, *T'ie-k'o-shu*; chap. cxliv, *T'a-li-ma*; *ibid. Dao-t'ung*; chap. cxcv, *Ts'üan-p'u-an sa-li*; *ibid. Bo-lo t'ie-mu-r*.

In the *Ming shi*, or "History of the Ming," chap. cccxxix, fol. 19, Karakhodjo is spoken of in the following terms:—

"火州 *Huo-chou* or 哈剌 *Ha-la* (the characters *huo-djo* are omitted in the text) is situated seventy *li* west of *Liu-ch'eng* (see 112), and thirty *li* east of 土魯番 *T'u-lu-fan* (Turphan). At the time of the Han dynasty, this place belonged to the kingdom of anterior 姑師 *Ku-sze*.[259] During the Sui dynasty it belonged to Kao-ch'ang. After the T'ang emperor T'ai-tsung (627—650) had destroyed the power of Kao-ch'ang, the city of 西州 *Si-chou* was established here. In the Sung period it belonged to the *Hui-hu* (here the Uigurs are to be understood). At the time of the Mongols it was known under the name of *Huo-chou*, and was comprised in the country of the *Wei-wu-r* (Uigurs)."

The embassy of *Shah Rokh* to the court of China (1419—1422) passed through *Turphan* and *Karakhodjo* (Yule's *Cathay*, p. cc).

The city of Karakhodjo still exists; at least on the great Chinese map of the empire, a place 哈拉和卓 *Ha-la-ho-djo* appears about sixty *li* south-east of Turphan.

魯古塵 *Lu-gu-ch'en* = *Lukchak*.

112. This name appears on the map east of Ho-la-huo-djo. In the *Yüan shi* it is only once noticed, in the list of places and countries of the Si-pei-ti. The "History of the Ming," chap. cccxxix, fol. 18, gives a short note on this place, styling it 柳城 *Liu-ch'eng* (willow city) or 魯陳 *Lu-ch'en*. It is stated there, that it is distant one thousand *li* from *Ha-mi*. At the time of the Han it was called 柳中 *Liu-chung*.[260] In the T'ang period Liu-chung belonged to *Kao-ch'ang*.

It seems that in the repeatedly-quoted narrative of Wang Yen-te (A. D. 982;—see above, 109), this place is also noticed; for the traveller is stated to have passed through the country of *Lu-chung* before reaching Kao-ch'ang.

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[259] The name of this kingdom is written also 車師 *Ché-sze* (pronounced also *Kü-sze*) in the *Han shu*. There were two kingdoms of this name, an anterior and a posterior. Compare note 220.

[260] Compare "History of the Posterior Han," chap. cxviii, *Si-yü*, introduction. Since the year A. D. 123, the Chinese military governor of the Si-yü had his residence in *Liu-chung*.

On the above-mentioned modern Chinese map, we find a place 魯克沁 *Lu-k'o-ts'in* marked, sixty *li* south-east of Turphan and thirty *li* north-east of Ha-la-ho-djo.

Further details on this place, which is properly called *Lukchak*, may be read in Klaproth's above-mentioned article (*l. c.* tom. ii, p. 342).

他古新 *T'a-gu-sin = Toksun.(?)*

113. I know nothing regarding this place, marked on the ancient map between Kamul and Bishbalik. I may however observe, that on modern Chinese maps a city termed 托克孫 *T'o-k'o-sun* appears west of Turphan.

彰八里 *Djang-ba-li = Djambalik.*

114. A city 昌八剌 *Ch'ang-ba-la* is mentioned in Ch'ang-ch'un's narrative of travel in 1221, west of Bishbalik. The city was ruled by a Uigur prince (see my *Notes on Chin. Med. Trav.* p. 31). The name of a city *Djang-ba-li* appears also in the itinerary of Ye-lü Hi-liang (see Appendix). It is stated there, that it was east of the river *Ma-na-sze*. The latter name is still applied to a river and a city on the great highway from Urumtsi to Kuldja. Haithon on his way from Karakorum to western Asia, passed through *Djambalekh*, west of Bishbalik (see Appendix).

On modern maps we find between Urumtsi (ancient Bishbalik) and Manass, a town *Ch'ang-gi* (昌吉 on Chinese maps). Perhaps this may be ancient Djambalik. It is known that *balik* means "city" in Turkish.

古塔巴 *Gu-t'a-ba = Khutukbai.*

115. Gu-t'a-ba on the ancient map is located west of Djambalik. I have little doubt that this place is the *Khutukbai* on Wenyukoff's map of western Mongolia (Petermann's *Geogr. Mitth.* 1872, map 17), the name of a river and a city west of Ch'ang-gi. The Chinese write the name 呼圖必 *Hu-t'u-bi*. It seems also that Gu-t'a-ba is identical with Haithon's *Khutaiyai*, mentioned in his itinerary between *Djambalekh* and *Yankibalekh*, of which I shall speak presently.

仰吉八里 *Yang-gi-ba-li = Yankibalik.*

116. On the ancient map, Yang-gi-ba-li lies west of Gu-t'a-ba. A place *Yankibalik* appears in Haithon's itinerary, west of Khutaïya. A city *Yang balgasun* is placed on Wenyukoff's map, west of Khutukbai, and east of Manass. It lies also on the great

high-way from Urumtsi to Kuldja. I may observe that *balgasun* (in Mongol) has the same meaning as *balik*, *i. e.* "city."

阿里麻里 *A-li-ma-li* = *Almalik.*

117. *A-li-ma-li*, the *Almalig* of the Mohammedan authors, is repeatedly spoken of by the historians of the Mongol era, and by the travellers of the same period, passing from western Asia to Mongolia or *vice versa*. With respect to this place therefore, I beg to refer to my *Notes on Chin. Mediæv. Travellers*, and especially to pp. 33, 62, 71, 114, where some particulars about A-li-ma-li as given by Chinese travellers, will be found. As I have proved in that paper, A-li-ma-li in the 13th and 14th centuries lay on the great highway from Mongolia to Persia, and was situated near the place where modern *Kuldja* stands.

It seems, the Persian authors first mention Almalig in 1211, in recording, that *Ozar*, prince of Almalig acknowledged the supremacy of Chinghiz (D'Ohsson, tom. i, p. 111). This prince was afterwards slain by Guchluk, gurkhan of Kara-khitai; and his son *Siknak tekin* succeeded him on the throne, by order of Chinghiz, who gave to Siknak in marriage, a daughter of his son Djuchi. When the conqueror directed his army to western Asia, he was joined by Siknak (D'Ohsson, tom. i, p. 212). We know nothing more about Siknak and the fate of Almalik in the days of Chinghiz; but afterwards this place seems to have been the capital of the middle Mongol empire, or the empire of Chagatai. According to the *Tarikh Djihan Kushai* (D'Ohsson, tom. ii, p. 100), Chagatai had his residence in the country of the Uigurs; but the same work states also (*l. c.* tom. ii, p. 100) that he was in the habit of spending the summer in the country of Almalik, near the high mountains Gueuk,[261] and the mount *Kut*, whilst he preferred to pass the winter in *Meruzik-Ila*. Sometimes the residence of the khans of Chagatai is also called *Oluk iff* (*l. c.* tom. iii, pp. 119, 122). When Hulagu passed through Almalik (*Notes on Chin. Med. Trav.* p. 62) in 1253, he was well entertained there by the princess *Organa*, the widow of Kara Hulagu, the son of Chagatai.

In the second half of the 13th century, Almalik sustained an important *rôle* in the struggle between the khans of the different branches of Chinghiz' lineage. When Kubilaï ascended the throne,

[261] In the narrative of Tamerlane's warlike doings, a place *Gheuk topa* is mentioned (between Kashgar and the Ili river) near the Issikul lake (Deguignes, tom. v, pp. 8, 18). Again, *l. c.* tom. v, p. 31, we read, that in 1390, Tamerlane sent an army to the country of the Getes. It passed by Tashkand, lake Issikul, *Gheuk topa*, the mountains *Ardjatu*, proceeded to *Almalig*, etc.

in 1260, his brother *Arik-buga*[262] laid claim to the crown, and collected troops in the north. After he had been defeated by Kubilaï, he went westward with the rest of his host and attacked *Algu*, who at that time ruled over the empire of Chagatai. Algu had been allied with Arik-buga; but after the defeat of the latter, had refused to assist him. Arik-buga's avant-guard, when first meeting with the troops of Algu, suffered a defeat near the city of *Pulad* (see further on, 122) and the lake *Sult* (Sairam lake). Algu then returned to his residence on the river *Hilé* (Ili); shortly after which Arik-buga's army arrived, advanced through the defile called *Iron-gate*[263] and took *Almalik;* when Algu retired towards Samarcand. In 1264, Arik-buga made peace with Kubilaï, and in 1266, Kara Hulagu's son Mubarek shah became khan of the Uluss of Chagatai. The above details are taken from the Persian authors (D'Ohsson, tom. ii, pp. 340—356).

118. The Chinese annals record the war between Kubilaï and Arik-buga, but not the struggle between Algu and Arik-buga. Alimali is for the first time mentioned in the *Yüan shi*, Annals, *sub anno* 1277, in connection with the war against *Kaidu* (see above, 85). This war, which was continued for about twenty-five years, caused much trouble to Kubilaï, who was obliged to maintain a considerable army at the north-western frontier against his nephew. The expeditions against Kaidu are recorded in some detail by the Chinese authors as well as by the Persian historians. M. Polo also has devoted a chapter to the battles between Caidu and the Great Kaan (*l. c.* vol. ii, pp. 389 sqq.).

According to the great traveller, in the year 1266, King *Caidu* and another prince called *Yesudar*,[264] made an expedition to attack the Great Kaan's Barons Chibai and Chiban, sons of Chagatai, and defeated them.[265] In 1268, Caidu attacked the Great Kaan's son *Nomogan*, and *George* the grandson of Prester John, who were at *Caracoron*. The battle was without victory on either side; but Caidu hearing, that the Great Kaan was sending a

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[262] 阿里不哥 *A-li bu-k'o* in the *Yüan shi*.

[263] Respecting the *Iron-gate*, situated in the *Talki* mountains north of Kuldja, see my *Notes on Chin. Med. Trav.* p. 71.

[264] The name *Ye-su-da-r* occurs repeatedly in the *Yüan shi*. In chap. cxxix and cxxxiii, we find the biographies of two persons of this name. I am not however, prepared to identify the Yesudar of M. Polo.

[265] Perhaps M. Polo means by *Chibai* the prince *Chi-bie t'ie-mu-r;* who however, according to the *Yüan shi*, was a son of Ogotai. He is there mentioned as a general under Kubilaï, and in connection with the war against *Hai-du* (Kaidu). As to Polo's *Chiban*, he may be identical with Rashid's *Sarban*, a son of Chagatai, mentioned in the record of Kubilaï's war with Kaidu (D'Ohsson, tom. ii, p. 452).

large army to reinforce his son, retired to Great Turkey and Samarcand.

There are some discrepancies between the records of these events in the Chinese annals and those given by M. Polo; especially respecting the dates. I may quote some passages from the *Yüan shi* and the *Yüan shi lei pien* bearing upon this subject. The Si-pei-ti (*Yüan shi*, chap. lxiii) gives the following account of A-li-ma-li and the expeditions against Kaidu :—

"The prince 海都 *Hai-du* had his encampment, (行營) in *A-li-ma-li* and the other places.[266] Proceeding from *Shang-tu* (Kubilaï's summer residence) in a north-western direction six thousand *li*, one reaches the *Five cities* (Bishbalik;—see above, 108) of the Uigurs. Four to five thousand *li* further to the west lies *A-li-ma-li*. In the year 1268, Hai-du revolted, raised an army and went southward (evidently a mistake for eastward). *Shi-tsu* (Kubilaï) repelled his aggression near 北庭 *Pei-t'ing* (Bishbalik), and he was pursued as far as *A-li-ma-li*. Hai-du fled more than two thousand *li* beyond A-li-ma-li, and the emperor gave orders to discontinue the pursuit. At the same time he conferred the chief command of the troops in the country of A-li-ma-li, on the 北平王 *Pei-p'ing wang*.[267] The latter was assisted by the minister 安童 *An-t'ung*.[268]

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[266] Kaidu's apanage was originally, it seems, at *Kayalik*, a place or country mentioned in the *Tarikh Djihan Kushai* (see further on, 121). It is the *Cailac* of Rubruquis. In the *Yüan shi*, Annals, *sub anno* 1252, it is recorded, that Mangu had ordered *Hai-du* to live in 海押立之地, "the country of *Hai-ja-li*."

[267] Pei-p'ing wang was the title of 那木罕 *Na-mu-han*, the fourth son of Kubilaï. In the short biographical note devoted to this prince in the *Yüan shi lei pien*, chap. xxx, fol. 16, we read that he was gazetted with this title in 1266. In 1282 it was changed into 北安王 *Pei-an wang*.

[268] An-tung of the *Yüan shi* is evidently the *Noyan hantum* of Rashid (D'Ohsson, tom. ii, p. 452). His biography is found in the *Yüan shi*, in chap. cxxvi. It is stated there, that he was a great-grandson of the celebrated Mongol general *Mu-hua-li*, the conqueror of northern China. In the year 1275 he went with Na-mu-han, who was sent by the emperor to defend 和琳 *Ho-lin* (Karakorum) against *Hai-du*. They passed ten years at the northern frontier,—were made prisoners by the revolted prince *Si-li-ki*,—and finally returned to China in 1284. Detailed accounts of the treason of *Si-li-ki* and the seizure of Na-mu-han may be read in Du Mailla's *History of China*, vol. ix, p. 389; and Rashid's report on the same subject is given by D'Ohsson, tom. ii, pp. 452 sqq. *Si-li-ki* (*Shircki* of Rashid), a son of Mangu khan was in the army of Na-mu-han, when he formed a conspiracy against Kubilaï. Na-mu-han and An-t'ung were made prisoners by the conspirators, who directed their forces towards Karakorum; but the latter were defeated by Kubilaï's valiant general *Pe-yen*. According to the *Yüan shi*, Na-mu-han was made prisoner by Si-li-ki in 1277, in the country of *A-li-ma-li*; but it is not stated when he was released.

It seems, that in the expeditions sent by Kubilaï against Kaidu, the armies of the Great khan advanced sometimes to great distances. Thus in the biography of *Yü-wa-shi* in the *Yüan shi*, chap. cxxxii, this general is stated to have given battle to *Hai-du* in the country of 亦必兒失必兒 *I-bi-r Shi-bi-r* (*Siberia;*—Rashid also speaks of the country of *Ibir Sibir*). Wassaf states, that in 1301, the hosts of Kaidu and Dua met with the army of the Great khan some days' journey distant from *Kayalik*; and adds, that this city was situated on the frontier of the two empires (I understand the empires of Dua and Kaidu). There Kaidu fought his last battle, for he died soon after (D'Ohsson, tom. ii, p. 516).

119. Mention is made of *Almalik* by most of the mediæval travellers who traversed central Asia. As to the reports of Chinese travellers respecting this place, I have already presented all the information I could gather about it in my *Notes on Chin. Med. Trav.* It remains to review the statements of western travellers regarding Almalik.

In the narratives of Carpini and Rubruquis, a name like Almalik does not appear; but it seems that Rubruquis applies the name *Organum* to the country of Almalik, confounding the name of the princess *Organa*, who ruled over that country when Rubruquis passed through, with the name of her dominions (see Yule's *Cathay, p.* 522).

Haithon, the king of Little Armenia, calls the city *Halualek*. He passed through it on his way home from Mongolia, before arriving at *Hanbalek* and crossing the *Ili* river, in 1255.

Almalik in the 14th century was a Latin missionary bishopric, and it seems, also a metropolitan see of the Nestorian church (Yule *l. c.* p. ccxliv). Col. Yule (*l. c.* p. 231) reproduces a letter from a Franciscan missionary, dated at *Armalec*, A. D. 1338, in the empire of the *Medes* (the missionary means probably *imperium medium*).

Marignolli was in Almalik in 1341, a year after the bishop and six Minorites had suffered martyrdom there. He terms the city *Armalek* (the capital) of the Middle Empire (Yule, *l. c.* p. 338).

Ibn Batuta (middle of the 14th century) speaks of *Almalik* as situated at the extremity of Maver-al-nahr (Transoxiana), near the place where *Sin* (China) begins (Yule, *l. c.* p. 503).

Pegoletti, in his notices of the land route to Cathay (first half of the 14th century;—Yule, *l. c.* p. 288), reckons a distance of forty-five days' journey with pack-asses, between *Oltrare* (Otrar;—see further on, 139) and *Armalec*, and a journey of seventy days from Armalec to *Kamexu* (Kan-chou) 甘州.

Sultan Baber, who wrote in the beginning of the 16th century, speaks of *Almalik*, as of a city which did not exist in his time;

having been previously destroyed by the Mongols or Uzbeks (Klapr. *Mém. rel. à l'Asie*, tom. ii, p. 137).

That is all I have been able to gather respecting ancient Almalik. As to its position, I find in the Russian translation of Ritter's *Asia* (by Mr. Semenoff, now Vice-president of the Russian Geographical Society), vol. ii, p. 96, a note by the learned translator, stating, that the ancient city of Almalik was situated forty *versts* west-north-west of the present *Kuldja* (New Kuldja), also in the valley of the Ili river. Mr. Semenoff speaks apparently from his own observation.

120. Thus the ancient name Almalik, applied also to the country by mediæval writers, covers the territories which in our day are known under the name of *Ili*,—伊犁 *I-li*[269] of the Chinese; *Kuldja* being the capital of this province, conquered by the army of the emperor Kien-lung, in 1755. In the year 1264, a city was built by the Chinese on the right bank of the Ili river, not far from the spot where the Uklyk discharges into the Ili. It received the Chinese name 惠遠城 *Hui-yüan ch'eng*, but in Europe it is better known under its Dsungar (?) name, *Kuldja*. There was probably a city of this name before the Chinese built Hui-yüan ch'eng. On the Russian maps it is designated *New Kuldja*, to distinguish it from *Old Kuldja*, located on the same maps also on the right bank of the Ili, about a hundred versts east of New Kuldja. The Russians call Old Kuldja also *Turachinskaya Kuldja;* for soon after the conquest of Ili, the Chinese transferred to this place the *Taranchi*, a Turkish tribe from eastern Turkistan, who still live there. Old Kuldja is a small city of about four thousand inhabitants, whilst New or *Manchurian Kuldja*,[270] the seat of the Chinese authorities, before the last Mohammedan insurrection, numbered sixty thousand inhabitants (compare Col. Wenyukoff's *Review of the Russian frontiers in Asia*, pp. 258—262).

The earliest European account of Kuldja we owe to the Russian

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[269] The territories of Ili, Tarbagatai, Karkara usu, Urumtsi, etc. are known to our geographers under the general name *Dsungaria*. *Dsun-gar* in Mongol means the "left hand," and thus the Mongols designate the most western branch of the *Eleuths*. The latter, as is known, constitute one of the great divisions of the Mongol nation. They were known in the Ming period to the Chinese under the name of 瓦剌 *Wa-la*. In the *Ming shi* (chap. cccxxviii, fol. 1); these are located to the west of the 韃靼 *Ta-la* or 蒙古 *Meng-gu* (Mongols). In modern Chinese geographical works, they are styled 額魯特 *E-lu-t'e* and the Dsungars, 準噶爾 *Djun-gie-r*. The Kalmuks belong also to the Eleuths.

[270] *Kuldja kure* or *Dziang-ghiun kholo* (*i. e.* the city of the military governor) according to Putimtseff.

traveller *Putimtseff*, who visited the place in 1811 (see above, 46).

柯耳魯地 *Country of the Ko-r-lu = Karluks.*

121. Rashid-eddin,—who traces the origin of the Karluks back to Oghuz khan, also the progenitor of the Uigurs, Kankalis, Kipchaks and other Turkish tribes,—gives the following historical etymology of the name Karluk (see Berezin, *l. c.* vol. i, p. 19):—

"It happened once, that Oghuz khan, when returning from an expedition, had to cross a high mountain. Owing to a great fall of snow, some families could not follow, and preferred to remain behind. Oghuz khan reprimanded them for their conduct, and henceforth they were derisively called *Karluks*,—a name meaning in Turkish 'inhabitants of the snow.'"

Rashid says nothing about the abodes of the Karluks; but it may be concluded from a statement of the *Tarikh Djihan Kushai*, that they dwelt not far from *Kayalik*.[271] It is there recorded (D'Ohsson, tom. i, p. 111), that *Arslan khan*, chief of the Turk Karluks and prince of Kayalik, acknowledged himself a vassal of Chinghiz, who gave him a princess of his house in marriage.[272]

In the *Yüan shi*, Annals, *sub anno* 1211, it is stated, that 阿昔蘭罕 *A-si-lan han* from the *Si-yü* (western countries), the chief (主) of the tribe 哈剌魯 *Ha-la-lu*, surrendered to Chinghiz.

In the *Yüan ch'ao pi shi* we read (Palladius' transl. p. 130):—"Chinghiz sent Kubilaï (of course not the celebrated emperor) to subdue the people of the *Kharluut*,[273] but their chief *Arselan* surrendered voluntarily, and presented himself to Chinghiz, who gave him one of his daughters in marriage."

The same is recorded in about the same terms by Rashid (Berezin, vol. i, p. 132):—"In the days of Chinghiz, the chief of the Karluks was Arslan khan. Chinghiz sent Kubilaï noyen, of the tribe *Berulass*,[274] to subdue the Karluks, but Arslan surren-

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[271] Regarding the position of ancient Kayalik, compare above, note 266, and Yule's *Cathay*, pp. ccxiii, 576. Col. Yule is correct I think, in placing Kayalik near the present *Kopal*. Kayalik is also mentioned by Wassaf (see above, 87). It is an interesting fact, noticed in the *Transactions of the Russian Geogr. Soc.* 1867, I, p. 290, that in a tumulus (kurgan) in Kopal, an ancient gold ring with precious stones was found by a Tatar in 1857. This ring which was sold by the Tatar for 250 rubles, bore the inscription "Arslan" in Turkish letters.

[272] The marriage of *A-r-sze-lan* with a Mongol princess is also mentioned in the *Yüan shi*, chap. cix, Table of the princesses.

[273] This is the Mongol plural form of Kharlu.

[274] In the *Yüan shi*, chap. cvii (see also *Yüan shi lei pien*, chap. xxx, fol. 1), the *Berulass* are termed 八魯剌斯 *Ba-lu-la-sze*. They were divided into the great and the little Ba-lu-la-sze.

dered voluntarily to Kubilaï; when Chinghiz gave him a princess of his house in marriage, and granted him the title *Sart*,[275] *i. e. Tadjik*, observing that it was impossible to give him the title khan. Arslan khan accompanied Chinghiz in the expedition to western Asia (D'Ohsson, tom. i, p. 212).

It seems that the Chinese annals mention the Karluks as early as the 7th or 8th centuries. In the "History of the T'ang," chap. cclvii, there is a long article on the 鐵勒 *T'ie-le*, a people inhabiting western Mongolia and central Asia. It was divided into many tribes, which are all enumerated. The *Hui-ho* or Uigurs also are stated to belong to the *T'ie-le*. One of these tribes is termed 葛邏祿 *Ko-lo-lu*, and said to be descended from the *T'u-küe* (Turks). The *T'ang shu* assigns to the Ko-lo-lu the mountainous country north-west of *Pei-t'ing* (Urumtsi), near the river 僕固振 *P'u-ku-ch'en*. There are in their country many cross mountain ridges. We have seen, that according to the Chinese history of the Uigurs (see above, 98), when that people was dispersed by the Kirghiz in the 9th century, *P'ang-t'e-le* with fifteen aimaks fled to the *Ko-lo-lu*. It is very probable, that the Ko-lo-lu of the T'ang period were the Karluks. Our ancient map assigns to them the country north-east of A-li-ma-li.

I have no doubt, that the *Corola* mentioned by Carpini, p. 709, among the nations and tribes of central Asia means the Karluks.

In the *Yüan shi*, the Karluks are generally termed *Ha-la-lu*. In chap. cxxxiii, biography of *Ye-han di-gin*, the name is written 匣剌魯 *Hia-la-lu*. Ye-han di-gin, who was a general under Kubilaï, belonged to this nation. It is stated in his biography, that his grandfather, by name *Hia-ta-r mi-li*, was in the country of 斡思堅 *Wa-sze-gien* (Uzgend;—see further on, 133), with three thousand troops of the Hia-la-lu, when Chinghiz invaded western Asia. He came to the emperor to surrender, and presented a great number of cattle and sheep. Ye-han di-gin's father was called *Ye-mi huo-dji*;—his sons, *Ho-na-ch'i di-gin* and *Ye-su-sha*. These were all in the service of the Mongol emperors.

Sha-ts'üan (biography in chap. cxxxii) was also a *Ha-la-lu* or Karluk. His father *Sha-di* had been a general under Chinghiz, and distinguished himself in the war with the Kin.

In chap. cxc, *Ha-la-lu* appears again as the native country of *Bo-yen* (see note 74).

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[275] D'Ohsson, who translates the same passage (tom. i, p. 218), writes *Arslan Siriaki* (le Syriaque), instead of Arslan Sart. There was probably a clerical error in his text. We have seen above (41) that *Sartol* was the Mongol name for the Mohammedan people. Thus they are always termed in the *Yüan ch'ao pi shi*.

普剌 *P'u-la* = *Pulad.*

122. This is without doubt the city of *Pulad* of the Persian authors, mentioned in connection with the war between Algu and Arik-buga (see above, 117), and situated near the lake *Sult.* Haithon, when proceeding homeward from Mongolia, passed through *Pulad,* and then arrived at the lake *Sutkul* (the lake Sairam ;—see Haithon's itinerary in the Appendix to this paper).

Rashid-eddin, enumerating the countries and places inhabited by Turk tribes, also mentions *Pula* (Berezin, *l. c.* vol. i, p. 2).

Rubruquis, when speaking of the Germans (Teutonici) in the service of Buri (see above, 81) says (p. 280):—

"De illis Teutonicis nichil potui cognoscere usque ad curiam Manguchan.....Quando veni in curia Manguchan intellexi quod ipse Mangu transtulerat eos, de licencia Baatu, versus orientem (they had been before in Talas) spacio itineris unius mensis a Talas, ad quamdam villam que dicitur *Bolat,* ubi fodiunt aurum et fabricant arma, unde non potui ire nec redire per eos."

As to the Chinese mediæval authors who mention this place, I may quote *Ye-lü Ch'u-t'sai,* who accompanied Chinghiz to western Asia. He states in his narrative (*Notes on Chin. Med. Trav.* pp. 113, 114), that "at a distance of more than a thousand *li* (westward), after having crossed the *han-hai,* one arrives at the city of 不剌 *Bu-la.* South of this city is the *Yin-shan* mountain.....On the top of the mountain is a lake."

In the itinerary of *Ye-lü Hi-liang* the name of the same city *Bu-la* appears again (see Appendix to this paper).

The city of 孛羅 *Bo-lo,* through which Ch'ang Te came, before crossing the defile *T'ie-mu-r ts'an-ch'a* (in the Talki mountains), seems also to be identical with Pu-lad (*Notes on Chin. Med. Trav.* p. 70). Pulad was situated evidently on the great highway from Mongolia to Persia. As Rubruquis states expressly that *Bulat* lay out of his way, his route was probably more to the north than that of the Chinese travellers.

也迷失 *Ye-mi-shi* = *Emil* (Imil).

123. Ye-mi-shi is placed on the ancient map to the north-east of P'u-la ; and I feel no hesitation in identifying it with *Emil* or *Imil,* the name of a river and a city, repeatedly mentioned by the Chinese as well as by the Mohammedan authors of the Mongol period. There can be no doubt that the character *shi* in the name is a misprint or clerical error ; for the *Yüan shi* writes the name *Ye-mi-li.* There is still a river *Emil,* south of Chuguchak, emptying itself into the lake Alak-kul.

We have seen (above, 33) that the Kara-khitai on their peregrinations to the west, had founded a city in the country of *Imil*. This explains Carpini's statements, p. 648 :—

"In terrâ autem prædictorum Kara-Kitaorum Occoday-can filius Chinghis-can, postquàm positus fuit imperator, quandam civitatem ædificavit, quam *Omyl* appellavit."

Ibidem, p. 751:—"Deindè terram nigrorum Kitaorum fuimus ingressi; in quâ tantùm de novo unam civitatem ædificaverunt, quæ *Omyl* appellatur; ubi Imperator domum ædificavit, in quâ vocati fuimus ad bibendum; etc."

I have been informed by Russian travellers, that in the valley of the river Imil, famed for its pastures, the ruins of an ancient city can still be seen.

The Mohammedan authors state (D'Ohsson, tom. i, p. 323), that Chinghiz khan, when returning in 1224 from western Asia, passed by the river *Imil*, where he was met by his grandsons Kubilaï and Hulagu.

According to the *Tarikh Djihan Kushai*, Ogotai the second son of Chinghiz had his apanage on the river Imil;[276] and Ogotai's son Kuyuk,—Great khan, 1246—1248,—left the Mongol capital (Karakorum) in the spring of 1248, and set out for his apanage on the river Imil, where he hoped the climate would better agree with the broken state of his health; but he died when seven days' journey from Bishbalik the capital of the Uigurs (D'Ohsson, tom. ii, pp. 2, 234).

A place or country *Ye-mi-li* is mentioned three times in the *Yüan shi*. In chap. cxxi, in the biography of Su-bu-tai we read, that after having accomplished the conquest of the countries north of the Caucasus (see above, 60), he went home by the way of 也迷里 *Ye-mi-li* and 霍只 *Ho-dji*.[277]

In the *Yüan shi*, Annals, *sub anno* 1252, it is stated, that 脫脫 *T'o-t'o*[278] was ordered by the emperor Mangu to live in the country of 葉密立 *Ye-mi-li*.

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[276] I may observe, that in the Annals of the *Yüan shi*, it is stated, that after the death of Chinghiz, his son Ogotai arrived from the country of 霍博 *Ho-bo*. It seems that this country was somewhere near Imil. At least in the itinerary of *Ye-lü Hi-liang*, a country 火孛 *Huo-bu* is mentioned after *Ye-mi-li* (Imil).

[277] *Ye-mi-li*, as I have stated is intended for Imil; but as to *Ho-dji*, coupled with *Ye-mi-li*, I cannot identify it. I may however observe, that in the history of Tamerlane, translated by Petis de la Croix, the royal (summer) residence of Mogolistan (not to be confounded with Mongolia proper; here the eastern branch of the Chagatai empire is meant), taken in 1389 by Tamerlane, is called *Aymul Guja* (Yule's *Cathay*, p. 524). This name has some resemblance to the Chinese *Ye-mi-li Ho-dji*.

[278] *T'o-t'o*, according to the *Yüan shi*, chap. cvii, Genealogical table,

The name of the country of *Ye-mi-li* occurs in the biography of *Ye-lü Hi-liang* (*Yüan shi*, chap. clxxx). See Appendix.

亦剌八里 *I-la-ba-li* = *Ilibalik.*

124. This name represents probably *Ilibalik* or "the city of Ili." On the map it appears to the south-west of A-li-ma-li. Haithon, proceeding from Almalik westward, arrived at *Ilan-baleck* and then crossed the *Ilan* (Ili) river.

This seems to be the only instance, that any mediæval author mentions a city of this name. The city was evidently situated on the Ili river, perhaps at that place, where on the Russian maps *Iliskoye* (*scil.* Selenie), the borough of *Ili*, is marked, south-west of Kuldja, on the river Ili.

In the "Ming History," chap. cccxxxii, fol. 12, 13, a country of 亦力把里 *I-li-ba-li* is mentioned west of the kingdom of *Bie-shi-ba-li*. It is stated there, that in 1418, the ruler of the kingdom of *Bie-shi-ba-li* had been slain by his younger brother, who after this declared himself king, emigrated with his tribe to the west, and changed his national designation to *I-li-ba-li*.[279] This is probably the reason that the *Ming yi t'ung chi*, or "Geography of the Ming empire" confounds I-li-ba-li with Bie-shi-ba-li.

也云赤 *Ye-yün-ch'i.*

125. It is impossible to identify this name, which on the ancient map is marked west of *I-li-ba-li*. I may however observe, that a similar-sounding name appears, as that of a river, in the *Si shi ki* (compare my *Notes on Chin. Med. Trav.* p. 74).

In this narrative, a river 亦運 *Yi-yün* is mentioned in the country of the Kara-khitai, somewhere near the river Chu.

苦父 *K'u-ch'a* = *Kucha.*

126. Here the city of *Kucha* in eastern Turkistan is meant. On modern Chinese maps the name is written 庫車 *K'u-ché.*

Rashid-eddin records (D'Ohsson, tom. i, p. 105), that Guchluk, the son of the khan of the Naimans, after having been defeated by the Mongols, fled through Bishbalik and *Kudja* to the khan of Kara-khitai. Under the article Sunit, Rashid mentions a corps

was a grandson of Ogotai and son of *Ha-la-ch'a-r*. The latter is mentioned by Rashid (*l. c.* tom. ii, p. 99) under the name of *Karadjar;* but T'o-t'o, it seems, is not spoken of by the Persian historians.

[279] 自立從其部落西去更國號曰亦力把里.

of the Mongol army composed of Uigurs, Karluks, Turkmans, and men from Kashgar and *Kuchaï* (Berezin, *l. c.* vol. i, p. 46).

It seems that Kucha is not mentioned by the Chinese authors of the Ming period. It is only since last century that the name appears again in Chinese geographical works (see note 284). Modern Chinese geographers identify 庫車 *K'u-ché* with the ancient 龜茲 *Kui-tze*, a kingdom in central Asia, first mentioned in the "History of the Anterior Han," before our era.

倭赤 *Wo-ch'i = Uch or Ush.*

127. This name is assigned on the map to a place between Kucha and Kashgar. It may be identified with the modern city of *Uch* (thus the name is written on Russian maps; on English maps it is written *Ush*) in eastern Turkistan, west of Aksu, situated on the great highway from Kamul to Kashgar, south of the T'ien shan. On modern Chinese maps the name is written 烏什 *Wu-shi*. The emperor K'ien-lung,—who after the conquest of eastern Turkistan and Ili in the last century, bestowed Chinese names upon the principal cities there,—named Uch, 永寧城 *Yung-ning ch'eng*.

The ancient Chinese map and the list in the Si-pei-ti are, it seems, the only instances in which Ush is mentioned in Chinese works of the Mongol time; but there is a place with a name sounding like Ush, in the "History of the Ming." There is however no doubt that Ush was known in the days of Tamerlane. In the narrative of his expedition to eastern Turkistan, in 1375, the place is called *Utche-ferman* (Deguignes, tom. v, p. 8). It is stated there, that it lies east of Kashgar. We read further (*l. c.* p. 30), that Tamerlane, who was with his army at *Yulduz*,[280] sent his son Omer Sheikh back to *Andekan* (written also *Andidjan*) in Fergana. He went by the *Kaluga* (Iron-gate),[281] *Couzan* (probably Kucha is meant) and *Utche-ferman* (Uch), and arrived at Andekan. The modern Chinese geographers identify Uch with the kingdom of 尉頭 *Yü-t'ou* mentioned in the histories of the Han (see further on, note 284).

八里茫 *Ba-li-mang.*

128. I can make nothing of this name, which is placed on the map north of Wo-ch'i or Uch.

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[280] *Yulduz* is still the name of a river in the country north-east of Kucha. It is an affluent of the Kaidu, which discharges into the Bosteng nor near Karashar. Shah Rokh's ambassadors passed a place named Yulduz in 1420 on their way to Turphan and Kamul.

[281] Not to be confounded with the defiles south of Samarcand and north of Kuldja respectively, which in ancient records are also called Iron-gate.

忽炭 *Hu-t'an* = *Khotan.*

129. Khotan, a city and country of eastern Turkistan, was well known to the Chinese, as also to western people, in the middle ages.

The most ancient notice of Khotan by Mohammedan authors occurs it seems, in the *Tarikh Tabari*, the great chronicle written in the 10th century. There it is reported, that *Kataiba*, the valiant general of the calif Valid, 707—715, sent envoys to *Khotan*. The king of this country dispatched four of his sons to Kataiba, who carried with them much tribute, and also earth from Khotan, upon which Kataiba might tread to make his oath.

I will not enter into details respecting the history of Khotan; for a special pamphlet has been devoted to this subject by Abel Rémusat (*Histoire de la ville de Khotan, tirée des annales de la Chine*). I may therefore confine my remarks to a brief notice of what is generally known of the place, with the addition of some new information from Chinese sources.

In the "History of the Anterior Han," chap. xcvi, where Khotan is first mentioned in Chinese works,—in the second century before our era,—this kingdom is styled 于闐 *Yü-tien;* and Khotan is spoken of under the same name in all the succeeding Chinese dynastic histories up to our own day. Sometimes, and especially in modern Chinese works, the name is written 玉闐 *Yü-tien.* The first character means "jade" in Chinese, and was chosen probably in allusion to the fame which Khotan has had from the most ancient time for its fine jade, so highly prized in China. *Yü-tien* or Khotan was visited by the Buddhist monk *Fa-hien*, on his way to India, A. D. 400 (see Rémusat's translation of the *Foĕ kuoĕ ki*).

In the "History of the T'ang," chap. cclviii, the following synonyms for *Yü-tien* are given: 瞿薩旦那 *Kü-sa-tan-na*, 瀚那 *Huan-na* and 屈丹 *K'ü-tan.* The first of these names is the Sanscrit name of Khotan. Under this name it appears also in the narrative of Hüan-tsang in the 7th century (Julien, *Mém. s. l. Contrées Occid.*). By *Kü-tan*, the Turkish (?) name Khotan seems to be rendered. Besides this, the *T'ang shu* states that the northern nomades (北狄) call the same realm 于遁 *Yü-tun*, whilst western people (胡) term it 斡旦 *Huo-tan.*

In the *Yüan shi*, Khotan is repeatedly mentioned, but seldom by its Chinese name *Yü-tien.* The Chinese historians of the Mongol period generally try to render the name Khotan, which was in use with the Mongols.

In chap. cxx, in the biography of Ho-sze-mai-li, it is stated, that after the khan of Kara-khitai had been slain (see above, 34), the

cities of 可失哈兒 *K'o-shi-ha-r* (Kashgar), 狎兒孛 *Ya-r-k'ien* (Yarkand) and 鄂端 *O-duan* (Khotan) surrendered. *Ye-lü Ch'u-tsai* (see *Notes on Chin. Med. Trav.* p. 113) writes the same name 五端 *Wu-duan*, and adds that this is the same as the *Yü-tien* of the T'ang.

In the Annals of the *Yüan shi*, *sub anno* 1274, we read 立于闐鴉兒看兩城水驛十三沙州北陸驛二, "Thirteen water-stations (on rivers of course)[282] were established (by imperial order) between the two cities *Yü-tien* (Khotan) and *Ya-r-k'an* (Yarkand), and two land-stations north of *Sha-chou* (see above, 90). On the same page, the Annals state, that the people of *Yü-tien* were relieved from the onus of collecting jade.

Under the same year it is recorded, that the emperor bestowed the sum of one hundred *liang* of silver upon each family of the two hundred and forty-nine soldiers from 合失哈兒 *Ho-shi-ha-r*, 鴉兒看 *Ya-r-k'an* and 斡端 *Wu-duan* (Khotan), who were killed at the siege of *Siang-yang fu* and *Fan-ch'eng*.[283]

Under the year 1271, Khotan is also termed *Wa-duan*.

Under the year 1288, mention is made of a military colony composed of workmen from *Ka-shi-ha-r* and 鄂端 *O-duan*.

On modern Chinese maps, and in Chinese geographical works published in the last century, Khotan appears under the names of 和闐 *Ho-tien* and 伊里齊 *I-li-ts'i*. *Ilchi* or *Elchi* is indeed, as we know from the reports of modern European travellers, the real name of the capital of Khotan.

Khotan is frequently mentioned by the Mohammedan authors of the middle ages. It was famed in the west for its musk (*Bibl. Orient.* art. "Khotan"), as well as for its jade (Klaproth, *Mém. rel. à l'Asie*, tom. ii, p. 289).

In the beginning of the 13th, and probably also in the 12th century, Khotan, Kashgar, Yarkand and the other cities of eastern Turkistan belonged to the dominions of the gurkhan of Kara-khitai (D'Ohsson, tom. i, pp. 170 sqq.). In 1218 the empire of the Kara-khitai was destroyed, and the Mongols took possession of eastern Turkistan, which after Chinghiz' death reverted to Chagatai. It seems, however from the above quotations, selected from the *Yüan shi*, that M. Polo may be right in stating (vol. i, p. 173), that the people of *Cotan* are subject to the Great khan. During the struggle between Kubilaï and the Great khan, the latter may

[282] It seems that communication by water was established between Khotan and Yarkand. Both places are situated on rivers, affluents of the *Tarim*. Or perhaps there was a direct watercourse connecting the two cities.

[283] *Siang-yang fu* had been taken by the Mongols in March, 1273. *Fan-ch'eng* is a town situated opposite Siang-yang, on the left bank of the *Han*.

have taken possession of the eastern part of the middle empire.

可失哈耳 *K'o-shi-ha-r* = *Kashgar.*

130. *Kashgar* also is often mentioned by the Mohammedan authors of the middle ages. The earliest occurrence of the name in their writings seems to be in *Firdusi's* "History of Persia" (Deguignes, tom. ii, p. 333). Under the reign of Anushirvan (531—579), Firdusi states, that a khan of China proceeded with his host to Transoxiana and defeated the khan of the Turks, who were in possession of this country. Anushirvan married the daughter of the khan of China, who then retired to *Kashgar*. Of course khan of China here is not to be taken *à la lettre.*

Deguignes further states (tom. iii, p. 219) on the authority of the Mohammedan authors, that the king of *Kashgar* came to *Urkend* (Uzgend) to render hommage to Malek shah of the Seldjuks (end of the 11th century).

In Chinese works, the name Kashgar first appears in the Mongol period, and as we have seen, in the *Yüan shi*, this name is generally found associated with Khotan and Yarkand (see 129).

In the itinerary of Ye-lü Hi-liang (see Appendix), the name of Kashgar is written 可失哈里 *K'o-shi-ha-li.*

In the "History of the Ming," chap. cccxxxii, fol. 20, 哈寶哈兒 *Ha-shi-ha-r* is mentioned as a small country in the *Si-yü*, which used to send embassies to the Chinese court.

Yarkand, although repeatedly noticed in the *Yüan shi* (see above),—and the name of a city 也里虔 *Ye-li-k'ien* is also found in the itinerary of Ye-lü Hi-liang,—has been omitted from the ancient map; neither is it found in the list of the Si-pei-ti. It seems that Yarkand is not spoken of in the *Ming shi.*

I may finally mention concerning Kashgar and Yarkand, that both names appear in the itinerary of M. Polo. Compare vol. i, pp. 169, 173, on the kingdom of *Cascar* and the province of *Yarcan.* Col. Yule observes, that *Yarkan* or *Yarken* seems to be the general pronunciation of the name, though we write Yarkand. The Chinese mediæval authors also write Yarkan or Yerkien, as I have shown. M. Polo reports, that in his time Yarcan belonged to Caidu, whilst Cascar was subject to the Great Kaan. Col. Yule justly observes, that this statement is not easy to understand. Perhaps by the above-quoted fragmentary accounts from the *Yüan shi*, some new light may be thrown on the subject.

Kashgar (Kashimgar) was, it seems, a metropolitan see of the Nestorian church in the middle ages (Yule's *Cathay*, p. ccxliv).

On modern Chinese maps, Kashgar is styled 喀什噶爾

K'o-shi-go-r, and Yarkand, 葉爾羌 *Ye-r-k'iang*. Kashgar is identified by the geographers of the present dynasty with the country 疏勒 *Shu-le*, mentioned in the histories of the Han; Yarkand with the ancient country 莎車 *So-kü*. Although the modern Chinese geographers in their identifications generally draw on their imagination, they may perhaps be right respecting *Shu-le*; for in the "History of the T'ang," chap. cclviii, where Shu-le is also spoken of, it is stated, that at that time the capital of this country was 迦師 *Kia-shi*. This name has at least some resemblance to Kashgar.[284]

途魯吉 *T'u-lu-ki* = *Turkey*.

131. The name is placed on our map west of Uch and north

[284] It is a curious fact, that up to the middle of last century, eastern and western Turkistan were almost unknown to the Chinese of the present dynasty, whilst the Yüan and the Ming were well acquainted with these countries. At least this may be inferred from the geographical works published during the present dynasty anterior to the time of K'ien-lung. The 大清一統志 *Ta ts'ing yi t'ung chi*, or great geography of the Chinese empire under the present dynasty, was first issued in 1743; but it is only in the second edition of this work, published in 1764 in 500 chapters, that we find a description of eastern and western Turkistan. The Chinese had again become acquainted with these countries,—well known to their ancestors eighteen centuries ago,—when the emperor K'ien-lung's armies made the conquest of eastern Turkistan and Dsungaria in 1755. In the new edition of the *Yi t'ung chi*, the countries of Ili, Tarbagatai, Karkara usu, Urumtsi, Kucha, Kharasha, Uch, Kashgar, Yarkand, Khotan, etc. and even some places of western Turkistan are treated of at length. All these countries in the *Yi t'ung chi* are comprised under the general name 新疆 *Sin-kiang*, "The new frontier." After the conquest of these countries, K'ien-lung sent some of the Catholic missionaries, namely Felix d'Arocha, Espinha, and Hallerstein, to determine the position of the principal cities there, and to compile maps of those countries. Thus the modern Chinese description of Dsungaria and eastern Turkistan, set down by imperial order, dates from about the middle of last century. Respecting our knowledge of central Asia, we are for the greater part still obliged to draw from these Chinese accounts, and our maps of central Asia are still based merely upon Chinese maps. It cannot be denied, that the Chinese description of central Asia compiled in the days of K'ien-lung, and translated into many European languages, contains information of much value; I would however caution the reader against placing too much reliance on the notes respecting the ancient history of these countries, and their identifications with ancient names. Although some of these identifications seem to be well founded, the greater part are merely the imagination of the learned committee appointed by K'ien-lung;—the same committee that corrupted the proper names in the *Yüan shi*. The views of these savants were not founded on historical documents, and their identifications have much the same value as those of Deguignes. European sinologues are accustomed to attach absolute credit to all that the Chinese in modern times say regarding the ancient history and geography of Asia, without attempting to discover what their views are founded on.

of Kashgar. Although no indication is found either on the map or in the list of the Si-pei-ti, that T'u-lu-ki is intended for the name of a country, I am nevertheless inclined to suppose that *Turkistan* is meant, or Great *Turkey* of *M. Polo*, vol. ii, p. 385 :—"Great Turkey lies towards the north-west (north-east) when you travel from Hormos. It begins on the further bank of the river *Jon* (Jihon or Oxus), and extends northward (?) to the territory of the Great Kaan."

Friar Benedict, the Pole who travelled with Carpini, states, *l. c.* p. 777 :—"Post terram Kangitarum (Kankali;—see above, 64) venerunt *Turkyami*. . . . . habet autem Turkya legem Machometi."

Carpini calls the same region, the country of the Bisermans.

In the Si-pei-ti, the name *T'u-lu-ki* is put at the head of the places and countries comprised in the middle empire, which, as is known, embraced the whole of Turkistan.

I may also observe, that on the map in Yule's *Cathay*, showing the metropolitan sees of the Nestorian church in the 14th century, the name *Tarak* appears between Samarcand and Armalek. Col. Yule explains:—"Turkish tribes beyond Samarkand probably."

阿忒八失 *A-t'e-ba-shi* = *Atapasha.*

132. This name appears on the map north-west of Kashgar. A place 阿體八升 *A-t'e-ba-sheng* is mentioned in the itinerary of Ye-lü Hi-liang after Kashgar.

In the narrative of Tamerlane's exploits (Deguignes, tom. v, p. 10) it is stated, that Camar-eddin of Kashgar encamped in 1376, at *Atbashi*, a place situated towards the lake *Palkati* (Balkash), into which the river *Ili* discharges its waters.

In accordance with the place assigned to *A-t'e-ba-shi* on the ancient map, about ten years ago a river was discovered, the native name of which is *Atapasha*. It is a southern affluent of the *Naryn*, one of the rivers which form the Sir-daria, and can be found on new maps of Turkistan. Baron F. von der Osten Sacken, late secretary of the Russian Geographical Society, who if I am not mistaken, was the first scientific explorer of the country of the upper Naryn, has had the kindness to inform me, that he saw in the valley of the river Atpasha, very interesting remains of an ancient fortress of strong appearance. The place where Baron Sacken crossed the Atpasha in 1867, is situated a little north of 41° N. lat. and about 75° 40′ E. long. Greenwich.

My identification however, is not free from doubt. On the map of Kokand and Turkistan, in Peterman's *Geogr. Mitth.* 1874, tab. 11, a fortress *Atbash* is marked north-west of Kashgar, on the route from this city to lake Chatyr-kul, about 40° N. lat. and

75° 40′ E. long. Greenwich. It is difficult to say whether this or the fortress on the river Atpasha is to be identified with the place. nearly the same name, mentioned in the *Yüan shi* and on the ancient map.

訛 跡 邦 *O-dsi-han*[285] = *Uzgend.*

133. The place assigned on the map to *O-dsi-han* or *O-dsi-dsien*, between Atpasha and Marghinan, points to its position in Fergana. The name has some resemblance to *Uzgend*. A city of this latter name still exists in the eastern part of the the khanate of Kokand (see the afore-mentioned map in Petermann's *Geogr. Mitth.*). It was also known in ancient times under the names of *Urkend* or *Aderkend* and *Awerkend*. Ebn Haukal (10th century) speaks of Awerkend as of a city near the eastern border of Fergana; Edrisi (12th century) calls it *Aderkend;* Abulfeda and Nasr-uddin (13th century), *Urkend (cf.* Ritter's *Asia*, vol. v, p. 749).

Neumann (*Geschichte d. Engl. Reichs in Asien*, vol. i, p. 115) translates from the *Kitab Jemini*, that Ilek, khan of the Turks (Uigurs) proceeded from Kashgar to Bokhara in 999, took the city and sent Abdal melek, the last sultan of the Samanides to *Urkend*, two days' journey from Khodjend. The *Bibl. Orientale*, p. 453,—where is a record of the same events, apparently derived from other sources,—instead of Urkend, has "*Dizghend*, place forte qui est fort avant dans le Turkestan."

Deguignes (tom. iii, p. 219) translates from the *Ben Elathir*, that Malek shah of the Seldjuks, in 1089, went to *Uzkend*, where the king of Kashgar repaired to render homage. This passage proves,—supposing Deguignes has exactly rendered the name as given in the manuscript,—that Uzkend was an ancient name of the place.

I have not been able to find in D'Ohsson's "History of the Mongols," that mention is made by the Mohammedan authors of the Mongol period, of this city of Urkend or Uzgend. It is only on the map appended to his work, and containing nothing but ancient names, that a place *Euzkend* appears in Fergana. Besides this, a city *Ozkend* is marked on the same map on the river Sihon towards the Aral lake. This city is also spoken of in the *Tarikh Djihan Kushai*, as having been taken by the Mongols in 1219 (see above, 49). It is of course out of the question, its being the place O-dsi-han on the ancient map.

A city of *Ozkend* is mentioned by the Mohammedan authors as a place, where the gurkhan of Kara-khitai had a treasury. It was

[285] The third character in this name is uncertain. It is written 丹 *dsien* in the Si-pei-ti.

plundered by Guchluk (D,Ohsson, tom. i, p. 167). In D'Ohsson, tom. i, p. 182 we read, that in 1209, Mohammed Khorazm shah invaded the dominions of the gurkhan of Kara-khitai and conquered Turkistan as far as Ozkend.

As I have stated in the article on the Karluks (121), the *Yüan-shi* speaks of a city *Wa-sze-gien* (somewhere in Turkistan) which sounds like Uzgend.

The unfortunate traveller, Professor Fedchenko, in 1871 visited *Uzgent* (thus he writes the name) in the khanate of Kokand. He speaks of the ruins of the tomb of Illik Mozi there, where he saw also some remarkable buildings dating from the beginning of the 12th century. The city is now in ruins, and from their extent it may be concluded, that the ancient city was very large (see *Proceedings of Russ. Geogr. Soc.* 1872, vol. viii, p. 8).

柯撒 *Ko-san=Kassan.*

134. The position assigned to Ko-san on the ancient map permits its identification with the city of *Kassan* in Fergana.

Kassan is mentioned as early as the 8th century, as having been taken by the Arabs (Deguignes, tom. ii, p. 497). *Edrisi* (11th century) states that Kassan is situated in the northern part of Fergana, in a fertile country (Ritter's *Asien*, vol. v, p. 748). *Abulfeda* (13th century) calls Kassan a great city of Fergana, but destroyed in his days by the Turks (*Bibl. Orient.* p. 238).

Sultan Baber in his description of Fergana (Klaproth's *Mém. rel. à l'Asie*, tom. ii, p. 145), written in the beginning of the 16th century, speaks of the same place as a little town north of *Akhsia*,[286] and adds, that the river which passes by Akhsia comes from Kassan.

Kassan is marked on Petermann's afore-mentioned map of Kokand, etc. a little north of 41° N. lat. and about 71° 30′ E. long. A river passing near Kassan runs southward, and seems to discharge into the Sir-daria near a place called *Akhsy*. On a Russian map of Tashkand, etc. found in the *Proceedings of the Russ. Geogr. Soc.* vol. ii, 1867, Kassan appears as a fortress.

巴補 *Ba-bu.*

135. The only corroboration I can adduce of the existence of a city of this name,—which is placed on the Chinese map between Kassan and Marghinan,—is the mention of it in the *Si yu lu*

[286] *Akhsia*, called also *Akhsiket* according to sultan Baber. Under the latter name it is mentioned by Ebn Haukal (10th century) as the capital of Fergana, situated on the Sihon (Ritter *l. c.* vol. v, p. 743).

(*Notes on Chin. Med. Trav.* p. 115). The name is written there 八普 *Ba-p'u,* and associated with Khodjend, Kassan and Balan (Badam).

麻耳亦囊 *Ma-r-i-nang = Marghinan.*

136. This is doubtless the city of *Marghinan* mentioned by Ebn Haukal in the 10th century, as a city of Fergana (Ritter, *l. c.* vol. v, p. 745), and spoken of also by sultan Baber, who states that the city was famed for its pomegranates and other fruits and flowers. The *Bibl. Orient.* records, p. 565, that Marghinan was in former times the capital of Ilek khan (a khan of Turkistan). Marghinan still exists. See Petermann's map, on which it is termed *Margijan.*

In the *Yi t'ung chi,* or great geography of the present Chinese empire, and on modern Chinese maps, the name is written 馬兒喀朗 *Ma-r-k'o-lang.* Mir Izzet, a Mohammedan traveller (1812), states that Marghinan is also called Margilan (Klaproth *Magaz. Asiat.* tom. ii, p. 45).

P. Nazaroff, a Russian traveller to Kokand, 1813—1814, who was detained three months in Marghilan, gives a detailed description of the city, which at that time was thirty versts in circumference (*Magaz. Asiat.* tom. i, p. 53).

忽氈 *Hu-djan = Khodjend.*

137. There can be no doubt, that by *Hu-djan* on the ancient map, the city of *Khodjend* on the Sir-daria is meant.

The Mohammedan annals mention Khodjend in the 8th century. Deguignes, tom ii, p. 497, states, that in 719 the Arabs conquered Fergana, and captured the cities of *Khodjend,* Kassan (see above, 134) and Shash (Tashkand ;—see 138). When Chinghiz' armies invaded Fergana, the valiant Timur-melik defended Khodjend (see above, 49). Abulfeda in the 13th century, calls the city Khojanda (Ritter, vol. v, p. 749). It is also mentioned by Nasr-uddin, who has determined its latitude and longitude. Sultan Baber (Klaproth, *l. c.* tom. ii, p. 143) speaks of Khodjend as of a very ancient city in Fergana, and praises its excellent fruits,—especially pomegranates,—stating, that the pomegranates of Samarcand and Khodjend are proverbial. Ye-lü Ch'u-ts'ai, when speaking of 苦盞 *K'u-djan,* also mentions the fine pomegranates there (*Notes on Chin. Med. Trav.* p. 115).

In the *Yüan shi,* chap. cli,—biography of *Sie-t'a-la-hai,* one of Chinghiz' generals, who was with the conqueror in western Asia,—the name of Khodjend is written 忽氍 *Hu-ch'an.*

The city of 火占 *Huo-djan* mentioned in the *Ming shi*, chap. cccxxxii, fol. 29, among the twenty-nine small kingdoms of western and central Asia, which used to send tribute every three or five years, seems to denote Khodjend.

Philippe Nazaroff, sent in 1813 by the Russian government on a mission to the khan of Kokand, (Klaproth, *Magazin Asiat.* tom. i, p. 34) was, it seems, the first European, who saw Khodjend in modern times. It is known that in 1866, Khodjend was taken by the Russians, and belongs now to Russian Turkistan.

The river *Sir-daria* on which Khodjend is situated,—the *Sihon* of the Persian authors, the *Yaxartes* of the ancients,—is termed 霍闐 *Ho-ch'an* or 忽牽 *Hu-k'ien* by Chinese mediæval travellers (*Notes on Chin. Med. Trav.* pp. 37, 75). This appellation may be explained by the statement in the *Bibl. Orient.* p. 791, that the Arabs call the Sihon generally *Nahar Khodjand*, "the river of Khodjend." Thus the Sihon is also termed by sultan Baber.

察赤 *Ch'a-ch'i = Chach or Tashkand.*

138. A place of this name is marked on the map, north-west of the afore-named cities of Fergana; and this position permits its identification with *Chach*, which was as is generally believed, the ancient name for the present Tashkand.

Sultan Baber (Klaproth, *Mém.* tom. ii, p. 147), when speaking of *Tashkand*, states, that in books this city is generally called *Shash*, and that some authors also write *Tchatch*. Julien (*Mém. s. l. Contrées Occid.* tom. i, p. 16) writes the name *Tchadj*.

Deguignes, tom. ii, p. 497, states on the authority of the Mohammedan authors, that Shash was conquered by the Arabs in 719.

Ebn Haukal (10th century) mentions the city of *Chaje* as one of the strongest places on the frontier of Turkistan.

The *Bibl. Orient.* has an article on *Shash* (p. 762), and another on *Tashkand* (p. 866), but does not say that the two names denote the same place. In D'Ohsson's "History of the Mongols," the name of Shash or Chach does not appear. *Tashkand* is only once mentioned, under the year 1306 (tom. iv, p. 557). It is marked also on D'Ohsson's map.

In the days of Tamerlane, Tashkand played an important *rôle*, and frequent mention is made of this place in the Mohammedan records of the conqueror's warlike doings (Deguignes, tom. v, pp. 26, 31).

The embassy of Shah Rokh to the Chinese emperor, in 1419, proceeded from Herat to Balkh, Tashkand, Sairam, etc. (Yule's *Cathay*, p. cc).

Ancient Chach or Shash has been identified by Ritter (*Asien*,

vol. v, p. 570) with the realm of 石 *Shi*,[287] also called 柘支 *Che-chi* or 柘折 *Che-che*, of which mention is made in the "T'ang History," chap. cclviii*b*. The accounts there given of this country are very vague, but not in contradiction with Ritter's suggestion. With respect to *Shi*, compare also notes 57 and 59.

The Buddhist monk Hüan-tsang, who visited Turkistan in the 7th century, travelled westward and south-westward from *Talas*, and arrived at 赭石 *Che-shi* or Tchadj (Julien, *l. c.* tom. i, p. 16). I suppose he travelled by the great highway leading now from the Talas river to Tashkand (see note 59).

The name Tashkand in Chinese works seems to occur as early as the Mongol period; at least in the Annals of the *Yüan shi*, under the year 1309, mention is made of the taxes which had to be gathered from the cities of 撒馬耳干 *Sa-ma-r-kan* (Samarcand) 塔剌思 *T'a-la-sze* (Taras;—see note 59) and 塔失元 *T'a-shi-yüan*. I think the last name is intended for Tashkand.

In the *Ming shi*, Tashkand is termed 達失干 *Ta-shi-kan* (chap. cccxxxii, fol. 8), and in the great geography of the present Chinese empire, as well as on modern Chinese maps, the same name is written 塔什干 *T'a-shi-kan*.

Ritter states (*l. c.* vol. v, p. 543), that in 1759, the Catholic missionary Felix D'Arocha made twelve astronomical determinations in Fergana, Badakhshan, etc. by order of the Chinese emperor. I have not been able to find any particulars regarding this scientific mission. In the *Mémoires concernant les Chinois*, tom. i, pp. 399, 400, where it seems the calculations of the missionaries,—in the second half of the last century—were first published, not a word is said as to their origin. The determinations given there deviate most widely from the new Russian determinations in those countries. Errors in the observations of the missionaries respecting the longitudes would be explicable; but the so-called observations of D'Arocha show a difference of from 1° 40′ to 1° 52′ even in the latitudes, when compared with the Russian calculations. Thus the correct latitude of Tashkand according to Russian observation is 41° 19′, whilst D'Arocha carries this place north to 43°, 3′. It is known that all the astronomical determinations made by the Jesuit missionaries in China, even so early as the beginning of last century are very correct. I therefore feel some doubt, whether D'Arocha ever travelled from China to Fergana.

I may finally mention, that for the first European accounts of

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[287] *Shi* in Chinese means "stone." *Tash* in the Turkish dialects has the same meaning.

Tashkand, based upon local observation, we are indebted to the above-mentioned Russian traveller Nazaroff in 1813, who in his narrative gives a good description of the city (Klaproth, *Magaz. Asiat.* tom. i, p. 31). It is needless to say, that since Tashkand was taken by the Russians in 1864, and made the capital of Russian Turkistan, the city is as well known (in Russia at least) as any other city of the empire.

兀提剌耳 *U-ti-la-r = Otrar.*

139. The position of Otrar seems to be erroneously marked on the ancient map, in relation to Tashkand and Sairam. I have not been able to find in my books, any statements regarding the position of ancient Otrar; and I cannot say whether it has been ascertained. The name of Otrar does not appear on the Russian maps of Turkistan which I have seen. But Dr. Petermann,—whose information is always drawn from the best sources,—on his excellent map of western Turkistan, Chiva, etc. (*Mittheil.* 1873, tab. 9), places the ruins of Otrar on the northern bank of the Sir-daria, between Fort Perowsky and the city of Turkistan.

This position agrees well with Pegoletti's notices of the land route to Cathay, written in the first half of the 14th century (Yule's *Cathay*, p. 288). This itinerary mentions *Gintarchan* (Astrachan), *Sara* (Serai) and *Saracanco* (Sarachik on the river Jaik). The distance from the latter place to *Organci* (Urgendj) is estimated at twenty days' journey in camel-waggon, and from Organci to *Oltrarre* (Otrar) thirty-five to forty days; but the direct way from Saracanco to Oltrarre is stated to take only fifty days. From Oltrarre to Armalec (Almalik), Pegoletti reckons forty-five days' journey.

It seems that the name *Otrar* is first mentioned by the Mohammedan authors in the 13th century. The *Bibl. Orient.* states, pp. 313, 690, that this city was previously called *Farab*. It was at one time considered the capital of Turkistan. The Mohammedan authors also state, that it was not very far from Bela-sagun (see note 57). Ebn Haukal (10th century) describes *Farab* as a large city in the western part of Turkistan.

The history of Otrar presents two remarkable events. Its capture by the Mongols, in 1219, was the commencement of the conquest of western Asia; and it was at Otrar, that the great Tamerlane died, on the 17th of February, 1405, just when he was about to move out on a great expedition against the emperor of China.

Haithon the Armenian, in his *Historia Orientalis*, p. 4, calls

Octorar (Otrar) the greatest city of Turkistan. Haithon the traveller writes the name correctly *Otrar*.

Col. Yule states (*Cathay*, p. 288), that Otrar stood on the frontier between the khanates of Kipchak and Chagatai (he does not say from whom this is quoted). The ancient Chinese map places it near the frontier of Kipchak, but as I observed above, this does not seem to be its proper place on the map.

The name *Ornas* (or *Orpar*) in Carpini's narrative, p. 750, is perhaps intended for Otrar. There is however some confusion in his statements about this place, which do not permit any identification (see note 91).

Concerning the siege and capture of Otrar, in 1219, by the Mongols,—which is recorded with more or less detail by the Mohammedan authors, and also by the Chinese authors,—see above, 49. The *Yüan shi* spells the name 脫幹羅兒 *Wa-t'o-lo-r* or 訛塔剌 *O-ta-la*. Yelü Ch'u-ts'ai also mentions 訛打剌 *O-ta-la* (*Notes on Chin. Med. Trav.* p. 115).

撒麻耳干 *Sa-ma-r-kan* = *Samarcand.*

140. Samarcand,—in times past the capital of Maver-al-nahr or Transoxiana,—is one of the most ancient and celebrated cities of Asia. The fertile valley of the Zarafshan, in which Samarcand was founded, is mentioned under the name of *Sogdo* in the ancient traditions of Iran. The Zend Avesta enumerates it among the places of abundance created by Ormuzd. From Sogdo, the name *Sogdiana* of the Greek and Roman authors is derived. It is not ascertained when the name Samarcand first appeared, but it is generally believed, that the place *Maracanda* visited by Alexander the Great (*cf. Arrian's History*, book III, chap. XXX), is identical with Samarcand.

The *Bibl. Orient.* quotes some Mohammedan writers, who assert, that Samarcand was founded by Kishtasp (Darius Hystaspes, B. C. 521—485. It seems, that very little is known of the ancient history of Samarcand. Before it was taken by the Arabs and Islam carried to Transoxiana, Samarcand was in the possession of the western Turks. In the 10th century it belonged to the Samanides, who reigned over Transoxiana and Khorassan. In the 11th and 12th centuries it was comprised in the dominions of the Seldjuks; and in the 12th century it seems that the rulers of Samarcand were for some time tributary to the Kara-khitai. When Chinghiz arrived in Transoxiana, Samarcand was subject to Mohammed shah of Khorazm; and it was taken by the Mongols in April, 1220. Samarcand in the days of the Mongols was repeatedly visited by Europeans. There was a metropolitan see of the Nestorian church,

and also a Latin missionary bishopric there (Yule's *Cathay*, pp. ccxliv and 192). The Christian missionaries in the middle ages called it *Semiscant*. Marco Polo (vol. i, pp. 170 sqq.) devotes a chapter to the great city of *Samarcan*. Haithon the traveller terms it *Semergent*. Clavijo and Schildberger, who both lived at the court of Tamerlane, at the end of the 14th and beginning of the 15th centuries, have left behind some accounts of the capital of Tamerlane. Clavijo states, that Samarcand was also called *Cimes-quinte* (Yule's *Cathay*, pp. cxxxv and 192). After Clavijo and Shildberger, for nearly four centuries no European visited Samarcand; so that Ritter in his *Asia*, could give no information respecting it, during that period, except some ancient Chinese historical accounts. For the first authentic accounts of Samarcand, we are indebted to the members of a Russian scientific expedition sent to Transoxiana in 1841. This expedition was composed of the well-known orientalist Khanikoff and two other savants, Lehmann (naturalist) and Bogoslawsky. They visited Bokhara and Samarcand, and Khanikoff subsequently published a "Description of the Khanate of Bokhara" (in Russian), St. Petersburg, 1843. A good map of Transoxiana, and also maps of the cities of Samarcand and Bokhara are appended.[288] The reports of this expedition are also found in *Beiträge zur Kenntniss des Russischen Reiches*, b. xvii. In 1863, the well-known traveller Prof. Vambery was in Samarcand; and in May, 1868, the Russian army took possession of the city.

141. Let me now show what the Chinese report respecting Samarcand. There can be no doubt that Sogdiana was known to them as early as the 2nd century B. C., since the famous Chinese general Chang Kien had visited the countries of the far west. From the vague accounts found in the histories of the Han, it is not easy to identify the ancient Chinese names applied to the countries of western Asia; it seems however, that the country of 康居 *K'ang-kü*,—first mentioned in the "History of the Anterior Han,"—before our era, included Sogdiana; for in the "History of the Northern Wei (386—558)," a country in the west, 康 *K'ang*, is described; and it is further stated there, that the people of K'ang are a branch of the *K'ang-kü* of the Han period. In the "History of the T'ang," chap. cclviii*b*, the kingdom of *K'ang* is again spoken of; and among the synonyms given for the same country, we find 薩末鞬 *Sa-mo-kien*, which is intended for Samarcand. This identification is corroborated by the narrative

[288] Khanikoff states *l. c.* p. 104, that he was not the first Russian who saw Samarcand, the place having been visited towards the end of last century by *Yefremoff*.

of Hüan-t'sang who visited *Sa-mo-kien;* and his itinerary leaves no doubt, that by this name Samarcand is to be understood.

We find Samarcand again mentioned in the Chinese annals, in the first half of the 12th century. As has been stated above (26), *Ye-lü Ta-shi*, the founder of the dynasty of the Western Liao, advanced as far as Samarcand, and even beyond it. In the narrative of his expedition, Samarcand is termed 尋思干 *Sün-sze-kan*. The same name was also in use in the east during the Mongol period. I have shown in my *Notes on Chin. Med. Trav.* (*cf.* pp. 23, 38, 48, 76), that Samarcand is repeatedly mentioned by Chinese mediæval travellers to the west in the 13th century; sometimes under the name of *Sün-sze-kan*, and sometimes 邪迷思干 *Sie-mi-sze-kan;* the latter name is evidently intended for *Semiscant* (see above). Ch'ang-ch'un states (*l. c.* p. 44), that the same city was also called 河中府 *Ho-chung fu* (the city between the rivers) by the Kara-khitai. This Chinese term is a literal translation of the Arabic *Beïn naharein*. Thus,—according to the *Bibl. Orient.* p. 738,—Samarcand was called in ancient times, on account of its position between the Djihun and Sihon (Oxus and Yaxartes).

An interesting explanation is given by Ye-lü Ch'u-ts'ai of the name *Sün-sze-kan* (*Notes on Chin. Med. Trav.* p. 116). He states, that "western people say, that the meaning of this name is 'fat' (肥 *fei*), and as the land there is very fertile, the city received this name."* Indeed *semiz* in the Turkish languages means "fat."

In the Annals of the *Yüan shi*, where Chinghiz' expedition to the west is reported, both the above-mentioned Chinese names for Samarcand appear (see above, 53).

In the Si-pei-ti, and on the ancient map, Samarcand is termed 撒麻耳干 *Sa-ma-r-kan*; and in the Annals of the *Yüan shi*, *sub anno* 1309, the city is spoken of once more under the same name (see above, 138).

Finally, I may mention respecting Samarcand in the middle ages, an interesting ancient Chinese document translated by Archimandrite Palladius, and published in *The Chinese Recorder*, vol. vi, p. 108. An ancient monument in Chin-kiang fu commemorative of *Ma Sie-li-ki-sze*, a Christian and a native of Samarcand, mentions *Sie-mi-sze-hien* as a country where the religion of the *Ye-li-k'o-wen* (Christians) dominates; and speaks of a miraculous

* It may be interesting to compare with this, the etymology given by Clavijo. He says:—"The city is so large, and so abundantly supplied, that it is wonderful; and the name of Samarcand or Cimes-quinte is derived from the two words *cimes* great, and *quinte* a town." (*Narrative of the Embassy of Ruy Gonzalez de Clavijo*, p. 170).—Ed. Com.

temple there, one pillar of which was in a hanging position, etc. This statement has special interest; for M. Polo (vol. ii, p. 139, speaks of the Baron *Mar Sarghis*, a Nestorian Christian and governor of *Chinghianfu*. Polo also records (vol. i, p. 171) the miracle in the Christian church of Samarcan, where one of the columns was without support.

The "History of the Ming" (*Ming shi*, chap. cccxxxii, fol. 1 sqq.) devotes a long article to 撒馬兒罕 *Sa-ma-r-han*, from which it appears, that in the days of Tamerlane, and also in the 15th and 16th centuries, active intercourse existed between China and the countries in the west, as Samarcand, Herat and Fergana.

那黑沙不 *Na-hei-sha-bu* = *Nakhsheb* (Karshi).

142. By *Na-hei-sha-bu*,—placed on the map south-west* of Samarcand, and south-east of Bokhara,—only *Nakhsheb* can be meant, which has the same position on D'Ohsson's map. This name is not found on modern maps, but I read in the *Bibl. Orient.* p. 664, that Nekhsheb, a city of Transoxiana,—according to Abulfeda and Arabshah is also known under the name of *Karshi*, and that it is situated on the way leading from the banks of the Djihun to the city of *Kesh*.[289] The country between the Djihun and Nakhsheb is stated there to be a sterile desert. As to *Karshi*, this name appears on modern maps, south-west of Samarcand (see Petermann's map;—*Mitth.* 1873, tab. 9). This place has been astronomically determined.

It seems, that Nakhsheb is spoken of in the "History of the Wei dynasty (386—558)." At least, the name of 那色波 *Na-she-bo* mentioned there, under the article *K'ang* (Samarcand;—see above), as that of a small realm dependant on K'ang, has a strong resemblance to Nakhsheb.

Firdusi, in his "History of Persia" (Deguignes, tom. ii, p. 333) relates, that at the time of Khosru Anushirvan, A. D. 531—579, the khan of China invaded Transoxiana and defeated the khan of the Turks, near Nakhsheb.

Nakhsheb is more than once mentioned in D'Ohsson's "History of the Mongols." When the Mongol armies appeared in Transoxiana, Mohammed shah of Khorazm left Samarcand and fled by way of Nakhsheb (tom. i, p. 241). After the capture of Samarcand, Chinghiz encamped the whole summer of 1220, between

* By a typographical error, NA-HEI-SHA-BU is placed about a ¼ inch too much to the right on our transliterated map.—ED. COM.

[289] *Kesh*, the native place of Tamerlane, lies south of Samarcand. Ch'ang-ch'un, when proceeding from Samarcand to the Hindu-kush, in 1222, passed through Kesh and the Iron-gate (see *Notes on Chin. Med. Trav.* p. 41).

that city and Nakhsheb (tom. i, p. 262). See also tom. i, p. 315. In the narrative of the exploits of Tamerlane, Nakhsheb is also mentioned (Deguignes, tom. v, p. 9).

不花剌 *Bu-hua-la* = *Bokhara.*

143. All Mohammedan authors agree in stating that Bokhara is one of the most ancient cities in the world. Oghuz khan the (half-mythical) progenitor of all the Turk tribes is said to have resided in Bokhara. In the political changes, which have successively taken place in Transoxiana, Bokhara has generally shared a common fate with Samarcand. Thus it was conquered by the Arabs in the beginning of the 8th century. In the 10th century, it was the capital of the dynasty of the Samanides. In 999, a khan of the Turks overran Transoxiana and took Bokhara. Abdalmelek, the last Samanide ruler was made prisoner. Subsequently a Seldjuk dynasty reigned over Transoxiana. When Chinghiz arrived, Bokhara belonged to the shah of Khorazm. The place surrendered to the Mongols in 1220 (see above, 49).

The Chinese annals, apparently, first mention Bokhara in the 7th century. In the "T'ang History" (chap. cclviii*b*), after the description of *K'ang* (Samarcand), nine smaller realms are mentioned, which were dependent on Samarcand. One of them is termed 安 *An*, and also 布豁 *Bu-huo* or 捕喝 *Bu-ho*. Bu-ho, which probably means Bokhara, is there stated to be bounded on the west by the river 烏滸 *Wu-hu*.[290] In Hüan-tsang's itinerary the kingdom of *Bu-ho* is also noticed. It is said to resemble *Samo-kien* or Samarcand (Julien, *l. c.* tom. i, p. 21).

The capture of Bokhara by Chinghiz is also recorded in the *Yüan shi*, where the name is written 蒲華 *P'u-hua*, and also 卜哈兒 *Bu-ha-r* (see above, 53). Ye-lü Ch'u-tsai (*Notes on Chin. Med. Trav.* p. 117) says *P'u-hua* is richer than Samarcand.

In the *Ming shi*, chap. cccxxxii, fol. 9, a short article is devoted to 卜花兒 *Bu-hua-r*. The Ming emperors several times sent envoys to Bokhara.

After Bokhara had been,—like Samarcand,—for long centuries a *terra incognita* to Europeans, it was first visited, in 1833, by Sir A. Burnes. In 1842, a Russian scientific expedition (Khanikoff, Lehmann, etc;—see above, 140) went to Bokhara and Samarcand; subsequent to which several political missions have been sent by the Russian government to the khan of Bokhara,

[290] The river *Wu-hu* seems to be the Oxus. It is again mentioned in the *T'ang shu*, in the articles *T'u-huo-lo* (Tokharestan;—see note 292) and *Ho-li-si-mi* (Khorazm;—see further on, 161).

who finally lost the province of Samarcand, in warlike contest with that empire.

的里安 *Di-li-an.* = *Daran. (?)*

144. Thus the name is written in the list of the Si-pei-ti; but on the ancient map it is spelt 的安里 *Di-an-li.* I am not prepared to say which may be the correct reading. The map places this name between Bokhara and Ko-t'i (Kath). Perhaps the city of *Daran*, mentioned in the *Bibl. Orient.* p. 513, among the cities of Khorazm, is intended.

柯提 *Ko-t'i* = *Kath.*

145. This name appears on the ancient map to the south-east of the place where Khorazm (see 161) is marked. I think *Kath* is meant, which according to the *Bibl. Orient*, pp. 241, 513, was a city of Khorazm, at one time the capital of that country, and situated on the eastern bank of the Djihun, eighteen *parasangs* (16 French *lieues*;—D'Herbelot) distant from *Hezarasp*, which lies on the western bank of the same river. Kath has disappeared from the maps, but Hezarasp still exists, a little north of 41° lat. west of the Amu-daria, about twelve English miles distant from the river (see Petermann's *Mitth.* 1873, tab. 9).

It seems the city of Kath is not mentioned by D'Ohsson; but in the relation of Tamarlane's war with Khorazm this name repeatedly occurs (Deguignes, tom. v, pp. 5, 7, 9). In 1388, Tamerlane gave orders to fortify the city of Kath, and it was still in existence in the middle of the 16th century (Deguignes, tom. iv, p. 472).

忒耳迷 *T'e-r-mi* = *Termed.*

146. *Termed* lies on the northern bank of the Amu-daria, north of Balkh. This city was in existence in the 5th century of our era. Deguignes states (tom. ii, p. 328), on the authority of Firdusi it seems, that about A. D. 460, Firuz, the brother of Hormuz, king of Persia, asked auxiliary troops from the khan of the Euthalites (Indo-scythæ) in Maver-al-nahr, to dethrone his brother. They made an agreement that Firuz should cede to the khan the cities of *Termed* and *Vasjard* on the Djihun.

Edrisi (12th century) states, that the river *Wakhsh-ab* (thus he terms the Oxus) runs along the frontier of the country of Balkh, reaches *Tarmedh*, etc. and finally discharges its waters into the lake of Khorazm (Yule's *Cathay*, p. ccxxxv).

Chinghiz khan took Termed by assault in the autumn of 1220 (see above, 51).

As to the Chinese authors who mention Termed, it seems that the kingdom of *Ta-mi* in Hüan-tsang's narrative (Julien, *Mém. s. l. Contrées Occid.* tom. i, p. 25) denotes Termed.

The Chinese annals *Kang mu* record the capture of 迭里密 *Tie-li-mi* by Chinghiz (see note 94); and in the *Yüan shi*, where the same fact is related in chap. cli, biography of *Sie-t'a-la-hai* the name of Termed is written 帖里麻 *T'ie-li-ma*.

Some particulars regarding Termed are also found in the *Ming shi*, chap. cccxxxii, fol. 9. It is stated there amongst others, that 迭里迷 *Tie-li-mi* is situated east of the river 阿木 *A-mu* (Amu-daria), south-west of Samarcand, and distant two thousand *li* from 哈烈 *Ha-lie* (Herat).

途思 *T'u-sze* = *Thus*.

147. The compiler of the ancient map has committed a grave error respecting the position of Thus and Talecan; carrying the first too far east (east of Balkh), and assigning it to Chagatai's empire, whilst Talecan (see 169) is marked too far west (north-west of Balkh). It seems these two places have simply been confounded; for Talecan belonged in fact to the middle empire, whilst Thus, at the time of the Mongols, was the capital of Khorassan, a province of Persia.

Thus is a very ancient and celebrated city. The foundation of it is attributed to Giamshid, a mythical king of Persia. The calif Harun al Rashid died in Thus, A. D. 809. His tomb there was destroyed by the Mongols in 1221 (see above, 51). *Thus* is the native place of the celebrated Persian poet Firdusi (940—1020), and of the great astronomer Nasr-uddin (1201—1274), for whom Hulagu built an observatory near Meragha. *Thus* had much to suffer from the Mongol invasion, being first sacked by Subutai, in 1220, and destroyed the following year by Tului. It was restored in 1239 by Kueurgueuz, who had been appointed Mongol governor of Khorassan, and who established his residence there (D'Ohsson, tom. iii, pp. 116, 117). In 1256, Hulagu, on his expedition to Persia, spent several days in Thus and its neigbourhood (D'Ohsson, tom. iii, p. 190). Haithon the traveller, on his way back from Karakorum, passed through Thus. All the Mohammedan geographers speak of this place. Ibn Batuta (middle of the 14th century) calls it one of the largest cities of Khorassan.

Thus at an early day was an episcopal see of the Nestorian church. Col. Yule states (*Cathay*, p. xc), that the existence of an

episcopal see in Merv and Thus A. D. 334 is ascertained. In 420 they were raised to the metropolitan dignity.

In the *Yüan shi*, the city of *T'u-sze* is twice mentioned. The Annals record its capture by Tului in the year 1222, and its name appears in the list of the Si-pei-ti.

巴荅哈傷, *Ba-da-ha-shang* = *Badakhshan.*

148. *Badakhshan*, the mountainous country where the Oxus takes its rise, so little known to Europeans in our day, is spoken of by most of the ancient Persian and Arabic geographers. It has always been famed for its rubies. An important trade route passes by Badakhshan, crossing the high mountain chain of *Bolor tagh* (the 葱嶺 *Ts'ung-ling* or Onion mountains of the ancient Chinese geographers), and connecting eastern Turkistan with the countries situated on the Oxus. Goës, on his journey from India to China, in the beginning of the 17th century, followed this route, which in the middle ages seems to have been of much greater importance than it is now. M. Polo also, when proceeding from western Asia to China, crossed the country of Badakhshan (*l. c.* vol. i, p. 149).

Some of the ancient Mohammedan geographers consider Badakhshan to be a part of *Tokharestan;* others distinguish it from the latter (*Bibl. Orient.* p. 870). Ebn Haukal, in the 10th century, understood by Tokharestan, the province east of Balkh, comprising *Taikan* (Talecan), *Anderabeh*, *Badakhshan* and *Penjhir* (Ritter, *l. c.* vol. v, p. 701).[201]

Edrisi (12th century) states (Yule's *Cathay*, p. ccxxxiv):—"The Djihun takes its rise in the country of *Wakhan* on the frontier of Badakhshan, and there it bears the name of *Khari-ab*. It receives five considerable tributaries, which come from the countries of *Khutl* (see note 294) and *Waksh*.....*Badakhshan* is built on the west bank of the Khari-ab, the most considerable of the rivers that fall into the Djihun. They bring to Badakhshan the musk of the regions of Tibet, adjoining Wakhan."

D'Ohsson (tom. i, p. 272) quotes an Arabic geographical dictionary, in which it is stated, that the trade route from Persia to Tibet passes through Badakhshan. This country is twice again mentioned by D'Ohsson;—in tom. i, p. 172, it is recorded, that Guchluk, the gurkhan of Kara-khitai was slain in Badakhshan in 1218 (see above, 35); and in tom. i, p. 272, we read of the Mongol invasion of the country in 1221.

[201] Tokharestan seems to be a name of very ancient date, for Strabo and Pliny mention the *Tócharoi* or *Tochari*. The Tochari were also known in the 2nd century of our era to Ptolemy, as a people among the mountains of the Oxus.

Badakhshan was known to the Chinese at an early date; not at first by this name, but under the general appellation 吐火羅 *T'u-huo-lo*, which doubtless denotes Tokharestan (see above). This name first appears in the "History of the Northern Wei," (A. D. 386—558). In the "History of the T'ang" we read, that the country of *T'u-huo-lo* is situated west of the *Ts'ung-ling* mountains (Bolor tagh;—see above), on the southern bank of the river 烏滸 *Wu-hu*.[292] The name of *Badakhshan* is first met with in Chinese books in the Yüan period, and it seems to be only once mentioned in the *Yüan shi*, viz. in the list of the countries situated to the north-west, where the name is written as on the ancient map.

In the "History of the Ming," Chap. cccxxxii, fol. 17, some information is given about 八答黑商 *Ba-da-hei-shang*. It is stated there, that it lies to the north-east of 俺都淮 *An-du-huai* (Andkhui), and the (principal) city is ten *li* in circuit. In Ba-da-hei-shang a great trade is carried on in products from the *Si-yü*; from which source the people have become very wealthy. The country belongs to the son of 沙哈魯 *Sha-ha-lu*, the king of 哈烈 *Ha-lie*.[293] The intercourse of Badakhshan with China (in the Ming period) began in the year 1408, when envoys from that country arrived at the Chinese court, together with envoys from *Ha-shi-ha-r* (Kashgar) and 葛忒郎 *Ko-t'e-lang*.[294]

Badakhshan is spoken of also in the great geography of the present Chinese empire. The name is written there 巴達克山 *Ba-da-k'o-shan*.

Badakhshan is quoted by Ritter (*l. c.* vol. v, p. 543) among the places said to have been astronomically determined by Felix D'Arocha (see above, 138).

可不里 *K'o-bu-li* = *Kabul*.

149. *Kabul*, the capital of modern Afghanistan,[295]—in times

[292] By this name, occurring repeatedly in the *T'ang shu* (see note 290), evidently the Oxus is meant; and it seems *Wu-hu* is intended for Wakh. We have seen that Edrisi terms the Oxus *Waksh-ab*. See above, 146.

[293] *Sha-ha-lu* denotes Shah Rokh; and *Ha-lie* is Herat. There is in the *Ming shi*, chap. cccxxxii, fol. 13, a special article on *Ha-lie*, where the king of this country is termed 沙哈魯把都兒 *Sha-ha-lu ba-du-r* (Shah Rokh bahadur).

[294] In chap. cccxxxii, fol. 28, of the *Ming shi*, the same name is written 哈的蘭 *Ha-ti-lan*. This is probably the country of *Kotlan* mentioned in the history of Tamerlane (Deguignes, tom. v, p. 28), and the *Kutl* of Edrisi, where the Oxus takes its rise.

[295] The name of the *Afghan* nation appears first in history, it seems, in the days of Tamerlane. Deguignes (tom. v, p. 41) states:—"Pir Mohammed, the grandson of Tamerlane, who governed the provinces of Condoz, Baklan,

past the capital of Kabulistan,—bears an ancient name, which can be traced back more than seventeen centuries; for Ptolemy mentions the city of *Kaboura*,—*Kabur* being the original Persian name of it (Ritter, *l. c.* vol. v, p. 237).

Ebn Haukal (10th century) writes the name, *Kabul*. He states that the castle is in the possession of the Mussulmans, but the city is still in the power of the infidels. In the 10th century Kabul belonged, it seems, to the empire of the Samanides, but in the 11th and 12th centuries it was under the rule of the Ghaznevids.

Chinghiz khan's armies probably entered Kabul, although the Mohammedan authors do not expressly state it. We have seen (52) that Chinghiz was at *Beruan*, which is situated among the mountains north of Kabul.

The Chinese probably knew Kabul in the time of the T'ang (7th to 9th century). I am not however prepared to say, which of the kingdoms in the west, mentioned in the *T'ang shu*, could be identified with Kabul. The identifications of Ritter and Rémusat are unfounded.

It seems, that the list of the Si-pei-ti is the only instance of the mention of Kabul in the *Yüan shi*. I have never met with this name elsewhere in Chinese books.

哥疾寧 *K'o-dsi-ning = Ghizning, or Ghazna.*

150. *Ghiznin* or *Ghazna* is also a very ancient city, and was the capital of Zabelstan, a country contiguous to and south-west of Kabulistan. It was celebrated in the days of Ebn Haukal; and towards the end of the 10th century, it became the capital of the Ghaznevid dynasty.

Ghazna played an important *rôle* at the time of the Mongol invasion of Persia. It then belonged to the empire of Khovaresm shah, and Djelal-eddin rallied his forces in Ghazna (see above, 52). It was destroyed in 1222, but was afterwards rebuilt. In the 14th century, the Mohammedan authors mention Ghazna repeatedly.

I have stated above (86), that according to the Mohammedan records, the countries of Badakhshan, Kabul and Ghazna seem to have been subject to Persia in the Mongol period. The map however assigns them to the middle empire. They may have been for a time in the possession of the Chagatai branch, the princes of which often passed the Djihun, invading the Persian territories.

Kabul, Ghazna and Kandahar, received orders in 1397 to attack the *Uganis* or *Aghuans*, who dwelt among the mountains of Solimankuh."

III. Countries and Places in the Empire of Yue-dsu-bu (Uzbek).

金察 *Kin-ch'a = Kipchak.*

151. The name of *Kin-cha* has been applied by Chinese authors, since the year 1223, to the land of the *Kipchaks* or *Desht Kipchak*, as the Mohammedan authors term the tract of land situated north of the Black sea, the Caucasus mountains, and the Caspian sea, and covered by vast steppes. The *Bibl. Orient.* translates the Persian word *desht*, by "campagne déserte, où il n'y a ni villes ni villages."

The Kipchak nation belonged to the great stock of the Turks, whose progenitor, according to the Mohammedan authors, was the famous *Oghuz khan*. Rashid-eddin gives the following legend of the origin of the Kipchaks (Berezin, vol. i, p. 18) :—

"Oghuz khan, having been defeated by the tribe of *Itbarak*, was forced to retire to an island between two rivers. At that time it happened, that a woman whose husband had been killed in the battle, was delivered of a child in the hollow of a large tree. When Oghuz heard of this he said,—'As this woman has no husband, I shall adopt her son.' The child received the name *Kipchak*, which is derived from the Turkish word *kubuk* meaning 'a tree worn hollow by decay.' All the people of Kipchak are descended from this adopted son of Oghuz. After seventeen years had elapsed, Oghuz succeeded in gaining the superiority over the Itbarak. He conquered Iran and returned to his original country; and afterwards when the Itbarak revolted, Oghuz settled the Kipchak between their country and the river Jaik. Since that time the Kipchaks have remained both in summer and winter in the same country."

It is a curious fact that the people here spoken of were known to their neighbours by quite different names. In the Russian annals they are always termed *Polovtsy;* for as to the identity of these and the Kipchaks of the Mohammedan writers, there can be no doubt. The Polovtsy are first mentioned in Russian history in the middle of the 11th century, as the southern neighbours of Russia, inhabiting the steppes north of the Black sea, the Caucasus, etc. (Karamzin, vol. ii, p. 67). Before that time these tracts had been occupied by the *Pechenegs*. The Polovtsy are described as an audacious, nomadic people and skilful horsemen. The Russians were frequently at war with them, and it was only when the Polovtsy had been defeated by the Mongols, that they made a league with the Russians against them (Karamzin, vol. iii, p. 228).[296]

[296] D'Ohsson (tom. i, p. 388) states, that *Polovtsy* in Russian means

In the Hungarian and Byzantine annals, the same people bear the name of *Kumans.*[297] Their country was known also to Marco Polo under the name of *Comania* (*M. Polo*, vol. i, p. 50; vol. ii, p. 421). Carpini states, pp. 742, 743 :—

"Ivimus autem per totam terram *Comanorum*, quæ tota est plana, et habet quatuor flumina magna: primum *Neper* (Dnieper) appellatur, juxta quod, ex parte Rusciæ, ambulabat Corenza (a Mongol general), et ex parte alterâ, per illa campestria, Mauci, qui major est quam Corenza; secundum *Don*, super quod ambulat quidam princeps qui habet sororem Bati in uxorem, qui Cartan appellatur; tercium *Volga*, istud flumen est valdè magnum, super quod vadit Bati; quartum *Jaec* appellatur (see above), super quod millenarii duo, unus ex unâ parte fluminis et alter ex alterâ parte, vadunt."

On p. 747 in Carpini's narrative, we read :—

"Comania verò habet ab aquilone, immediatè post Rusciam, Morduinos,[298] Bileros id est magnam Bulgariam, Bascartos id est magnam Hungariam (Bashkirs;—see above)."

Rubruquis, p. 246 describes his journey through the steppes of the Comans, in the following terms :—

"Et tendebamus recte in orientem ex quo eximus predictam provinciam *Gasarie*, habentes mare ad meridiem et vastam solitudinem ad aquilonem, que durat per xxx dietas alicubi in latitudine, in qua nulla silva, nullus mons, nullus lapis, herba est optima. In hac solebant pascere *Commani*, qui dicuntur *Capchat*." (Thus Rubruquis identifies the Commans and Kipchaks.)

Haithon the historian also has a chapter on the kingdom of the *Comans*.

The Mongols came first in contact with the Kipchaks in 1223, when Subutai with his army crossed the Caucasus (see above); but it was only about twelve years later their country was subdued, when Batu undertook his famous expedition against the nations north of the Caspian and Black seas. After Batu had returned from Hungary, in 1242, he established his residence in Desht Kipchak near the lower Volga.[299]

"inhabitants of the plain;" but he is wrong, for the name has no meaning in Russian; and Polovtsy can by no means be derived from *polye*, "field" as D'Ohsson intimates.

[297] D'Ohsson (tom. i, p. 338) derives the name from the river *Kuban*, which empties into the Black sea; but it seems more reasonable to bring the Kumans into connection with the large river *Kuma*, discharging into the Caspian.

[298] The *Mordwins* still live on the Volga.

[299] This capital of the Golden Horde was known in the middle ages under the name of *Sarai*, and is mentioned in the Russian annals, as well as by mediæval travellers and Mohammedan geographers, *e. g.* Ibn Batuta (middle of the 14th century) and Abulfeda (beginning of the 14th century). *Sara* is one of the principal stations in Pegoletti's itinerary to Cathay (Yule's *Cathay*,

152. Ye-lü Ch'u-ts'ai, who accompanied Chinghiz to western Asia, is the first Chinese author, who mentions the country of the Kipchaks, terming it 可弗义 *K'o-fu-ch'a.*[300] He describes it also as a country without cities, consisting of vast plains, where many horses and much cattle are bred (see my *Notes on Chin. Med. Trav.* p. 118).

The *Yüan ch'ao pi shi* calls the Kipchaks, *Kibcha* (see above, 63). The *Yüan shi* always spells the name 金察 *Kin-ch'a*, as it is rendered on the ancient map. I need not here repeat the accounts given in the *Yüan shi* and the *Yüan ch'ao pi shi* respecting the conquest of Kin-ch'a by the Mongols (see Part V).

The Chinese annals *Kang mu, sub anno* 1237, state concerning *Kin-ch'a*, that this country is distant thirty thousand *li* from China. In summer the nights there are extremely short; soon after the sun has set it rises again. There are fine horses; and wealthy people breed a large number of them. The people are skilful in working leather and metal. They are manly, valiant, strong and impetuous. They have blue eyes and red hair.[301]

In the biography of 土土哈 *T'u-t'u-ha* (*Yüan shi*, chap. cxxviii), who was a Kipchak prince, and general in Kubilaï khan's army, the following somewhat obscure accounts are given of Kin-ch'a:—

"The ancestors of the people of *Kin-ch'a* originally dwelt north of 武平 *Wu-p'ing*, on the river 折連 *Dje-lien*, near the mountain 按答罕 *An-da-han.*[302] 曲出 *Kü-ch'u* emigrated to the north-west, to the mountain called 玉里伯里 *Yü-li-bo-li*, and this name was then adopted for the reigning family. K'ü-ch'u had a son *So-mo-na*, who also had a son *I-no-sze*. They were all hereditary princes of Kin-ch'a. When Chinghiz was at war with the *Mie-li-ki* (Merkits), their prince 火都 *Huo-du* fled to Kin-ch'a.[303]

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p. 287). Carpini, who was at the court of Batu in 1246, and Rubruquis, in 1254, both speak of the residence of Batu; but the name *Sarai* does not occur in their narratives. Marignolli passed the winter of 1339 at the court of Uzbeg khan of the Kipchaks, but the name Sarai seems to have been unknown to him also (Yule's *Cathay*, p. 321). M. Polo states, (vol. i, p. 4), that the residences of Barca Kaan (a son of Djuchi, in 1257—1265) were at *Sara* and *Bolgara*. Towards the end of the 14th century, *Sarai* is enumerated among the Latin bishoprics in Asia (Yule's *Cathay*, p 172). For further particulars on Sarai and its position, see Yule's *M. Polo*, vol. i, pp. 5, 6.

[300] Edrisi writes *Kifchak* (Ritter, *l. c.* vol. v, p. 702).

[301] Evidently the Kipchaks are here confounded with the Russians.

[302] All these names are unknown to me.

[303] Rashid-eddin states, that *Khudu*, a Merkit prince attempted to flee to Kipchak, but was slain by the Mongols (Berezin, vol. i, p. 73). In the biography of Subutai (*Yüan shi*, chap. cxxi) also it is stated, that 雹都 *Huo-du*, chief of the Merkits fled to the Kin-ch'a. He was pursued by Su-bu-tai, who vanquished the Kin-ch'a at 玉峪 *Yü-yü*. The Mohammedan

Chinghiz demanded his delivery, which was refused, when the emperor gave orders to attack Kin-ch'a. When I-no-sze became old, his realm was troubled by insurrections; and his son *Hu-lu-su-man* then determined to send envoys to Chinghiz, and offered his submission. *Meng-k'o* (Mangu,—subsequently emperor) received orders to occupy Kin-ch'a. Hu-lu-su-man's son *Ban-du-ch'a* surrendered with his people. Black-mare's milk—which was very pleasant to the taste—used to be sent from Kin-ch'a to the court of China; whence the Kin-ch'a were called also 哈剌赤 *Ha-la-ch'i.*[304] *T'u-t'u-ha*, whose biography is found in the *Yüan shi*, was a son of Ban-du-ch'a. He died in 1279. His son *Chuang-wu-r* who died in 1322, was also a renowned general; and his son *Yien-tie-mu-r* (see his special biography in chap. cxxxviii) was a minister of China 1328—1333. *Yien-tie-mu-r's* brother *San-tun*, was also minister; as was San-tun's son likewise.

The name Kin-ch'a appears also in the biographies of the following persons, who belonged to that people.

Chap. cxxiii,—*Shan-ch'e ba-du-r.* Chap. cxxxi,—*Wun-djo-du.* Ibid.,—*Bo-tie-mu-r.* Chap. cxxxiii,—*Wan-djo ba-du-r.* Ibid.,—*Si-du-r.* His father's name was *T'o-sun.*

阿羅思 *A-lo-sze = Russia.*

153. *A-lo-sze* is the Chinese mode of spelling the Mongol *Oros*, by which name the Russians are known to the Mongols even to the present day.

The name of Russia is not of very ancient origin. We learn from the Byzantine authors, A. D. 865, that under the reign of the emperor Michael III, a heathen people, previously unknown, arrived from Scythia at the Bosphorus in two hundred ships and besieged Constantinople. The name of this people was *Ross.* The emperor Michael, who at that time was at war with the Arabs in Asia, made haste to return to deliver his capital; and the fleet of the *Ross* sailed away. Subsequently Greek missionaries were sent among the Ross, many of whom were converted.[305] It is a remarkable fact, that about the same time, the name of *Ross* first appears in the Russian annals.

The oldest Arabic author who mentions the Russians, is *Ibn*

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authors also record the appearance of the Merkits conducted by their chief, Tuk Togan, north of the Aral lake, and their pursuit by the Mongols (D'Ohsson, tom. i, p. 208).

[304] *Khara* in Mongol means "black." Rashid-eddin terms one of the five principal tribes of the Turks,—to which the Kipchaks also belonged,—*Kalladj.*

[305] Compare *Photii Epistolæ* (Photius, 891), and Sophocles' "Greek Lexicon of the Roman and Byzantine periods."

Fozlan, who accompanied an embassy from the court of Bagdad to Bulgar, A. D. 921. He gives detailed and very curious accounts of them (compare Fraehn's *Ibn Fozlan*. St. Petersburg, 1823, p. 5), stating among other things, that he never saw people of more perfectly developed form; they were tall as palm trees, and of ruddy countenance; but at the same time the most uncleanly people[306] that God had created, drunken and frightfully gross in their manners.

The *Ross* or Russians are spoken of by all the Arabic and Persian geographers and historians, from the 10th to the 14th century (Massudi, Edrisi, Ibn Alverdi, Yacut, Abulfeda, etc.); and of course also by Ala-eddin, Juveni and Rashid.

We have seen from the records of the Russian, Mohammedan, Chinese and Mongol chronicles (see above, Part IV), that the Mongols first became acquainted with the Russians in 1223, when Subutai invaded the countries north of the Caucasus. The Russians were then defeated, together with the Kipchaks on the river *Kalka*. Fourteen years later, Russia was again attacked by the Mongol armies (Part V). They appeared on the eastern frontier, ravaged northern Russia in the winter of 1237—1238, and in 1230 devastated the southern principalities. After returning from Hungary in 1242, Batu established his residence near the lower Volga. His dynasty is known to the Mohammedan authors under the name of *Desht Kipchak*, whilst the Russian annals term it the *Golden Horde*. Russia was for more than two hundred years under its yoke. The Russian grand-dukes and all her other princes were forced to repair to the court of the Golden Horde to pay homage. Whoever attempted to disobey, or incurred the khan's displeasure, met with death at the hands of the Mongol executioner. Thus *e. g. Michael* of *Chernigov*, who refused to bow before the Mongol idols, was executed in the ordo of Batu khan in 1246. The tragedy is reported with some detail in the Russian annals, as well as by Carpini (621), who speaks as an eye-witness. Another cruel execution of a Russian prince, is recorded under the reign of Uzbeg khan. After the death of the grand-duke Andreï of Vladimir, two Russian princes, Michael of Twer and Yury of Moscow disputed the throne. Yury was defeated by Michael, and the wife of the former, being a sister of Uzbeg, was made prisoner and died soon after. Michael was then summoned

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[306] Rassmussen in his pamphlet, *De Orientis commercio cum Russia et Scandinavia medio ævo*, 1825, translates many details respecting the Russians, from Arabic and Persian mediæval authors. One curious passage there, about the uncleanness of the Russians reads as follows (p. 35):—"Omnium sunt sordidissimi: neque se mundant post alvi dejectionem, neque post pollutionem vel coitum se abluunt, ac si asini errantes essent."

to appear before the khan, who at that time was travelling towards Derbend. Michael obeyed and was cruelly put to death in 1319. His son Dmitry was executed in 1325.

154. After Russia was subdued by the Mongols, the grand-duke *Yaroslav II* of *Vladimir* (1238—1247) appeared in person before Batu, who acknowledged his supremacy over the other Russian principalities. Yaroslav sent his son Constantine to Karakorum to the Great khan Ogotai. Constantine returned in 1245, after having been absent for two years (Russian annals ;—Karamzin, vol. iv, pp. 31, 295). A few years later, Yaroslav was again summoned to repair with his family to Batu's ordo, and then forced to proceed to the court of the Great khan, to exculpate himself on account of some denunciations brought against him by one of the Russian noblemen. After an audience with Kuyuk khan, Yaroslav was allowed to return. He died on his way home however, in September, 1246, and his body was carried to Vladimir.[307]

[307] Carpini, who spent more than three months (July to November, 1246) at the court of Kuyuk khan near Karakorum, saw Yaroslav there. According to this traveller, the grand-duke had been poisoned, and died at the court during his own residence there. He writes, pp. 761, 762:—"Eodem tempore mortuus fuit *Ieroslaus*, dux magnus in quâdam parte Rusciæ quæ *Susdal* nominatur. Hic modò fuit vocatus ad matrem Imperatoris, quæ dedit ei manducare et bibere, quasi pro honore, de manu ipsius ; et reversus est ad hospicium incontinenti, et infirmatus, et fuit mortuus post septem dies, et totum corpus ejus miro modo factum est glaucum ; quarè credebatur ab omnibus quòd potionatus esset ibidem, ut suam terram liberè et plenariè possiderent: et ad hoc est argumentum quòd incontinenti, nescientibus hominibus suis qui erant ibi, misit nuncium festinanter in Rusciam ad *Alexandrum* filium ejus ut veniret ad ipsam, quià vellet ei terram patris donare; qui ire noluit, sed remansit: et medio tempore dabat litteras ut ipse veniret ut terram patris sui haberet. Credebatur tamen ab omnibus quòd eum occideret si veniret, vel etiàm perpetuò captivaret." *Susdal* is the name of a city north of Vladimir. It was in ancient times the capital of a considerable principality, belonging originally to the house of Yaroslav, grand-duke of Vladimir. Carpini therefore is correct in calling him duke of Susdal. As to Yaroslav's son Alexander, mentioned by Carpini, the latter speaks of the Russian hero *Alexander Nevsky*, thus named on account of the victory he gained over the Swedes in 1240 on the river Neva. Yaroslav is again mentioned in Carpini's narrative, p. 771, in the chapter—*De testibus qui in terrâ Tartarorum nos invenerunt.*—"In reversione in terram *Biserminorum* (see above, 41), in civitate *Lemfinc (?)* invenimus Ugneum, qui de mandato uxoris *Ieroslai* et Bati ibat ad prædictum Ieroslaum, et Cocteleban et omnem societatem ejus. Isti omnes reversi sunt in terram Susdalensium in Rusciâ; a quibus poterit, si oportuerit, veritas inveniri. Apud *Mauci (?)* invenerunt socios nostros qui remanserant dux Ieroslaus et societas ejus; etc." On p. 749 he alludes to the journey of some Russians, who went through the country of the Kankalis to join Yaroslav (see above, 64):—"Post hoc terram intravimus Cangitarum quæ magnam habet in pluribus locis penuriam aquarum; in quâ etiàm homines pauci morantur propter aquæ defectum: undè homines Ieroslai ducis Rusciæ, qui in terram Tartarorum ibant ad ipsum, fuerunt, propter sitim, plures mortui in illo deserto."

Alexander Nevsky, prince of Novgorod, the son of Yaroslav, was also obliged to undertake the painful journey to the Great khan; in which he was accompanied by his younger brother Andreï. They returned in 1249, and three years later he ascended the throne of Vladimir.

The subjection of Russia to the khans of the Golden Horde, referred chiefly to the tribute the Russians were obliged to pay. At first the khans farmed out the tribute, due by the Russians, to some Mohammedan merchants (called Bussurman merchants in the Russian annals;—Karamzin, vol. iv, p. 329), and the tax-gatherers collected the dues with the greatest rigour and cruelty. They were assisted by Mongol officers, called *baskaks* in the Russian annals (*l. c.* vol. iv, p. 97).[308] In the 14th century, the Russian princes succeeded in obtaining permission to collect the taxes themselves, and to carry the tribute directly to the khans. Besides the heavy taxes, there was another duty imposed on them by the Mongols. At the demand of the khan, they had to supply troops and fight against the enemies of the Mongols. We shall see further on, that in the time of Kubilaï, a division composed of Russian soldiers was met with even in China. As to the administration of Russia however, and its political relations, the Mongols did not change the then existing state of things. The grand-dukes and princes were allowed to rule their people as they liked, and the Christian religion was also respected. Karamzin gives (vol. iv, p. 179) the translation of a *yarligh*, or written patent, granted in the beginning of the 14th century to the Russian clergy, by Uzbeg khan. This patent exempted the clergy from taxation.

After the death of Uzbeg (1312—1342), the dynasty of the Golden Horde began to decline. The first attempt to profit by this debility of the Mongols was made by *Dmitry*, grand-duke of Moscow, who in 1380 defeated the khan *Mamai* with great slaughter. This memorable battle, known in Russian history as the battle of the "field of snipes" *(kulikowoye polye)*, was fought at the place where the river *Nepriavda* discharges into the *Don*. Dmitry received the surname *Donskoi* on this account. This brilliant victory did not break down the Mongol power however; for a few years later, Mamai's successor *Tokhtamysh* unexpectedly appeared at Moscow, and sacked and burnt the capital, when Dmitry again became a vassal of the Mongols. At the end of the 14th century, the khanate of the Golden Horde experienced a serious shock by the invasions of *Tamerlane*; and in 1395, when pursuing Tokhtamysh, Tamerlane advanced as far as *Yelets* (near the river

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[308] Compare Carpini, p. 703—"*Baschatos* sive præfectos suos ponunt in terrâ illorum quos redire permittunt; etc."

Don, in the province of Orel), devastating the land adjacent to the Don. After the conqueror left Russia, the grand-duke *Vassily I* (1389—1425), refused to Tokhtamysh the payment of tribute; but he had under-estimated the power of the khan, who in 1408 arrived with a great host, and imposed a heavy fine on Moscow as indemnity. In the first half of the 15th century, the Mongol empire of Kipchak was much weakened, owing to the rise of two other khanates, viz. those of *Kazan* and the *Crimea*. The subjection of Russia to the Golden Horde then became quite nominal, and the tribute paid to the khans consisted merely in presents sent from time to time by the grand-dukes, who were on good terms with the Horde of the Crimea. The Mongol dynasty of Kipchak, or the Golden Horde, was destroyed in 1502, by *Mengli Girei*, khan of the Crimea; and in Russian history this date marks the end of the period designated by the name "the Mongol yoke."

155. It seems that Russia was unknown to the nations of eastern Asia before the Mongol period. In the Mongol and Chinese annals, the Russians are first mentioned after Subutai's invasion of southern Russia, in 1223. The *Yüan ch'ao pi shi* terms Russia or the Russians *Orus*, as they are called even now by the Mongols. The Chinese of the Mongol period write 阿羅思 *A-lo-sze*, sometimes also 斡羅思 *Wa-lo-sze* or 兀魯思 *U-lu-sze*. All these names evidently render the Mongol appellation *Orus*.[309] In the *Yüan shi*, the name of Russia is frequently met with. Regarding the Chinese and Mongol accounts of the conquest of Russia, I beg to refer to Parts IV and V of my paper, where all the information on this subject has been collected. I may notice here some other instances, where the Russians are spoken of in the *Yüan shi*.

We read in the Annals, *sub anno* 1253, that the emperor Meng-k'o ordered 必闍別兒哥 *Bi-dje Bie-r-k'o* to be sent to *Wu-lo-sze* (Russia), in order to take a census of the people.[310]

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[309] I may observe, that no word in Mongol begins with the consonant *r*. Thus the Mongols in rendering the word *Russ*, prefix a vowel to the name.

[310] This statement seems to be corroborated by the Russian annals, in which it is recorded (but a few years later), that in 1257, Mongol officers arrived at Suzdal, Riazan and Murom, to take a census of the people, and special officers were appointed to collect the taxes, when none but the clergy were exempt. In the year 1259, two Mongol officers, named *Berkai* and *Kassachik*, arrived with their families and many Mongols on the banks of the river Volkhov, in order to number the Russian people. This measure caused a revolt in Novgorod (Karamzin, vol. iv, pp. 71, 74). I am inclined to identify the *Berkai* of the Russian annals with the *Bi-dje Bie-r-k'o* in the *Yüan shi*. *Bi-dje*, properly 必闍赤 *Bi-dje-ch'i*, is a Mongol title, which may be translated by "secretary." The dictionary appended to the new edition of the *Yüan shi* (see above,—Introduction) explains the term by

It is an interesting fact, recorded in the *Yüan shi*, that there was in the beginning of the 14th century, a settlement of Russians near Peking. We read in the Annals, *sub anno* 1330, chap. xxxiv, that the emperor *Wen-tsung* (Tob timur,—1329—1332,—the great-grandson of Kubilaï) formed a regiment composed of *U-lo-sze* or "Russians." This regiment, being commanded by a *wan-hu* (commander of ten thousand of the third degree, received the name 宣忠兀羅思扈衛親軍 *Süan-chung U-lo-sze hu-wei ts'in-kün*, "the ever faithful Russian life-guard." It was placed under the direct control of the council of war. Further on in the same chapter it is stated, that one hundred and thirty *king* of land, north of 大都 *Ta-tu* (Peking), was bought from the peasants and allotted to these Russians, to establish a camp and to form a military colony. We read again in the same chapter:—"They were furnished with implements of agriculture, and were bound to present for the imperial table, every kind of game, fish, etc. found in the forests, rivers and lakes of the country where their camp was situated."[311] The Russian regiment is again mentioned in chap. xxxv.

In chap. xxxvi of the *Yüan shi*, mention is made in three places, of Russian prisoners sent to the emperor of China.

In the year 1232, the prince 章吉 *Djang-gi* presented a hundred and seventy Russian prisoners, and received a pecuniary reward.[312] On the same page we read that clothes and corn were bestowed on a thousand Russians.

In the same year the prince 燕帖木兒 *Yen-t'ie-mu-r*[313] presented fifteen hundred Russian prisoners to the Chinese emperor;

寫字人. In modern Mongol, "a letter," is *bichik*. In Rashid's "History of the Mongols," we often meet with the term *bitikchis*. D'Ohsson (tom. iv, pp. 371, 380, 381, 410) translates it by "officiers du département des finances." According to the *Yüan shi*, chap. lxxxv, there were in the *hu-pu* or "board of revenue," seven *bi-dje-ch'i*. *Cf.* chap. xcix, on the emperor's body-guard. There the emperor's secretaries are called *bi-dje-ch'i* (天子主文史者曰必闍赤).

[311] It seems from this latter statement, that the Russian colony was established somewhere about the southern border of Mongolia.

[312] The prince *Djang-gi* here, is probably the *Djinkshi* of the Mohammedan authors, noticed as khan of the middle empire between 1330 and 1333. He reigned only a short time (see D'Ohsson, tom. iv, Geneal. tables). The khans of the middle empire were often at war with the khans of Kipchak, and thus it is not unlikely, that Russian soldiers had been made prisoners by Djinkshi.

[313] The genealogical table of Chinghiz khan's house in the *Yüan shi*, chap. cvii, mentions a prince Yen-t'ie-mu-r, a descendant of Kubilaï khan's brother *Bo-ch'o*. It is however difficult to understand how he should have captured one thousand five hundred Russians. The annals speak probably of another prince of this name.

and another prince, 阿兒加失里 *A-r-gia shi-li*, presented thirty.

Finally, in the biography of *Bo-yen* (chap. cxxxviii), he is stated to have been appointed (in 1334) commander of the emperor's life-guard, composed of *Mongols*, *Kin-ch'a* (Kipchaks) and *Russians*.

Such is all I have been able to find in the *Yüan shi* regarding the Russians. It seems that no one of the Russians in the service of the Mongol emperors in China has played a conspicuous part. At least among the biographies in the *Yüan shi* the Russians have no representatives, whilst many distinguished statesmen and captains of the Mongol-Chinese empire were from the Kipchaks, Kankalis, Alans and other nations subdued by the Mongols.

I am not aware, that any mention is made of Russia by Chinese authors of the Ming period. All that we know of the intercourse between Russia and China during that dynasty, is the narrative of a Russian embassy to the Chinese court, in the beginning of the 17th century. In 1619, the prince *Kurakin*, Russian military governor of Tobolsk, sent two Cossacks, *Ipashka Petlin* and *Petunka Kusselep*, from Tomsk through Mongolia to Kalgan and Peking. Compare Fisher's "History of Siberia," 1774 (in Russian), p. 267; and Bergeron, *Traité des Tartares*, p. 106.

It does not come within the scope of this paper, to record the political and commercial intercourse between Russia and China during the present dynasty. An interesting pamphlet on this subject was published a few years ago by my friend and colleague Dr. J. Dudgeon. I may therefore confine myself to the remark, that the present Chinese official name for Russia is 俄羅斯 *O-lo-sze*; being in fact the same as in the Yüan period, only represented by other characters.

不里阿耳 *Bu-li-a-r* = *Bulgar*.

156. Both copies of the map write this name 不思阿耳 *Bu-sze-a-r* and place it east of Russia; but the list in the Si-pei-ti has *Bu-li-a-r*, which is the correct reading; for it is evidently *Bulgar* to the east of the Volga that is meant. According to the *Bibl. Orient.* the Mohammedan authors call Bulgar also *Bular*.

Bulgar[314] was the name of a rich country situated on the Volga and the Kama. The capital of it had the same name. It was a renowned emporium in the middle ages, and also a centre of Mohammedan learning. The Bulgars seem to have been a mixture of Fins, Slavs and Turks (Fraehn). The ruins of the ancient city of Bulgar still exist, and have been the subject of learned investigation

[314] The name of the river Volga and Bulgar are probably the same word. See *Bibl. Orient.* p. 305, art. "Etil," where it is stated, that some oriental geographers call the Volga, "Bulgar."

by several Russian scholars (Pallas, Fraehn, Erdmann, etc.). In 1853, the Russian orientalist Prof. Berezin published an interesting pamphlet,—"Bulgar on the Volga" (in Russian), in which detailed accounts are given of the antiquities of the place. The remains of ancient Bulgar are found on the spot, where now the village of *Uspenskoye* (called also *Bolgarskoye*) stands, in the district of Spassk, and province of Kazan. This village is six *versts* (four English miles) distant from the Volga, on the east, and one hundred and twenty-five *versts* from Kazan. Prof. Berezin proves, that there is no reason for the view, suggested by some authors, that the city of Bulgar in the 10th century was not on the same site as the Bulgar of the time of the Mongols. According to a work published in the Tatar language, in the first half of the 16th century, and translated by Berezin, Islam penetrated to Bulgar at an early date,—in the 9th year of the Hegira. Massudi (A. D. 943) however states, that the king of Bulgar embraced Islam in the beginning of the 10th century (Klaproth, *Magaz. Asiat.* tom. i, p. 270). Col. Yule thinks, that the Bulgars, before they had been converted to Islamism professed Christianity; but the above-mentioned Tatar work, translated by Berezin states, that the Bulgars were fire worshippers before they embraced Islamism.

Bulgar is of course mentioned by the Russian chroniclers at an early date of Russian history; *i. e.* in the 10th century, and also by the Byzantine authors; but the fullest ancient account of Bulgar which we possess, is that of *Ibn Fozlan*, an Arabic writer, who accompanied an embassy from the court of Bagdad to Bulgar, A. D. 921 (compare Fraehn's translation of this narrative).

According to Ebn Haukal (10th century) and Edrisi (12th century), Bulgar was the limit of the countries towards the north, known to the orientals. Most of the old Arabic writers tell wonders of the cold and the brief summer nights in Bulgar. Peltry, wax, honey, hazel-nuts and Russian leather, formed the staple articles of trade. The last item derived from Bulgar the name which it still bears all over Asia (Yule's *M. Polo*, vol. i, p. 6).

According to the Mohammedan authors (D'Ohsson, tom. i, p. 345), the Mongols first invaded the country of Bulgar at the end of 1223 (under Subutai;—see above, 58); and in 1236, when a new Mongol expedition had been directed to the west, Subutai was again detached with a division to sack the city of Bulgar, when the country submitted (D'Ohsson, tom. ii, p. 111). Colonel Yule states (*l. c.* vol. i, p. 7) that Bulgar was first captured by the Mongols in 1225; but he does not say whence his information is derived. Prof. Berezin, in the afore-mentioned pamphlet (p. 61), mentions a strange Arabic inscription very frequently met with, not only among the ruins of Bulgar, but also in some other places

in the province of Kazan. This inscription reads جبارغ جبّور meaning literally, *adventus oppressionis*. Berezin thinks, that this inscription is an allusion to the Mongol invasion. The anagram of the Arabic letters converted into numbers gives the year 623 of the Hegira, or A. D. 1226. It does not appear however, from the Mohammedan records above quoted, that the Bulgars had been troubled in that year.

Berezin states further (p. 63), that all the ruins of Bulgar belong to the Mohammedan period (10th to 15th century), and that the most ancient inscriptions found there cannot be traced back earlier than the Mongol invasion. The same writer proves also, that Bulgar even in the days of the Mongols, had preserved its importance as a place of trade and a centre of Mohammedan learning.

Carpini, in his narrative, mentions the Bulgars three times (pp. 677, 708, 747) and always under the double name of "*Bileri* id est *magna Bulgaria*."[315]

Rubruquis, p. 252, states:—"Post istos est *Etilia* (Volga), que est major fluvius quam unquam viderim, et venit ab aquilone, de *majori Bulgaria* tendens ad meridiem, etc."

M. Polo (*l. c.* vol. i, p. 4) states, that Barca Kaan (see note 299) was accustomed to reside at Sara and *Bolgara*.

The well-known Arabian traveller Ibn Batuta visited Bolgar in the middle of the 14th century, in order to witness with his own eyes the shortness of the northern summer nights. North of Bulgar was the land of *darkness* (Yule's *Cathay*, p. 401).

In the *Yüan ch'ao pi shi*, the name of Bulgar is rendered by *Bular* (see above). In the *Yüan shi*, Bulgar is only once mentioned, *i. e.* in the list of the Si-pei-ti. The *Yüan shi* does not record the capture of Bulgar by Su-bu-tai.

The city of Bulgar seems to have perished early in the 15th century, after which Kazan practically took its place (Yule, *l. c.* vol. i, p. 7).

撒吉剌 *Sa-gi-la = Solgat.(?)*

157. The identification of this name presents some difficulty. On the map it is placed west of Russia. The only place, the

[315] By Little Bulgaria in the middle ages, was understood, the country inhabited by those Bulgars, who had emigrated to the Danube in the 5th century. The Russian annals state, that in the second half of the 10th century, *Swiatoslav* invaded the country of the Bulgars on the Danube. The Catalan map applies the name *Bulgaria* to the country south of the lower Danube, which even now bears the same name. Opposite Bulgaria, north of the Danube, we read on the Catalan map the name *Burgaria*, whilst the original country of the Bulgars, east of the Volga is termed there *Borgar*.

mediæval name of which has some resemblance to Sa-gi-la is *Solgat*, which was an ancient appellation for the Crimea, on the south-eastern coast of which *Soldaya* or *Soldachia* was situated in the 13th century, the great port of intercourse with what is now Russia. The place was called *Sudak* by the orientals. It was taken by the Mongols in 1223.

The name of Sa-gi-la has also some resemblance to *Sarkel*, which was an ancient fortress in the country of the Khazars, according to Constantine Porphyrogenitus, who wrote in the 10th century; but Sarkel is not noticed by the writers of the 13th and 14th centuries.

阿蘭阿思 *A-lan A-sze* = *Alans* or *Ases*.

158. This name is intended for the people termed "*Alani* sive *Assi*" by Carpini (p. 709), and "*Alani* sive *Aas*" by Rubruquis.

The *Alans*, a people settled north of the Caucasus, have been known to the Roman and Greek authors since the beginning of our era. They are mentioned in the 1st century by Suetonius, Lucan and Pliny. The Greek author Lucian (2nd century) terms them *Alanoi*. Ammianus Marcellinus (4th century) gives a full account of the Alans. Vologesus, king of the Parthians, is reported to have called upon Vespasian (A. D. 69—79) for assistance against this people. Arrian, when he was governor of Cappadocia (2nd century), waged war with the Alans. In the 5th century, the Alans accompanied the Sueves and Vandals, when they invaded Gaul.

In the second half of the 6th century, Zemarchus the Cilician, who had been sent by the Byzantine emperor Justin to the Turks, on his way back visited the chief of the Alans (Yule's *Cathay*, p. clxvi). Constantine Porphyrogenitus (middle of the 10th century) states, that the country of the Alans is situated beyond (*i. e.* north of) the Caucasus mountains (Klaproth, *Asia Polyglotta*, p. 85). Klaproth in his *Magaz. Asiat.* tom. i, pp. 258—302, gives a translation of Massudi's (A. D. 943) account of the Caucasus and the countries on the confines of the Black sea and the Caspian. Massudi calls the Alans,—*Lan*, and their residence—*Maas*. He states, that these people in former times were idolaters. They embraced the Christian religion in the time of the Abbaside califs; but in 320 of the Hegira (beginning of the 10th century), they repudiated this faith and drove away the bishops sent by the emperor of Constantinople. The same author tells us, that in the middle of the country of the Alans, among the Caucasus mountains, there is a fort, and a bridge spanning a large river. The fort is called the castle of the *Alan gate*. It was

built in ancient times by a king of Persia, to prevent the invasion of the Alans.[316]

In the Russian annals, the Alans are always termed *Yasy*. In A. D. 936, Swiatoslav is reported to have captured the city of Bielowej on the Don, belonging to the Khazars, and to have waged war with the *Yasy*[317] and the *Kassogy*. The Yasy are also spoken of by the Russian chroniclers of the 13th century, as a people near the Caucasus, beyond the river Terek (Karamzin, vol. iv, pp. 119, 355).

The Mongols, when they had passed the Caucasus in 1223, found the Alans living on the northern skirts of those mountains. Fifteen years later, the Alans became subject to Batu khan, after they had made a stout resistance to the Mongols. The Mohammedan historians, who report the expeditions against this people, call them indiscriminately *Alans* or *Asi* (D'Ohsson, tom. ii, pp. 619, 620).

Carpini and Rubruquis, as we have seen, also identify the *Alans* and *Asi*. The former mentions their settlements south of Comania (p. 748). Rubruquis (p. 246) says :—"In hac solebant pascere Commani, qui dicuntur Capthat; a Teutonicis vero dicuntur *Valani*, et provincia *Valania*. Ab Ysidoro vero dicitur, a flumine Tanay (Don) usque paludes Meotidis et Danubium, *Alania*." On p. 252 we read :—"Habebamus autem ad meridiem montes maximos, in quibus habitant, in lateribus versus solitudinem illam, *Cherkis* et *Alani*, sive *Aas*, qui sunt christiani et adhuc pugnant contra Tartaros." On. p. 243 Rubruquis says :—"In vigilia Pentecostes venerunt ad nos quidam Alani, qui ibi dicuntur Aas, christiani secundum ritum Græcorum, et habentes litteras grecas et sacerdotes grecos. Tamen non sunt scismatici sicut Greci, sed sine acceptione persone venerantur omnem christianum, etc."

M. Polo (vol. ii, p. 421) mentions *Alania* among the countries conquered by the Mongols; and in another place (vol. ii, p. 140), devotes a whole chapter to the history of the slaughter of certain Alans, who were Christians, and formed a corps in Kubilaï's army. This slaughter took place in the city of *Chinginju* (*Chang-chou fu* in Kiangsu).

Marignolli (middle of the 14th century) writes regarding the *Alans* (Yule's *Cathay*, p. 373) :—"They form at this day the greatest and noblest nation in the world, the fairest and bravest of

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316 Klaproth thinks that the Alan gate was at *Darion* on the river Terek, not far from mount Kazbek, where the great road from Tiflis to Russia now passes.

317 Deguignes (tom. iv, p. 344) tries to identify the Yasy, spoken of in the Russian annals, (misunderstood by him) with the Yazyges south of Lithuania.

men. 'Tis by their aid that the Tartars have won the empire of the east, and without them they have never gained a single important victory. For Chinguis Caan, the first king of the Tartars, had seventy-two of their princes serving under him, when he went forth under God's providence to scourge the world."[318]

Klaproth (*Asia Polyglotta*, p. 82) identifies the *Alans* or *Assy* (and the like) with the *Ossethi*, a people still found in the Caucasus, north of Georgia. He states, that they are known to the Georgians under the name of *Osi*. Vivien de St. Martin however, has adduced reasons against this identification; though he considers both tribes to have been originally members of one great stock of *Asi*, who by different routes and at times widely separated, severally found their way from central Asia to the region of the Caucasus. According to the same authority, the Georgians, who always distinguished between the *Alanethi* and *Ossethi*, still recognize a people of the former branch in the interior of the Abaz country (Yule, *l. c.* p. 317).

159. Col. Yule states (*l. c.* p. 316):—"The *Alans* were known to the Chinese by that name, in the ages immediately preceding and following the Christian era, as dwelling near the Aral, in which original position they are believed to have been closely akin to, if not identical with, the famous Massagetæ."

This statement, respecting the early knowledge possessed by the Chinese of the Alans, brought forward by Col. Yule, probably on the authority of Deguignes (tom. ii, p. 279), requires some elucidation and correction. I may be allowed to show on what facts Deguignes' identification is based. In the "History of the Anterior Han (B. C. 202—A. D. 25)," chap. xcvi, a realm 奄蔡 *Yen-t'sai* is spoken of, 2,000 *li* north-west of *K'ang-kü* (Samarcand;—see above, 141). The people of this country are stated to be nomades, and to resemble the people of K'ang-kü. It is further stated, that Yen-t'sai is situated on a great lake (澤, properly a marsh), with flat shores, which is called the Northern sea. In the "History of the Later Han (A. D. 25—221)," chap. cxviii, Yen-t'sai is again mentioned, and it is noticed there, that the name of the country had been changed to 阿蘭聊 *A-lan-ya* (Deguignes' *Alans*). In the "History of the Wei (386—558)," mention is made of a kingdom 粟特 *Su-t'e*, north-west of K'ang-kü, situated on a great lake, and anciently called *Yen-t'sai* and 温那沙 *Wen-na-sha*. I am unable to decide, whether these vague accounts

[318] As I shall show further on, Marignolli's statement about the prominent position of the Alans in the Mongol-Chinese empire, is fully corroborated by the *Yüan shi*; but he is mistaken as to the Alans in Chinghiz khan's service. As we have seen, the country of the Alans was only conquered under the reign of Ogotai.

of Yen-t'sai and the resemblance of the name *A-lan-ya* with *Alania* are sufficient to establish the identity of these names. At any rate it cannot be ascertained that the Alans were known to the Chinese by that name before the Christian era.

We learn from the *Yüan shi*, that during the Mongol period, the Alans were not only well known in China, but their nation furnished many able officers to the Mongol-Chinese empire. Several of them held high offices, or distinguished themselves as valiant captains. Among the biographies in the *Yüan shi*, more than twenty meritorious Alans, some of them of royal blood, have been immortalized, and besides these the names of many others are mentioned there.

They are generally termed 阿速 *A-su*, and sometimes also 阿思 *A-sze*. The name *A-lan* occurs there only once, viz. in the Si-pei-ti, where the name is coupled with *A-sze*, as it is on the map. As we have seen, the *Yüan shi* mentions the *A-su* first in the year 1223 (see above, 59).

I may give a list of the Alans, whose names appear in the biographies of the *Yüan shi*.

Chap. cxxxii,—杭忽思 *Hang-hu-sze* (the name is also written *Ang-ho-sze*). When the army of the emperor Ogotai had reached the country of the *A-su*, the ruler of it, named *Hang-hu-sze*, surrendered spontaneously; whereupon the emperor granted him the title 拔都兒 *ba-du-r* (bahadur), and a golden tablet of authority, confirming him as the ruler of his principality. Order was given also to form a regiment of a thousand men of the A-su people (for the life-guard of the khan). Hang-hu-sze had two sons, 阿塔赤 *A-t'a-ch'i* and 安法普 *An-fa-p'u;* the former of whom took service in the emperor's life-guard. Hang-hu-sze, after he had returned home, was slain in an insurrection, and his widow 外麻思 *Wai-ma-sze* was then placed at the head of the government. She put on armour, quelled the riot, and handed over the power to her son *An-fa-p'u*.

Hang-hu-sze's eldest son *A-t'a-ch'i*, whose biography is found in chap. cxxxv, was a valiant captain under Mangu and Kubilaï, and distinguished himself in China in the war against the Sung. He had a son named *Bo-tu-r*, who was the father of *O-lo-sze*, who had two sons *Du-dan* and *Fu-ding*. All these were officers in the Mongol army.

In chap. cxxxii, is also the biography of 玉哇失 *Yü-wa-shi*, another Alan, who distinguished himself as captain during the reign of Kubilaï. He was sent against the revolted princes in the north-west (Kaidu, etc.), and carried the Mongol arms as far as the country of *I-bi-r Shi-bi-r* (Siberia;—see above, 118). The

father of Yü-wa-shi, by name 也烈拔都兒 *Ye-lie ba-du-r* (Elias bahadur,—also a prince it seems) had surrendered at the same time as Hang-hu-sze. Others of Yü-wa-shi's descendants are also mentioned.

In chap. cxxiii, we have the biography of the *A-su* (or Alan) 捏古剌 *Nie-gu-la* (Nicholas), who is stated to have surrendered at the same time as 也里牙阿速 *Ye-li-ya A-su* (probably the afore-mentioned Elias is meant) and others, thirty-eight in all. Nie-gu-la was with the emperor Mangu, when he waged war in China with the Sung. His son 阿塔赤 *A-t'a-ch'i* (this name occurs for the second time as an Alan) distinguished himself at the siege of Siang-yang fu, and in the expedition against the revolted prince *No-yen*. In the reign of the emperor Jen-tsung 1312—1321, he was still active. His son *Kiao-hua* held a high office at court.

In the same chapter we find also the biography of the *A-su* prince 阿兒思蘭 *A-r-sze-lan*. It is stated there that his city was besieged by Mangu, when A-r-sze-lan together with his son 阿散眞 *A-san-djen* repaired to the camp of that prince, and offered his submission. The Mongol granted A-r-sze-lan a patent to rule his people the A-su, but enrolled half of A-r-sze-lan's troops in his own life-guard, whilst the other half was left to him, to protect his dominions. *A-san-djen* remained with Mangu, but was subsequently killed, when fighting against the revolted troops of 闊兒哥 *She-r-k'o*.[319] Mangu ordered his body to be embalmed and sent back to his native country. When A-r-sze-lan had been informed of the death of his son, he said—"My eldest son is cut off in early life, before he could be of service to the emperor. There is my second son 捏古來 *Nie-gu-lai* (Nicholas), whom I offer to your Magesty." Nie-gu-lai was a valiant warrior, and took part in *Wu-liang-ho-dai's* expedition to 哈剌章 *Ha-la-djang* (the Karadjang of Rashid,—*Yünnan*). He left a son 忽兒都答 *Hu-r-du-da*, who, by order of Kubilaï accompanied 不羅那顏 *Bu-lu no-yen* when he was sent to the country of 哈兒馬某 *Ha-r-ma-mou.(?)* *Hu-r-du-da* had a son *Hu-du t'ie-mu-r*. All these served in the emperor's life-guard.

In chap. cxxxii, we meet with the names of three Alans, who surrendered when Mangu invaded their country, viz 拔都兒 *Ba-du-r* and his brothers 兀竹兒不罕 *U-tso-r-bu-han* and 馬塔兒沙 *Ma-t'a-r-sha*. The latter was in the avant-guard of the Mongol army when the city of *Mai-k'o-sze* was stormed (see above, 71).

[319] I do not know whether this is the name of a man or a country.

In chap. cxxxv, is the biography of 口兒吉 *K'ou-r-gi* (George) a native *A-su*, who served in the Mongol army during the reign of Kubilaï. His father *Fu-de-lai-sze* had been in the life-guard of the emperor Mangu. K'ou-r-gi's son was called 的迷的兒 *Di-mi-di-r* (Demetrius).

In the same chapter are the biographies of two other Alans, *Shi-la ba-du-r* and *Ch'e-li*, both in Kubilaï's army. The father of the latter, *Bie-gi-ba*, had accompanied the emperor Mangu in his expedition against the Sung.

We may conclude from some of the names of the Alans mentioned in the *Yüan shi*, that they were Christians.

The *Yüan ch'ao pi shi* terms the Alans—*Asut*, or *Asu*. I may observe, that Asut is the Mongol plural form of Asu.

撒耳柯思 *Sa-r-ko-sze* = *Circassia.*

160. There can be no doubt, that the name *Sa-r-ko-sze* is intended for the country of the *Circassians* or *Cherkess*, as they are termed by Rashid-eddin (Berezin, vol. i, p. 2). In the ancient Russian annals, they appear repeatedly under the name *Cherkassy*, a name still in use. Compare Karamzin, vol. iv, p. 304 (71), and p. 466 (the people of the Cherkassy afflicted with plague).

Rubruquis writes (p. 252):—"Habebamus autem ad meridiem montes maximos (Caucasus), in quibus habitant, in lateribus versus solitudinem illam, *Cherkis* et Alani, sive Aas, etc." Some of the manuscripts have *Cergis* or *Kerkis* instead of Cherkis.

Carpini speaks repeatedly of the *Kerkis*, but there is some confusion in his narrative as to the application of this name. On pages 678, 679 he seems to mean by Kerkis, the Circassians; for in recording the Mongol conquests in the west, he states:—"Chirpodan verò eodem tempore misit Occoday-can cum exercitu ad meridiem contra *Kergis*, quos in bello devicit . . . . . Quibus devictis, ad meridiem ivit contrà Armenos." But on page 659, where the same name again appears, the *Kirghiz* seems to be meant:—

"Chingis can . . . . . ivit in expeditione contrà Orientem (mistake for Occidentem) per terram *Kergis*, quos bello non vicit."

On page 708, where Carpini enumerates in a certain geographical order, the nations subdued by the Mongols, he associates the Kergis with the Bascart (Bashkirs), Sarracens, etc. not with the Alani and Georgiani.

花剌子模 *Hua-la-tze-mu* = *Khorazm.*

161. *Khorazm* is a name of very ancient date. It has been

applied for long centuries to the country south and south-west of lake Aral. The present khanate of Khiva covers for the greater part ancient Khorazm. The name of *Qarasmiah*, written in cuneiform characters, is found on the ancient monuments of Persepolis, in the enumeration of the countries and nations of Iran (Ritter's *Asia*, vol. vi, p. 100). Herodotus, the most ancient of the Greek geographers (5th century B. C.) terms the same country *Chorasmia* (book iii, ss. 93, 117).

When Chinghiz invaded western Asia, the sultan of Khorazm was a powerful sovereign, ruling also over Transoxiana and Iran.

Haithon in his *Historia Orientalis* (13th century) states, that Khorazm is bordered by a certain desert,[320] and stretches westward as far as the *Caspian sea*. On the north it is bounded by the kingdom of the *Kumans* (Kipchaks); on the south (evidently a mistake for east) by *Turkistan*.

The ancient capital of Khorazm was *Urgendj;* which the Mohammedan authors spell *Keurcandje*, or *Orcandje;* the latter being, according to D'Ohsson (tom. i, p. 265) the Mongol appellation; the Arabs write *Djordjaniah*. The city was situated on both banks of the Djihun, *i. e.* on the ancient channel; for now *Kunia Urgendj* (or Ancient Urgendj) is far west of the Amu-daria. The Mongols took Urgendj in 1221, after a stout resistance by the inhabitants. It was then destroyed (see above, 51); but it must have recovered to some considerable extent in the next hundred years, according to the accounts given by Pegoletti and Ibn Batuta. Pegoletti in his itinerary (beginning of 14th century) calls it *Organci* (Yule's *Cathay*, p. 294). A Franciscan missionary, in a letter dated 1338, speaks of *Urganth*, a city at the extremity of the empire of the Tartars and the Persians (*l. c.* p. 234). It is the *Urghanj* of Marignolli, who visited the place in 1339 (*l. c.* p. 321). Urgendj was destroyed by Tamerlane in 1378 (Deguignes, tom. v, p. 11), but was subsequently rebuilt.

There is a curious ancient Russian geographical treatise extant, compiled towards the end of the 16th century, entitled *Kniga bolshomu cherteju* ("The Book on the Great Map;"—*cf. Transact. of Russ. Geogr. Soc.* 1871, p. 110). In it some distances are given, respecting the routes near the Caspian sea, lake Aral, the Sir-daria and Amu-daria. There Urgendj is called *Yurgens;* the lake Aral is termed *Sineye more* (blue sea); the Caspian, *Hwalimskoye more* (the sea of Hwalim).[321]

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[320] This desert is marked on Petermann's map (*Mittheil.* 1873, tab. 9) as *Desert* of *Khorasm* south of the khanate of Khiva.

[321] This name for the Caspian sea occurs in the Russian annals as early as the 10th century. The lake Aral was known to the Persians under the name of Lake of Khorazm.

In 1603, the Cosacks of the Ural plundered the city of Urgendj, and towards the end of the 17th century it was entirely destroyed by the Kalmuks. In an article on the ancient channel of the Amu-daria,—translated from the Russian,—in Petermann's *Geogr. Mitth.* vol. xx, p. 25, it is stated, that a remarkable tower, about two hundred feet high, has survived from the ancient splendour of Urgendj.[322]

The Chinese knew Khorazm as early as the 7th century of our era. In the "T'ang History," in the section treating of western countries, we find the following accounts of 貨利習彌 *Ho-li-si-mi*, called also 火尋 *Hua-sin* and 過利 *Kuo-li*:—"This country is situated on the river 烏滸 *Wu-hu* (the Djihun or Oxus, as has been proved in notes 290, 292). On the south-west it is bounded by 波斯 *Po-sze* (Persia); to the north-west, it extends as far as the 葛薩 *K'o-sa*,[323] who belong to the stock of the *T'u-küe* (Turks). In this country (of Ho-li-si-mi) in the time of the Han was the city of 奥鞬 *Ao-gien*.[324] The ruler of Ho-li-si-mi resides in 急多颶遮 *Tsi-to-pei-che.(?)* Among the countries of the 胡 *Hu* (people of western Asia) this is the only one where carts drawn by oxen are found. The merchants travel in these carts to other countries. Several embassies proceeding from Ho-li-si-mi to the Chinese court are recorded."

The Buddhist monk Hüan-tsang, also,—in his peregrinations from China to India in the 7th century,—passed through Khorazm. He writes the name of this country 貨利習彌迦 *Ho-li-si-mi-kia*, and states that this kingdom is situated on both banks of the river 縛芻 *Fo-ch'u*,[325] extending from north to south five hundred *li*, and from east to west twenty or thirty *li*.[326]

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[322] *Khiva*, the present capital of Khorazm, or the khanate of Khiva, is situated about one hundred English miles south-east of ancient Urgendj. It became the capital of the Uzbek dynasty,—now ruling over Khorazm,—in the 17th century. It seems that a place of that name already existed in the days of Tamerlane. We read in Deguignes, tom. v, p. 5, that the cities of *Kath* (see above, 145) and *Kayuk* or *Kivak*, in 1371, were in the possession of the chief of the *Kumkurats* (there is probably a connection between these Kumkurats and the city named *Kungrat* near the mouth of the Amu-daria).

[323] In the article 拂菻 *Fo-lin* (the Byzantine empire) in the same "T'ang History," it is said that this kingdom is opposite the country of 可薩 *K'o-sa*. I think that by *Ko-sa* or *K'o-sa*, the *Khazars* are meant.

[324] In the "History of the Anterior Han," art. *Kang-kü* (Samarcand,—see above, 141), *Ao-kien* is mentioned among the small realms dependent on Samarcand, distant about one thousand four hundred *li* from the latter place.

[325] *Vatch* or Oxus. See Julien's *Mém. s. l. Contrées Occid.* tom. i, p. 22.

[326] Evidently the author takes into consideration only the cultivated land in the valley of the Oxus. Even now the khanate of Khiva consists properly only of the valley of the Amu-daria, the rest being deserts.

In the *Yüan shi*, the name of Khorazm occurs only once, *i. e.* in the list of the Si-pei-ti. Urgendj is not marked on the ancient map, but as we have seen above (53), the *Yüan shi* records its capture by the Mongols, spelling the name 玉龍傑赤 *Yü-lung-gie-ch'i*. The *Yüan ch'ao pi shi* writes it *Urungechi* (Palladius' transl. p. 147). Ye-lü Ch'u-ts'ai states (*Notes on Chin. Med. Trav.* p. 117) :—"West of *P'u-hua* (Bokhara) there is a great river, flowing to the west, which enters a sea. West of this river is the city of 五里揑 *U-li-gien*, where the mother of the *so-li-t'an*[327] is living. This city is still more rich and populous than Bokhara."

賽蘭 *Sai-lan* = *Sairam*.

162. *Sairam*[328] is still the name of a city in Russian Turkistan, north-east of Tashkand. It was situated at the time of the Mongols, as it is even now, on the great highway leading from Almalik (Kuldja) to Samarcand; and thus it is spoken of by the Chinese mediæval travellers, who took this route (see my *Notes on Chin. Med. Trav.* pp. 36, 75); and also by Haithon. In the biography of *Sie-t'a-la-hai*,—one of Chinghiz khan's generals,—(*Yüan shi*, chap. cli), the capture of 賽蘭 *Sai-lan* by the Mongols is recorded. The Mohammedan authors do not mention Sairam among the cities taken by Chinghiz khan's army; but this place is spoken of, it seems, by Rashid-eddin, in the chapter on the Turkish tribes. Compare Berezin's translation, vol. i, p. 2, where *Talas* and *Sairam* appear in the list of countries and places inhabited from ancient time by Turkish tribes. On page 13 of the same translation, the same place apparently is called *Kary Sairam*, and associated again with *Talas*. Rashid states that Kary Sairam and Talas are said to be situated in the country, where Abuldja khan[329] was in the habit of encamping in winter time. He states further, that Kary Sairam is an ancient and very large city with forty gates. To cross it takes a whole day. In Rashid's day Kary Sairam was inhabited by Turk Mussulmans and was subject

[327] *Turkan khatun*, the mother of sultan Mohammed of Khorazm.

[328] I may observe, that there is in central Asia a lake and a city, which on our maps bear the same or nearly the same name. The *lake* Sairam, of which I have given more detailed accounts in my *Notes on Chin. Med. Trav.* (pp. 32, 71, 114) is situated north-east of *Kuldja* and is termed 賽哩木 *Sai-li-mu* on modern Chinese maps. The *city* of Sairam (thus the name is written on Russian maps) in eastern Turkistan is situated between Kucha and Aksu, and marked on modern Chinese maps as 賽里木 *Sai-li-mu*. The name appears on English maps as *Sailim* or *Sairim*.

[329] Abuldja khan was the ancestor of the famous Oghuz khan, the progenitor of all the Turk tribes, according to Rashid-eddin.

to Kaidu. *Ibid.* p. 17 we read again, that Oghuz khan, after having got the supremacy over his relatives who had attacked him, ruled over the whole country stretching from *Telash* and *Syrym* (I think Talas and Sairam are meant) to *Bokhara.*

In the *Ming shi*, chap. cccxxxii, fol. 8, the following account is given of 賽藍 *Sai-lan*:—"It is situated in the middle of a plain, east (a mistake for north-east) of *Ta-shi-kan* (Tashkand), more than a thousand *li* distant from Samarcand. The city is two or three *li* in circuit (probably a mistake in the figures). The country is fertile, produces the five kinds of grain and many fruits, and is well populated. There is found in the grass, a little black spider,[330] the sting of which is poisonous. The people cure the wound from its sting with 薄荷 *Po-ho.*"[331]

巴耳赤利刊 *Ba-r-ch'i-li-han* = *Barkhaligh-kend.*

163. I have no doubt that Ba-r-ch'i-li-han of the map is the same as the city of *Barkhaligh-kend*, situated according to Rashid on the Sihon, and taken in 1219 (or 1220) by Chinghiz khan's eldest son Djuchi (see above). The *Yüan shi* states (see 53), that Djuchi captured the city of 八耳眞 *Ba-r-djen.* This name is evidently intended for the same place. As I have proved in note 91, the name *Barchin* in Carpini's narrative (p. 750) refers also to this city. Haithon the traveller writes the same name *Phartchin.* He also mentions however a city *Barkant.*

迭的 *Djan-di* = *Djend.*

164. *Djend*, according to D'Ohsson's map was situated on the Sihon (Sir-daria, or Yaxartes) towards its mouth. The *Bibl. Orient.* writes the name *Giund.*

It was near *Djend* that the troops of Mohammed Khorazm shah had the first opportunity of fighting with the Mongols (see above, 48), before the main body of Chinghiz khan's army had arrived in Turkistan. In 1220, Djuchi captured Djend (see 49).

IV. Countries and Places in the Empire of Bu-sa-yin, = Persia.

巴某 *Ba-mou* = *Bamian.(?)*

165. This name appears only in the list of the Si-pei-ti, as a

330 This is the *karakurt* of the Kirghiz,—*latrodectes lugubris.*
331 This name is applied in China to several species of *mentha.*

city belonging to Persia, without further notice. It is omitted from the ancient map, so that it cannot be decided what place is meant. *Ba-mou* may be intended for *Bamian*, a district and important fortress in the Hindu-kush, taken and destroyed by Chinghiz khan in 1221 (see above, 52). A place of this name still exists, and was visited by Burnes in 1832. I may however observe, that there is also a place called *Bam*, south-east of Kerman, which name also has some resemblance to Ba-mou, and is also of ancient origin; for Bam is mentioned by Ebn Haukal (Ritter, *l. c.* vol. via, p. 734).

塔八辛 *T'a-ba-sin* = *Thabas Sistan*.

166. This name also is not marked on the map, but is noticed in the Si-pei-ti; which, as has been previously stated, is the list of the proper names occurring on the original ancient map of central and western Asia. I am inclined to identify T'a-ba-sin with Thabas, a city occasionally mentioned by the Mohammedan authors of the Mongol period (D'Ohsson, tom. iv, p. 679). The *Bibl. Orient.* p. 856, states, that there are two cities of this name in Persia; one of them, *Thabas keilar*, situated near Yezd,[332] whilst the other is a city of Sistan; wherefore it is also called *Thabas Sistan*. Both places are found on modern maps.

不思忒 *Bu-sze-t'e* = *Bost*.

167. This name is placed on our ancient map south-west of Ghazna (see 150), and this position agrees well with *Bost*, a city in Seyistan (Sistan), on the river Hilmend. Compare *Bibl. Orient.* pp. 779, 174.

Bost is an ancient city, which Isidore of Charax (1st century of our era) calls Bis (Ritter's *Asien*, vol. vi, p. 120). Bost is frequently mentioned in the ancient history of Persia. In the 10th century it belonged to the Ghaznevids (Deguignes, tom. ii, p. 332; tom. iii, p. 157). It is also spoken of by the Mohammedan chroniclers, in connexion with Chinghiz' invasion of western Asia (D'Ohsson, tom. i, pp. 195, 298), and is noticed in the relation of Tamerlane's wars (Deguignes, tom. v, p. 20).

In the *Ts'in cheng lu* (see above, 57) we read:—"In the spring of 1223, Chinghiz moved out with his army and proceeded northward, following the course of the Sin-tze su. The third prince reached the city of *Bu-si-sze-dan*, and asked permission of Chinghiz to attack it; but the emperor recalled his son in view of the hot season commencing."

[332] About a hundred and twenty English miles north-east of Yezd.

It seems that the Chinese characters Bu-si-sze-dan here represent the combined names *Bost* and *Sistan*.

In the *Yüan ch'ao pi shi*, the invasion of *Sisten* by Tului, Chinghiz' third son, is also recorded (see above, 56). Rashid-eddin however states (see above, 52) that "Ogotai after having destroyed Ghazna, asked permission to attack the city of Sistan; but Chinghiz objected owing to the excessive heat, and recalled his son."

法因 *Fa-yin = Caïn.(?)*

168. This name also is met with only in the list of the Si-pei-ti. Perhaps *Caïn* is meant, a city south-west of Herat. Caïn in times past, was the capital of the mountainous country called *Kuhistan*, and belonged to the Ismaëlians, when Hulagu began the conquest of Persia (D'Ohsson, tom. iii, pp. 158, 175). *Tun* was another city of Kuhistan, M. Polo (tom. i, p. 79) notices *Tunocaïn* as a kingdom of Persia.

塔里于 *T'a-li-gan = Talecan.*

169. I have noticed above (147) the erroneous position assigned to Talecan on the ancient map. This place seems to have been confounded with *Thus* by the compiler of the map.[333]

Talecan or *Taïkan* was an ancient city in the region of the sources of the Oxus or Djihun. The Arabic historians state, that in the middle of the 7th century it was taken by the Arabs. Ebn Haukal (10th century) mentions *Taïkan* among the cities of Tokharestan (Ritter, *l. c.* vol. v, p. 701). Edrisi (12th century) gives a description of Talecan (Ritter, *l. c.* vol. v, p. 787). *Nussret-kuh*, the fortress of Talecan, resisted the Mongols for seven months; but was finally taken, when Chinghiz himself arrived, in 1221 (see above, 51).

M. Polo visited Talecan, which in his narrative bears the same name as in Ebn Haukal's geography. Polo states (vol. i, p. 144):— "After those twelve days' journey (from Balc) you come to a fortified place called *Taïcan*, where there is a great corn market. It is a fine place, and the mountains that you see towards the south are all composed of salt."[334]

Göes on his way from India to China, in the beginning of the 17th century, halted for a month in *Talhan*. The place was also visited about thirty-eight years ago by Wood.

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[333] There were three places called *Talecan;* the one here mentioned, in Badakhshan; that in Khorassan; and a third in Dilem (see further on, 182).

[334] Compare my *Notes on Chin. Med. Trav.* p. 46. Ch'ang-ch'un also noticed the salt in the mountains on his way from Samarcand to the Hindu-kush.

Talecan was known to the Chinese in the 7th century. The kingdom of 呾剌健 *Ta-la-kien*, described by Hüan-tsang (Julien, *l. c.* tom. i, p. 35), can only be identified with Talecan. The Chinese annals mention the capture of Talecan by Chinghiz (see above, 53). The *Yüan shi* writes the name 塔里寒 *T'a-li-han*.

巴里黑 *Ba-li-hei* = *Balkh*.

170. According to the *Bibl. Orient.* p. 167, *Balkh* is one of the most ancient cities of Persia. Kai khosru, one of the kings of the second dynasty (Kayanides) who lived in the 6th century B. C. is said to have established his residence in Balkh. It has always been considered one of the principal cities of Khorassan.

The country of Balkh is identical with the *Bactris* of the Zend texts and the cuneiform inscriptions found on the ruins of Persepolis. To the ancient Greek authors, this country,—and it is believed especially the city of Balkh,—was known by the name of *Bactria* or *Bactriana*. The *Bibl. Orient.* p. 151, explains this name by *bakhter*, meaning "east" in Persian. It is known that after Alexander the Great, on his expedition to India, had passed through Bactria, this country was for many centuries under Greek culture, of which the traces can still be found there.

Balkh suffered terribly from Chinghiz. Though the city surrendered without resistance, the whole population was massacred by the Mongols in 1221; and in 1223, when Chinghiz again passed through Balkh, he ordered the slaughter of the inhabitants who had meanwhile settled there (see above, 51, 52).

M. Polo says (vol. i, p. 142) :—"*Balc* is a noble city and a great, though it was much greater in former days. But the Tartars and other nations have greatly ravaged and destroyed it. There were formerly many fine palaces and buildings of marble, and the ruins of them still remain. The people of the city tell that it was here that Alexander took to wife the daughter of Darius. Here, you should be told, is the end of the empire of the Tartar Lord of the Levant. And this city is also the limit of Persia in the direction between east and north-east."[335]

Balkh was in the middle ages a metropolitan see of the Nestorian church (Yule's *Cathay*, p. 179).

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[335] This statement is in accordance with the ancient map; but as has been stated on a former page, the frontier between Persia and the middle empire has often changed (see above, 86, 150). We read further in D'Ohsson, tom. iv, p. 268, that in 1300, Dua, khan of the middle or Chagatai empire, invested his son Kutlug shah with the countries of Ghazna, Seyistan Badakhshan, Balkh and Meru. Thus these countries seem then to have belonged to the middle empire.

Balkh was probably known to the Chinese at an early date; it is difficult however to venture any identification upon the vague descriptions of the countries of western Asia, as found in the histories of the Han, Wei, etc. It is generally believed that the kingdom of 大夏 *Ta-hia*, reached by the Chinese general Chang Kien (see above, 39) in the second century B. C. answers to Bactria. Hüan-tsang in his accounts of western countries mentions a kingdom 縛喝羅 *Fo-ho-lo*, bounded on the north by the river *Fo-ch'u* (Oxus). Vivien de St. Martin identifies Fo-ho-lo with Balkh (see Julien's *Mém. s. l. Contr. Occid.* tom. i, p. 29; tom. ii, p. 289). He may be right.

In the *Yüan shi*, Balkh is repeatedly mentioned, and the name is differently written. In the Annals, *sub anno* 1221, the capture of 班勒紇 *Ban-le-ho* by Chinghiz is recorded. In Subutai's biography, the name is written 必里罕 *Bi-li-han* (see above, 54); in Ho-sze-mai-li's biography, *Yüan shi*, chap. cxx, 阿剌黑 *A-la-hei*.[336] In the biography of *Ch'a-han* (Djihan), *Ibid.* chap. cxxxvii, the name of Balkh reads 扳勒紇 *Ban-le-ho*. Ch'a-han was a native of Balkh.

The Taouist monk Ch'ang-ch'un, on his way from Samarcand to the Hindu-kush passed through the city of 班里 *Ban-li*, by which name again Balkh is meant (see *Notes on Chin. Med. Trav.* p. 47). Ye-lü Ch'u-ts'ai (*Ibid.* p. 117) designates Balkh by the single character 班 *Ban*.

乃沙不耳 *Nai-sha-bu-r* = *Nishabur*.

171. This name is found in the list of the Si-pei-ti, but not on the map. There can however be no doubt that *Nishabur* is meant, the ancient capital of Khorassan; for Nishabur is repeatedly mentioned under almost the same name in the *Yüan shi*, in connection with the Mongol invasion of Persia. In the Annals, *sub anno* 1221, the name of Nishabur is rendered by 匿察兀兒 *Ni-ch'a-wu-r* (see above, 53); in the biography of Ba-r-chu a-r-te di-gin, by 你沙卜里 *Ni-sha-bu-li* (see above, 100); and in the biography of Ho-sze-mai-li, *Yüan shi*, chap. cxx, by 你沙不兒 *Ni-sha-bu-r*. Compare also (51 above) the statements of the Mohammedan authors respecting the siege and capture of Nishabur by the Mongols.

Nishabur is also an ancient city, and is generally believed to be identical with the *Nisaya* of the Zend text, and the *Nisaia* or

[336] It is an interesting fact, that in the ancient list of metropolitan sees in the middle ages, Balkh is termed *Halaha* (Yule's *Cathay*, p. ccxlv). This name has a great resemblance to A-la-hei.

Nisaea of the ancient Greek and Roman authors (Ritter, *l. c.* vol. via, p. 56). The *Bibl. Orient.* however states, p. 659, that the celebrated city of Nishabur was founded by king Sapor II (A. D. 310—380) of the Sassanide dynasty, and that the name is derived from *nei*, meaning "reed," and the name of its founder. The sultans of the Seldjuk dynasty, in the 11th century, were accustomed to reside at Nishabur.

撒剌哈夕 *Sa-la-ha-si* = *Serakhs.*

172. This place also is only found in the Si-pei-ti, and not on the map; and it seems, that *Serakhs* a city of Khorassan (*Bibl. Orient.* p. 744) is meant. I know nothing about the history of this place; but it is mentioned by the Mohammedan authors of the 13th century (D'Ohsson, tom. i, p. 281); and the capture of a place 昔剌思 *Si-la-sze* by the Mongols, is recorded in the *Yüan shi* (see above, 53). I think Si-la-sze, which in the Chinese text is associated with Meru and Maruchak, also denotes Serakhs.

巴瓦兒的 *Ba-wa-r-di* = *Bavurd.*

173. Ba-wa-r-di also is missing from the ancient map. In the list of the Si-pei-ti, it is placed between Serakhs (172) and Meru (174). The *Bibl. Orient.* states, p. 179, that *Bavurd* is a city of Khorassan, where in times past the Seldjuks, after having crossed the Djihun, remained for a time. With the capture of Bavurd, Tamerlane began the conquest of Persia. I have not met with the name of Bavurd in D'Ohsson's "History of the Mongols;" but it seems that in the *Yüan shi* it is spoken of once more. In chap. cxxiii, biography of *A-la-wa-r-sze*, we read, that he was a *Hui-hu* (Mohammedan) from 八瓦耳 *Ba-wa-r*, a commander of a thousand in his country. When Chinghiz' armies arrived at *Ba-wa-r*, A-la-wa-r-sze surrendered, and subsequently entered the Mongol service.

I can give no information about the exact position of Bavurd, the place not being marked, it seems, on modern maps. I may however notice, that the Turkish admiral *Sidi Ali*, who in the 16th century travelled from India through Persia to Constantinople, passed through *Bawerd* and then proceeded to *Thus* (*Journal Asiatique*, tom. ix, p. 287).

麻里兀 *Ma-li-wu* = *Meru* or *Merv.*

174. Ma-li-wu is marked on the ancient map south of Bokhara, and evidently denotes *Meru* or *Merv*, also a celebrated city of Khorassan, and one of the four capitals of this province (Meru,

Nishabur, Herat, Balkh;—D'Ohsson, tom. i, p. 245). The name is of very ancient origin; for *Meru* is mentioned in the Zend Avesta, as one of the places of abundance (Ritter, *l. c.* vol. vi, p. 52). The province *Margianè* of Isidore of Charax, with the city of *Antiochia*, is the same as Meru.

The ancient Mohammedan authors (Ebn Haukal and others) distinguish two cities of Meru; one of which is called *Meru Shahjan* (Meru, king of the world); the other *Meru-al-rud*. Both are situated on the river Meru-rud (now Murgab). Meru-al-rud, known also under the name of *Maruchak*, lies about one hundred and forty English miles south-east of Meru Shahjan; which is the more celebrated of the two cities, and belived to be the same as ancient Antiochia, founded by the Greeks. It is praised by all the ancient Mohammedan geographers. Ebn Haukal states, that near this city is the mill, where Yezdejerd the last king of the Sassanides was slain (Ritter, *l. c.* p. 232). Meru was for a time the residence of the Seldjuk sultans.

The fate of Meru at the time of the first Mongol invasion, has been recorded above (51). In the *Yüan shi* mention is made of both cities of Meru. Meru Shahjan is termed there 馬魯 *Ma-lu*, whilst Meru-al-rud is mentioned by its other name Maruchak, rendered by the Chinese characters 馬魯察葉可 *Ma-lu-ch'a-ye-k'o* (see above, 53).

的希思丹 *Di-hi-sze-dan* = *Dahistan.*

175. Dahistan is still the name of the country bordering on the south-eastern corner of the Caspian sea (Petermann's *Geogr. Mitth.* 1873, tab. 9). Hammer derives the name from the *Dáoi*, of *Herodotus* (book i, sec. 125), and the *Daai*, a people of Hyrcania according to Strabo.

The *Tarikh Djihan Kushai* spells the name *Dihistan*, being nearly the same as on the map (D'Ohsson, tom. i, p. 259). Turkan khatun, the mother of Mohammed shah, proceeded from Urgendj to Mazanderan through *Dihistan*. The name of Dihistan appears once more in D'Ohsson's translations from the Persian historians. In tom. iv, p. 685, we read that Hassan and Talish, the sons of Choban, a revolted general of Abu Said, khan of Persia, in 1327 fled from Mazanderan through Dihistan to Khovaresm.

On the Catalan map, *Deystam* is marked on the south-eastern corner of the Caspian sea.

朱里章 *Dju-li-djang* = *Djurdjan.*

176. *Djurdjan* or *Gurkang* in the middle ages, was a famous

town situated on the river Giurgen or Gurgan, which discharges into the south-east corner of the Caspian sea. According to *Ibn Khordad Beh* (quoted in the "Transactions of the Russian Geographical Society," 1871, vol. iv, p. 103), in ancient times the trade of Russia with Balkh, Rayi (near modern Teheran) and Bagdad, passed through Djurdjan. Compare also note 85.

Djurdjan is mentioned by the Mohammedan authors as early as the 7th century, in connection with the warlike enterprises of the Arabs. Massudi and Ebn Haukal speak also of Djurdjan.

It is believed that Djurdjan or Gurkana is the *Vehrkana* of the Zend Avesta, and that the *Hyrcania* of the ancient Greek and Roman writers denotes the same name (Ritter, *l. c.* vol. vi, p. 61).

After Tamerlane had subdued Mazanderan, in 1392, he ordered the magnificent palace of *Shasman* to be built near Djurdjan (Deguignes, tom. v, p. 32).

The ruins of ancient Djurdjan still exist. Mention is made of them by Fraser, who in 1822 visited the Gurgan river and the place where Djurdjan stood, of which a remarkable tower has been preserved.

塔米設 *T'a-mi-she* = *Damegan.*

177. This name is placed on the map between Djurdjan and Simnan (see the following), and I have little doubt *Damegan* is intended. The character *she* is probably erroneous.

Damegan, also an ancient city, was the capital of the country known under the name of *Cumuss* (*Bibl. Orient.* p. 259). The place,—which still exists,—is repeatedly mentioned by the Persian writers of the Mongol period (D'Ohsson, tom. i, p. 248; tom. iii, pp. 22, 23).

Haithon the traveller calls this city *Thamghain.* Compare also note 341.

西模娘 *Si-mu-niang* = *Simnan.*

178. Simnan, also a city of Cumuss (*Bibl. Orient.* p. 249), is frequently mentioned by Rashid-eddin and other Mohammedan authors, speaking of the Mongol invasions of Persia (D'Ohsson, tom. i, p. 248; tom. iii, p. 194; tom. iv, pp. 177, 675).

撒里牙 *Sa-li-ya* = *Saria* or *Sari.*

179. *Sari* is still the name of a city in the Persian province of Mazanderan. In the ancient Mohammedan records, this place is generally styled *Sari;* but the biographers of Tamerlane write the

name *Saria* (Deguignes, tom. v, pp. 22, 33), and thus justify the spelling Sa-li-ya on the map.

Sari is considered to be an ancient city. It has been identified with *Saulōe*, capital of the ancient Persian province of Parthyene (Ritter, *l. c.* vol. via, pp. 527, 118), mentioned by Isidore of Charax in the 1st century. Firdusi and Ebn Haukal speak of Sari as a large city, and call it the capital of Tabristan (Ritter, *l. c.* pp. 478, 529).

In the 18th century, Sari was for a long time the royal residence of the Kadjar dynasty, now reigning over Persia.

In the "History of the T'ang dynasty," *Sari* is mentioned as a city (capital) of Tabristan in the 8th century or earlier. We read in the *T'ang shu*, chap. cclviiib, at the end of the article 波斯 *Po-sze* (Persia), of a country 陀拔斯單 *T'o-po-sze-tan*,[337] bounded on three sides by mountains, and on the north by a little sea (Caspian). The ruler of this realm has his residence in 娑里 *Sa-li*.[338] From ancient times these princes were commanders-in-chief of the Persian eastern army (世爲波斯東大將). When Persia was destroyed by the 大食 *Ta-shi* (Arabs), T'o-po-sze-tan refused to surrender. A prince of this country named 忽魯汗 *Hu-lu-han*, sent an envoy in 746 to the Chinese court. The Chinese emperor granted him the title of king, and Hu-lu-han's son *Tze-hui-lo* entered the Chinese service. The realm of T'o-po-sze-tan was finally destroyed by the black-coated *Ta-shi* (Arabs).[339]

阿模里 *A-mu-li* = *Amol.*

180. Amol is correctly placed on the map west of Sari. It is still the name of a city in the western part of Mazanderan.

Amol has also been in times past the capital of Tabristan. Ebn Haukal mentions it as an important place of trade for silk,

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[337] Ritter, *l. c.* vol. via, p. 418, states, that in the Pehlvi or ancient language of western Persia, Tabristan *(Trafestan)* means "a woody, mountanous region." In Vuller's *Lexicon Persico-Latinum*, the name Thabristan is derived from *thaber*, "a kind of willow." It has been suggested, that the country of the *Tapuri* mentioned by Arrian, book iii, ch. 23, par. 3, 5, denotes Tabristan. Amru, in the middle of the 14th century, in his list of metropolitan sees of the Nestorian church, mentions *Tabaristan* together with Rai (Yule's *Cathay*, p. ccxlv).

[338] The Chinese text has in fact 婆 里 *Po-li;* but I feel no hesitation in correcting the first character, which has evidently been confounded with the very similar-looking character 娑 *so*, pronounced *sa* in ancient times (Williams' *Dictionary*).

[339] See my pamphlet *On the Knowledge possessed by the Ancient Chinese of the Arabs, &c.* p. 9.

from which many routes diverge. It was a renowned trading-place in the time of Harun al Rashid. The author of the *Tarikh i Thabrestan*, who wrote in the 13th century, states, that in his time Amol was a great emporium, where the nations of the west used to meet, being frequented by the *Saccasins* (see note 128), *Bulgars* and *Russians*, as well as the merchants of Hindustan.

In 1220 Amol was sacked by the Mongol troops under the command of Chebé, sent in pursuit of Mohammed shah (see above, 50).

胡瓦耳 *Hu-wa-r = Khavar.*

181. *Hu-wa-r* is marked on the map south of Sari, and is without doubt intended for the *Choarēnē* of Isidore of Charax,—the *Choara* of Pliny near the "*Caspiæ Portæ;*"—*Partheæ amœnissimus situs* (*Plinius*, tom. vi, p. 15), or the *Khavar* of the Mohammedan authors of the Mongol period. This latter name has survived in that of a defile and a plain to the south-east of the present Teheran, between fifty and sixty English miles distant from the capital. The defile of Khavar or Khar, answering to the *Portæ Caspiæ* of Pliny, or the *Caspiæ pylæ* of Arrian, leads through a southern spur of the Alburs chain, which projects into the plain country, separating the fertile plain of Veramin (situated towards Teheran) from that of Khavar. I can speak of this region from personal observation.

The Mohammedan authors translated by D'Ohsson, frequently mention Khavar in connection with the Mongol invasions (tom. iii, p. 193; tom. iv, pp. 177, 678, etc).

低簾 *Di-lien = Dilem.*

182. *Dilem* is a name applied to a region situated in the Alburs mountains, south of Ghilan. The traveller, who crosses the Alburs chain, on his way from Kasvin to Resht, has to pass through Dilem, which in times past was an independent kingdom with the capital *Shaherek.*[340]

The kings of Dilem conquered a great part of Persia in the 10th century. Their dynasty is known in history under the name of *Dilemits* or *Buyids.*

When the Mongols first invaded Persia, Dilem was in possession of the Ismaëlians, who had there several strong castles (Alamut, see 183; Lembasser, see 184; Meïmundiz, etc). When Hulagu,

[340] Ritter is wrong in identifying (*l. c.* vol. vi*a*, p. 418) Dilem with Tabristan; but it may be that Tabristan at one time belonged to Dilem.

in 1256, went to attack Alamut, he passed through Shaherek (D'Ohsson, tom. iii. p. 197).

Oldjaitu, khan of Persia in 1307, was obliged to undertake an expedition against the people of Dilem, who refused to acknowledge the supremacy of the khan (D'Ohsson, tom. iv, p. 188).

阿剌模忒 *A-la-mu-t'e = Alamut.*

183. The castle of *Alamut*, one of the strongest among the Ismaëlian mountain castles, was built in 860 by a prince of Dilem, on an inaccessible rock. In the 13th century it was the headquarters of the chief of the Ismaëlians or the "Old man of the mountain," as the crusaders used to call him, and as he is termed also by M. Polo (vol. i, p. 132). The siege of the castle of Alamut by Hulagu's host and its surrender in 1256, are related by D'Ohsson, tom. iii, pp. 197, 198. Mohammed of Nessa states, that Kasvin is the nearest city to Alamut.

Colonel Monteith, who in 1832 visited the ancient country of the Assassins or Ismaëlians, has rediscovered mount Alamut, north-east of Kasvin. The river Shah-rud takes its rise in this region (Ritter, *l. c.* vol. vi, p. 592).

蘭巴撒耳 *Lan-ba-sa-r = Lembesser.*

184. *Lembesser* was the name of another castle of the Ismaëlians, also situated in Dilem. It is sometimes termed *Lemsher* (D'Ohsson, tom. iii, p. 191). On the siege of Lembesser by the Mongols, see *Ibid.* tom. iii, p. 200.

The position of Lembesser it seems has not been ascertained; we only know from ancient authors that it was in Dilem. The position of Alamut and Lembesser as given on the map, is not correct.[341]

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[341] There is yet a third castle of the Ismaëlians, mentioned by the Chinese authors of the Mongol period, the castle of *Girdkuh*, which according to the Mohammedan historians opposed a strong resistance to the Mongols. The siege began in 1253, but they could not take it till 1256. At least D'Ohsson states, that in 1256 the whole country of the Ismaëlians had surrendered, and they had been all exterminated. Colonel Yule however records (*M. Polo*, vol. i, p. 140) on the authority of Rashid, that Girdkuh surrendered only in 1270. Haithon (*Historia Orientalis*, chap. xxiv) states, that the Assassins had an impregnable castle, called *Tigado*, and that the Tartars besieged it for seven whole years, after which time the Assassins surrendered. In the *Yüan shi*, chap. cxx, biography of Ho-sze-mai-li, the name of Girdkuh is rendered by 玉兒谷 *Yü-r-gu*. In the biography of Kuo Khan, *Ibid.* chap. cxlix, where some details are given with respect to the capture of Girdkuh, the name is written 乞都卜 *K'i-du-bu*, (see my *Notes on Chin. Med. Trav.* p. 79), and it is stated there that this fortress was situated on

可疾云 *K'o-dsi-yün* = *Kasvin.*

185. *K'o-dsi-yün* on the map denotes the well-known city of *Kasvin*, situated on the great highway from Teheran (Rayi in ancient times) to Tebriz, south of the Alburs chain. It is said to have been founded by the Sassanide king Sapor II, A. D. 310—380. Kasvin was taken by the Mongols (Subutai and Chebé) in 1221, and the inhabitants were massacred (see above, 58). Hulagu in 1257, when attacking the castles of the Ismaëlians in Dilem, had his head-quarters in Kasvin (D'Ohsson, tom. iii, p. 200). Ghazan khan of Persia died near Kasvin in 1304 (*l. c.* tom iv, p. 349).

Haithon the traveller terms this city *Khezovin.*

M. Polo (vol. i, p. 79) calls *Casvin* one of the eight kingdoms of Persia.

撒瓦 *Sa-wa* = *Sava.*

186. On the map, Sa-wa is marked between Kasvin and Isfahan. This position suits well the city of Sava, which still exists, fifty miles south-west of Teheran. It is described by consul Abbott, who visited it in 1849 (Yule's *M. Polo*, vol. i, p. 76). This is

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the top of the mount 檐寒 *Yen-han.* In the narrative of Ch'ang Te (Ibid. p. 78) we read:—The realm of the 木乃奚 *Mu-nai-hi* (Moulahida or Ismaëlians;—Ibid. p. 63, note 12) "had three hundred and sixty mountain fortresses, all which had been reduced. There was however, west of 檐寒 *Tan-han*, a mountain fortress 乞都布孤 *K'i-du-bu-gu* on a very steep rock, which could not be reached either by arrows or by stones (thrown by catapults). In the year 1256 the imperial army arrived at the foot of this fortress. The rock was so steep, that when one looked upwards his cap fell off." After this Ch'ang Te gives some details with respect to the capture of *K'i-du-bu-gu*, which occurred in the same year. In the Annals of the *Yüan shi, sub anno* 1252, the siege of Girdkuh is also reported, and the name is written there quite correctly 吉兒都怯 *Gi-r-du-k'ie.* In my *Notes on Chin. Med. Trav.* I suggested (p. 64, and p. 78, note 85), on the authority of D'Ohsson (tom. iii, p. 189), that the castle of Guirdcouh was situated in Couhistan (the hill country between Nishabur, Herat and Yezd). I was misled it seems by D'Ohsson. Col. Yule writes (M. Polo, vol. i, p. 139):—"Girdkuh . . . . has not, as far as I know, been identified by modern travellers, but it stood within 10 or 12 miles of *Damghan* (to the west or north-west)." I do not know where Yule obtained his information about the position of Girdkuh; but it is in accordance with the map of northern Persia appended to Buhse's *Reise in Persien.* It seems to be the only map which marks Girdkuh (I possess only the map of this work). Mr. Buhse, a Russian botanist, who travelled in Persia about twenty years ago, places Girdkuh, which lay on his way, about fourteen English miles west-north-west of Damegan. Now I have little doubt that in the above-quoted Chinese statement, about K'i-du-bu-gu being situated west of *Tan-han*, the latter name denotes Damegan.

the city of *Saba* in Persia, from which according to M. Polo (*l. c.* p. 73) the three Magi set out, when they went to worship Jesus Christ. Sava was destroyed by the Mongols in 1224 (D'Ohsson, tom. i, p. 349).

柯傷 *Ko-shang* = *Kashan.*

187. Ko-shang on the ancient map is placed between Khavar (181) and Isfahan; the city of *Kashan*, north of Isfahan, being intended.

Kashan is said to have been built by Zobeïde khatun, wife of Harun al Rashid; but Ouseley in his *Oriental Geography*, proves, that this city existed at a much earlier date (Ritter, *l. c.* vol. vi*b*, p. 35).

Kashan was for the first time plundered by the Mongols in 1224. D'Ohsson (tom. i, p. 349) states, that in the beginning of 1224, a Mongol detachment proceeded from Khorassan to *Rayi*, plundered and destroyed this city, and then attacked *Savé* (Sava; —see 186), *Kum* and *Kashan*, which cities suffered the same fate.

Odoric (Yule's *Cathay*, p. 50) calls *Cassan*, which he passed through, a royal city of great repute, the city of the three Magi.[342]

亦思法杭 *I-sze-fa-hang* = *Isfahan.*

188. Isfahan or Ispahan is perhaps the same as the Aspadánë of Ptolemy (tom. vi, ch. 4, fol. 150). All the Mohammedan geographers agree that Isfahan is a very ancient city (*Bibl. Orient.* p. 301). Kai kobad, the founder of the second Persian dynasty (Kayanides), is reported to have established his residence in Isfahan; but the capital of Persia was subsequently transferred in turn to Susa, Persepolis and Madaïn. When the Seldjuk dynasty ruled over Iran, in the 11th and 12th centuries, Isfahan again became the capital. At the end of the 12th century, Iran was conquered by the sultan of Khorazm. When Chinghiz first invaded Iran, his troops did not advance so far as Isfahan; nor when Hulagu subdued the whole of Persia, did this city share the common fate of the other cities of that realm. At least D'Ohsson does not mention its name in connection with the Mongol invasion. Under the reign of Shah Abbas the Great, 1585—1627, the court of Persia was again established in Isfahan.

In the Annals of the *Yüan shi*, *sub anno* 1229,—reign of Ogotai,—it is recorded, that the "chief" (部長) of the city of

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[342] We have seen that M. Polo considers *Sava* to be the city of the three Magi.

伊思八剌納 *I-sze-ba-la-na* in the *Si-yü* (western Asia) surrendered. The *Ts'in cheng lu* (Palladius' translation, p. 196) states under the same year, that the chief of the city of *I-sze-ba-la-na* sent an envoy with tribute to the Mongol court. I am not prepared to say, whether by I-sze-ba-la-na here, Isfahan is meant. D'Ohsson relates (tom. ii, p. 92), that the brother of the prince of Fars arrived at the court of Ogotai with valuable presents (see further on, 205). If I am not mistaken, at the time here spoken of, Isfahan belonged to Fars. I may however observe, that there was in Khorassan a city of *Esferain (Bibl. Orient* p. 302). This name rendered by Chinese characters would also read like I-sze-ba-la-na.

In the "History of the Ming," chap. cccxxxii, fol. 20, a short account of 亦思弗罕 *I-sze-fa-han* is found, and some details are given regarding the intercourse between that city and the court of China.

阿八哈耳 *A-ba-ha-r = Abhar.*

189. This name is marked on the map between Zendjan (191) and Kasvin (185); and is intended, it seems, for *Abhar*, placed on modern maps west-south-west of Kasvin, and south-east of Zendjan. There is also a river of this name. *Abhar* (*Bibl. Orient.* p. 10), or *Ebher* as D'Ohsson spells the name, is frequently mentioned by the Mohammedan authors of the Mongol period. (D'Ohsson, tom. iii, p. 49; tom. iv, pp. 8, 566, 706, 734).

It seems that in the days of the Mongols, the great highway from Rayi (near the present Teheran) to Tebriz passed through Abhar. The stations enumerated in Haithon's itinerary when returning from Mongolia, are,—*Hreï*, *Khezovin*, *Avakhr* (Abhar), *Zanghian*, etc. As I know from personal observation, Abhar lies a little south of the present post-road between Kasvin and Zendjan (*resp.* Teheran, Tebriz), which passes directly from Kasvin to Saïn kala.

孫丹尼牙 *Sun-dan-ni-ya = Sultaniah.*

190. Sultaniah was the name given to the city founded in 1305 in Media (between Kasvin and Zendjan), by Oldjaïtu, the grandson of Hulagu. For further details, see D'Ohsson, tom. iv, p. 485. Oldjaïtu established his residence here, and his successor Abu Said, resided also in Sultaniah. Thus at the time our map was compiled, Sultaniah was the royal residence of Persia. Abu Said, who died in 1335, was buried in his mausoleum at Sultaniah (D'Ohsson, tom. iv, p. 720).

Odoric, who saw Sultaniah about 1320, says (Yule's *Cathay.*

p. 49) :—"Departing from the city of Tauris (Tebriz), I travelled for ten days and reached a certain city called *Soldania*, in which dwelleth the emperor of the Persians in the summer season."

On the Catalan map, the same city is termed *Sodania*. It was the seat of an archbishop about A. D. 1330 (Yule's *Cathay*, p. 238).

Sultaniah was destroyed by Tamerlane, at the end of the 14th century. The ruins of the city may still be seen south-east of Zendjan, on the great caravan and post road from Teheran to Tebriz. The magnificent ancient mosque there was described by Chardin more than two hundred years ago, and is still admired by travellers who pass that way.

The position assigned to Sultaniah on the ancient map, in relation to Kasvin and Abhar, is not correct.

贊 章 *Dsan-djang* = *Zendjan.*

191. I know nothing respecting the ancient history of *Zendjan*, a city which also lies on the great trade route from Teheran to Tebriz. It is often mentioned by D'Ohsson. Subutai sacked the city in 1221 (see above, 58). It was near Zendjan, that sultan Abu Said in 1319 defeated the troops of a revolted general (D'Ohsson, tom. iv, pp. 635, 640).

都 耳 本 *Du-r-ben* = *Derbend.*

192. Derbend is a very common name in Persian geography. The word means, according to the *Bibl. Orient.* p. 267, "passage étroit et fermé." By Du-r-ben on the ancient map,—a place located in the north-western part of Persia,—only *Derbend* on the western shore of the Caspian can be meant, a very important place in the middle ages, and long before that period.

Massudi, who wrote in the middle of the 10th century, has left a description of the Caucasus *(Djebal ul Kaïtak)* and the adjacent countries. His treatise has been translated by Klaproth, and published in the *Magazin Asiatique*, tom. i, pp. 258 sqq. We learn from it, that the Persian king Khosru Anushirvan,—A. D. 531—579,—in order to protect Persia against the invasions of the nations north of the Caucasus,—Khazars, Alans and Turks,—constructed a wall, which ran along the ridges of the mountains for forty *parasangs*, and was prolonged into the sea for a mile. At certain distances iron gates were placed in the wall, and troops posted there to defend the passages. One of these gates (the principal one) was called *Bab-ul-avab* (the gate of the gates) and a city was built there which bears the same name.

Bab-ul-avab is the Arabic name for Derbend. The Turks call it *Demir kapi* or "Iron-gate."

There is also another oriental tradition, reported by M. Polo (vol. i, p. 50), according to which the wall in question was built by Alexander the Great, and therefore it was also known under the name of *Sedd Eskanderi* (*Bibl. Orient.* p. 267). It is possible that the Sassanian king only renewed the original wall, which may have been of more ancient date. Moses of Chorene,—who wrote a little after, A. D. 440,—on page 356 of his *Geographia Armena* speaks of the *Murus Darbandus.*

About the end of the 7th century, Derbend was taken by the Arabs. The place sustained an important *rôle* during the middle ages, and is often spoken of by the Mohammedan writers who relate the wars of the Persian khans with the khans of Kipchak.

As is known, a splendid artificial road, crossing the middle of the Caucasus chain near the Kazbek, now connects Russia with the Transcaucasian provinces; but it seems that in ancient times, the only practicable road leading from Persia to the regions north of the Caucasus, passed by Derbend.[343]

We have seen (see above, 58) that in 1222 Subutai, who first carried the Mongol arms to the countries north of the Caucasus, passed through Derbend. He was not able to take the citadel, where Rashid Shirvan shah had shut himself up.

In 1262 Barkai, khan of Kipchak, sent a host of thirty thousand men under the command of Nogai against Hulagu. Nogai passed through Derbend into the province of Shirvan. He was at first successful, but was afterwards forced to retire, and Hulagu passed through Derbend in pursuit of him. Some time after, Hulagu's son Abaka was defeated by Barkai, and pursued as far as Derbend (D'Ohsson, tom. iii, p. 379).[344]

In 1266, there was another battle fought between Barkai and Abaka near Derbend, in which the former was vanquished (D'Ohsson, tom. iv, p. 180).

In 1318, Uzbeg, khan of Kipchak, invaded the dominions of Abu Said and attacked Derbend (*Ibid.* 613).

In 1325, Choban, one of the Abu Said's generals, passed through Derbend and advanced as far as the Terek (*Ibid.* 666). Under the date 1334, another invasion of Uzbeg through Derbend is recorded (*Ibid.* 716).

The first European traveller who mentions Derbend, is the Rabbi Benjamin of Tudela in 1170 (see the English translation of his itinerary). He terms Derbend the *Iron-gate of Alexander.*

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[343] Edrisi however, in the 12th century, enumerates twelve defiles by which the Caucasus could be crossed (Klaproth, *Magaz. Asiat.* tom. i, p. 260).

[344] This war is also recorded by M. Polo (vol. ii, p. 424).

Rubruquis writes (p. 252):—"Post hos (Lesgos) est *porta ferrea*, quam fecit Alexander ad excludendos barbaros gentes de Perside, de cujus situ dicam vobis postea, quia transivi per eam in reditu." On p. 381, Rubruquis relates his passing through the Iron-gate on his way back. On p. 263, he also mentions the Iron-gate or Derbend in the following terms:—

"Est alius qui dicitur Jerra (Berca), frater Baatu qui pascit versus *Portam Ferream*, ubi est iter Sarracenorum omnium venientium de Perside et de Turkia."

Haithon the traveller calls *Derbend* by its Persian name; M. Polo terms it *Iron Gate*. In Turkish Derbend is still called *Demir kapi* (Iron gate). The ancient Russian annals of the 13th century also speak of the *Jeleznya vorota* (Iron gate), by which the high mountains of the *Yasy* (Asi or Alans) and *Cherkess* might be avoided. (Karamzin, vol. iv, p. 355).

In the days of Tamerlane, Derbend still retained its strategical importance. In 1387, Tamerlane when encamped on the Araxes, sent his troops against the Kipchaks who had passed Derbend.

Derbend, which since the year 1806 has belonged to Russia, is now one of the finest cities in the region of the Caucasus, situated very picturesquely on the Caspian sea, on the slope of the eastern termination of the Caucasian mountains. A good view of Derbend is given in Yule's *M. Polo*, vol. i, p. 53; and a detailed description of the city is found in the great Russian encyclopædical dictionary. As Col. Yule complains (*l. c.* vol. i, p. 51) that he was not able to find any modern information of a precise kind regarding the ancient wall of Derbend, I may translate a few details from the above-quoted encyclopædia:—

"The city of Derbend is located on the slope of the mountains, which descend toward the sea-shore. It is bounded on three sides by walls, of which the northern and southern are about three *versts* in length. These walls project into the sea; and to the south-west they ascend a steep rock more than a thousand feet high, and join the citadel called *Naryn kalé*.[345] Near Derbend, at the village of *Djelgan* begins the famous *Daghbary* (mountain wall) provided with towers and bastions at distances of from a thousand to fourteen hundred feet. The ancient wall stretches towards the mountains of Derbend. About the commencement it is in a demolished state, but among the mountains it is well preserved. The outer stones of it are well hewn, three feet and a half square and nearly a foot thick. The middle of the wall consists of smaller stones, which though not hewn are closely fitted in. At some

[345] This citadel is the same as that which the Mongols were unable to take (see above).

places the wall measures more than twenty feet in height, the thickness being not less than seven feet. Trees of remarkable size have grown upon the wall, and frequently these have caused it to fall to pieces. This wall has been followed for ten *versts* from its commencement.[346] It then ascends the high mountains of Tabasseran, and its existence there has not been ascertained; but thirty-six *versts* from Derbend, at the village of *Lidjili*, a well-preserved ancient gate can be seen. Remains of the ancient wall have been also discovered not far from the river *Alazan*, on the frontier of *Kakhetia*. At some places the ancient forts of the wall have been preserved, *e. g.* the fort called *Kedjeli kalé*, which is twenty-eight feet high, thirty-six feet long, and twenty-four feet broad."

巴耳打阿 *Ba-r-da-a* = *Bardaa.*

193. *Bardaa* was in ancient times a celebrated city in Armenia. There is a tradition, that it was founded by Alexander the Great (*Bibl. Orient.* p. 173). According to other Mohammedan sources, Kobad, king of Persia,—A. D. 491—531,—was its founder (*Bullet. de l'Acad. de St. Petersbourg*, vol. viii). Bardaa is mentioned in connection with the war between the calif Harun al Rashid and the king of the Khazars. According to Ebn Haukal, it was a large city of *Aran*,[347] situated in a fertile and pleasant country.

Bardaa is a city of special interest in Russian history; for the ancient Mohammedan authors record, that in the 10th century it was attacked by Russians. The celebrated Massudi in his "Golden Meadows" states, that the Russians undertook an expedition against Bardaa in the 10th century (*Nouv. Journ. Asiat.* tom. ii, p. 450; Klaproth, *Magaz. Asiat.* tom. i, p. 276). Abulfeda records, that the Russians crossed the Caspian sea, entered the river *Kur* and carried fire and slaughter over Bardaa (*Annales Muslemici*, tom. ii, p. 426). This warlike enterprise of the Russians has been the subject of a bulky dissertation by a Russian orientalist (*Erdmann, De Expeditione Russorum Berdaam versus*, Casani, 1828). It seems D'Ohsson mentions Bardaa only once, tom. iii, p. 178. A vizier of sultan Djelal-eddin sojourned there in 1228.

Bardaa was a metropolitan see of the Nestorian church in the 14th century (Yule's *Cathay*, p. ccxlv). This place is often mentioned in the history of Tamerlane. The conqueror encamped ten days in the plain of Bardaa, which at that time was the capital of the Karabagh (Petis de Lacroix, *Hist. de Timour*, tom. iii, p. 239).

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[346] The author of this article wrote in 1839. I have no doubt, that now the Caucasian wall has been explored throughout its whole extent.

[347] Aran was the name of a little realm in Armenia.

Massudi states that the river *Kuru* (Kur) passes at a distance of three miles from Bardaa (Klaproth, *Mag. Asiat.* tom. i, p. 300). The ruins of ancient Bardaa can still be seen on the right bank of the Terter (an affluent of the Kur), near the village of *Bardeh*, which is situated on the left bank of the river, 40° 20′ N. lat.

設里汪 *She-li-wang=Shirvan.*

194. By She-li-wang, the compiler of the ancient map apparently means *Shirvan*, a small realm in the eastern part of Transcaucasia; but he is mistaken respecting its position, locating the name too far south.

Shirvan is, it seems, first mentioned by Massudi, who states (*Mag. Asiat.* tom. i, p. 261), that after Anushirvan had founded Derbend (in the 6th century), he established several kingdoms in the region of the Caucasus. The ruler of the province of Shirvan bore the name *Shirvan shah*. Filan shah reigned in Shirvan, when the calif Vathek (A. D. 842—847) reached the country and subdued it (*Bibl. Orient.* p. 772).

Shirvan was ravaged by the Mongols, and its capital *Shamakha* burnt in 1221 or 1222. *Rashid* Shirvan shah had fled and shut himself up in the citadel of Derbend.

In the *Yüan shi*, chap. cxx, biography of *Ho-sze-mai-li*, 失兒灣沙 *Shi-r-wan sha* is mentioned in connection with Subutai's and Che-bé's expedition to the region of the Caucasus (see above, 61).

Shirvan is still the name of a province in Transcaucasia, having for its capital Shamakha.

撒里茫 *So-li-mang=Takht i Soleiman.*

195. The Si-pei-ti writes the name *Sa-li-mang*, whilst the map has *Sa-li-shi* (失). I have adopted the former reading, for it seems to me that the name Soleiman is intended.

On modern maps we find a city *Soleimania*, midway between Tebriz and Bagdad; but this place is out of the question, being founded in 1788 (Ritter, *l. c.* vol. vi*b*, p. 566).

I am inclined to identify So-li-mang with *Takht i Soleiman*. The ruins of this name are considered by Sir Henry Rawlinson to be identical with the ancient capital of Azerbaidjan (Ritter, *l. c.* vol. vi*b*, pp. 1040 sqq.). They are situated west of Zendjan (So-li-mang,—or Sa-li-shi of the map is placed north of Zendjan), in the mountains, where the river Chagatu, a southern affluent of the Urumia lake, partly takes it rise.

Rashid reports that Hulagu died in 1265, on the river *Chogotu*,

where he was accustomed to stay in winter. Ritter states (*l. c.* p. 1041), it seems on the authority of Rawlinson, that Abaka khan, the son of Hulagu had a palace at Takht i Soleiman, the ruins of which can still be seen.

毛夕里 *Mao-si-li* = *Mosul.*

196. *Mosul*, the celebrated city of Mesopotamia, situated on the Tigris, near the place where ancient *Nineveh* stood, is first mentioned by Mohammedan writers in connection with the first conquest of the Arabs (Ritter, *l. c.* vol. viib, p. 176).

When Hulagu invaded western Asia, Mosul was a small principality, governed by Bedr-eddin Lulu, who went in person to Meraga in 1258, to offer his submission to the Mongol prince (D'Ohsson, tom. iii, p. 258). Thus Mosul at first escaped destruction by the Mongols, but after Bedr-eddin's death the inhabitants revolted. The Mongols besieged the city for nine months, and after its capture, in 1262, utterly destroyed it (*l. c.* tom. iii, p. 372).

Mosul was a metropolitan see of the Nestorian church in the middle ages (Yule's *Cathay*, p. ccxliv).

M. Polo devotes a chapter of his book to the kingdom of *Mausul* (vol. i, p. 57). He states among other things:—"All the cloths of gold and silk that are called *Mosolins* are made in this country." It seems from this statement of M. Polo, that *mosolin* or muslin had a very different meaning from what it has now. I may observe however, that in the narrative of Ch'ang-ch'un's travels to the west in 1221 (see *Notes on Chin. Med. Trav.* p. 45), it is stated that in Samarcand the men of the lower classes (on the same page lower down it is said only the priests) wrap their heads about with a piece of white 麼斯 *mo-sze*. There can be no doubt that *mo-sze* here denotes "muslin," and the Chinese author seems to understand by *mo-sze* the same material which we now call "muslin."

Marignolli, speaks of *Monsol* (probably a clerical error for *Mousul*) on the Tygris, a city built out of the ruins of *Nynive* (Yule's *Cathay*, p. 351).

兀乞八剌 *U-k'i-ba-la* = *Okbara.*

197. *U-k'i-ba-la*, placed on the map south-east of Mosul, is without doubt the city of *Okbara* mentioned by Edrisi and Abulfeda, situated at a distance of fifteen hours' journey from Bagdad up the Tigris, on its eastern bank (Ritter, *l. c.* vol. viia, pp. 208, 237).

Benjamin of Tudela (12th century) reached Bagdad from Okbara in two days (Ritter, *l. c.* p. 256).

It seems that Okbara has disappeared from the maps.

八吉打 *Ba-gi-da = Baydad.*

198. This name has been omitted from the map, but is found in the list of the Si-pei-ti.

As is well known, Bagdad was founded by Almansur, the second of the Abbaside califs, A. D. 762, who before that time resided in *Anbar.*[348] Originally a city was built on the western bank of the Tigris; but some years later it was found more convenient to lay out one on the opposite bank; and this then became the celebrated city of Bagdad, where the calif established his residence. The western city was afterwards considered only a suburb, and called *Karshi* (D'Ohsson, tom. iii, p. 248).

Bagdad was taken by Hulagu in 1258, and some details respecting its capture will be found in my *Notes on Chin. Med. Trav.* p. 66. Subsequently the Mongol khans of Persia were accustomed to pass the winter in Bagdad (Ghazan and Oldjaitu;—see D'Ohsson, tom. iv, p. 172; tom. ii, p. 535).

Carpini (p. 710) terms Bagdad, *Baldas* or *Baldach.* The latter spelling is also met with in Haithon's *Historia Orientalis,* and on the Catalan map. Bagdad in the middle ages was a metropolitan see of the Nestorian church (Yule's *Cathay,* p. ccxliv).

M. Polo devotes several chapters of his book to the great city of *Baudas* (as he writes the name of Bagdad), the last calif, and the end of its supremacy (vol. i, pp. 60 sqq.).

The Chinese mediæval traveller Ch'ang Te applies nearly the same name to Bagdad as M. Polo, in styling it 報達 *Bao-da.* He also gives many details about the calif and the capture of the city by the Mongols (see *Notes on Chin. Med. Trav.* pp. 82 sqq.).

Ch'ang Te states, in accordance with the Mohammedan authors, that ancient Bagdad consisted of a western and an eastern city, a large river running between them. The western city had no wall, whilst the eastern one was well fortified.

In the *Yüan ch'ao pi shi* the name of Bagdad appears several times. It is spelt there *Bakhtat,* and the calif is termed *Khalibo* (Palladius' translation, p. 148). In the unabbreviated text of the *Yüan ch'ao pi shi* (see above, 11), a list is given of articles, animals, etc. sent from western Asia to Ogotai khan. They are there stated to be the productions of Bagdad. I may give the names of these articles, and venture an identification of

[348] Also situated on the Tigris, south-east of Bagdad.

some of them. The Chinese translation of the *Yüan ch'ao pi shi* (made as I have intimated in the 14th century) furnishes some explanations of these names, which for the greater part may be Persian or Arabic words. I add a translation of the Chinese explanations in parentheses.

Shiramala.(?)
Nakhut (a kind of gold brocade).
Nachidut (a silk stuff interwoven with gold).
Dardas (a stuff embroidered in gold).
Subut (pearls).
Tanas (great pearls).
Tobichaut (horses from Bageda with long legs and long necks).
Gurin cleut (camels).
Dao-u-si.(?)
Kichidut (camels).
Khachidut (mules).

With respect to *nakhut* and *nachidut* I may observe, that these words represent the Mongol plural form of *nakh* and *nachid;* and the latter apparently represent the stuffs *nacchi* and *nachetti*, spoken of by Pegoletti in his notices of the trade at Constantinople (Yule's *Cathay*, p. 306). The stuff *nakh* is named several times by Ibn Batuta, and explained by him as cloths of silk and gold. Rubruquis tells us (p. 317), that Mangu khan made him a present of *nasic*. M. Polo (vol. i, p. 60) speaks of "gold brocades, such as *nasich* and *nac*," woven in Baudas. I may finally mention, that in the *Yüan shi*, chap. lxxviii (on official dresses) a stuff 訥石失 *na-shi-shi* is repeatedly named, and the term is explained there as 金錦 or "gold brocade." In the same chapter we also meet with the term 速不都 *su-bu-du* (evidently the same as *subut* in the above list). It is explained as 珍珠 "pearls." *Subut* even now is the Mongol name for pearls. There is also the term 塔納 *t'a-na*, explained as 東珠 *tung-chu*. At the present day, *tung-chu* is the name applied in Peking to the finest and largest kind of pearls; but in modern Mongol *ta-na* means mother-of-pearl (see Schmidt's "Mongol Russian German Dictionary").

As to the horses from Bagdad called *tobichaut*, they are also spoken of by the Chinese traveller Ch'ang Te, who applies to them the same name (see *Notes on Chin. Med. Trav.* p. 84).

苦法 *K'u-fa = Kufah.*

199. K'u-fa also is not marked on the map, but the name appears in the list of the Si-pei-ti.

The city of Kufah was founded near the ancient city of Hira, in 638, during the reign of the calif Omar. The calif Abul Abbas

(A. D. 750—754) established his residence there, but afterwards transferred it to *Anbar*. In the first period of Islam, Kufah was a very celebrated city and a centre of Mohammedan learning. It is known that the appellation of the most ancient Arabic characters employed in writing is derived from the city of Kufah. Benjamin of Tudela visited Kufah in the 12th century (Ritter, *l. c.* vol. viia, p. 266).

The Mohammedan historians mention the capture of Kufah by the Mongols in 1258 (D'Ohsson, tom. iii, p. 255). Ibn Batuta in 1325, found it in a ruined state, but calls it the mother of cities in Irac (Ritter, *l. c.* p. 281).

The ruins of Kufah are marked on modern maps 32° N. lat. west of the Euphrates.

瓦夕的 *Wa-si-di* = *Wassit.*

200. This name also, occurs only in the list of the Si-pei-ti. As it is associated there with K'u-fa, there can be no doubt, that the city of Wassit is meant, founded also by the califs before Bagdad existed. The year A. D. 702 is given as the date of its foundation. It was situated midway between Kufah and Bassra,[349] and also between the rivers Euphrates and Tigris; wherefore it received the name Wassit, meaning "the middle" in Arabic (*Bibl. Orient.* p. 901).

Wassit was sacked by Hulagu's troops in 1258, and its population slaughtered (D'Ohsson, tom. iii, p. 255). Ghazan khan (A. D. 1295—1304) was accustomed to hunt near Wassit (*l. c.* tom. iv, pp. 200, 315).

On modern maps a city *Wasset e Hie* is marked, between the Euphrates and Tigris, a little south of 32°. Ritter (*l. c.* vol. viia, p. 191) thinks, that the identity of this place with the Wassit founded in 702, has not been established.

乞里茫沙杭 *K'i-li-mang-sha-hang* = *Kirmanshahan.*

201. *Kirmanshah*, a city situated on the great route leading from Teheran to Bagdad, between Hamadan and the latter place, is of ancient origin. It was founded by the Sassanide king Bahram (Vararanes IV, 388—399), who, on account of his having been governor of Kirman in the life-time of his father Sapor II, had the surname Kirman shah. The newly-built city then became the residence of Bahram; and Khosru Nushivan (539—572) and Khosru Parvez (590—628) also held their courts at Kirmanshah.

[349] Founded A. D. 636.

It is worthy of notice, that whilst the name of this place is generally written Kirmanshah by the Mohammedan geographers, Ebn Haukal styles it *Kirman Shahan*, which evidently is the name rendered by the Chinese sounds *K'i-li-mang-sha-hang*. Rashid-eddin also writes Kermanshahan (D,Ohsson, tom iv, p. 313).

那哈完的 *Na-ha-wan-di = Nahavand.*

202. Nahavand is placed on modern maps south of Hamadan and south-east of Kirmanshah. According to the Mohammedan authors, it is a very ancient city. Some geographers (as Kazwini) assert, that it was founded by Noah, and that the name reads properly *Nuhawend* (Ritter, vol. vi*b*, p. 95).

This place is of historic celebrity; for it was at Nahavand, that the famous battle was fought, A. D. 641, in which Yezdejerd III, the last king of the Sassanides was defeated by the Arabs.

羅耳 *Lo-r = Lor or Luristan.*

203. Lor, Lur or Luristan, is still the name of the mountainous country situated between Kuzistan and Irac Adjem. When the Mongols invaded western Asia, Lur was divided into two principalities, *Little Lur* (to the west) and *Great* (or eastern) *Lur* (D'Ohsson, tom. iii, p. 261; tom. iv, p. 171). This distinction still exists.

M. Polo (vol. i, p. 79) terms one of the kingdoms of Persia—*Lor.*

設剌子 *She-la-tze = Shulistan.*

204. The position assigned to She-la-tze on the ancient map, between Shiraz (205) and Kazerun (206), seems to point to *Shulistan.* The latter name is applied to the country of the *Shuls*, a people who long occupied a part of Luristan, but were expelled by the Lurs in the 12th century, and then settled in the country between Shiraz and Kuzistan.

M. Polo names [Suolstan],—*Cielstan* (Shelstán), as a kingdom of Persia (vol. i, p. 79). Ibn Batuta going from Shiraz to Kazerun, encamped the first day in the country of the Shuls.

泄剌失 *Sie-la-shi = Shiraz.*

205. The history of Shiraz, the capital of Fars or Persia proper, does not begin earlier, it seems, than Islam. Ebn Haukal calls Shiraz a new city (Ritter, *l. c.* vol. vi*a*, p. 854).

At the time of the rise of the Mongol power, the dynasty of the Salghar atabegs,—who were descended from Salghar, a governor

of Fars,—reigned in that country. Salghar's grandson Sankor had profited by the weakness of the Seldjuks, and in 1148 made himself independent. His successors reigned under the title of *atabegs* in Fars, and had their capital in Shiraz. When the Mongols for the first time ravaged western Asia, they did not reach Shiraz; and atabeg Abubekr, A. D. 1231—1260, who was anxious to be on good terms with the Great khan, sent his brother with rich presents to the court of Ogotai, and received the title of Kutlug khan (D'Ohsson, tom. ii, p. 92). When Hulagu passed the Djihun in 1256, Abubekr sent his nephew to compliment the Mongol prince. Thus Shiraz was spared by the Mongols until 1262, when the troops of the latter were sent to this city to punish Seldjuk shah, who was guilty of several acts of violence. After a stout resistance, the latter was made prisoner in Kazerun (see 206) and executed. From that time a Salgharian princess, married to a son of Hulagu, had the mere title of atabeg; but the province of Fars was under Mongol administration (D'Ohsson, tom. iii, pp. 400 sqq.).

M. Polo speaks of the kingdom of *Serazy* in Persia (vol. i, p. 79).

In the biography of *Kuo Khan*, found in the *Yüan shi*, chap. cxlix, and in the narrative of Ch'ang Te's travels (see *Notes on Chin. Med. Trav.* pp. 88, 89), Shiraz is termed 石羅子 *Shi-lo-tze*, and the title atabeg of the princes of Fars, is rendered there by 阿塔臯 *a-t'a-bei*.

In the *Ming shi*, Chap. cccxxxii, fol. 19, there is an article on 失剌思 *Shi-la-sze* or Shiraz, from which it appears, that in the 15th century, envoys were repeatedly sent from Shiraz to the court of China.

可咱隆 *Ko-dsa-lung* = *Kazerun.*

206. *Kazerun*, still the name of a city of Fars, is said to have been founded by king Kobad in the 6th century. In D'Ohsson's *Hist. d Mongols*, this place is twice mentioned, viz. tom. iii, p. 401, in connection with the capture of Seldjuk shah (see 205); and in tom. iv, p. 270, it is reported that Kutlug khodja, a Mongol prince of the Chagatai branch, ravaged Fars in 1300, and proceeded through Shiraz and Kazerun to Kuzistan and Guermsir.

怯失 *K'ie-shi* = *Kish.*

207. *Kish* or *Kais* is an island in the Persian gulf, on which was "for a long time one of the chief ports of trade with India and the East" (Yule's *Polo*, vol. i, p. 61). This place, believed

to be identical with the *Cataea* of Arrian, is the *Kisi* of M. Polo, situated where the merchants coming from Baudas enter the Indian sea. Opposite this island of Kish, was, according to Ritter (*l. c.* vol. via, p. 752) the ancient sea-port of *Siraf*, flourishing in the 9th century;—compare Reinaud's *Relation des voyages faits par les Arabes et les Persans dans l'Inde et à la Chine dans* le ix^e^ *siècle*, tom. i, pp. 13, 14. Ebn Haukal mentions Siraf in the 10th century; and Edrisi, two centuries later, speaks of Siraf still as an important place. Hamdallah Kazwini, who wrote in the 14th century, attributes the decline of Siraf, to the rise of *Kish* as a trading place in the 11th century (Ritter, *l. c.* pp. 774, 775).

八合剌因 *Ba-ha-la-yin=Baharaïn.*

208. *Baharaïn* was,—according to the *Bibl. Orient.* p. 158,—in ancient times the name of a province of Arabia, stretching along the western shore of the Persian gulf, and famed for the pearl fishing on its coast. On modern maps, this name is applied especially to an island in the Persian gulf near the coast of Arabia. Baharaïn is well known also in our day, for the pearl-oyster beds in its neighbourhood. Some Chinese mediæval accounts of pearl-fishing in the Persian gulf, will be found in my *Notes on Chin. Med. Trav.* pp. 88, 89.

忽里模子 *Hu-li-mu-tze=Hormuz.*

209. The name *Hu-li-mu-tze* is not found on the map. It occurs only in the list of the Si-pei-ti. Probably Hormuz, the celebrated emporium at the entrance of the Persian gulf is meant.

The name of Hormuz seems to be of very ancient origin, for Arrian tells us, that Nearchus, the admiral of Alexander the Great, when returning from India beached his fleet on the shore of *Harmozia* (*Indian History*, chap. xxxiii). A place *Armuza* appears in Ptolemy; but it was only in the 10th or 11th century, that Hormuz acquired its importance as a sea-port of Indian trade. It had been preceded by *Kish* as the principal port of the Persian gulf; and as we have seen, before Kish, in the 9th century *Siraf* occupied the most prominent place among the Persian sea-ports.

The port of Hormuz, which before the Mongol era belonged to the atabegs of Fars, originally stood upon the main-land. M. Polo, who repeatedly visited this place, terming it generally *Hormos* (once also *Curmosa*), states expressely, that it is situated on the shore of the sea (vol. i, pp. 79, 101). It is known, that when the great traveller, in 1293, returned from China by the sea route,

entrusted with the important mission of accompanying a Mongol princess from China to the court of the Persian khan, he landed at Hormuz.

The *Ormes* visited by Odoric in about 1320 (Yule's *Cathay*, p. 56), was on an island some five miles distant from the main-land. A few years later Ibn Batuta saw Hormuz, or *New Hormuz* as he calls the city on the celebrated island (*Ibid.* p. 400).

Abulfeda reports that ancient Hormuz on the main-land had been devastated by the incursions of the Tartars, wherefore its inhabitants had transferred their abode to an island in the sea, near the continent lying west of the old city.

When the Portuguese made their first appearance in the Persian gulf, in the beginning of the 16th century, Hormuz was a rich entrepôt of Indian trade. It was taken in 1509 by Albuquerque, and in the 16th century, flourished as one of the richest ports of the east. But in 1623 the Portuguese were expelled from the island by the united English and Persian forces. Shah Abbas destroyed the city of Hormuz and built another sea-port on the opposite shore (north), which was named *Bender Abbassi*. In our day *Bender Bushir* is the principal Persian port of the gulf.

We learn from M. Polo, that in the time of Kubilaï khan Chinese vessels visited Hormuz. The *Yüan shi* mentions several sea-ports of India as carrying on trade with China; but Hormuz is not spoken of there. I may however quote from the "Yüan History," a curious statement which perhaps refers to this port. In chap. cxxiii, biography of Arszelan, it is recorded, that his grandson Hurdutai, by order of Kubilaï khan, accompanied 不羅那顏 *Bu-lo no-yen* on his mission to the country of 哈兒馬某 *Ha-r-ma-mou*. I am inclined to suppose that the character 某 is a misprint for 斯 *sze*, and that the name should be read *Ha-r-ma-sze* or "Hormuz." I do not think that by the no-yen Bu-lo, M. Polo could be meant, for the title noyen would hardly have been applied to him; but as I have already noticed, Rashid-eddin mentions a distinguished Mongol, by name Pulad, with whom he was acquainted in Persia, and who furnished him much information regarding the history of the Mongols.

In the *Ming shi*, chap. cccxxvi, fol. 13 sqq. some details are given regarding Hormuz.[350] It is there stated that "忽魯謨斯 *Hu-lu-mu-sze* is a great kingdom, situated on the western sea north-west of 古里 *Ku-li* (probably Kalikut); from which place it can be reached in twenty-five days. In the year 1412, the emperor

350 I omit in my translation, some passages of the Chinese account of Hormuz, being absurd statements, or of little interest.

Yung-le sent 鄭和 *Cheng Ho* to the countries of the western sea. Gifts were bestowed upon the ruler of Hu-lu-mu-sze, his wives and ministers, and subsequently he sent an envoy named 已卽丁 *I-dsi-ding*, to the Chinese court. He brought a letter written on gold paper, and presented horses and products of his country as tribute. After this the embassies from Hu-lu-mu-sze were four times repeated, and Cheng Ho was sent thither for a second time in 1430. The kingdom was then ruled by 賽弗丁 *Sai-fu-ding*. Three years later, an embassy sent by this prince, reached Peking and presented tribute, which was courteously received by the emperor.

"The country of Hu-lu-mu-sze is situated on the utmost border of the western sea. The trading vessels of the southern barbarians come thither, and the nations of the great western sea, as well as the merchants of the *Si-yü* (western Asia) meet there for commercial purposes; wherefore the country is very rich. Snow is unknown there, but hoar-frost occurs; it seldom rains, and the soil is sterile; so that corn has to be brought from abroad. The people are wealthy. The women, when they go out of doors, veil their faces. Every necessary is to be had in the markets; but wine is forbidden, and whoever violates the interdict is severely punished, and sometimes even put to death. The ruler of Hu-lu-mu-sze, the officers and the people, profess the Mohammedan religion (回敎). They wash and pray five times a day. The soil there is covered with 鹹 *kien*;[351] wherefore grass and trees do not thrive. Cattle and horses are fed on dried fish.[352] As regards fruits, there are walnuts, 把聃 *ba-dan*,[353] pine seeds, pomegranates, grapes and dates.[354]

"There is a great hill (mountain) in that country, which is differently coloured on each of its four sides. One side consists of red rock-salt, of which the people make vessels; and when they put flesh in these, it is not necessary to add salt for its preservation. Another side is of white clay, used for whitewashing walls. The

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[351] *Kien* in Peking is a kind of impure carbonate of soda, used for soap. But in this case probably salt is to be understood.

[352] M. Polo reports the same of Esher on the south coast of Arabia; and Col. Yule (*l. c.* vol. ii, p. 379) states that "this custom holds more or less on all the Arabian coast from Shehr to the Persian Gulf, and on the coast east of the Gulf also." Compare Strabo's account of the *Ichthyophagi* on the coast of Mekram (b. xv, par. 11).

[353] *Badam* is the Persian name for "almonds."

[354] 萬年棗 *Wan-nien tsao*, "ten thousand year's jujubes,"—called also 波斯棗 *Posze tsao*, or "Persian jujubes." These names and others were applied in the time of the T'ang dynasty to the dates brought from Persia. See on this subject my pamphlet, *On the Study and Value of Chinese Botanical Works.*

third and fourth sides of the hill are of reddish carnation (赤) and yellow clay, which is also brought into use.

"The country produces lions, 麒麟 *k'i-lin*,[355] 駝鶏 *t'o-ki*[356] and 福祿靈羊 *fu-lu ling yang*.[357] Great pearls and various precious stones are also found there."

V. Countries and Places marked on the Map west of the dominions of Abu Said.

吉思荅你 *Ki-sze-da-ni* = *Constantinah or Constantinople.*

210. *Constantinah* was the name by which the Arabs, Persians and Turks used to designate Constantinople (*Bibl. Orient.* p. 252). The Mongol khans in Persia were generally on good terms with the Byzantine emperors, and several marriages of Byzantine princesses with Mongol khans are recorded by the Byzantine chroniclers. Hulagu demanded in marriage a daughter of Michael Paleologus, named Mary, who was sent in compliance with this demand; but when she arrived in Persia, Hulagu was dead, and she was married to his son and successor Abaka khan. This princess is mentioned by Rashid under the name of *Tespina* (D'Ohsson, tom. iii, p. 418),—evidently the Greek *Despoina*. Andronicus the elder is said to have given his natural daughter to Ghazan khan of Persia, and a few years later his sister Mary to Oldjaitu khan (D'Ohsson, tom. iv, pp. 315, 318). Other Byzantine princesses were married to the khans of Kipchak.

迷思耳 *Mi-sze-r* = *Misr or Egypt.*

211. By *Mi-sze-r*, doubtless the original name of Egypt is rendered, that being *Misr* in Arabic. Misr properly means "a great city" (*Bibl. Orient.* p. 585). The Hebrew name for Egypt is *Mizraïm*.

In the *Yüan shi*, the name of 密昔兒 *Mi-si-r*, or Egypt, occurs several times; *e. g.* the biography of *Kuo Khan* in chap. cxlix, and

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[355] *K'i-lin* is a fabulous Chinese animal,—the Chinese *unicorn*. *K'i* is the appellation for the male, and *lin* for the female. It is known that the ancients in the west also believed in the existence of the unicorn, or an animal with one horn; and even now the people of western Asia and Africa still believe in its existence. Some modern zoologists are of opinion, that the antelope, called *oryx leucoryx*, and found in Nubia, has given rise to the belief in the unicorn.

[356] *T'o-ki* or "camel fowl" is the "ostrich." See *Notes on Chin. Med. Trav.* p. 88.

[357] I know nothing about *fu-lu*. Perhaps the foreign name of a bird or a beast is represented by this sound. With respect to *ling yang* this term is given in the *Pen ts'ao kang mu* (chap. 1, fol. 34) as a synonyme of 大尾羊 *ta-wei yang* or "broad-tailed sheep."

Annals, *sub anno* 1353. Ch'ang Te in his account of the countries of the west, gives some particulars respecting *Mi-si-r* (see *Notes on Chin. Med. Trav.* p. 85).

The *Ming shi*, chap. cccxxxii, fol. 22, has also an article on 米昔兒 *Mi-si-r*. Several embassies from Egypt to the Chinese court, in the 15th century, are there recorded. One was sent in 1441 by *su-li-tan A-shi-la-fu*.[358]

的迷失吉 *Di-mi-shi-gi* = *Dimishik or Damascus.*

212. The history of Damascus can be traced back to the narratives of Holy Scripture, where this city, the capital of one of the kingdoms of Syria, is often mentioned. *Dimishik* is the Arabic name of Damascus. It appears frequently in the Persian annals, in connection with the wars of the Mongol khans of Persia with the sultans of Egypt, in the 13th and 14th centuries.

In a letter addressed by *Arghun khan* of Persia to king Philip of France, written in Mongol in 1289, and preserved in the French archives, Damascus is termed *Dimiski* (Pauthier's *M. Polo*, p. 776).

In the *Mém. conc. les Chinois*, tom. xiv, Father Amiot has translated a number of letters, sent by some sovereigns of western Asia to the Ming emperors of China. On page 246, the translation of a letter by the sovereign of *Ty-mi-shi* is found. As Amiot had sent to Paris a copy of the original text of the letters (written in Persian), together with the Chinese translation, Rémusat was enabled to ascertain that by Ty-mi-shi, Damascus was meant.[359]

丹牙 *Dan-ya* = *Damiath or Damietta.*

213. Although the position assigned to Dan-ya on the ancient map (north of Constantinople) does not suit Damietta, I suppose that this city was meant. At least there was no country or city north of Constantinople bearing a similar name.

The original name of Damietta is *Damiath* (*Bibl. Orient.* p. 266). The Catalan map has *Damyat*. This ancient city, situated on the eastern mouth of the Nile, played an important part in the crusades. The Mongol armies never advanced so far as Damietta, but of course the name was well known to them.

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[358] *Ashref* was a favorite name among the Mameluke sultans of Egypt.

[359] In my pamphlet, "*On the knowledge possessed by the Chinese of the Arabs etc.*" on p. 22, I stated that these letters had been addressed to the emperor K'ang-hi of the present dynasty. I did so on the authority of A. Rémusat (*Mélanges Asiatiques*, tom ii, p. 249). But now, when referring to Amiot's original translation, I see that Rémusat misunderstood Amiot; for the latter clearly says, that the letters in question date from the time of the Ming.

APPENDIX.

I may be allowed to review here, in completion of my notices of the mediæval geography of central and western Asia, two narratives of Asiatic travel in the 13th century, to which frequent reference has been made in these pages. The first comprises the journey of Haithon, king of little Armenia, to Mongolia and back; the second records the adventures of a Mongol officer during his peregrinations in central Asia. These two itineraries mention many places marked on the ancient Chinese map, which has been reviewed in the foregoing part, and thus furnish corroborative evidence of its authenticity.

I. THE JOURNEY OF HAITHON, KING OF LITTLE ARMENIA, TO MONGOLIA AND BACK, A. D. 1254—1255.

This narrative of the journey was originally written in Armenian, by *Kirakos Kaidzaketsi*, who accompanied king Haithon to Mongolia. A manuscript copy of it, dated 1616, was found in the monastery of Sanahin in southern Georgia, and was translated into Russian by the Armenian prince Argutinsky, and published in the Russian periodical *Sibirsky Westnik*, 1822, pp. 69 sqq. Klaproth translated it from the Russian version into French:—see *Nouv. Journal. Asiat.* tom. xii, pp. 214, 273 sqq.

I shall not here give a complete English version of Haithon's narrative, but intend merely to review that part of the journey bearing directly upon the subject of my investigations in this paper.

Haithon I (or *Hethum* as the name is written in the Armenian text), son of Constantine Rupen, became king by his marriage with Isabella, daughter and only child of Leon II, king of Little Armenia. Haithon ascended the throne in 1224, abdicated in 1269, in favor of his son Leon III, and then became a monk.[360] The narrative of his journey is entitled:—

TRAVELS OF HAITHON, THE PIOUS KING OF THE ARMENIANS, TO BATU AND MANGU KHANS, IN 703 AND 704 OF THE ARMENIAN ERA (A. D. 1254—1255).

Haithon, who resided in the city of *Sis* in Cilicia, sent (in 1246) his brother Sempad, commander-in-chief of his troops, to Kuyuk khan, with presents. Sempad returned from the court

[360] King *Haithon I* is not to be confounded with his kinsman *Haithon*, prince of *Gorhigos*, who also became a monk, and is the author of the *Histoire des Pays Orientaux*, written in 1307 by N. Salcon (Faulcon) in Poitiers, from the dictation of Haithon. Compare Bergeron's *Voyages en Asie.*

of the Great khan,—where he had been well received,—bringing letters from the monarch.[361]

After Mangu khan's accession, the great *bâsileopater* and general *Batu*,—who had established himself in the north, on the borders of a large river called *Ethil* (Volga), which empties into the Caspian sea,—sent to king Haithon, inviting him to come and proceed to the court of Mangu khan. The king, who was in fear of Batu, departed secretly and disguised; for he had to pass through the dominions of the sultan of *Rum*, who hated him on account of the assistance he had received from the Tartars. He arrived safely at the city of *Kars* (north-east of Erzerum), where he saw *Bachu nuin*,[362] the commander-in-chief of the Tartar army in the east. After this, Haithon proceeded through the country of the *Aghovans*, passed the gate of *Darband* (192) and the fortress *Djora*,[363] and then went to see *Batu*, and his son *Sartakh*[364] who was a Christian.[365] Both treated him with honour, and sent him on to the court of Mangu khan, by a very long route beyond the Caspian sea.

Haithon (and his companions) started on the 13th of May, 1254. After crossing the river *Aiekh*,[366] they arrived at *Hor*,[367] which was midway between Batu and Mangu khans. Thence they proceeded to *Erthidj*, entered the country of the *Aïimani*,[368] and then got to *Khara-khitai*.[369]

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[361] Sempad was four years absent. We possess a letter from him written on the journey. See Yule's *Cathay*, p. cxxvii.

[362] The *Baidju noyen* of the Persian historians.

[363] Perhaps *Madjar*. See above, 63.

[364] The 撒里答 *Sa-li-t'a* of the Chinese authors. See above, 89.

[365] Rubruquis says however, p. 263:—"De Sartach autem, utrum credit in Christum vel non, nescio. Hoc scio, quod christianus non vult dici, immo magis videtur michi deridere christianos. Ipse enim est in itinere christianorum, scilicet Rutenorum, Blacorum, Bulgarorum minoris Bulgarie, Soldainorum (see above, 157), Kerkisorum (see above, 160), Alanorum, qui omnes transeunt per eum quando vadunt ad curiam patris sui, deferentes ei munera, unde magis amplectitur eos. Tamen si Sarraceni veniant, et magis afferant, citius expediuntur. Habet etiam circa se nestorinos sacerdotes, qui pulsant tabulam et cantant officium suum."

[366] The Yaikh of the middle ages, now *Emba*, an affluent of the Caspian.

[367] Judging from the position assigned to this place in the itinerary, we must look for it somewhere near lake Balkash, or in Tarbagatai. I have not been able however, to find such a name in other mediæval authors.

[368] By Erthidj evidently the river *Irtysh* is meant, and Aïimani is intended for *Naiman*, a people to whom Rashid assigns the country near the sources of the Irtysh. The Chinese authors term them 乃蠻 *Nai-man*.

[369] The country Haithon now passed through belonged indeed to the Kara-khitai, before this people went to Turkistan (see Part I). Ch'ang-ch'un, in 1221, saw the ruins of a city of the Kara-khitai somewhere between the present Urga and Uliassutai. See *Notes on Chin. Med. Trav.* p. 23.

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On the 13th of September, Haithon had an audience with Mangu khan (in or near Karakorum I suppose),[370] and offered his gifts. He was treated with all the honour due to his rank, and staid ten days with Mangu khan's son. A diploma with the imperial seal was granted him, insuring his safety throughout the Mongol states.

The party set out on their homeward journey on November 1st, 1254. They arrived in three hundred and thirty days[371] at Ghumsghur,[372] went on to *Berbaligh* and then to *Beshbaligh*.[373] After this a desert is spoken of by the diarist, inhabited by naked wild men, who have their heads covered with horse-hair. The breasts of their women are extremely large and pendent; the people being indeed veritable brutes.[374] There are also wild horses of a yellow and black colour. They are bigger in size than common horses and donkeys. Wild camels with two humps are also met with there.[375]

Further on, the way of king Haithon led through *Yarlekh*, *Kuluk*, *Henkakh*, *Djambalekh*, *Khutaïyaï* and *Yankibalekh*,[376] after which they entered *Turkistan*.

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[370] Rubruquis had left the court of Mangu two or three months before Haithon arrived.

[371] This figure is without doubt a clerical error.

[372] A place unknown to me, but situated probably near the lake Kizil-bash. As the diarist states that Haithon passed through Bishbalik, it may be assumed that he travelled by the same route as Ch'ang-ch'un.

[373] Bishbalik, the present Urumtsi;—see above, 108.

[374] The story of wild men in the desert of Dsungaria seems to have been current in the middle ages. Carpini's report on the subject reads as follows (pp. 648, 649):—"In terrâ autem Kara-Kitaorum Occoday-can filius Chingis-can, postquàm positus fuit imperator, quandam civitatem ædificavit, quam Omyl appellavit: prope quam ad meridiem est quoddam desertum magnum, in quo sylvestres homines pro certo habitare dicuntur, qui nullo modo loquuntur, nec in cruribus habent juncturas; et si quandò cadunt, per se surgere sinè aliorum adjutorio minimè possunt; sed tantam discretionem habent quod faciunt filtra de lanâ camelorum, quibus vestiuntur, et ponunt etiàm contra ventum; et si aliqui Tartari vadunt ad eos et vulnerant eos sagittis, ponunt gramina in vulneribus et fortiter fugiunt antè eos."

[375] Wild horses, known under the name of *tarpan* are still found in the steppes of Mongolia, as also *djigetais*, which are called "wild mules" *(equus hemionus)*. The djigetai is about the size of a mule, and is of a yellowish color. Perhaps by "wild horses," the diarist means the *djigetai*. As to the wild camels, their existence in our day in the deserts of western Mongolia, has been ascertained by Col. Przewalsky; and Col. D. Forsyth proves, that they are found also in the deserts near Turphan (*Proc. Roy. Geogr. Soc.* No. xviii, "Elias, on Przewalsky's travels"). The embassy of Shah Rokh, sent to China in 1419, fell in with a wild camel between Kamul and the Chinese frontier.

[376] As to the first three of these names, I cannot trace them in any itinerary of other mediæval travellers, nor can I find similar names on the maps referring to those regions. With respect to *Djambalekh*, see above, 114. *Khutaïyaï* is probably the *Gu-t'a-ba* of the ancient map (115) and the *Khutukbai* of modern maps. *Yankibalekh* is the Yang-gi-ba-li of the ancient

The next stations mentioned in the itinerary are,—*Tsekopruk*, *Dinkabalekh*, *Pulad*, *Sutkul*,—the last name is explained by the diarist by "Sea of milk,"—*Halualekh* and *Ilan-baleck*.[377] Further on, they passed over the river *Ilan su*,[378] crossed a branch of the *Thoros* mountains,[379] and arrived at *Talas*,[380] where they saw *Hulavu* the brother of Mangu khan, who had taken the east as his portion.[381]

Thence they proceeded in a north-westerly direction, passing through *Kutughchin*, *Barkant*, *Sulghan*, *Urusoghan*, *Kayi-kant*, *Khuzark* or *Kamots*, *Khendakhoïr* and *Senghakh*. There is the mountain *Kharchuk*, whence the Seldjuks came; where is also the beginning of the mount *Thoros*. Further on they reached *Phartchin*, and turned aside in order to meet *Sartakh*, the son of Batu, who was on his way to Mangu khan. They then returned to *Senghakh* and continued their route to the large city of *Savran*, after which they passed through *Kharchukh*, *Yasun*, *Savri*, *Otrar*, *Zurnukh* and *Dizak*.[382]

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map (116), and *Yangibalgasun* of modern maps. All these places are situated on the great highway between Urumtsi and Kuldja.

[377] *Dinkabalekh* may perhaps be traced in modern 精河 *Dsing-ho*, the name of a river and of a city situated on the great route from Urumtsi to Kuldja, east of lake Sairam. Regarding *Pulad*, the 普剌 *Pu-la* of the Chinese authors, see above, 122. The name *Sutkul* and the appellation "Sea of milk" have been satisfactorily explained by Klaproth. In the language of the Kirghiz, *Sutkul* even now means "Lake of milk;" and this name is applied by the Kirghiz to lake *Sairam* of our maps, north-east of modern Kuldja. Sairam, or as Klaproth correctly writes *Sairim* or *Chagan Sairim nor* (the white lake of tranquility) is its Mongol name. *Halualekh* is evidently a corruption of *Almalik* (117), situated near the present Kuldja. *Ilan-baleck* is probably the *I-la-ba-li* of the ancient Chinese map (124).

[378] *Su* or *usu* in Mongol means "river." By *Ilan su* probably the *Ili* river is meant.

[379] By Thoros probably the *Alatau* is meant, the high mountain chain which stretches along the northern shore of lake Issikul. The traveller proceeding from Kuldja to Tashkand has to cross the north-western spur of the Alatau, by the defile of *Kastek*. The Chinese traveller Ch'ang Te in 1259, after having left Alimali (Kuldja), and before reaching the country where the Kara-khitai had dwelt (on the Chu river), mentions a place *Yi-tu* on the way, situated between two mountains. I have little doubt, that the Chinese traveller alludes to the Kastek pass. Compare *Notes on Chin. Med. Trav.* p. 74.

[380] With respect to *Talas*, see note 59.

[381] By east here, western Asia, *i. e.* the Orient in our sense is meant.

[382] Of the greater part of these names I can make nothing. They may partly refer to obscure places not mentioned by other mediæval authors. Haithon left for a while the direct road leading from Talas through Sairam to Samarcand, and went in a north-westerly direction to meet Sartakh. Among the cities he passed through, *Senghakh* is noticed also by Rashid-eddin. When Chinghiz' host had reached Otrar, it was divided into four corps. One under the command of Djuchi was sent along the border of the

From Dizak they reached *Semergend* in thirty days.[383] Next they came to *Sariphuch*, *Kerman* and *Bokara*;[384] reached the great river *Djehun* (Amu-daria); crossed it and then proceeded to *Mermen*, *Serakhs* and *Thus*;[385] the last place is on the border of *Khorassan*, called also *Raughastan*. After that they entered *Mazanderan*,[386] passed through *Bestan* and the country of *Eraz*, situated at the frontier of the *Mulhet*, and then came to *Thamghain* and the great city of *Hreï*.[387]

Sihon downward, and the first city captured by the Mongols on this way was *Signac* (see above, 49). After this Uzkend and *Barkhalighkend* were taken. The latter, as has been pointed out on a previous page, is the same as the *Ba-r-ch'i-li-han* of the map, the 八耳真 *Ba-r-djen* of the *Yüan shi*, the *Barchin* of Carpini, and the *Phartchin* of Haithon (see above, 163 and note 91). The mountain Kharchuk, where the Thoros begins, is the mountain chain stretching in a north-western direction between the river Talas and the Sir-daria, and named *Karatau* on modern maps. The diarist of Haithon's journey seems to comprise in the name Thoros, the Alatau, Alexander's chain, and the Karatau. The great city *Savran* in the itinerary has been identified by Klaproth with a place of a similar name situated on the Sir-daria; but *Savran* on modern maps is located in the vicinity of the ruins of Otrar, whilst our itinerary puts three stations between Savran and Otrar. I should rather think that the great city Savran of Haithon is the same as *Sairam* (162), of which Rashid-eddin also says, that it is a very large city. Supposing I am right, then the diarist of the ancient itinerary would intimate, that Otrar was situated on the way from Sairam to Samarcand. It is worthy of notice, that our map also places Otrar between Sairam and Samarcand. On modern maps we find the ruins of ancient Otrar marked north-west of Sairam, near the city of Turkistan. I am not aware whether the position of ancient Otrar indeed has been ascertained. In the books at my disposal, I find nothing with respect to modern researches concerning the ruins of this city. *Zurnukh* of Haithon is the same as *Zernuk* of the Persian authors (D'Ohsson, tom. i, p. 227). When Chinghiz proceeded from Otrar to Bokhara, Zernuk was the first place he attacked. *Dizak* in the ancient itinerary is the *Djizak* of modern maps, situated north-east of Samarcand.

[383] There is a mistake again in the figure, for the distance between Dizak and Samarcand is only eighty English miles.

[384] With respect to Sariphuch I may observe, that Mr. Khanikoff, in his itinerary from Samarcand to Bokhara ("Description of the Khanate of Bokhara," p. 98), mentions a place *Shahri khatyn* between Samarcand and *Kermineh*, the latter being identical with the Kerman of Haithon. The same place is spoken of in the *Liao shi*, under the name of 起兒漫 *K'i-r-man* (see above, 26).

[385] *Mermen* is intended, it seems, for *Meru Shahjan* (see above, 174). *Serakhs* is mentioned by Rashid (172). On modern maps it is found about forty-six English miles north-east of Meshed. Concerning *Thus*, see 147.

[386] This is still the name of a Persian province, on the southern shore of the Caspian sea.

[387] *Bestan* or *Bistam*, as Rashid writes it, is still the name of a city on the route from Meshed to Teheran. It is situated north-east of *Damegan* (see above, 177), which is the *Thamghain* of Haithon. The name *Eraz* is probably a mistake. Haithon really passed through the country of *Cumuss*, of which Damegan was the capital. *Mulhet* denotes the *Mulahida*, Ismaëlians

Further on, the itinerary mentions *Khezovin* (Kasvin;—185), *Avakhr* (Abhar, 189), *Zanghian* (Zendjan, 191), and *Miana;* from which place they reached *Tavrej* in twelve days.[388]

Eight months after quitting the court of Mangu khan, Haithon arrived at the frontier of Armenia, in July, 1255.

II. THE PEREGRINATIONS OF YE-LÜ HI-LIANG IN CENTRAL ASIA, A. D. 1260—2162.

Translated from his biography in the Yüan shi, chap. clxxx.

耶律希亮 *Ye-lü Hi-liang* was the great-grandson of *Ye-lü Ch'u-ts'ai* (Chinghiz khan's and Ogotai's minister;—see *Notes on Chin. Med. Trav.* p. 108). The name of Hi-liang's father was 鑄 *Chu.* Hi-liang was born near 和琳 *Ho-lin* (Karakorum). Father and son were both distinguished scholars, and held offices under *Süan-tsung* (Mangu khan). In the year 1258, when the emperor encamped among the mountains 六盤山 *Liu-pan shan,*[389] Hi-liang was with him; and when Mangu subsequently directed his host southward, Hi-liang and his father accompanied him.

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or Assassins (see above, 183, 184). *Hreï* is the same as ancient *Rági*, of which the ruins may be seen about six English miles south of Teheran.

[388] The city of Miana, famed for its poisonous bugs *(argas persicus)*, is only fifty English miles distant from *Tavrej* or *Tebriz*, the capital of Azerbaidjan. The figures in the distances given in Haithon's itinerary are all exaggerated, or perhaps Haithon travelled very slowly.

[389] The mountain *Liu-pan shan* has still the same name. On modern Chinese maps it is marked in the department of *P'ing-liang* in Kansu, south of the city of *Ku-yüan chou.* According to the Chinese annals *T'ung kien kang mu,* Chinghiz died near this mountain, in 1227, after having subdued the Tangut empire. The *Yüan shi* however, implies that he died in northern Mongolia. We read there in the Annals, under the year 1227, that "in the 5th intercalary month the emperor moved to the mountain *Liu-pan shan* in order to avoid the heat of the summer. In the 6th month, the empire of the 夏 *Hia* (Tangut) submitted. Chinghiz rested on the river 西江 *Si-kiang,* in the district of 清水 *Ts'ing-shui* (in Kansu; it has still the same name). In autumn, in the 7th month, on the day 壬午 *jen-wu,* the emperor fell ill, and eight days later died in his 'palace,' 哈老徒 *ha-lao-t'u,* on the river 薩里 *Sa-li.*" The river *Sa-li* is repeatedly mentioned in the *Yüan shi,* viz.—in the first chapter, in connection with the first military doings of Chinghiz. Rashid reports (D'Ohsson, tom. i, p. 58) that Chinghiz, in 1199, retired to his residence *Sari kihar.* The *Yüan ch'ao pi shi* (Palladius' translation, p. 81) writes the same name *Saari keher. Keher* in modern Mongol means "plain." On the ancient map of Mongolia found in the *Yüan shi lei pien* (see above, 10), 撒里怯兒 *Sa-li k'ie-r* is marked south of the river 斡難 *Wa-nan* (the Onon of our maps), and close to Sa-li k'ie-r we read the characters 元初起此; *i. e.* "here was the original abode of the

In the year 1259, the emperor died in 蜀 *Shu*,[390] when Hi-liang with the heavy baggage (of the army) proceeded northward to the province of *Shensi*. In the next year, 1260, *Shi-tsu* (Kubilaï) was elected emperor, when 阿里不哥 *A-li-bu-ko*[391] revolted (against his brother). Kubilaï sent to 渾都海 *Hun-du-hai*,[392] to require him to appear. *Chu* (the father of Hi-liang) tried to persuade him and the other officers; but Hun-du-hai refused. *Chu* thereupon left his wife and his sons, and made haste to Kubilaï to offer his service. Hun-du-hai then became enraged and sent a hundred horsemen in pursuit, but they could not catch him. Hun-du-hai then arrested Hi-liang, his mother and his son, and forced them to accompany him. They started from 靈武 *Ling-wu*,[393] passed through 應吉里 *Ying-gi-li*[394] and 西凉 *Si-liang*[395] and arrived at 甘州 *Kan-chou*.[396]

Mongols." Thus it seems the above-translated passage in the *Yüan shi* intimates that Chinghiz died in Mongolia, and not at the Liu-pan shan as is generally believed. The *Yüan ch'ao pi shi* (Palladius' translation, p. 152) and the *Ts'in cheng lu* (Palladius' translation, p. 195) both agree in stating, that after having subdued the Tangut empire, Chinghiz returned home and then died. Col. Yule in his *M. Polo* (vol. i, p. 216) states, that Rashid-eddin calls the place of Chinghiz' death *Leung-Shan*, which appears to be intended for Liu-pan shan. It is strange that D'Ohsson does not mention this statement of the Persian historian. In 1258, when Mangu khan waged war with the Sung, and commanded his host in person, he had for a time established his head-quarters among the mountains of *Liu-pan shan (Yüan shi, sub anno)*, and then proceeded to Sze-ch'uan, where he died.

390 *Shu* is the ancient name for what is now called the province of Sze-ch'uan. There are some discrepancies in the reports of the chroniclers respecting the death of Mangu khan. The Chinese annals *T'ung kien kang mu* records, that he died in the 7th month of 1259, before the walls of 合州 *Ho-chou*, which city had been besieged without success for several months (Ho-chou, a city in Sze-ch'uan still bears the same name;—30° 8′ N. lat.). The *Yüan shi* gives the 13th of the 7th month as the date of Mangu's death, and states that he died after an illness of several weeks, near the hill 釣魚山 *Tiao-yü shan*. This name is not found on modern Chinese maps; but it appears from the *Yüan shi*, that this hill or mountain was in the vicinity of Ho-chou. M. Polo (vol. i, p. 216) makes Mangu die by an arrow shot. Haithon says, that he was drowned.

391 The Persian authors call him *Arik-buga*. He was the youngest brother of Mangu and Kubilaï; and when Mangu departed for China, Arik-buga was intrusted with the regency. He had his residence in Karakorum, and after Mangu's death and the election of Kubilaï, laid claim to the supreme khanship.

392 After the death of Mangu khan, *Kondukai* was left at the head of the Mongol troops in Shensi. He embraced the cause of Arik-buga (D'Ohsson, tom. ii, p. 346).

393 An ancient city situated near the present *Ling-chou*, south-east of Ning-hia fu in Kansu.

394 The present *Ning-hia chung-wei* 37° 40′ N. lat.

395 Now *Liang-chou fu*.

396 The present *Kan-chou fu*.

Meanwhile 阿藍答兒 *A-lan-da-r*, the commander-in-chief of A-li-bu-ko's troops, marched out from *Ho-lin* (Karakorum) to effect his junction with Hun-du-hai, and arrived at the mountain 焉支山 *Yen-chi shan*. When he saw Hi-liang, he inquired about his father. Hi-liang, answered, that he knew nothing about him, and that if he could have known where he was fleeing to, he would have been with him. Some while after, they met the imperial army (of Kubilaï), and A-lan-da-r and Hun-du-hai were both defeated and killed. The remains of their troops went to the north, where they rallied under the command of 哈剌不花 *Ha-la bu-hua*.[397] Hi-liang, succeeded in escaping, and hid himself in the 沙陀 *sha-t'o*,[398] north of *Kan-chou*, and east of 黑水 *Hei-shui*. Ha-la bu-hua passed there with his army, without detecting Hi-liang; but some time after, when some straggling soldiers arrived, looking for horses, an old woman betrayed his retreat, and he was then arrested and brought to 肅州 *Su-chou*, to the commander-in-chief. Ha-la bu-hua was related to Hi-liang's father; they had served together in the last campaign in *Shu* (Szech'uan); and it had once happened, that Ha-la bu-hua fell ill, when *Chu* sent him a physician and supplied him with meat and wine. In grateful remembrance of these things, Ha-la bu-bua released Hi-liang, saying:—"Your father did me friendly service, I am happy to repay it now in granting you your freedom."

Hi-liang then proceeded to the northern river of 沙州 *Sha-chou*.[399] He was obliged to travel on foot with his brothers; and they carried their own baggage, without eating cooked food for many days. Being then winter time, they had to walk through the snow. After crossing the 天山 *T'ien shan* (Celestial mountains) Hi-liang arrived at 北庭都護府 *Pei-t'ing tu-hu fu*.[400]

In 1261 they arrived at the city of 昌八里 *Djang-ba-li*.[401] In summer they crossed the river 馬納思 *Ma-na-sze*,[402] and

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[397] The *Karabuka* of Rashid.

[398] The literal meaning of *sha-t'o* is "sandy downs." This is the name applied by the Chinese to the sandy part of the great Mongolian desert.

[399] *Sha-chou* in western Kansu (see above, 90). The Chinese text has 沙州北川 *Sha-chou pei-chuan*, "the northern river of Sha-chou." But perhaps *Pei-chuan* is the name of a place.

[400] The same as *Bishbalik*, or the present *Urumtsi*. See above, 109. Hi-liang went, it seems, from Sha-chou to Pei-t'ing by the common route, leading through the desert, and then passing through Kamul, Karakhodjo, etc.

[401] *Djambalik*, mentioned in Haithon's itinerary, and marked on the ancient map (114).

[402] *Manass* is still the name of a city in Dsungaria. It lies on the great road from Urumtsi to Kuldja, on the river of the same name.

finally reached 葉密里 *Ye-mi-li*.[403] This city was the capital of the apanage given to *Ting-tsung* (Kuyuk khan) when he was heir-apparent.[404] At that time the younger sister of the sixth empress was queen regent (in that country).[405] She and the prince 禾忽 *Ho-hu*[406] were desirous of presenting themselves to the emperor (Kubilaï). Hi-liang's mother, who was well aware of their situation, was desirous that her son should see the queen regent, but it was not possible. In winter of the same year Hi-liang proceeded to the country of 火孛 *Huo-bu*.[407]

In 1262 the 大各王 *Ta-ming wang*, Ting-tsung's (Kuyuk's) youngest son,[408] who commiserated Hi-liang in his misfortunes, in that he was unable to return home, made him a present of silk stuffs and a saddled horse. Hi-liang accompanied the prince to the country of 忽只兒 *Hu-dji-r*.[409]

At that time it happened that the prince 阿魯忽 *A-lu-hu*[410] gave orders to kill the officer appointed by A-li-bu-ko, and was desirous of submitting to the emperor (Kubilaï). Hi-liang joined the two princes A-lu-hu and Ta-ming wang, who returned to

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[403] The city of *Emil* or *Imil*. See above, 123.

[404] 葉密里城乃定宗潛邸湯沐之邑也 Rashid-eddin reports also that *Imil* was Kuyuk's apanage.

[405] It seems to me that *Organa* is here meant, the widow of Kara Hulagu, grandson of Chagatai. After the death of her husband, she was, according to the Persian historians, for eight years (1252—1260) regent of the middle empire and resided in Almalik. She was dethroned by Arik-buga, who set upon the throne of Chagatai, another of his grandsons named *Algu*. Algu subsequently married Organa.

[406] *Ho-hu* was the third and youngest son of Kuyuk khan (*Yüan shi*, chap. cvii, genealogical table).

[407] This country belonged also to the apanages of Kuyuk's and Ogotai's descendants. In the *Yüan shi*, beginning of chap. ii, it is stated, that after Chinghiz died, Ogotai came from the country of 霍博 *Ho-bo* to attend the funeral.

[408] *Ta-ming wang* = "prince of *Ta-ming*." The latter is the name of a department in the province of Chili. According to the Annals of the *Yüan shi*, *sub anno* 1236, *Ta-ming* was given as an apanage to Ku-yuk. It seems, that the afore-mentioned prince *Ho-hu* and *Ta-ming wang* are identical.

[409] In the biography of Subutai (see above, 60) a similar name of a place or country is mentioned. It is stated there that Subutai, after having finished the campaign in the west, went home by the way of *Ye-mi-li* (Imil) and 霍只 *Ho-dji*. There is a place *Boro hudjir* marked on the Russian maps of central Asia, on the road from Kuldja to Kopal; but it may be questioned whether this name occurs so early.

[410] Rashid-eddin tells us (D'Ohsson, tom. ii, p. 352) that *Algu* (see note 405), who at first was allied to Arik-buga, after having heard of the defeat of the latter, declared himself for Kubilaï khan, and ordered the three commissaries left by Arik-buga in Algu's states, to be put to death. Arik-buga then marched against Algu.

Ye-mi-li. The Ta-ming wang offered to Hi-liang a present of pendants, consisting of two pearls as large as hazel-nuts and worth a thousand *liang*, wishing that he might wear them in his ears. But Hi-liang declined to receive the present, saying, that he dared not injure the body received from his father and mother, and that besides this he had no merits. The prince then unfastened his own girdle richly adorned with gold, and gave it to Hi-liang, saying :—"I hope this present will not injure your body."

In the 5th month (1262) they met the army of A-li-bu-ko and were forced to retreat westward for fifteen hundred *li*. They reached the country of 孛劣撒里 *Bu-lie sa-li*,[411] and in the 6th month the country of 換扎孫 *Huan-dja-sun*. They passed through the city of 不剌 *Bu-la*,[412] and proceeding westward for six hundred *li*, arrived at the mountain 徹徹里澤剌 *Ch'e-ch'e-li tse-la*.[413] The queen regent and the heavy baggage were left behind. Hi-liang's mother and brothers also remained there. Hi-liang departed alone on horseback, and after riding more than two hundred *li*, reached the city of 出布兒 *Ch'u-bu-r*, and a hundred *li* further on arrived at the city of 也里虔 *Ye-li-k'ien*,[414] where he met the host of *Ha-la-bu-hua* (Arik-buga's general ;—see above.) He then again joined the two princes, who had rallied their forces, and returned to the city of *Bu-la*, where a battle was fought with Ha-la-bu-hua, who was defeated and lost his life. His head was then packed up and sent by a courier to the emperor (Kubilaï).[415]

In the 11th month they went to the country of 于亦思寬 *Yü-i-sze-kuan* (Uzkend ?), and in the year 1263, reached 可失哈里 *K'o-shi-ha-li* (Kashgar ;—130). In the 4th month they

[411] On this name and the next I can throw no light; but it may be noticed that the name *Sari* occurs frequently on modern maps of the regions here spoken of, *e. g. Gurban Sari, Sari Bulak*, etc.

[412] The city of *Pulad*, situated as has been proved above (122), near lake Sairam. It is the *Pulad* of Haithon.

[413] I know nothing about this mountain.

[414] Perhaps *Yarkand* is meant; but the indications in Hi-liang's itinerary are so vague that it is quite impossible to venture any identification of the places last mentioned.

[415] This statement about the battle at *Bu-la* corresponds in a general way with Rashid's record (D'Ohsson, tom. ii, p. 353). The Persian historian reports, that *Karabuka*, who commanded the avant-guard of Arik-buga, met the troops of the prince Algu, near the city of *Pulad* and the lake *Sut* (the Sutkul of Haithon,—the lake Sairam). A battle was fought there and Karabuka was defeated and killed. Subsequently however Algu was attacked and defeated by Assutai, who had arrived at the head of Arik-buga's forces. Algu was forced to abandon his apanage and retreat to *Kholan* and *Kashgar* with his right flank, and finally withdrew towards *Samarcand*.

were again attacked by the host of Ha-la-bu-hua, near the city of 渾八升 *Hun-ba-sheng*. At that time the mother of Hi-liang was still with the queen regent, who spent the summer in the mountains of 阿體八升 *A-t'i-ba-sheng*.[416]

Meanwhile *Chu* (the father of Hi-liang) had put the emperor (Kubilaï) in mind of his son's being still in the countries of the north-western frontier; whereupon the emperor sent letters to the two princes, ordering them to dispatch Hi-liang as a courier. In the 6th month, the latter passed through the city of 苦先 *K'u-sien*,[417] reached 哈剌火者 *Ha-la-huo-djo*[418] and 伊州 *I-chou*,[419] crossed the 大漠 *ta-mo* (great desert), and in the 8th month presented himself to the emperor in 上都 *Shang-tu*,[420] and reported on the state of things at the frontier etc.

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416 Probably *Atapasha* is meant. See above, 132.
417 Probably *Kucha*. See 126.
418 *Karakhodjo*. See 111.
419 *Kamul*. See 91.
420 *Shang-tu*, the summer residence of Kubilaï, in southern Mongolia.

ARTICLE V.

RETROSPECT OF EVENTS IN CHINA, FOR THE YEAR 1875.

By ARCHIBALD J. LITTLE, F.R.G.S.

THE year just past has been marked by two events of great importance, in so far as this part of the world is concerned: the murder of Augustus Raymond Margary, assistant in H. B. M.'s Consular service, and the death of the Emperor known by the style of T'ung-chi. Both events created great excitement at the time and promised momentous changes in the foreign relations of the empire; but in the one case a mission of enquiry has staved off the impending trouble, and in the other case the succession to the throne has been peacefully transferred to the infant under whose reign of KWANG-SÜ we are now living.

The news of the death of Mr. Margary reached us on the fifth of April by the mail steamer from India, but the news was known to the Chinese in Peking some ten days earlier. The sad event occurred on the 21st February at a place called Manwyne, a walled village in the Sanda valley in the "Shan" territory, called by the Chinese, the land of the Pa i (八夷) or "eight barbarian" tribes. The attack is said to have taken place in the "Khyong" a sort of temple and "guest-house" which exists in all these towns.[1] The Shans are feudatory to the Chinese. This city is often confounded with Momein in the Chinese jurisdiction of Teng yueh chow in Yunnan: the proper name for which is Teng-yueh-ting (騰越廳) a town registered in the "Tsin-shen" or Chinese Civil List, as a residence of a "Ting" magistrate, under the prefecture of Yung ch'ang foo (永昌府). Mr. Margary had, after a long and adventurous journey, already passed through both cities on his way westward; and had joined Colonel Browne, who had been appointed leader of the proposed expedition through the western provinces of China in Bhamo. It was on his return journey while prospecting in advance of the party that he was fallen upon and killed; report

[1] Vide "Memorial" from the *Tsungli Yamên*, 28th August 1875. "The British Interpreter Margary and his party were proceeding from Burmah into Yunnan, when, at a town fifty *li* southwest from the seat of government at the Shan principality of Sanda, subject to the prefecture of Yung-chang they were attacked by troops in the service of the government and [Mr. Margary was] murdered," &c.

says under the direction of the high Chinese officials of Yunnan without whose connivance the Shaus, a semi-civilised race would not have ventured such an act: whether truly or not the investigations of the commission now on its way thither, will ere long inform us. The horror and disgust which this cold blooded crime inspired in the breasts of poor Margary's fellow-countrymen, and indeed of all foreigners throughout China, led people to look for war as the only means of duly avenging the murder on the native officials who were supposed to be its instigators, and on the literati class generally who are believed to approve it. As time wore on, however, these feelings calmed down and the complicity of the mandarins was no longer felt to be an absolute certainty. Meanwhile the joint commission was determined upon by our minister at Peking; and it was hoped and believed that the real truth would be ferreted out, and the guilty brought to punishment. This commission was composed, on the British side, of the Honourable T. G. Grosvenor, second secretary of H. M. Legation at Peking and Mr. Baber, consular interpreter; together with Mr. Davenport, the then vice-consul at Shanghai, attached as a sort of legal assessor and accompanied by Sung Pao hwa: on the Chinese side, of Li Han chang, governor-general of the two Hu. They were preceded by Liu[2] and assisted by Chên, late judge of the Shanghai Mixed Court; altogether a body so constituted as to ensure a fair hearing and a thorough investigation. This party started on the fifth of October from Hankow, reached Shasi on the 25th November, Ichang on the 1st December and Kwei chow fu on the 13th of that month. Li Han chang and his colleagues arrived in Yunnan fu on the 13th November and immediately sent a report to the Peking government; who published an edict on the 9th day of December last, degrading the officials concerned in the outrage, preparatory to their formal trial.

Six months thus elapsed from the time the news of the murder was received to the final despatch of the commission to adjudicate upon it. The interval was filled with negotiations between the British government, represented by Mr. Wade, on the one part; and the Peking authorities, who deputed Li Hung chang, viceroy of Chihli as their plenipotentiary, on the other part. The agreement was not arrived at without enormous difficulty; and the greatest credit is due to Mr. Wade for his patience and pertinacity in bringing the negotiations to a successful issue, without having recourse to that force, which would have been the resource of a less able diplomatist. People at the time, especially his fellow-

[2] Liu Yŏ-chao, Governor-General of Yunnan and Kweichow had gone to his native place in Hunan. He was now ordered to return and "cooperate with the Governor (Ts'en yü-ying) in selecting officials of intelligence and ability to deal with the matter as justice requires."

countrymen here in China, annoyed at the long delay in exacting retribution, hardly gave Mr. Wade that full credit for his action in the matter which time is beginning to award him; and which his government has deservedly acknowledged with a K.C.B. Mr. Wade, now Sir Thomas, had an extremely difficult task to fulfil; and a slight sketch of the negotiations, as far as known, will hardly be out of place; as showing the system pursued, and at the same time the great difficulty of obtaining redress from the Chinese government in dealing with foreign affairs.

News of the outrage reached Peking at the end of March; and H. B. M.'s minister at once demanded the despatch of a high Chinese commission to investigate the crime on the spot, and bring the guilty parties, whatever their position, to punishment: at the same time insisting that no one should be sentenced until a commission of foreigners, appointed by himself, should have had the opportunity of investigating the evidence and assuring themselves of the real guilt of the accused. The Chinese were long in yielding a general compliance to this demand; until a threat of hauling down his flag induced them to give way, and to appoint Li Han chang, viceroy of the two Hu and brother of Li Hung chang as special commissioner. Meanwhile a memorial was received at Peking from the governor of Yunnan, in which the attack upon Margary was attributed to a popular outbreak, and that the only blame due to the officials was an inability to foresee the disturbance, or quell it in time. On the 19th June the first notification on the subject appeared in the Peking Gazette; viz. the appointment of Li Han chang to proceed to Yunnan "to enquire into and settle a certain affair which had occurred in that province," no notice of foreigners or foreign troubles having been made. To this apparent disposition of the Chinese authorities to gloss over the matter, and let it seem to their own people one of comparative insignificance, must be attributed the hitch which about this time occurred; and which led to a renewal of negotiations and the postponement of the departure of the commission. At the same time too, the strongest orders appear to have been received from the home government by Sir Thomas Wade ordering a firm stand to be made for all the points demanded; viz. a full investigation, degradation and punishment of the guilty however high-placed; acknowledgment of the status of British subjects, and their right to travel in the country; the publication of these facts in the Government Official Gazette; and the establishment of direct intercourse with the Heads of Departments in Peking, in lieu of being limited to the Tsung-li yamên or department of Foreign Affairs as heretofore. Sir Thomas Wade spent the early summer in Shanghai, presumably in order to remain in telegraphic com-

munication with his government, while these negotiations were pending; and, it is said, to arrange with the Admiral of the British fleet in these waters in the event of the situation demanding ulterior measures. Colonel Browne who was in command of the escort which was attacked by the Chinese militia on the frontier of Yunnan was also present here. In August Sir Thomas, armed with full powers, returned to the north, and in Tientsin met Li Hung chang, who had been appointed as plenipotentiary on the Chinese side. Lengthened negotiation ensued, and war, which at one time was confidently expected, was prevented, it is reported, by Li's firmness in pressing on his own government the true state of affairs. For there is little doubt that in August last the Empress and her entourage were eager to fight, and if possible, oust the barbarian altogether; for which purpose they believed the Chinese army to be now, both in equipment and numbers, fitted. Prince Ch'un, the father of the boy emperor, is described as a rash man and fanatical barbarian-hater; and to his influence is attributed the qualification of Li's powers to the extent of not allowing him to concede the arraignment of Liu Yoh-chao the governor-general of Yunnan. This restriction was only made known apparently at the last moment, and our minister then retired from Tientsin to Chefoo in a gun-boat, threatening war. As the Chinese know that Sir Thomas Wade is not a man to utter empty threats, Li hereupon determined to apply once more to Peking; knowing full well that the Chinese army was in no position to face a foreign foe. He succeeded in impressing his views upon the Empresses; and upon Sir Thomas Wade's returning to Tientsin with Admiral Ryder, he met a messenger from Li conceding the point. Thus, as ever, the Chinese, finding the foreigner to be in earnest, gave way; and thus a second time has Sir Thomas by his tact and firmness saved this unwieldy empire from plunging into war, and probable self destruction. Such we believe to have been the main steps in the negotiations, the details of which we must await the publication of a blue book to confirm.

On the 28th September an edict appeared in the Peking Gazette conceding intercourse with the Great Departments of State; and on the 10th October appeared another ordering action to be taken by Li Han chang in the matter of the murder of Margary; declaring the right of foreigners to travel in the interior, and requiring the officials to take cognizance of the provisions of the treaty in this regard. Further in the Gazette of the 9th December, the failure of the prefect of Yunnan-foo to control his lawless subjects, and the neglect of the brigadier commanding the district to take cognizance of the murder of Margary and the attack on Colonel Browne's escort, and to arrest those concerned in it, is admitted, and both

officials (Wu K'i liang and Tsiang Tsung han) are temporarily degraded from their posts, with a view to their examination. Here the matter now stands. It remains to be seen whether the Chinese hope seriously to palm off upon the British minister a tale which requires him to believe the officials were ignorant and quiescent, and that such events as a spontaneous assembly of the militia could have taken place. It may be that the British government, anxious not to press the reigning dynasty too hard, may be satisfied with the degradation of the officials and the execution of the immediate murderers of Margary, if these can be discovered; and wink at the subterfuges of the Peking government to conceal their dishonour. Such seems to be the present home policy; but we believe that as in Turkey, the support given to an effete, corrupt and obsolete system, is a mistake, and that it would be better to let both governments collapse on the chance of something better arising to take their places; as, without external props, they would inevitably do from their own rottenness.

The accession of the Emperor, whose style or Kwo-hao is Kwang-sü (光緒), was announced in the Peking Gazette of 16th January; and we learn from the *North-China Herald*, to which able periodical, and notably to the translations of the Peking Gazettes regularly published therein, we are indebted for many of the facts of this Retrospect, that this name was selected from a sentence occurring in a state paper of the Sung dynasty, entitled "Memorial requesting the bestowal of a title of honour." The sentence is as follows:—光復丕緒 Kwang fuh-p'ei sü *i. e.* "gloriously renew the dynastic continuation," so that Kwang-sü may be freely rendered as "Glorious succession." The boy's own name is Tsai t'ien (載湉), and he is a cousin of the late emperor, styled T'ung-chi (同治) or "Law and order," who had commenced his reign in August 1861. He is the ninth of the line of the T'sing or Manchu dynasty, inaugurated in the year 1644 by the Tartar conqueror, Shun-che.

The late emperor, T'ung-che, was born on the 27th April 1856, his death thus occurring in his 19th year. The death of his father Hien-feng ("Plenty") which took place at Jehol on the 17th August 1861, after his flight from Peking in the autumn of the previous year, when the allied forces menaced the capital, left the guardianship of the young heir apparent a prize to be disputed for by the powers at court. The dispute which was naturally to be expected in an Oriental palace took place. The princes Su-chun, Ts'ai-yuen and Twan-hwa, members of the Blood Royal, strongly opposed to the peace policy of which prince Kung was the foremost representative, having proclaimed the emperor, endeavoured to seize the reins of

government and form a regency in which their own party should have unlimited sway. The Empress Dowager ("Mother of the State"), and the mother of the sovereign, were admitted to the Council of the Regency, nominally as guardians of the boy emperor. Prince Kung was excluded, and the empresses, being dissatisfied with Su-shun's conduct, arranged a coup d'état with the former prince. The three conspiring princes were arrested, tried and condemned to be cut to pieces: this sentence was commuted to the decapitation of Su-shun, and the self-strangulation of the other two. The young emperor ascended the throne, nominally at the commencement of the year 1862, which is called the first of T'ung-che, (the year in which one emperor dies continues to be called by his style), the administration of the government devolving upon the Empresses Dowager as Regents, with his uncle Prince Kung as chief adviser. On the 16th October 1872, he was married; and on the 23rd February following he assumed the reins of government. We know little of the character or capacity of the deceased emperor; but there are grounds for believing that he inherited some of the energy which distinguished the earlier monarchs of the dynasty. Opportunity of the crisis produced by his death was taken to make Li Hung chang, a Chinese (native of Ngan-hui) senior of the Ta hio sze or Grand Secretaries of State, a precedence hitherto assigned to a Manchu. Speculations have been rife as to the likelihood of this powerful viceroy overturning the Manchus and establishing a native dynasty in his own person; but all we can learn goes to show that no such disloyalty is felt either by Li or any other of the high Chinese officials; and that the Manchu dynasty are no more regarded as intruders than is the German family that now sits on the throne of England. In both instances as long as the government is carried on in accordance with the ancient principles of constitutionalism on the one side, and of a democratic autocracy on the other, no opposition is likely or even conceivable. No: the danger to the Manchu dynasty is from without.

On the morning following the death of T'ung-chi, which took place on the 12th January, it was reported in Peking that a grand child of his eldest uncle, the Prince of Tun had, in the absence of a direct heir, been selected for the succession; but later in the day it became known that the two Empresses (*i. e.* the Empress Dowager and Empress Mother of T'ung-chi) had selected the only son of the seventh prince, the Prince of Ch'un. This child, who was born in 1871 and is thus five years old, was designated as a successor to the throne in a decree of the Empresses, sanctioned, it was said, in a valedictory manifesto of the departed sovereign. The Empress Mother and the Princess of Ch'un are sisters, and are said to be daughters of a Manchu functionary, formerly in office as

Tao-tai of the Kwei-sui district in Shansi, named Chêng-lin 徵麟. The result shews that the empresses have known how to maintain and exalt the position gained by their coup d'état in 1861, when they seized the reins of power after the death of Hien-feng: and we cannot but admire the vigour, and determination with which they appear to dominate the rival parties, and bend princes and ministers to their will. We believe that, in truth, the Empresses Regent are now carrying on personal government in a way hardly credited in Europe. Placing themselves behind a curtain they receive the numerous officials daily going up from all parts of the vast empire to Peking for audience, and we are told that the Empress Mother particularly shews no little discernment in judging of the character of the officials brought before her, and in selecting them for appropriate posts.

The past year has witnessed the evacuation of Formosa by the Japanese troops, who have been replaced by large bodies of Chinese sent across to subdue the natives. Very little has been done beyond organising the coast districts already in Chinese possession and extending new roads. Of the actual operations of the troops little is known with certainty, but the reports received state that in their encounters with the aborigines they were regularly repulsed as soon as they left the settled districts, notwithstanding that the men were well armed with foreign rifles and equipped for the field as no other Chinese force has yet been. At the recommendation of Shen Pao chen, the Imperial commissioner, some wise edicts encouraging the settlement of the country were issued, and the Futai of Fokien was ordered to reside in the island. The show of pacification over, the majority of the Chinese troops were withdrawn and passed through Shanghai during the summer on the way back to the districts north of the Yang-tsze, from which they had been drawn, and disbanded. To cover the expenses of this expedition and of that in the north-west against Kashgar, two small loans, secured on the Customs' revenues, were privately negotiated, one of two million taels with the Oriental Bank, and one of one million taels with the British firm of Jardine, Matheson & Co. The rate of interest upon these loans is ten per cent per annum, being an increase upon the rate at which the first loan was borrowed in the previous year through the medium of the Hongkong and Shanghai Banking Corporation—£627,615 at eight per cent.

Turkistan has been another source of anxiety and expenditure to China during the past twelve months. Not content with quelling the rebellion in Shensi and Kansuh, the Peking government, it is said, much against the advice of the high officials outside the cabidet, desired to reduce the Mohammedan tribes beyond the wall; and to reconquer the revolted provinces of Turkistan which have

been welded into a kingdom by Yacoob khan. These further efforts have been, however, unsuccessful: indeed it is reported that Tso Ts'ung t'ang's army of 100,000 men has been utterly destroyed, all but the rear guard, which had not advanced far beyond the wall, and with which was the general himself. It has been obvious from the commencement that China was in no condition to attempt the reduction of Kashgar; and the enterprise has only added to the many other heavy embarrassments of the country.

The interests of the foreigners settled in the country have continued to retrograde, and although the Chinese may have no premeditated policy of starving us out, they appear to be slowly but surely doing so. The establishment of a subsidiary line of coast steamers in the shape of the China Merchants' Steam Navigation Company has proved a formidable blow to foreign shipping. In this as in other instances the Chinese government has shewn itself by no means unwilling to avail of foreign arts, but with the hope of using them to keep foreigners at a distance. So of the Woosung railway, built to connect Shanghai with its port of Woosung, ten miles distant. The Chinese government possibly does not object to railways in themselves, but solely as a weapon in foreign hands. It is willing to buy and work the road itself, but not to permit foreigners to introduce the thin end of the wedge, if it can prevent it. Foreign machinery has been introduced to work the Keelung (Formosa) coal-mines, but no foreign company is allowed to own or work them. In the lower walks of trade the superior economy of the natives is fast ousting foreigners from ground once their own, such as storekeeping, printing, carpentering and blacksmith work; whereby the number of foreigners able to make a living in China is daily diminishing. This is but natural and hardly regrettable; but that the field to foreign enterprise on a large scale should be entirely closed against us is a sad disappointment to those who have lived here in the expectation of sooner or later seeing the country "opened up." That the Chinese have a right so to hold us at a distance is, if we treat them as equals, undeniable, but our existence here at all is a violation of this right, and most foreign residents in China were of the belief that, in the interests of humanity in general, and of the Chinese in particular, this supposed right would continue to be violated. For what have we here but a country, richly endowed by nature, filled with a frugal and industrious population, yet decaying through absence of organisation and want of leadership. Every year a famine is recorded in some portion or other of the interior of the empire, but the rich crops of the more fruitful provinces are of small avail in allaying the curse. Want of means of communication and accumulated

taxation check the overflow of one province into the void of another, and the starving people, no other resource left them, rise in rebellion. The dry provinces of the north-west have to depend on their own precarious crops for food, and are prevented as much by the want of funds from paying for it, as by the want of roads from importing supplies from a distance. The mineral resources at their feet are untouched, and regions which, if report speaks true, are as rich in the materials of wealth as any portion of the known globe, vegetate in miserable poverty. If these things were as well known to our rulers at home as they are to us here, less pusillanimity would be shown in dealing with the position of foreigners in China; for our prestige is sufficient to enable us to gain all that we can in reason ask, and, should it fail for the moment, the first renewal of a display of force would revive it. Properly administered the resources of the country are ample; but as the government is now managed, each province, in the memorials of its governors to headquarters, vies with the others in proclaiming its insolvency.

It is beyond the province of this retrospect to enumerate the mercantile disabilities under which we labour; instanced by the taxation of our goods, over and above the five per cent. Customs tax levied on landing, even in this our own settlement; by the seizure, without previous warning, of the *Carisbrooke* steamer off Hainan; and by the nullification of Treaty Transit-passes at the outports, and the attempt to starve out our colony of Hongkong by a Customs' cordon surrounding it. Here in Shanghai we have one of the most important sea ports in the world being gradually closed up by what the highest official in the province was not ashamed to call the heaven-sent (see Fu-t'ai's despatch to Consul Medhurst) barrier of the Woosung bar. It is an astonishing sight to see the rapid encroachments of the Yang-tsze mud, which in fifteen years has narrowed our river by nearly one-third; and in no other country but China would a river serving such a trade as this be left to its natural devices. Mainly at the expense of the foreign community, some Dutch engineers were summoned from Japan to examine the bar; but their report has not yet been published, nor when published is there any reason to hope that action will be taken upon it. The condition of the settlement is an abnormal one; and the governing powers of the Municipality established by the foreign residents are being daily encroached upon. To ensure a continuance of the prosperity brought to the place by foreigners an extension of these powers is needed: the jurisdiction of the foreign residents needs to be extended, as in the time of the thirty mile radius, so that fresh roads could be made, the conservancy of the river taken in hand, waterworks and other appliances of civilisation established; in short power taken

from those who won't govern, and given to those who will.

At the time when war with Japan was imminent the government of Fuh-kien, under whose administration the island of Formosa is placed, saw the necessity of availing themselves of the telegraphic facilities which the Great Northern Telegraph Company has provided on this coast. But Foochow, although the largest tea-port in China, exporting annually nearly 100,000,000 lbs. of tea, has no direct communication, the wire being landed at the neighbouring and more accessible port of Amoy. To set up a wire overland between the two ports, and thus put Foochow in direct communication with the rest of the world was a very simple matter, but no permission could be gained from the Chinese, and the affair was given up, until in 1874 the difficulty with Japan induced the viceroy to consent to the undertaking. The Great Northern Telegraph Company immediately set to work; but before the line was completed, by the good offices of Mr. Wade, a peace was settled, and the wire no longer needed. The Telegraph Company were forced to receive payment for the work done, and the posts were pulled down. Thus, in nothing but the direct appliances of war has the Chinese government shewn itself really progressive. In obtaining these they have spared no cost, even in the face of the financial embarrassment which is disclosed in memorials from every part of the empire. Frigates and gun-boats of the most approved designs have been constructed at the arsenals of Foochow and Shanghai, or imported from abroad. Enormous orders have been sent to the Krupp factory, and scarcely a steamer has arrived from Europe during the year without bringing out a heavy consignment of war material of some sort or another for the government. Powder-mills and cartridge manufactories on a large scale have been added to the Shanghai arsenal, and forts of the most approved modern type have been erected at the mouths of the principal rivers, notably at Woosung and Taku, and at the head of the more commanding reaches of the Yang-tsze and the Min. This ceaseless activity in the War Department has been in marked contrast with the apathy and obstructiveness shewn in all other quarters, and bodes little good for the pacific progress of foreign interests, which all who have cast in their lot with this country are so anxiously watching for.

As an instance of the energy of our residents in the cause of science we may mention, apart from the work accomplished by the members of this Society, the establishment of an Astronomical Observatory on a modest scale by Doctor L. S. Little; whose labours we confidently expect will in time produce good fruit. Opportunity has been taken of the determination of the Longitude of Nagasaki by the American "Transit of Venus" expedition in 1874 accurately to fix the Longitude of Shanghai.

A first need of the American party, upon their arrival in Nagasaki, was to determine the longitude of their observatory. The cable to Wladivostock enabled them to do this by putting themselves in communication with the Siberian astronomers; and last year the cable between this and Nagasaki was placed at the disposal of Mr. A. C. Taintor and Dr. Little for a like work here.

Another addition has been made to our local scientific resources during the year in the shape of a "Chinese Polytechnic Institu-"tion and Reading-Room." This institution has originated in a desire, on the part of some of our foreign residents, seconded by one or two enlightened Chinamen, to bring home to the natives generally a knowledge and appreciation of foreign arts and sciences. Mr. Fryer, who holds an appointment at the Chinese Arsenal as translator of foreign scientific works, H. M. Consul Mr. Medhurst, together with Mr. T. W. Kingsmill and the Chinese Hsü, Wang and Tong-king-sing (the latter being the official manager of the China Merchants Steam Navigation Co.), have been the prime movers of the scheme and now form the Committee. A modest building has been erected in the settlement in the Chinese style, and the nucleus of a Library bought, and various models collected. The cost has been defrayed partly by subscriptions from the foreign community, but mainly by contributions from high Chinese officials. The Prospectus states that the object of the institution is to bring the Sciences, Arts and Manufactures of Western Nations in the most practicable manner possible before the notice of the Chinese; the means proposed being, 1st. an Exhibition of machinery, apparatus, manufactured goods etc. 2nd. Lectures and classes for scientific instruction; and 3rd. a Chinese Library and Reading Room. It adds that it is hoped Foreign Mercantile Firms in Shanghai and other ports of China will see that it will be greatly to their advantage, not only to countenance this exhibition themselves, but also to prevail on the Firms they are connected with at home to render as much assistance as possible. In how far the very sanguine results aimed at in the original prospectus are likely to be attained it is hard to say: at present Chinese officials appear to be mainly interested in foreign science only in so far as it may aid them to keep foreigners at bay. The best means in our opinion to enlighten the Chinese people and open the country to foreign enterprise and capital is the using of diplomatic pressure to remove the official obstructions to our free intercousse. Left to themselves the Chinese officials, however much we may teach them to appreciate the advantages to be gained by the application of our mechanical arts to the natural resources of the country, will fear to apply their knowledge, until such time as they feel themselves strong enough to do

so without foreign aid; and we therefore are somewhat dubious of the gain to ourselves in subscribing money for an institution thus placed. The permission to a foreign company to rent and open one coal-mine, and connect it by rail with the nearest port, would teach the Chinese by practical experience that which, as long as they are confined to books and models, they will never really appreciate. The peaceful and profitable nature of such undertakings would become obvious, and the absurd concession to Chinese official prejudice, which denies to a foreigner the right to rent land or occupy a house for business purposes outside the limits of the treaty ports, be broken through. We have heard Chinese officials say "we acknowledge your superiority in mechanics, but we deny it in ethics or morals." Had we access to the country they would soon see that, apart from missionaries whom, wisely or not, our governments compel the Chinese to tolerate, in improving their mechanical knowledge we should be quite content to leave their superiority on this latter point undisturbed, while our welcome from the wage-receiving class would be of the warmest character.

The year 1875 has been almost barren of geographical discoveries which might come within the province of this Society. The practical withdrawal of diplomatic communication with Kashgar, and the delay in taking effective steps after the murder of Margary, have stood in the way of opening up two promising routes. The unsettled position of affairs and the want of confidence thereby engendered has prevented exploration in other quarters, so that so far as any increase in our geographical knowledge of the outlying portions of the Chinese empire is concerned, the year has remained almost a blank. To this the only exception has been the mission of enquiry sent into Yunnan. At the end of the year the mission had hardly advanced beyond Hankow; whatever its results therefore, they will be for a future chronicle.

On the side of India geographical research likewise met with a sudden check. It seems as if the fatal result of Margary's journey had paralysed the Indian government; and as if, in lieu of urging them to push on with greater vigour, and morally, if not physically, to avenge such a disgrace on their own frontiers, they had submitted to the check the Chinese had designedly imposed upon them. The expeditions of the pundits under Colonel Montgomery still continue, but scarcely with the energy which marked former years. Not one well organised expedition had set out, and the frontiers between India and Central Asia and China remain still practically closed to intercourse. Yet the pundits did good work. That hitherto enigmatical district known vaguely as the Pamîr steppe is by degrees being conquered for geography. The hitherto unknown

highlands of Thibet have been to a certain extent explored, and one of the pundits has passed round the Tengri nor and connected those wild regions with the series of observations made at Yarkand and Kashgar. Of Chinese Turkistan our knowledge has met with no increase during the year, as the British government has deferred taking advantage of the right of travel and residence stipulated for by Sir Douglas Forsyth at Kashgar.

Little has been done during the past year towards the surveys of the coast of China. An accurate re-survey of the mouth of the Yang-tze would be invaluable both in commercial and scientific points of view. One of H. M. naval officers has been told off for the duty but has since been invalided; but without ample assistance the work he will be able to perform will be of little utility. The rate of advance of the delta of the Yang-tsze is a matter of the highest scientific interest, apart from the bearing it has on the future development, not to say existence, of our trade. Taken in connection with Chinese statistics which, in a more or less trustworthy form, reach back some twenty centuries, there is here afforded a means of gauging the ancient condition of the eastern portion of the Asiatic continent. The old coast-line is clearly marked and the area of the alluvial plain can be accurately measured. A clue to the age of the River Yang-tzse may thus be obtained, by measuring its present rate of growth, and comparing it with such facts as we can gather from the ancient records. The changes going on are so vast and rapid as to have altered the face of the country during the stay of many of our foreign residents, and it is much to be wished that permanent measures should be taken for marking the changes as they occur on a complete and accurate scale. No rapid currents exist in the Yellow Sea, and their action on the growth of the delta has hence been comparatively trifling, and not such as seriously to affect any calculations based upon these measures.

While, however, Great Britain has been inactive in the west and south-west, the Russians have made another great stride in the north-west. The remaining portion of Kokand has been overrun, and the Russian dominion is now conterminous with the T'ien-shan; that great range of mountains, whose flanks have, since the beginning of history afforded the highway for nations east and west.

The Khanate of Kokand comprises the richest basin of Central Asia: it is well watered by the Naryn and it produces all the crops and fruits of temperate latitudes. Its climate is not marked with the severity which generally characterises the plateau, and it is abundantly supplied with mineral wealth in the shape of coal, petroleum, iron, lead and most of the other useful metals. Already one of the coal-fields has been opened and a coal of excellent

quality extracted. The importance of this supply, readily accessible to the Jaxartes and the Aral can scarcely be over-estimated. Two mines have also opened in the Karatau; one near Khojend, and another not far from Tashkand. If freedom of trade were encouraged, or permitted, the future of central Asia would be assured. The question of the feasibility of again connecting the Aral and the Caspian seas by means of the old bed of the Oxus has attracted attention during the year. The surveys and observations made appear to show that as far as levels go, no difficulty would be experienced. The dessication of central Asia seems however to have been progressive, and there is not now a sufficient supply of water in the upper Oxus to carry the stream across the intervening tract. Partially, at least, this is due to the waste incurred through the present system of irrigation, which allows large bodies of water to run off uselessly into the desert.

Japan has shewn us an example of activity in providing in her treaty with Corea, for a survey of the coast. It is to be hoped that this useful work will shortly be put in hand. Our present charts of the Corean coast are most defective. A farther survey of the gulf of Tonquin and the coast of Cochin-China generally is also much needed: and now that the port of Kiung-chow in Hainan has been opened, we hope soon to see the work taken up and our knowledge of those seas extended. The French marine has surveyed the approaches to the newly opened ports in Annam, and has published charts of the entrance to the Caocam from the sea to Haiphong, and of the river mouths and internal waters of the provinces of Haichong and Quangyen. The Russians, on their part have surveyed some 450 miles of the eastern coast of Siberia from Imperial Harbour to Castries bay.

In our own Journal Dr. Bretschneider gives valuable notes of the mediæval geography of central and eastern Asia; and the Archimandrite Palladius throws new light on the travels of Marco Polo in north China. The Reverend Mr. Holcombe describes in picturesque language a journey through Shansi and Shensi; which, although passing over little actually new ground adds much to our knowledge of these not easily accessible provinces.

The Chinese Review continues a series of valuable papers by Mr. W. F. Mayers on Chinese explorations in the Indian Ocean, while Mr. T. W. Kingsmill makes an attempt to explain the geographical puzzle of the Yu-king.

The *Chinese Recorder and Missionary Journal* completed during the year the memoranda written by Dr. Bretschneider upon Chinese Mediæval Travels to the west, which has since been published in a separate form; and which will remain a valuable aid to all engaged in the study of Asiatic antiquities. Mr. G. Phillips contributes

notes on the position of the Zaitun of Marco Polo, in reference to which he has carried on an interesting discussion with Colonel Yule. Of a more historical character was a paper read by Mr. Clements Markham on the 26th April before the Royal Geographical Society giving a resumé of explorations in Thibet, and more especially of the very remarkable journey of Mr. Bogle in 1774. The trade routes to Southern China were likewise the subject of a paper by Mr. J. Corryton. Major Herbert Wood, who accompanied the Russian expedition to the Oxus, has made valuable notes on his journey, which it is understood will shortly be published.

In the Berlin Geographical Society Baron von Richthoven read some interesting notes on the population of China, which, contrary to the general opinion of those calculated to judge, he rates at the enormous amount of 415 millions. The publication of the Baron's work upon China, more particularly upon the geology and mineral resources of the country is still delayed. The cost of the Baron's explorations, were, it will be remembered borne by the merchants of China in the hope that a knowledge of her undeveloped resources would lead to the throwing upon of the country to their enterprise. Alas! It now looks as though it would be left to their posterity to reap any reward of their enterprise. A Russian Traveller, Mr. Sasnofelsy left Hankow on the 11th December, 1874 on a journey overland to Siberia. He hoped to be able to pass through Kansuh and thence by way of Ulia-sutai. An account of his journey has not yet been received.

Upon the whole the geographical interest of the year has been mainly retrospective; and but little really new has been added to our stock of knowledge. It is to be hoped, however, that the present state of stagnation may not long be allowed to continue; that the check given to the Yunnan expedition will lead to a strong rebound, and that the blood of poor Margary will not have been shed in vain. It the Chinese are taught to respect and aid foreign explorers as they can and should, there will be doubtless many more capable men entering the field, and much of the remaining terra incognita of China and Central Asia will be cleared up. The late edicts on the duty of protecting men from the west, drawn from the authorities at Peking will, we trust have due weight with the officials throughout the country; for it is from the official class alone that our obstacles come; the masses of the people are curious but mostly inoffensive: they take their cue from the mandarins, and if the authorities treat us with respect we shall hear no more of mob disturbances impeding the progress of a traveller.

The condition of our settlement during the past year has, so far as the general health of the foreign residents is concerned, been eminently satisfactory. Indeed if we take 1875 as a standard we

may class Shanghai as an eminently healthy locality. The number of foreigners, resident and non-resident, is estimated as about 3,000 and the total of deaths during the year was only 67, giving a mortality of 22.3 per mille. Too much reliance must not, however, be placed upon these figures, as many, who fall dangerously ill, are sent home; it is consequently impossible to frame statistics of any accurate scientific nature, except for the comparison of one year with another: all we can positively state is that the mortality of 1875 was considerably lower than that of any previous year.

An outbreak of cholera occurred in the year, chiefly among the non-resident (floating) population: the range of the epidemic was limited, less than twenty persons being attacked by the disease, of whom, however, more than half died. The disease was seemingly not imported by sea; it would appear to be present among the natives every year at certain seasons. It is noticeable that the past year was remarkable for heavy rainfalls and higher maximum temperatures than usual, and these phenomena may have influenced the disease. It is to be expected that the settlements should gradually become more healthy, as year by year the ground is being raised and the drainage improved. Paddy fields are giving place to cotton, and thus the unwholesome swamps of which the former consist are rapidly being driven from our immediate neighbourhood. In increasing the area of under-ground drainage, however, much care is needed to have the drains constantly flushed and properly ventilated: for this reason in a place like Shanghai surface drains are safer and can, we think, be make equally efficient.

In concluding our review of the scientific progress of the year in this part of the world, we must not omit to chronicle the very satisfactory progress of the Museum of natural history established in connection with our society, a separate report upon which is in this number.

Shanghai, 29th April, 1876.

APPENDIX I.

LIST

OF THE

PRINCIPAL TEA DISTRICTS

IN CHINA.

LIST OF

THE PRINCIPAL TEA DISTRICTS IN CHINA

AND

NOTES ON THE NAMES APPLIED TO THE VARIOUS KINDS

OF

BLACK AND GREEN TEA.

BLACK TEA DISTRICTS.

湖北省

PROVINCE OF HOO-PEH.

咸寧縣	*Han-ning*	Districts in the prefecture of Woo-chang 武昌府
蒲圻縣	*P'oo-ke*	
崇陽縣	*Ts'ung-yang*	
通山縣	*T'ung-shan*	
興國州	*Hing-kwŏ*	
長陽縣	*Chang-yang*	Districts in the prefecture of E-chang 宜昌府
鶴峯州	*Hŏ-fung*	

馬橋鋪 *Ma-kh'eaou p'oo* is a small town about 9 miles to the South-west of the city of Han-ning.

柏墅 *Peh-tun* is about 15 miles South-east of the city of Han-ning.

Teas from these two places reach the River Yang-tsze at 金口 Kin-kh'ow, about 18 miles above Hankow.

羊樓洞 *Yang-low-tung*

羊樓司 *Yang-low-sze*

are situated about 21 miles to the South-west of the city of P'oo-ke. Teas from these places pass down by water through 新店 *Sin-tëen*, a small place, 9 miles distant, then through the province of Hoo-nan to 島口 Taou-kh'ow on the Yang-tsze, 103 miles above Hankow.

大沙平 *Ta-sha-p'ing* is about 18 miles East of the city of Ts'ung-yang.

小沙平 *Seaou-sha-p'ing* is about 10 miles from Ts'ung-yang.

白霓橋 *Peh-ne-kh'eaou* is about 5 miles from Ts'ung-yang.

Teas from these places pass down to 陸溪口 Lŭh-kh'e-kh'ow on the Yang-tsze, 93 miles above Hankow.

楊芳林 *Yang-fang-lin*, in the district of T'ung-shan.

Teas from the district of T'ung-shan are taken by land to Peh-tun, and then on to Hankow by the water route.

龍涤 *Lung-këang* in the district of Hing-kwŏ is about 20 miles to the East of the city of T'ung-shan.

Lung-këang is situated on a river, which, flowing past the city of Hing-kwŏ, falls into the Yang-tsze at 富池口 Foo-che-kh'ow, just below the Split Hill, and about 40 miles above Kew-këang.

湖南省

PROVINCE OF HOO-NAN.

臨湘縣	*Lin-sëang*	Districts in the prefecture of Yŏ-chow. 岳州府
平江縣	*P'ing-këang*	
安化縣	*Ngan-hwa*	Districts in the prefecture of Chang-sha. 長沙府
湘潭縣	*Sëang-t'an*	
瀏陽縣	*Lew-yang*	
醴陵縣	*Le-ling*	

雲溪 *Yun-kh'e* is a small town, about 18 miles South of the city of Lin-sëang.

聶家市 *Nĕĕ-këa-she* is about 27 miles from the city of Lin-sëang.

白荊橋 *Peh-king-kh'eaou* is about 18 miles from the city of Lin-sëang.

Teas from these districts pass down to the Yang-tsze at Taou-kh'ow.

長壽街 *Chang-show-keae* is an important town, about 24 miles East of the city of P'ing-këang.

高橋 *Kaou-kh'eaou* is distant 24 miles from P'ing-këang.

晉坑 *Tsin-kh'ăng* is 9 miles West of P'ing-këang, on the river running from Chang-show-keae past the city of P'ing-këang to the Tung-t'ing lake.

漁口 *Yu-kh'ow* is 9 miles below Tsin-kh'ăng on the same river.

The teas from these districts, after passing through the Tung-t'ing lake, enter the Yang-tsze at Yŏ-chow.

江西省

PROVINCE OF KËANG-SE.

武寧縣 *Woo-ning (hëen)*
義寧州 *E-ning (chow)*
} Districts in the prefecture of Nan-chang. 南昌府

龍泉縣 *Lung-ts'euen* } District in the prefecture of Keĭh-ngan 吉安府

瑞昌縣 *Shwuy-chang* } District in the prefecture of Kew-këang 九江府

河口 *Ho-kh'ow*, a town, 9 miles North of the city of 鉛山縣 Yuen-shan, in the prefecture of 廣信府 Kwang-sin.

Teas from these districts are brought by water to Kew-këang.

安徽省

PROVINCE OF NGAN-HWUY.

建德縣 *Këen-teh*, a district in the prefecture of 池州府 Che-chow.

六安州 *Lŭh-ngan (chow)*, an inferior prefecture in the West of the province.

福建省

PROVINCE OF FŬH-KËEN.

政和縣	*Ching-ho*	Districts in the prefecture of Këen-ning. 建寧府
松溪縣	*Sung-kh'e*	
建陽縣	*Këen-yang*	
崇安縣	*Ts'ung-ngan*	
邵武縣	*Shaou-woo*	Districts in the prefecture of Shaou-woo. 邵武府
光澤縣	*Kwang-tsch*	
尤溪縣	*Yew-kh'e*	Districts in the prefecture of Yen-p'ing. 延平府
沙縣	*Sha (hëen)*	
永安縣	*Yung-ngan*	
順昌縣	*Shun-chang*	
將樂縣	*Tsëang-lo*	
漳平縣	*Chang-p'ing*	Districts in the inferior prefecture of Lung-yen (chow) 龍巖州.
寧洋縣	*Ning-yang*	
安溪縣	*Ngan-kh'e*	District in the prefecture of Ts'euen-chow 泉州府

赤石街 *Ch'ĭh-shĭh-keae*, a small town, 5 miles to the South of the city of Ts'ung-ngan.

星村 *Sing-ts'un*, a town in the district of Ts'ung-ngan, situated on the celebrated 九曲溪 Kew-kh'eŭh-kh'e or stream of the nine windings. This town is close to the Woo-e hills, through which the stream flows for a distance of about 5 miles from Sing-ts'un to Woo-e kung, where it joins the river Min.

水吉 *Shwuy-keĭh*, a town about 21 miles to the East of the city of Këen-yang.

麻沙 *Ma-sha*, a town about 21 miles to the West of the city of Këen-yang.

界首 *Keae-show*, an important mart about 18 miles East of the city of Shaou-woo, and 9 miles West of Ma-sha.

大湖 *Ta-hoo* and

小湖 *Seaou-hoo* give their names to Rapids on the river between Shwuy-keĭh and the city of Këen-ning (foo); they are situated about 11 miles below Shwuy-keĭh and 25 miles above Këen-ning.

洋口 *Yang-kh'ow*, a town about 30 miles North-west of the city of Yen-p'ing, and 9 miles East of the city of Shun-chang.

黃坑 *Hwang-k'ang*, about 30 miles East of the city of Yen-p'ing.

高橋 *Kaou-kh'eaou*, about 20 miles North of the city of Sha (hëen).

湧溪 *Yung-kh'e*, a town about 21 miles North-east of the city of Sha (hëen).

白林鋪 *Peh-lin p'oo*, a town close to the district city of 福鼎縣 Fŭh-ting in the prefecture of 福寧府 Fŭh-ning.

北嶺 *Peh-ling*, a mountain pass, which gives its name to a small tea-district, about 15 miles North of the city of Fŭh-chow.

丹陽 *Tan-yang*, a small town, about 33 miles North-north-east of the city of Fŭh-chow.

臺灣府 *T'ae-wan foo*, or the Island of Formosa.

廣東省

PROVINCE OF KWANG-TUNG.

南海縣 *Nan-hae*
清遠縣 *Ts'ing-yuen*
花縣 *Hwa (hëen)*
} Districts in the prefecture of Kwang-chow. 廣州府

鶴山縣 *Hŏ-shan*
} District in the prefecture of Chaou-kh'ing 肇慶府

和平縣 *Ho-p'ing*
河源縣 *Ho-yuen*
} Districts in the prefecture of Hwuy-chow 惠州府

羅定州 *Lo-ting (chow)*, an inferior prefecture in the West of the province.

西樵山 *Se-ts'eaou shan*, a hill in the district of Nan-hae.

橫河 *Hwang-ho*, a small place in the district of Ts'ing-yuen.

大山 *Ta-shan*, a hill in the district of Hŏ-shan.

古勞 *Koo-laou*, a small place in the district of Hŏ-shan.

三多竹 *San-to-chŭh*, a town about 25 miles East of the city of Hwuy-chow.

九連山 *Kew-lëen shan* on the borders of the province of Këang-se, about 15 miles North of the city of Ho-p'ing.

急水 *Kĕĭh-shwuy*, a small place in Lo-ting chow.

雲南省

PROVINCE OF YUN-NAN.

普洱府 *Poo-urh*, a prefecture in the South-west of the province.

GREEN TEA DISTRICTS.

安徽省

PROVINCE OF NGAN-HWUY.

歙縣	*Heŭh (hëen)*	Districts in the prefecture of Hwuy-chow. 徽州府
黟縣	*Heh (hëen)*	
婺源縣	*Woo-yuen*	
休甯縣	*Hew-ning*	
祁門縣	*Ke-mun*	
太平縣	*Tae-p'ing*	District in the prefecture of Ning-kwŏ 寧國府

屯溪 *Tun-kh'e*, a large town in the district of Hew-ning, about 15 miles South-west of the city of Hwuy-chow.

This is the most important mart for Green Teas. It is situated on the **縣港河** Hëen-këang ho, a tributary of the Tseen-tang river, which falls into the sea at Hang-chow. The teas are conveyed from Tun-kh'e to Ningpo for shipment to Shanghae. The natural route for the tea is through the city of Hang-chow to Shanghae, but this would involve the export duty falling into the hands of the Governor-General of Këang-nan and Këang-se; the Governor-General of Fŭh-këen and Che-këang therefore places a prohibitive duty on Tea at Hang-chow, thus diverting the Teas to Ningpo where they pay export duty within his jurisdiction.

江西省

PROVINCE OF KËANG-SE.

德興縣 *Teh-hing*
浮梁縣 *Fow-leang*
} Districts in the prefecture of Jaou-chow. 饒州府

Teas from these districts, and also from Woo-yuen and Ke-mun in Ngan-hwuy, pass down by water to the Po-yang lake, and then on to Kew-këang.

浙江省

PROVINCE OF CHE-KËANG.

平水 *P'ing-shwuy*, a small town, about 9 miles South of the city of 紹興府 Shaou-hing.

華埠 Hwa-fow, a small town, about 7 miles South-west of the district city of 開化縣 Kh'ae-hwa, in the prefecture of 衢州府 Kh'eu-chow.

Teas from these places pass through Ningpo to Shanghae for reasons already given.

NOTES ON THE NAMES APPLIED TO TEA.

Before proceeding with these notes, it may be as well to mention that the word "Tea" is derived from "Tây," the pronunciation in the Amoy dialect of 茶. This character is pronounced in various ways throughout China, and it is generally represented in English by Cha. It is used not only for Tea, but for the Tea oil tree, and other members of the Camellia family.

BLACK TEAS.

These are called by the Chinese 紅茶 (Hung Cha) Red Teas.

Congou is derived from Kong-hoo, the Amoy pronunciation of 工夫 (Kung-foo) which means "work or labour."

Souchong is derived from 小種 (Seaou-chung) which means "small sort."

Paou-chong is derived from 包種 (Paou-chung), which means "wrapped sort." This is also called Padre Souchong from the fact of the priests, at the Woo-e shan (Bohea hills) and other celebrated places, cultivating and preparing very choice teas, which are packed in small paper bundles, each of which is supposed to be the produce of one shrub only.

Flowery Pekoe.—This is called in Chinese 白毫 (Peh-haou), which means "white down," because it is picked before the leaf-bud has expanded, at which time the convoluted part is covered with a down-like substance.

Oolong is a corruption of 烏龍 (Woo-lung), which means literally Black Dragon. The origin of this term

being applied to a description of Tea is stated to be as follows:—A Tea-planter named Soo 蘇 noticed that one of his plants bore leaves of remarkable fragrance, and, after carefully watching the plant day by day so as to ascertain the cause, discovered a Black Serpent coiled round the stem of the bush, which remained there for a considerable period. The tree then became known as the 'Black Dragon,' and it was in great repute for grafting. The seeds of this tree did not produce such good plants as those propagated by grafts. This is said to have occurred at Seao-hoo on the river between the city of Këen-ning and Shwuy-keĭh.

Caper is called in Chinese 雙製 (Shwang-che), which means "doubly manipulated," much labour being bestowed on its preparation with the feet as well as hands. The term Caper was probably given, owing to its resemblance to the flower buds of the Caper bush.

Scented Caper is called in Chinese 珠蘭 (Choo-lan), on account of its being scented with the flowers of the 眞珠蘭 Chin-choo-lan or 魚子蘭 Yu-tsze-lan (Aglaia odorata).

Scented Orange Pekoe is called in Chinese 花香 (Hwa-heang), which means literally "aroma of flowers." The blossom of the 桂花 Kwei-hwa is most commonly used for scenting this description of tea.

Bohea is derived from Boó-ê, the Amoy pronunciation of 武彝 (Woo-e), the name of the celebrated hills in the province of Fŭh-keen. It is somewhat surprising that this name should be given to the very commonest description of Black Tea, while the hills themselves have been always famous for producing the very finest kinds.

GREEN TEAS.

These are called by the Chinese 綠茶 (Lŭh-cha) Green Teas, and 松蘿茶 (Sung-lo-cha), Sung-lo being the name of a hill where Green Tea is supposed to have been first discovered.

Gunpowder is called 小珠 (Seaou-choo) "small pearls," and various expressions are used to designate the different qualities, thus :—

蔴珠 (Ma-choo) Hemp (seed) pearls.
寶珠 (Paou-choo) Precious pearls.
芝珠 (Che-choo) Sesamun (seed) pearls.

The very best Gunpowders from the P'ing-shwuy district are called 蝦目 (Hea-mŭh) Crabs-eyes.

Imperial is called 大珠 (Ta-choo) "large pearls,'c and the different qualities are designated, thus :—

珍珠 (Chin-choo) Oyster pearls.
圓珠 (Yuen-choo) Round pearls.
熙珠 (He-choo) Pearly hyson kind.

Young Hyson is so called, because it is similar to but smaller than Hyson. The Chinese call it 雨前 (Yu-tseen), literally "before Yu," which implies that it is picked before 穀雨 Kŭh-yu, a term which falls on or about 20th April every year. The different qualities are distinguished, thus :—

娥眉 (Ngo-mei) Imperial concubine's eyebrows.
眉雨 (Mei-yu) Eyebrows picked before Kŭh-yu.
芽雨 (Ya-yu) Buds do.
熙雨 (He-yu) Hyson kind do.

Other expressions are also used, such as :—

鳳眉 (Fung-mei) Phœnix eyebrows.
秀眉 (Sew-mei) Elegant eyebrows.

Hyson.—This word is a corruption of 熙春 (He-hun), which means literally "vigorous or flourishing spring," but the characters do not bear translating in this case.

Ball in his work on the cultivation and manufacture of tea, states that the characters "He-chun" formed the hong name of a Tea merchant named Le, who was engaged in the Tea-trade in the district of Hew-ning, during the reign of Kh'ang-he (A.D. 1662-1722).

Another explanation is that He-chun was the name of the daughter of the Tea merchant Le, and that this particular kind of tea was called after her, because she was the first person to separate the leaves, so as to make what is called Hyson.

Members of this same family are still engaged in the Green Tea trade, and the celebrated chop 李亦馨 (Le-yih-hing) continues to be made by them.

The different qualities of Hyson are described as follows:—

眉熙 (Mei-he) Eyebrows Hyson.
正熙 (Ching-he) Best Hyson.
副熙 (Foo-he) Second (best) Hyson.

Twankay.—This term is derived from 屯溪 Tun-kh'e, the well known mart about 15 miles to the South-west of the city of Hwuy-chow.

This description of tea is, however, generally called by the Chinese 松蘿 (Sung-lo), from the celebrated Sung-lo shan before alluded to; and here we have another instance of the commonest descriptions of tea being named from places most celebrated for producing and manufacturing the very best kinds.

Sung-lo shan is a small hill about 4 miles to the

North of the city of Hew-ning. It is also called 金佛山 (Kin-fŭh shan) "Golden Buddha hill," and is stated to be 160 jin in height, or say about 1,500 English feet. This hill was visited by Fortune in 1848, when he found that tea was no longer cultivated upon it.

In describing the different qualities, the following characters are used as prefixes:—

公司 Kung-sze.
鄣山 Chang-shan.
黃山 Hwang-shan.
天都 T'ëen-too.
白嶽 Peh-yŏ.
華山 Hwa-shan.
眼生 Yen-săng.
上品 Shang-pin.
揀選 Këen-seuen.

Kung-sze, which means literally "public company," stands for the old East India Company.

Chang-shan is the name of a famous hill in the Northern part of the Woo-yuen district.

Hwang-shan, meaning Imperial or Yellow Mountains is a celebrated group of spiculated hills in the prefecture of Hwuy-chow, famous for producing the best Tea.

T'ëen-too is the name of one of the highest and most noted peaks in this group; the Chinese call it 900 jin in height, or about 8,500 English feet.

Peh-yŏ stands for Peh-yŏ shan, also called 齊雲巖 Tse-yun-yen. This is another celebrated group of peaks about 9 miles to the West of the city of Hew-ning.

Hwa-shan is a contraction of 九華山 Kew-hwa-shan, a cluster of peaks in the district of 青陽縣 Ts'ing-yang, and about 20 miles from the town of Ta-tung on the Yang-tsze.

Yen-săng is ambiguous, but means generally "very fine."

Shang-pin means "best," and Këen-seuen, "selected."

It is now very generally recognised that either Black or Green Tea can be made from the same plant. No doubt some districts produce Tea more suitable for being made into Black than Green, but it is well known that at one time the leaf in the Woo-ning district was made into Green Tea, while it is now made into Black; and in Këen-teh the leaf is made into Black or Green, or Black and Green, according to the demand at the time.

The essential difference between Black Tea and Green Tea is, that the former is sun-dried soon after being picked and before it is first roasted, while the latter is roasted immediately after being picked, and is not exposed to the sun at all.

The baskets used by the pickers in the Green Tea districts are very similar to fishing baskets, having small mouths and long necks, while the baskets used in the Black Tea districts are open. It is even said that, in picking the leaves to be made into the choicest Green Tea, the pickers stand with their backs to the sun, so as to prevent the sun's rays acting upon the leaf after being picked from the tree.

Morrison's orthography is used throughout this paper, as being the most suitable for proper names.

APPENDIX II.

OBSERVATOIRE

MÉTÉOROLOGIQUE ET MAGNÉTIQUE,

DES PÈRES DE LA COMPAGNIE DE JESUS,

À ZI-KA-WEI.

A. M. D. G.

OBSERVATOIRE

MÉTÉOROLOGIQUE ET MAGNÉTIQUE

des Pères de la Compagnie de Jésus

à ZI-KA-WEI.

BULLETIN MÉTÉOROLOGIQUE

de

Septembre 1874.

NOTE PRÉLIMINAIRE.

POSITION GÉOGRAPHIQUE DE L'OBSERVATORE.—*Zi-ka-wei,* en Mandarin Siu-kia-hoei, est un petit village situé dans une vaste plaine à 6 kilomètres au S.W. de Chang-hai. L'observatoire est bâti à 1 kilomètre du village, dans un jardin complètement isolé ; il domine les habitations voisines à une distance de plus de 200m. La Latitude de l'Observatoire est de 31° 12′ N. ; sa Longitude de 7h. 56m. E. de Paris ; l'Altitude de la cuvette du baromètre est de 7m. environ.

ABRI ET SUSPENSION DES INSTRUMENTS.—C'est l'abri dit de Montsouris, modèle Renou et S.-C. Deville, construit par M.M. Arnoult et Guibourgé. Nous y avons placé les thermomètres maxima et minima, le psychromètre, l'évaporomètre et le papier ozonométrique.

OBSERVATIONS, INSTRUMENTS UTILISÉS ET NOTATIONS EMPLOYÉES.—1o. *Pression barométrique.*—Baromètre à large cuvette Renou ; échelle métrique,—par Tonnelot.

2o. *Température* et *Hygrométrie.*—Thermomètre sec et thermomètre mouillé à mercure, échelle centigrade,—par Baudin. Tous nos thermomètres sont à échelle centigrade.

3o. *Actinométrie.*—Thermomètre à boule nue et thermomètre à boule noircie, à mercure, par Baudin. Ils sont placés l'un et l'autre au centre d'une boule de verre dans laquelle on a fait le vide ; ils sont installés à 1m. 50. audessus du sol, dans un lieu parfaitement découvert. Les observations actinométriques ont commencé le 1er Mars 1875.

4o. *Ozonométrie.*—Papier ozonométrique et gamme de M,M. Bérigny et Jame de Sédan, de 0 à 21.

5o. *Vent.*—La direction est obtenue au moyen d'une girouette inscrivante, et sa vitesse enregistrée par l'anémomètre du Météorographe-Secchi. Ces deux instruments sont placés à une hauteur de 12m. sur une plate-forme qui surmonte l'Observatoire.

6o. *Etat du Ciel.* 1o.—*Nébulosité;* exprimée en dixièmes; 0 signifiant un ciel entièrement serein, 10 un ciel entièrement couvert. 2o.—*Forme des nuages* : K cirrus ; C cumulus ; N nimbus ; KST cirro-stratus ; CST cumulo-stratus; CK cumulo-cirrus ; KC cirro-cumulus ; AC alto-cumulus ; CN cumulo-nimbus ; BR brume ; BD brouillard.(1)

(1) Dans le tableau intitulé : "*Forme et Direction des nuages,*"—la 1ère ligne indique les nuages supérieurs, la 2e les nuages inférieurs.

7o. *Hyétometrie.*—Hyétomètres (pluviomètres) décuplateurs, modèle S.-C. Deville. L'un de ces instruments est placé dans le jardin à 1m. 50. audessus du sol ; l'autre sur la plate-forme de l'Observatoire à 10m. plus haut que le premier. Ce dernier a été installé au mois de Mars 1875.

8o. *Evaporation.*—Atmismomètre Piche.

9o. *Températures extrêmes.* 1o. *Au soleil* : deux maxima de Negretti, par Alvergnat. La boule de l'un d'eux est enveloppée de laine noire, celle de l'autre de laine blanche.(2) 2o. *A l'ombre*: maxima Walferdin à mercure, minima Rutherford à alcool,—par Baudin.

10o. *Température du Puits de l'Observatoire.*—Thermomètre à pinceau Janssen, par Baudin. La profondeur du puits est de 6m. 80, celle de la nappe d'eau de 2m. 70 ; l'altitude du niveau de l'eau est de 1m, à peu près constamment, excepté pendant la saison des pluies, ou elle s'élève jusqu'à 2m.

Outre ces instruments usuels, l'Observatoire posséde :

1o *Le Météorographe-Secchi*—modifié par M. Brassart à Rome.

2o. *Plusieurs Baromètres Fortin.*—L'un deux, construit par Adie à Londres, a été comparé avec le baromètre de l'Observatoire de Kew ; son tube a 12mm. de diamètre intérieur. C'est le *Standard Barometer* des Anglais.

3o. *Un thermomètre étalon*,—par Baudin.

Enfin en dehors des instruments purement Météorologiques l'Observatoire possède encore : une lunette astronomique, de 4 pouces ; un transit-théodolite servant de lunette méridienne ; un théodolite ordinaire ; un cercle de réflexion ; un cercle répétiteur ;—ces trois intruments sont sortis des atéliers de Gambey ;—deux chronomètres, l'un et l'áutre de Frodsham, etc.

Tableaux Météorologiques.—Les observations ont commencé à l'Observatoire au mois d'Août 1873 et n'ont pas été interrompues depuis lors. A partir du mois de Septembre 1874, la méthode d'observations tri-horaires, de 4h. du matin à 10h. du soir, a été définitivement adoptée ; au mois de Février 1875 on y a ajouté l'observation de 1h. du matin.—Toutes ces observations sont faites par nous-mêmes ; celles qui ont été interpolées ou suppléées, au moyen du météorographe-Secchi, sont précédées d'une asterique*. Le Baromètre et les thermomètres utilisés ont été vérifiés par les soins de M. S.-C. Deville et les corrections faites d'après ses indications. Le zéro des thermomètres a été vérifié de nouveau au commencement de Mars 1875. La correction relative à l'altitude a été omise. On s'est servi des tables de M. Renou pour la réduction à zéro de la pression barométrique, ainsi que pour le calcul de la tension de la vapeur et de l'humidité relative.

Journal Météorologique.—Nous observons le ciel en même temps que les instruments ; et les remarques diverses consignées dans le journal ne sont que le complément ou l'explication des tableaux.

H. LeLec., S.J.

Zi-ka-wei, Septembre, 1875.

(2) Les observations ont commencé le 1er Janvier 1875.

TABLEAU MÉTÉOROLOGIQUE.—*Septembre* 1874.

Pression Barométrique à Zéro.

Jours de la Lune	Jours du Mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
		mm	mm	mm	mm	mm	mm	mm	mm
21	1	758,91	759,97	760,40	759,96	759,66	759,90	760,50	759,90
22	2	59,86	60,10	60,61	59,62	58,98	60,08	60,91	60,02
23	3	60,11	60,57	61,39	60,27	60,25	60,50	60,97	60,58
24	4	60,52	61,05	61,35	60,27	59,44	59,69	60,09	60,34
25	5	58,40	58,71	59,11	57,86	58,30	59,56	60,32	58,89
26	6	60,70	61,56	62,03	61,57	60,81	61,33	61,89	61,41
27	7	61,04	61,42	61,83	60,40	59,15	59,59	61,07	60,64
28	8	58,19	59,21	59,47	58,17	57,70	58,34	59,36	58,68
29	9	58,70	59,42	59,69	58,88	58,98	59,03	59,79	59,21
30	10	58,70	59,35	59,55	58,61	59,21	57,97	59,35	58,82
1	11	58,09	58,99	59,82	58,79	59,30	58,61	58,77	58,91
2	12	57,70	58,44	58,87	57,70	56,84	56,79	57,60	57,70
3	13	56,74	56,89	57,38	55,81	55,24	56,24	57,10	56,49
4	14	55,10	54,33	54,09	53,81	54,48	55,48	56,66	54,85
5	15	57,36	58,79	59,82	59,41	59,52	60,72	61,79	59,63
6	16	61,31	61,91	62,40	61,65	61,09	61,25	62,11	61,67
7	17	61,17	61,85	62,15	61,07	61,02	61,83	62,72	61,69
8	18	62,24	62,87	63,20	62,41	62,38	62,60	63,46	62,74
9	19	63,03	63,85	64,22	63,74	62,96	62,82	63,78	63,48
10	20	62,23	63,03	63,45	62,11	61,46	61,46	62,30	62,29
11	21	61,43	61,93	62,56	61,35	61,23	62,29	62,86	61,95
12	22	61,59	62,49	63,54	62,47	62,35	62,86	63,62	62,70
13	23	62,90	63,82	64,37	63,79	63,94	64,20	65,01	64,00
14	24	64,45	65,10	65,96	64,62	63,91	64,21	64,64	64,70
15	25	63,08	63,34	63,61	63,12	61,41	61,92	62,19	62,67
16	26	60,50	60,87	61,19	59,82	59,28	59,47	59,73	60,12
17	27	57,65	58,25	60,43	58,77	58,74	58,67	59,83	58,90
18	28	59,25	60,43	60,84	59,78	60,07	59,72	60,81	60,13
19	29	58,60	58,92	58,72	57,27	56,13	55,86	56,06	57,36
20	30	54,90	55,00	53,23	54,21	54,27	55,97	57,36	54,99
Moyennes du	1–10	59,54	60,14	60,54	59,56	59,15	59,60	60,43	59,85
	11–20	59,49	60,10	60,54	59,65	59,43	59,78	60,63	59,95
	21–30	60,44	61,02	61,45	60,52	60,13	60,52	61,21	60,75
	Mois	759,82	760,42	760,84	759,91	759,57	759,97	760,76	760,18

Maximum : 765,96 observé le 24 à 10 h. A.M.
Minimum : 753,23 „ le 30 à 10 h. A.M.
} différence : ..... mm 12,73

TABLEAU MÉTEOROLOGIQUE.—*Septembre* 1874.

TEMPÉRATURE À L'OMBRE.

Jours de la Lune	Jours du Mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
21	1	22,6	24,3	28,6	29,0	27,1	23,6	23,6	25,54
22	2	24,5	24,6	25,9	27,7	26,3	23,7	24,1	25,25
23	3	24,1	24,8	27,9	27,3	26,7	24,7	23,9	25,63
24	4	22,6	24,6	26,4	30,0	28,1	24,0	23,3	25,57
25	5	22,7	25,4	29,8	29,1	28,7	24,6	23,1	26,20
26	6	21,0	22,4	24,1	25,8	24,8	22,8	22,9	23,40
27	7	22,9	22,9	26,8	28,5	28,0	24,3	22,1	25,07
28	8	21,0	23,3	28,9	31,5	29,5	23,0	22,1	25,61
29	9	20,5	24,1	28,1	29,2	28,4	23,3	22,4	25,14
30	10	21,9	24,3	28,9	30,5	27,5	24,6	22,6	25,80
1	11	22,5	25,1	29,5	27,2	21,6	21,5	20,5	23,98
2	12	20,1	22,9	27,8	27,2	26,5	22,3	19,7	23,78
3	13	18,3	21,6	27,9	30,4	26,3	23,4	22,1	24,30
4	14	22,1	23,0	23,8	23,6	23,9	22,8	21,3	22,90
5	15	21,3	21,4	24,7	25,6	23,7	20,0	18,7	22,20
6	16	16,3	17,8	22,6	23,2	22,8	18,7	18,1	19,93
7	17	16,1	17,7	23,6	23,1	22,9	18,1	14,9	19,48
8	18	14,0	16,2	22,6	24,9	22,9	18,1	17,3	19,43
9	19	18,1	19,4	21,4	21,1	21,1	18,9	18,6	19,80
10	20	18,7	19,3	20,7	22,4	23,0	20,5	19,0	20,51
11	21	17,6	20,3	24,9	25,9	23,8	21,1	19,7	21,90
12	22	21,3	22,9	24,1	23,9	23,2	22,5	21,9	22,83
13	23	20,9	21,1	21,2	21,1	19,8	19,1	19,1	20,32
14	24	18,7	18,4	20,9	21,2	21,0	19,3	20,3	19,97
15	25	18,1	18,3	19,1	22,3	20,5	18,7	18,8	19,40
16	26	19,8	20,8	23,6	23,9	23,6	21,8	21,1	22,10
17	27	21,3	22,9	21,5	24,5	24,1	22,2	22,1	22,66
18	28	21,4	21,1	21,3	22,0	21,0	19,9	20,6	21,30
19	29	21,7	22,5	25,1	26,4	26,0	23,4	23,2	24,04
20	30	23,4	24,4	29,6	30,1	27,1	24,1	22,2	25,84
Moyennes du	1–10	22,4	24,1	27,5	29,0	27,5	23,9	23,0	25,32
	11–20	18,8	20,4	24,5	24,9	23,5	20,4	19,0	21,64
	21–30	20,4	21,3	23,1	24,1	23,0	21,2	20,9	22,04
	Mois	20,5	21,9	25,0	26,0	24,7	21,8	21,0	23,00

Maximum : 31,5 observé le 8 à 1 h. P.M.
Minimum : 14,0 „ le 18 à 4 h. A.M.
} différence 17,5

TABLEAU MÉTEOROLOGIQUE.—*Septembre* 1874.

Tension de la Vapeur.

Jours de la Lune	Jours du Mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
21	1	20,38	18,42	15,77	16,25	15,09	16,38	17,99	17,18
22	2	20,92	21,24	22,62	23,09	23,75	21,80	21,55	22,14
23	3	22,32	21,37	21,75	21,23	20,72	21,75	21,10	21,46
24	4	20,38	21,62	21,51	21,67	20,86	21,80	19,22	21,01
25	5	19,59	20,51	22,39	25,42	22,47	21,05	19,16	21,51
26	6	18,50	18,36	18,04	18,04	18,48	18,02	18,23	18,24
27	7	13,95	16,12	16,88	15,65	15,96	18,97	16,96	16,36
28	8	16,95	18,17	12,44	14,72	15,10	19,41	18,36	16,45
29	9	17,94	19,09	18,32	17,54	18,13	19,40	19,09	18,50
30	10	18,49	19,88	18,78	18,17	20,42	20,09	20,38	19,46
1	11	19,53	21,32	19,79	20,61	17,61	17,84	16,56	19,04
2	12	17,50	18,41	17,93	18,30	16,20	17,18	17,05	17,51
3	13	15,66	17,26	16,57	14,66	16,51	17,75	18,00	16,63
4	14	19,45	20,89	21,35	19,94	19,58	19,35	18,49	19,86
5	15	18,14	17,56	15,71	14,64	15,12	12,30	13,10	15,22
6	16	12,05	13,49	13,51	11,54	11,93	13,99	13,31	12,83
7	17	12,59	13,25	10,39	10,69	11,27	11,09	11,78	11,58
8	18	11,21	12,39	9,66	9,59	10,38	12,86	11,72	11,12
9	19	11,66	12,52	12,18	12,52	12,07	13,71	13,75	12,63
10	20	15,09	16,01	15,16	16,26	12,46	14,79	14,56	14,90
11	21	14,51	16,03	15,68	15,66	15,40	16,71	15,77	15,68
12	22	16,76	18,23	17,50	17,80	19,87	17,40	17,25	17,83
13	23	18,38	18,35	18,32	17,92	16,66	16,13	16,45	17,46
14	24	15,41	13,87	15,03	14,08	14,33	15,69	13,95	14,62
15	25	14,65	15,33	15,17	12,89	14,63	15,09	15,83	14,79
16	26	16,98	17,66	20,53	18,16	19,04	18,37	17,74	18,35
17	27	18,86	20,38	19,10	19,39	19,09	19,21	19,45	19,35
18	28	18,43	18,62	17,62	17,19	16,49	15,65	16,22	17,17
19	29	18,61	19,02	20,36	21,51	19,99	20,25	19,83	19,94
20	30	20,83	21,75	21,51	22,50	22,29	21,93	19,90	21,53
Moyennes du	1–10	18,94	19,48	18,85	19,18	19,10	19,87	19,20	19,23
	11–20	15,29	16,31	15,23	14,88	14,31	15,07	14,83	15,13
	21–30	17,34	17,92	18,08	17,71	17,78	17,64	17,24	17,67
	Mois	17,19	17,90	17,39	17,25	17,06	17,53	17,09	17,35

Maximum : 25,42 observé le 5 à 1 h. P.M.
Minimum : 9,59 „ le 18 id.
} différence..... 15,83

TABLEAU MÉTÉOROLOGIQUE.—*Septembre* 1874.

Humidité Relative.

Jours de la Lune	Jours du Mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
21	1	100	83	55	54	56	76	83	72,43
22	2	92	93	92	84	94	100	100	93,57
23	3	100	92	79	79	79	94	95	88,29
24	4	100	94	84	69	74	98	91	87,14
25	5	96	80	72	85	77	91	91	84,57
26	6	100	92	81	73	80	92	88	86,57
27	7	67	78	65	54	57	84	87	70,29
28	8	92	86	42	43	49	94	92	71,14
29	9	100	86	65	55	63	91	95	79,29
30	10	94	88	63	55	75	88	100	80,43
1	11	96	90	64	77	91	92	92	86,00
2	12	100	89	65	68	63	86	100	81,57
3	13	100	91	59	46	65	83	91	76,43
4	14	98	100	98	93	90	94	98	95,86
5	15	96	92	67	60	69	71	82	76,71
6	16	87	88	66	54	58	88	86	75,29
7	17	93	88	48	51	54	72	93	71,29
8	18	95	91	48	40	50	84	80	69,71
9	19	76	74	65	68	65	84	86	74,00
10	20	94	96	83	81	60	83	88	83,57
11	21	98	91	72	63	70	90	92	82,29
12	22	89	88	78	81	84	86	88	84,86
13	23	100	99	98	96	96	98	100	98,14
14	24	96	88	81	71	78	94	79	83,86
15	25	96	98	92	64	81	94	98	89,00
16	26	98	96	86	82	91	94	96	91,86
17	27	100	98	100	85	85	96	98	94,57
18	28	98	100	94	88	89	91	89	92,71
19	29	96	93	85	84	79	95	93	89,29
20	30	98	95	70	71	84	98	100	88,00
Moyennes du	1–10	94,1	87,2	69,8	65,1	70,4	90,8	92,2	81,37
	11–20	93,5	89,9	66,3	63,8	66,5	83,7	89,6	79,04
	21–30	96,9	94,6	85,6	78,5	83,7	93,6	93,3	89,46
	Mois	94,83	90,57	73,90	69,13	73,53	89,37	91,70	83,29

Maximum : 100 observé 18 fois
Minimum : 40 „ le 18 à 1 h. P.M. } différence 60

TABLEAU METEOROLOGIQUE.—*Septembre* 1874.

ETAT DE CIEL 1o.—*Nébulosité.*

Jours de la Lune	Jours du Mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
21	1	9	7	4	3	1	5	2	4,4
22	2	10	10	10	10	10	10	10	10,0
23	3	9	10	10	10	9	9	1	8,3
24	4	10	8	8	7	2	1	0	5,1
25	5	0	1	1	10	5	7	1	3,6
26	6	9	10	10	10	10 Br.	10 Br	10 Br	9,9
27	7	0	1	3	2	3	7	8	3,4
28	8	0	0	1	1	1	1	0	0,6
29	9	0	1	2	5	5	2	0	2,6
30	10	0	0	4	5	5	2	0	2,3
1	11	0	3	8	9	10	8	1	5,6
2	12	0	3	5	5	5	1	1	3,0
3	13	0	1	5	3	2	9	5 Br	3,5
4	14	10	10	10	10	1	10	10	10,0
5	15	10 Br	10	2	5	7	1	1 Br	5,1
6	16	1 Br	10 Br	10 Br	10 Br	9	7 Br	1 Br	6,9
7	17	3	2	2	7	5	0	1	3,1
8	18	1	1	5	5	5	0	1	2,6
9	19	10 Br	10	10 Br	10 Br	10 Br	10	10 Br	10,0
10	20	10	10	10	10	9	1	5	8,9
11	21	1	1	7	5	5	1	1	3,0
12	22	9	9	10	10	10	10	10	9,7
13	23	10	10	10	10	10	10	10	10,0
14	24	10	10	10	10	10 Br	10	10 Bd	10,0
15	25	10	10	10 Br	10 Br	10 Br	10 Br	10 Br	10,0
16	26	10 Br	10 Br	10	10	10	10	10	10,0
17	27	5 Bd	2 Br	10 Br	10 Br	10 Br	10	10	8,1
18	28	10	10 Br	10	10	10	9	10	9,9
19	29	10	10 Br	10	9	7	2	1	7,0
20	30	10 Br	5	3	5	10	10	10	7,6
Moy. du Mois		5,9	6,2	7,0	7,1	7,0	6,1	5,0	6,4

NOMBRE DE JOURS DE :

Ciel beau, ou moins de $2\frac{1}{10}$ couverts	1	Brouillard	2
,, peu nuageux ou de 2 à $4\frac{1}{10}$,,	9	Brume	12
,, nuageux, ou de 4 à $6\frac{1}{10}$,,	4	Rosée	13
,, très nuageux, ou de 6 à $8\frac{1}{10}$,,	5	Pluie	14
,, couvert ou plus de $8\frac{1}{10}$,,	11	Orage avec éclairs et tonnerre	2

N.B.—La lumière zodiacale a été observée 8 fois.

TABLEAU MÉTÉOROLOGIQUE.—*Septembre* 1874.

ETAT DU CIEL 2o.—*Forme et Direction des Nuages.*

Date.	4 h. M.		7 h. M.		10 h M.		1 h. S		4 h. S.		7 h. S.		10 h. S.	
	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.
1	,,	,,	K	,,	K	,,	K	,,	K	,,	AC	SW	,,	,,
	AC	SW	AC	SW	CST	E	C	E	KST	,,	,,	,,	CST	,,
2	,,	,,	K	SE	C	,,	,,	,,	CN	W	K	,,	,,	,,
	,,	,,	AC	E	CN	E	C	E	C	E	CN	E	CN	E
3	,,	,,	K	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	KC	W	C	W	C	N	CN	N	CST	N	CST	,,	C	,,
4	,,	,,	KST	,,	AC	,,	KST	,,	K	,,	KST	,,	,,	,,
	C	E	C	NE	C	E	C	E	KC	W	,,	,,	,,	,,
5	,,	,,	K	,,	KST	,,	,,	,,	KST	,,	KST	,,	,,	,,
	,,	,,	C	SW	CN	W	CN	NW	CN	,,	,,	,,	,,	,,
6	KST	,,	CST	,,	CST	,,	KST	,,	,,	,,	,,	,,	,,	,,
	,,	,,	C	N	C	N	CN	W	CN	NW	C	,,	,,	,,
7	,,	,,	K	,,	KST	,,	KST	,,	KST	,,	K	W	,,	,,
	,,	,,	KST	,,	KC	E	KC	E	KC	E	CN	E	KC	,,
8	,,	,,	,,	,,	,,	,,	KST	,,	K	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	KC	S	KC	S	,,	,,	,,	,,
9	,,	,,	KST	,,	KST	,,	K	W	K	,,	,,	,,	,,	,,
	,,	,,	KC	E	KC	E	KC	SE	KC	SE	,,	,,	,,	,,
10	,,	,,	,,	,,	KST	,,	KST	,,	K	,,	KST	,,	,,	,,
	,,	,,	,,	,,	KC	S	KC	S	KC	S	KC	S	,,	,,
11	,,	,,	KST	,,	K	,,	CN	,,	CN	,,	KST	W	AC	NW
	,,	,,	AC	,,	C	E	C	E	C	NE	CN	NE	,,	,,
12	,,	,,	K	N	AC	N	AC	N	AC	N	KST	,,	,,	,,
	,,	,,	C	,,	C	E	C	E	C	W	,,	,,	CST	,,
13	,,	,,	K	N	AC	NW	K	,,	K	,,	KST	,,	,,	,,
	CST	,,	C	,,	,,	,,	KC	NW	KC	NW	CN	N	CN	,,
14	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	N	,,	N	E	N	W	N	W	CN	S	CN	,,	BD	,,
15	,,	,,	,,	,,	KST	,,	KST	,,	K	,,	KST	,,	,,	,,
	,,	,,	C	NW	KC	NW	KC	NW	KC	NW	KC	NW	,,	,,
16	,,	,,	,,	,,	K	,,	,,	,,	K	W	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	C	N	C	N	,,	,,	,,	,,
17	,,	,,	K	,,	K	,,	K	NW	KST	,,	,,	,,	,,	,,
	CST	,,	KST	,,	KC	E	CN	N	KC	N	CST	,,	,,	,,
18	,,	,,	,,	,,	KST	,,	KST	,,	KST	,,	,,	,,	,,	,,
	CST	,,	,,	,,	KC	E	KC	E	KC	E	,,	,,	CST	,,
19	,,	,,	KST	W	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	CST	E	,,	,,	,,	,,	C	E	N	,,	,,	,,
20	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	KST	,,	,,	,,
	CN	,,	CN	,,	CN	E	CN	E	CN	E	,,	,,	C	E
21	,,	,,	,,	,,	KST	,,	AC	E	K	,,	KST	W	,,	,,
	C	,,	C	,,	CN	E	,,	,,	KC	E	,,	,,	C	,,
22	,,	,,	K	W	AC	SW	AC	SW	,,	,,	,,	,,	,,	,,
	C	,,	CN	NE	CN	E	CN	E	CN	E	CN	E	C	E
23	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	CN	,,	CN	NE	CN	NE	CN	NE	CN	NE	CN	,,	CN	,,
24	,,	,,	CST	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	N	,,	,,	,,	CN	E	CN	E	,,	,,	N	,,	N	,,
25	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	N	,,	CN	,,	CN	E	CN	E	CN	E	CN	E	N	,,
26	,,	,,	,,	,,	,,	,,	K	,,	C	,,	,,	,,	AC	W
	,,	,,	,,	,,	CN	W	CN	W	,,	,,	C	,,	,,	,,
27	K	,,	K	,,	,,	,,	K	,,	K	W	K	,,	K	,,
	,,	,,	,,	,,	C	W	C	W	C	E	CST	,,	C	,,
28	,,	,,	,,	,,	,,	,,	CST	,,	,,	,,	,,	,,	K	,,
	CN	E	CN	E	N	E	CN	E	N	E	CN	E	CN	S
29	,,	,,	,,	,,	K	,,	K	SE	K	,,	,,	,,	K	,,
	C	,,	,,	,,	KC	SE	KC	SE	KC	SE	,,	,,	C	SE
30	,,	,,	K	SE	K	,,	K	,,	,,	,,	,,	,,	C	SE
	,,	,,	C	SE	KC	S	CN	S	CN	S	N	,,	N	,,

TABLEAU MÉTÉOROLOGIQUE.—*Septembre* 1874.

Direction et Vitesse du Vent.

Jours de la Lunet du Mois		Matin. 4 h. Dir.	Vit.	7 h. Dir.	Vit.	10 h. Dir.	Vit.	Soir. 1 h. Dir.	Vit.	4 h. Dir.	Vit.	7 h. Dir.	Vit.	10 h. Dir.	Vit.	Moyennes des 7 observations.
			m		m		m		m		m					m
21	1	NE	0	NNE	0,8	NNE	3,8	ENE	4,7	ENE	5,2	ENE	0	ENE	0	2 1
22	2	ENE	0	E	0,3	E	1,1	E	1,8	ENE	1,1	NE	1,0	NE	0	0,8
23	3	NE	0	NE	0	NNE	0,3	ENE	1,2	NNE	0,2	NE	1,4	NE	0	0,4
24	4	NNW	0	NE	0	N	1,1	ENE	1,3	ENE	0,9	ENE	1,1	E	0	0,6
25	5	ESE	1	SE	1	S	3	W	4	NNW	5	WNW	2	WNW	1	2,4*
26	6	WNW	0	NNW	0,1m	NW	0,2m	NNW	1 7m	W	0,3m	W	0,9m	WNW	0,3m	0,5
27	7	WNW	0	WNW	0	NW	0,6	NNE	0,2	NE	0,1	E	0,8	E	1,1	0,4
28	8	ESE	0	ENE	0	ESE	1,2	SE	2,5	E	1,2	ESE	2,9	ESE	1,6	1,3
29	9	ESE	0	E	0	ESE	2,5	ESE	4,1	ESE	5,4	ESE	3,7	ESE	2,2	2,6
30	10	ESE	2	ESE	1	SE	2	SSE	1	ESE	4	E	2	E	1	1,9*
1	11	E	1	E	2	E	3	E	3	E	3	E	0	N	0	1,7*
2	12	NNE	0	NE	0	ENE	3	NE	2	NE	2	NE	1	NE	0	1,1*
3	13	N	0	N	0	E	2	ESE	2	E	2	ESE	1	ESE	1	1,1*
4	14	E	1	ESE	1	NNW	5	S	1	NNW	1	N	0	NNW	0	1,3*
5	15	N	1	N	1	N	3	N	4	NNE	4	NNE	1	N	1	2,1*
6	16	NNW	0	N	1	N	4	N	4	N	2	NNW	0	NNW	1	1,7*
7	17	NW	1	NNW	1	N	4	N	4	N	4	N	4	NNW	2	2,8*
8	18	NW	0,2m	NNW	0,1m	NNE	0,1m	NE	3,7m	NE	1,9m	NNE	2,5m	NE	1,1m	1,8
9	19	ENE	0,3	ENE	2,4	ENE	4,5	ENE	4,4	ENE	5,0	NE	2.7	N	1,0	2,9
10	20	NNE	0,1	NE	0,9	ENE	2,7	ENE	4,2	NE	4,5	NNE	2,7	NNW	1,1	2,3
11	21	N	0,2	N	1,9	NNE	0,4	NE	0,4	NE	5,6	NNE	4,5	NNE	1,8	2,1
12	22	NNE	2,3	NE	2,0	NNE	5,3	NE	5,5	NNE	5,0	NE	4,7	NE	4,6	4,2
13	23	NE	2,5	NNE	2,5	NE	5,6	NE	5,7	NE	6,4	NE	5,9	NNE	3,6	4,6
14	24	N	2,5	NNE	1,4	NE	2,0	N	2 8	NE	0,4	W	0,3	W	0,5	1,4
15	25	NW	0,2	NW	0,2	ENE	1,6	ESE	3,1	E	3,4	ENE	2,2	ENE	2,1	1,8
16	26	E	2,6	E	1,9	NW	0,2	N	1,8	NNW	1,7	N	0,5	E	0,1	1,3
17	27	SE	1,1	SSE	1,9	N	2,8	NE	1,9	NE	2,3	NE	1,3	NE	0,6	1,7
18	28	NE	2,1	ENE	3,7	ENE	6,2	ENE	6,1	NW	7,0	ENE	5,1	ENE	4,3	4,9
19	29	ENE	2,8	ENE	3,0	ESE	4,4	ESE	5,1	ESE	6,3	ESE	5,9	ESE	5,4	4,7
20	30	ESE	3,5	SE	2,3	SE	4,5	SSW	4,7	N	8,1	NNE	1,0	NNE	4,6	3,4

Fréquence Relative des 16 Vents sur 100

N.....12,5	W..... 2,0	S 1,1	E 10,8
NNW.... 7,6	WSW 0,0	SSE..... 0,7	ENE 14,3
NW..... 4,9	SW 0,1	SE 3,1	N 18,2
WNW.... 3,3	SSW 0,4	ESE 12,4	NNE 8,6

NB.—Les moyennes marquées d'une astérique ont été obtenues avec des evaluations approximatives de la force du vent : 0 indiquant le calme ; 1 léger souffle ; 2 petite brise ; 3 vent modéré ; 4 vent fort ; 5 vent très-fort ; 6 tempête ; 7 ouragan.

TABLEAU MÉTÉOROLOGIQUE.—*Septembre* 1874.

Jours de la Lune	Jours du Mois	Températures extrêmes à l'ombre. Minima	Maxima	Moyennes	Ozone. 7 h. M.	7 h. S.	Moyennes	Évaporation. Somme des 24 h.	Pluie. 7 h. M.	7 h. S.	Somme des 24 h.	Température du Puits.
		o	o	o				mm	mm	mm	mm	o
21	1	22,1	29,4	25,75	12	6	9,0	5,8	0,0	0,0	0,0	15,5
22	2	23,3	29,0	26,15	10	14	12,0	1,8	1,2	40,9	32,1	...
23	3	24,1	27,8	25,95	13	6	9,5	2,1	0,0	0,0	0,0	...
24	4	22,5	30,0	26,25	6	9	7,5	2,7	0,0	0,0	0,0	...
25	5	22,5	32,7	27,60	9	6	7,5	3,4	0,0	0,4	0,4	...
26	6	20,4	28,1	24,25	11	8	9,5	2.2	0,0	0,0	0.0	...
27	7	17,7	31,1	24,40	6	8	7,0	3,0	0,0	0,0	0,0	...
28	8	19,6	32,0	25,80	14	9	11,5	4,9	0,0	0,0	0,0	15,9
29	9	20,3	29,0	24,65	16	6	11,0	4,6	0,0	0,1	0,1	...
30	10	21,9	31,8	26,85	15	8	11,5	5,5	1,2	0,8	2,0	...
1	11	22,5	29,0	25,75	14	11	12,5	0,3	0,0	2,7	2,7	...
2	12	19,1	29,2	24,15	9	6	7,5	0,4	0,0	0,0	0,0	...
3	13	17,6	31,1	24,35	6	8	7,0	3,9	0,0	0,0	0,0	...
4	14	20,1	25,5	22,80	15	8	11,5	0,4	42,6	68,2	110,8	...
5	15	20,4	24,0	22,20	12	9	10,5	4,4	0,0	0,0	0,0	...
6	16	15,6	24,3	19,95	10	8	9,0	4,0	0,0	0,0	0,0	...
7	17	13,8	24,8	19,30	9	8	8,5	5,2	0,0	0,0	0,0	...
8	18	12,7	24,9	18,80	9	8	8,5	4,7	0,0	0,0	0,0	15,9
9	19	16,5	22,6	19,55	11	8	9,5	4,6	0,0	0,1	0,1	...
10	20	17,9	25,3	21,60	20	15	17,5	2,9	1,2	0,8	2,0	...
11	21	17,3	27,1	22,20	15	8	11,5	3,8	0,0	0,0	0.0	...
12	22	19,5	26,5	23,00	19	9	14,0	3,0	0,0	0,0	0,0	...
13	23	19,0	21,1	20,05	20	20	20,0	...	0,4	12,6	13,0	...
14	24	17,8	21,7	19,75	20	11	15,5	1,3	12,8	0,0	12,8	...
15	25	17,6	23,4	20,50	16	20	18,0	1,2	4,5	5,8	10,3	...
16	26	18,5	26,4	22,45	20	9	14,5	0,9	2,2	0,0	2,2	...
17	27	20,7	27,8	24,25	7	10	8,5	0,8	0,0	0,0	0,0	...
18	28	21,1	23,7	22,40	...	...	...	0,4	13,7	28,1	41,8	...
19	29	19,6	28,2	23,90	20	17	18,5	2,3	0,0	0,8	0,8	...
20	30	22,9	32,2	27,55	11	8	9,5	1,3	0,0	33,0	33,0	16,4
Moyennes du	1–10	21,44	30,09	25,77	11,2	8,0	9,6	35,0	1,2	41,3	42,5	...
	11–20	17,62	26,07	21,85	11,5	8,9	10,2	30,8	43.8	71,8	115,6	...
	21–30	19,40	25,81	22,61	16,4	12,4	14.4	15,0	33,6	80,3	113,9	...
	Mois	19,49	27,32	23,41	12,9	9,7	11,31	80,8	78,6	193,4	272,0	...

Maximum:	o 32,7 observé le 5	20 observé 7 fois	mm Hauteur d'eau tombée 272,0
Minimum:	32,7 „ le 18	6 „ 8 fois	„ „ évaporée 80,0
Différence:	20,0	14	Différence 192,0

JOURNAL MÉTÉOROLOGIQUE.

Septembre 1874.

1. 4h.m.—Calme ; les nuages marchent rapidement. 10h.—Beau ciel ; nuages transparents. 1h. S.—Même ciel ; vent fort. 4h.—Ciel très-pur ; vent comme à 1h. 7h.—Alto-cumulus brillants à l'W ; couche de cumulo-stratus au S : le vent est tombé. 8h. 30m.—Eclairs au SE. 10h.—Cumulo-stratus partout le ciel excepté au N.
2. 4h.m.—Même ciel ; calme. 7h.—Pluie fine ; au-dessous de la brume des cumulus arrivent rapidement de l'E. 10h.—Temps pluvieux ; il bruine par moment. 1h. S.—Ciel uniformément couvert ; le vent augmente. 4h.—42mm. de pluie en 2h.; Les cumulus arrivent rapidement de l'E ; éclaircie au S. 7h.—Averses : des éclaircies laissent voir des cirrus. 10h.—Ciel uniformément couvert ; calme.
3. 4h.m.—Le calme continue ; nuages transparents. 7h.—Rosée malgré le ciel couvert. 10h.—Les nuages s'élèvent ; temps lourd. 1h. S.—Ciel uniformément couvert ; éclaircie au NE. 4h.—Cumulo-stratus au NE. 7h.—Couche de cumulus au zénith ; zône éclairée à l'horizon ; calme. 10h.—Ciel découvert excepté au S. occupé par des cumulus compactes.
4. 4h.m.—Ciel uniformément couvert ; calme. 5h.—Ceinture de gros cumulus à l'horizon. 7h.—Des cumulus arrivent très-rapidement du NE ; rosée très-abondante. 10h.—Cumulo-nimbus vaporeux au NE ; éclaircies d'un bleu foncé. 4h.—Quelques cumulo-stratus à l'horizon ainsi que des cumulo-nimbus très-noirs. 7h.—Cirro-stratus à l'horizon. 10h.—Ciel splendide.
5. 4h.m.—Ciel très-pur ; rosée. 7h.—Quelques cirrus ; rosée très-abondante. 10h.—Bonne brise. 1h. S.—Orage avec éclairs et tonnerre à l'E. 4h.—Quelques gouttes de pluie seulement ; l'orage a disparu ; quelques nimbus orageux au SE. 7h.—Eclaircie au NW ; gros nimbus à l'E et au S ; éclairs au SE. 10h.—Ciel à peu près éclairci.
6. 4h.m.—Cirro-stratus laissant entre eux des éclaircies. 7h.—Ciel gris, un peu de rosée. 10h.—Des cumulus blanchâtres arrivent rapidement du N. 1h. S.—Gros nimbus au zénith ; éclaircie au NW. 4h.—Cumulo-nimbus audessous de la brume ; vent faible. 7h.—Ciel uniformément couvert. 10h. Même remarque.
7. 4h.m.—Léger voile de brume ; rosée très-abondante. 7h.—Brouillard s'élevant à la hauteur des maisons ; couche compacte de cumulus allant du SE au SW et occupant tout le S. 10h.—Cirrus très déliés au zénith. 4h. S.—Mêmes remarques. 10h.—Ciel sombre ; çà et là quelques éclaircies.
8. 4h.m.—Ciel serein ; calme. 7h.—Gros cumulus orageux au S ; rosée très abondante. 10h.—Bande de cumulus au S. 1h. S.—La bande de cumulo-stratus persévère ; ciel splendide. 4h.—Même ciel. 7h.—Id. vent très régulier. 10h.—Id.
9. 4h.m.—Lumière zodiacale brillante ; elle s'élève jusqu'au *delta* des Gémeaux ; ciel très étoilé. 7h.—Rosée très-abondante ; ciel serein. 10h.—Ciel d'un bleu foncé au zénith. 1h. S.—Cirro-cumulus transparents. 4h.—Même remarque. 7h.—Ciel sans nuages. 10h.—Id.

10. 4h.m.—Ciel très pur ; lumière zodiacale plus belle qu' hier. 7h.—Ciel splendide ; quelques légers cirrus au zénith ; rosée abondante. 10h.—Beau temps. 1h. S.—Couche de cumulus compactes comme le 7. 4h.—Même ciel. 7h.—Les cumulus persévèrent ; quelques cirrus au zénith. 10h.—Beau ciel ; étoiles brillantes.
11. 4h.m.—Lumière zodiacale en partie cachée par les nuages à l'horizon. 7h.—Gros cumulus au N. ; ceux du S. persévèrent ; rosée abondante. 10h.—Temps orageux. 1h. S.—Id. 3h.—Fort coup de vent, 15 à 20m. par seconde. 4h.—Il pleut ; des petits cumulus arrivent rapidement du NE. 7h.—Calme ; quelques éclairs au SE. 10h. —Le ciel, qui s'était éclairci, se couvre de nouveau ; le vent est tombé.
12. 4h.m.—Lumière zodiacale splendide ; la pointe est légèrement inclinée vers le S. 7h.—Rosée abondante ; léger brouillard ; bande de gros cumulus a l'horizon, du N. au S. en passant par l'E. 10h. —Ciel d'un bleu foncé au zénith. 1h. S.—Beau temps, chaleur supportable. 4h.—Mêmes remarques. 10h.—Ceinture de stratus à l'horizon.
13. 4h.m.—Lumière zodiacale comme hier. 7h.—Quelques cirrus au zénith, gros cumulus au NE ; rosée très-abondante. 10h.—Cumulus transparents. 1h. S.—Le ciel s'éclaircit. 4h.—Cirrus au zénith. 7h.—Le ciel se couvre subitement. 10h.—Après s'être éclairci à 9h., il est couvert maintenant.
14. 4h.m.—Pluie abondante ; de 6h. à 6h. 30m. pluie torrentielle. Coup de tonnerre presque zénithal. 10h.—Pendant 10m. environ à Chang-Hai ciel très sombre, on ne peut lire sans lumière. Coup de tonnerre zénithal, le vent saute subitement de l'E au NW ; 24mm. d'eau en 20m. 7h.—Ciel couvert, éclaircie à l'W. Calme. 10h. —Ciel uniformément couvert.
15. 1h.m.—Ciel uniformément couvert ; calme. 7h.—Ciel moutonné ; rosée abondante. 10h.—Le ciel s'éclaircit ; cirro-cumulus transparents. 1h. S. et 4h. Beau temps ; cirrus très déliés. 7h.—Beau clair de lune. 10h.—Cumulus vaporeux ; calme.
16. 4h.m.—Lumière zodiacale visible à travers les nuages. 7h.—Cumulo-nimbus à l'horizon. 10h.—Brume ; cirrus au zénith. 1h. S.—Même ciel. 4h.—Eclaircie au N. 7h.—Id. au zénith ; reste du ciel indistinct. 10h.—Ciel brumeux ; auréole lunaire incomplète.
17. 4h.m.—Lumière zodiacale comme hier ; cumulus compactes à l' E.S.E. comme précédemment ; rosée abondante. 7h.—Rosée très-abondante. 10h.—Les cumulus sont chassés en bloc vers le SE ; au N. même phénomène, cumulus compactes allant du NE. au NW. 4h.—Le vent prend de la force et amène des cumulus. 7h.—Ciel étoilé ; 1ère bande de corbeaux voyageurs. 10h.—Ciel serein.
18. 5h.m.—Quelques stratus à l'horizon. 7h.—Id. rosée très-abondante. 10h.—Cumulus arrivant rapidement de SE. 1h. S.—Le vent souffle par rafales. 4h.—Ciel d'un bleu foncé au zénith. 7h.—Le temps s'adoucit. 10th.—Ciel très-noir au N. et à l'W ; le reste très-pur.
19. 4h.m.—Ciel uniformément couvert. 7h.—Nuages de toutes espèces. 10h.—Ciel uniformément couvert. 7h. S.—Quelques gouttes de pluie. 4h.—Cumulus blanchâtres audessous de la brume. 7h.

Pluie ; ciel sombre. 10h.—La pluie a cessé ; ciel couvert de nuages transparents.

20. 4h.m.—Cumulus blanchâtres au-dessous du brouillard. 7h.—Id. pluie fine. 10h.—Il bruine ; le vent s'élève ; quelques cumulus à l'horizon. 1h. S.—Fort coup de vent. depuis midi ½, pluie fine. 4h.—Le ciel s'éclaircit. 7h.—Ciel découvert ; calme. 10h.—Le ciel se couvre subitement de cumulus venant rapidement de l'Est.

21. 4h.m.—Ciel très-étoilé ; lumière zodiacale plus brillante que la voie lactée. 7h.—Ciel splendide ; rosée très-abondante. 10h.—Légère couche du cirrus ; gros cumulo-nimbus au zénith. 1h. S. —Les cirrus ont disparu, vent très-fort. 4h.—Quelques cirrus au S. 7h.—Un cirro-stratus passant par le zénith partage le ciel en deux parties. Cumulo-nimbus noirâtres au NW. 10h.—Clair de lune magnifique.

22. 4h.m.—Lumière zodiacale à travers les nuages ; brise tiède. 7h.—Des cumulus arrivent très rapidement du NE.; pas de rosée. 10h. —Même ciel. 1h. S.—Quelques gouttes de pluie. 4h.—Il bruine ; vent très-fort. 7h.—Quelques gouttes de pluie. 10h.—Le vent emporte rapidement les nuages.

23. 4h.m.—Pluie fine. 7h.—Pluie assez forte. 10h. et 1h. S.—Id. 4h.—Le baromètre remonte. 10h.—Pluie fine, ciel uniformément couvert.

24. 4h.m.—Pluie fine, torrentielle vers minuit ; ciel couvert, averse à 5h. 30m. 7h.—Calme. 10h.—Quelques gouttes de pluie. 1h. S. et 4h.—Le calme continue. 7h.—La pluie recommence. 10h. —Ciel uniformément couvert ; pluie fine. Calme.

25. 4h.m.—Cumulo-nimbus au zénith se détachant sur la brume. 10h. et 1h. S.—Mêmes remarques. 4h.—Petite averse. 7h.—Temps couvert et sombre. 10h.—Pluie fine.

26. 4h.m.—Ciel uniformément couvert ; pluie fine. 7h.—Id. 10h.— Cumulus arrivant de l'W ; ciel moutonné. 1h. S.—Temps lourd. 7h.—Beau coucher de soleil ; éclaircie a SE. 10h.—Clair de lune ; nuages transparents.

27. 4h.m.—Brouillard ; rosée très abondante. 10h.—Pluie fine. 1h. S.—Le brouillard s'élève ; quelques grosses gouttes de pluie ; Ciel sombre à l'W. 4h.—Le ciel s'éclaircit à l'W. 7h.—Quelques gouttes de pluie.

28. 4h.m.—Il vient de pleuvoir. 7h.—Il bruine. 10h.—Ciel uniformément couvert. 4h. S.—Averse torrentielle. 7h.—Eclaircies, on aperçoit les étoiles au zénith ; cumulo-nimbus à l'horizon. 10h. Ciel moutonné ; gros cumulo-nimbus au zénith.

29. 4h.m.—Ciel uniformément couvert. 7h.—Brume générale. 10h. —Vent tiède (20°) ; des cumulus arrivent rapidement de l'ESE. 1h. S.—Averses depuis midi. 4h.—Le ciel s'éclaircit. 10h.— Cumulo-nimbus comme à 10h. A.M.

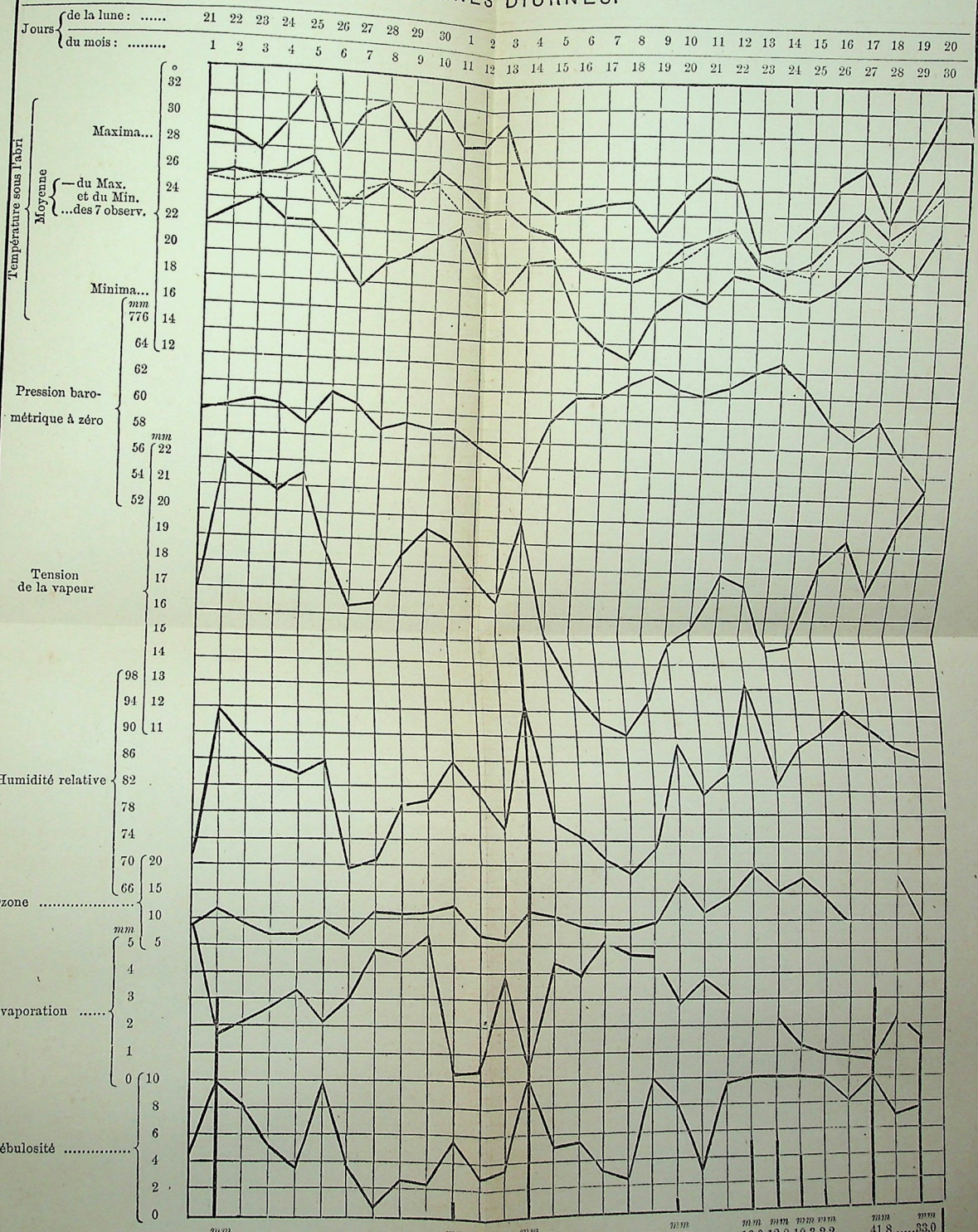
30. 4h.m.—Brume générale ; air tiède et humide. 10h.—Cirrus au zénith. 1h. S.—Quelques grosses gouttes de pluie. 4h.—Pluie torrentielle sans orage. 5h.—Arc-en-ciel magnifique ; il se compose d'un arc intérieur dans lequel on distingue nettement 4 arcs secondaires, et d'un arc extérieur à couleurs pâles et renversées. 7h.— Quelques gouttes de pluie. 10h.—Ciel uniformément couvert ; pluie fine.

A. M. D. G.

OBSERVATOIRE DE ZI-KA-WEI

Résumé des Observations Météorologiques de Septembre 1874.

MOYENNES DIURNES.



OBSERVATOIRE DE ZI-KA-WEI.

BULLETIN MÉTÉOROLOGIQUE,

OCTOBRE 1874.

NOTA.—Pour la position géographique de l'observatoire, les instruments utilisés, les notations employées, etc., voir la note préliminaire placée en tête du Bulletin de Septembre 1874.

TABLEAU MÉTÉOROLOGIQUE.—*Octobre* 1874.

Pression Barométrique à Zéro.

Jours de la Lune	Jours du Mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
		mm	mm	mm	mm	mm	mm	mm	mm
21	1	57,66	58,86	59,67	58,97	58,88	59,52	59,88	59,06
22	2	58,86	59,56	59,91	58,75	57,86	58,15	58,54	58,80
23	3	58,05	59,23	59,96	59,35	59,15	59,89	60,05	59,37
24	4	59,16	60,09	59,54	59,47	59,18	60,05	60,80	59,76
25	5	61,36	62,44	63,30	62,48	62,68	63,76	64,75	62,97
26	6	64,20	65,14	65,43	64,34	63,83	64,25	65,11	64,61
27	7	64,74	64,38	64,82	63,21	62,17	63,41	63,54	63,75
28	8	62,53	63,09	63,02	61,48	60,47	61,42	61,81	61,97
29	9	61,04	61,80	61,95	60,25	59,85	60,92	61,57	61,07
1	10	60,66	61,79	62,39	61,52	61,79	64,92	65,76	62,69
2	11	66,94	67,92	68,10	67,53	67,27	67,81	68,06	67,66
3	12	67,33	68,26	68,07	66,98	65,87	66,20	66,29	67,00
4	13	64,26	64,51	64,35	61,78	61,72	61,87	62,84	63,05
5	14	63,72	65,22	66,47	65,94	66,23	66,75	67,51	65,98
6	15	67,19	67,66	67,56	65,33	64,91	65,72	66,35	66,39
7	16	66,35	67,49	67,87	66,68	67,03	67,13	67,61	67,16
8	17	67,01	68,14	69,35	67,94	67,82	68,26	68,52	68,15
9	18	67,72	68,26	68,56	67,42	67,11	67,39	67,31	67,68
10	19	64,48	64,93	65,17	62,57	61,96	62,37	62,21	63,38
11	20	61,15	61,88	62,99	63,00	63,84	64,87	65,89	63,37
12	21	65,39	66,46	66,55	65,51	64,96	65,70	65,70	65,74
13	22	65,03	65,68	65,89	64,49	64,54	65,19	65,22	65,15
14	23	64,40	65,29	65,63	64,68	64,33	65,42	66,49	65,18
15	24	65,45	66,28	66,51	64,46	64,21	64,37	65,99	65,32
16	25	65,17	66,17	66,99	65,78	66,03	67,13	67,10	66,34
17	26	66,10	66,72	67,82	65,81	65,46	65,88	65,88	66,21
18	27	64,50	65,27	65,29	64,41	63,55	64,38	65,28	64,67
19	28	64,64	64,87	64,94	63,86	63,63	65,18	67,07	64,88
20	29	68,74	70,04	70,95	69,79	69,99	71,52	71,91	70,42
21	30	71,03	71,80	73,10	72,31	72,68	74,02	75,25	72,88
22	31	74,88	76,04	76,48	74,75	74,40	75,88	76,24	75,52
Moyennes du	1–10	60,83	61,64	62,00	60,98	60,59	61,63	62,18	61,55
	11–20	65,62	66,43	66,85	65,52	65,38	65,84	66,26	65,98
	21–31	66,85	67,96	68,20	66,90	66,71	67,70	68,38	67,48
	Mois	64,51	65,33	65,76	64,54	65,31	65,14	65,69	65,08

Maximum : 776,48 observé le 31 à 10 h. A.M.
Minimum : 757,66 „ le 1er à 4 h. A.M.
} différence : ..... mm 18,82

TABLEAU MÉTÉOROLOGIQUE.—*Octobre* 1874.

TEMPÉRATURE À L'OMBRE.

Jours de la Lune	Jours du Mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
		o	o	o	o	o	o	o	o
21	1	21,2	19,7	21,1	21,1	20,0	20,3	21,5	20,70
22	2	22,1	22,5	22,6	22,9	23,1	22,8	22,2	22,60
23	3	21,5	21,7	22,5	21,7	20,9	20,7	20,1	21,30
24	4	20,3	19,7	21,1	21,2	20,9	19,1	19,1	20,20
25	5	19,1	19,1	22,7	23,4	22,1	18,0	15,9	20,04
26	6	15,5	16,5	22,1	23,8	21,7	17,2	15,3	18,87
27	7	16,0	16,8	23,3	23,4	22,9	18,4	17,1	19,70
28	8	17,2	19,7	25,3	25,4	24,4	20,1	19,7	21,70
29	9	18,8	20,7	25,9	26,7	25,8	21,0	20,5	22,77
1	10	19,1	20,1	26,1	25,8	21,9	17,1	17,1	21,03
2	11	17,5	17,1	18,8	19,0	17,9	16,0	13,9	17,17
3	12	12,6	13,6	19,3	21,3	19,5	15,0	14,4	16,53
4	13	13,9	16,5	22,1	23,9	23,1	18,9	17,7	19,44
5	14	18,7	17,0	19,3	18,5	18,8	16,5	15,3	17,73
6	15	15,8	15,4	16,8	17,9	17,8	16,8	15,5	16,57
7	16	15,1	14,8	17,7	19,8	18,9	16,8	16,1	17,03
8	17	15,1	15,3	16,2	19,1	18,5	15,4	14,9	16,36
9	18	12,4	14,6	20,5	20,4	18,1	16,1	16,2	16,90
10	19	17,8	17,9	21,1	21,0	17,6	17,1	17,2	18,53
11	20	16,1	16,4	18,6	19,5	19,8	15,8	12,7	16,98
12	21	14,3	14,8	18,1	18,9	17,2	14,9	13,9	16,01
13	22	13,7	14,6	19,3	20,1	18,2	16,5	16,1	16,93
14	23	14,5	14,7	18,6	21,4	20,4	17,1	16,9	17,66
15	24	13,8	14,9	21,6	23,8	20,5	17,5	16,4	18,36
16	25	17,0	18,1	20,5	20,4	19,8	16,8	15,8	18,34
17	26	14,5	16,9	19,6	19,7	18,6	17,7	17,5	17,78
18	27	16,7	16,3	18,4	17,9	17,9	17,5	16,1	17,26
19	28	17,1	16,9	19,4	19,2	16,5	14,3	11,5	16,41
20	29	9,8	7,7	8,9	10,4	9,5	5,5	3,8	7,94
21	30	2,7	4,0	9,5	11,1	10,5	7,9	5,1	7,26
22	31	4,1	5,3	11,0	12,7	12,2	9,8	7,8	8,98
Moyennes du	1–10	19,08	19,65	23,27	23,54	22,37	19,47	18,85	20,89
	11–20	15,50	15,86	19,04	20,04	19,00	16,44	15,39	17,82
	21–31	12,56	13,11	16,81	17,78	16,48	14,14	12,81	14,81
	Mois	15,61	16,10	19,61	20,37	19,19	16,60	15,59	17,58

Maximum : 26,7 observé le 9 à 1 h. P.M.
Minimum : 2,7 „ le 30 à 4 h. A.M.
} différence 24,0

TABLEAU MÉTÉOROLOGIQUE.—*Octobre* 1874.

Tension de la Vapeur.

Jours de la Lune	Jours du Mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
21	1	15,17	17,05	16,26	15,92	16,38	17,38	18,73	16,70
22	2	19,09	19,02	18,78	18,60	19,16	19,53	19,66	19,12
23	3	19,10	18,43	18,66	18,61	18,38	17,65	17,50	18,33
24	4	17,72	16,40	16,09	16,37	15,35	16,13	16,45	16,36
25	5	14,20	13,89	14,56	11,72	12,06	13,07	12,86	13,19
26	6	12,82	12,91	12,06	10,57	11,55	11,78	12,10	11,97
27	7	12,87	13,65	10,87	12,37	11,57	13,57	13,02	12,56
28	8	13,56	14,13	14,13	13,96	14,86	15,83	15,45	14,58
29	9	15,35	16,76	17,26	16,44	16,81	17,22	17,26	16,71
1	10	16,45	17,50	18,97	17,86	17,42	13,02	12,41	16,23
2	11	10,06	9,85	10,52	9,01	8,84	9,99	9,96	9,75
3	12	9,09	9,75	8,38	8,60	8,70	11,07	10,84	9,49
4	13	11,01	11,93	10,87	12,55	13,20	14,47	14,60	12,66
5	14	14,44	12,19	9,39	10,30	9,41	10,08	11,68	11,07
6	15	12,35	12,60	13,35	12,06	11,13	11,47	13,10	12,29
7	16	12,78	12,27	11,20	9,65	9,91	10,77	11,62	11,17
8	17	12,78	11,54	11,84	11,05	10,30	11,06	10,71	11,33
9	18	10,34	11,24	9,49	9,55	9,98	10,77	11,97	10,48
10	19	14,08	14,77	13,94	13,68	14,66	14,51	14,45	14,25
11	20	12,87	13,90	14,50	13,95	10,34	11,38	10,82	12,54
12	21	11,87	11,70	9,70	9,49	9,26	9,74	10,35	10,30
13	22	10,74	11,37	11,35	11,19	11,45	12,77	12,03	11,56
14	23	11,74	12,19	14,65	13,28	15,02	13,45	11,97	13,19
15	24	11,59	12,63	13,96	13,40	13,49	13,83	13,29	13,17
16	25	13,68	14,05	14,31	13,70	11,52	11,74	11,52	12,93
17	26	11,74	11,97	10,60	12,03	11,63	12,18	12,77	12,84
18	27	13,11	13,35	13,72	13,87	14,63	14,87	13,63	13,88
19	28	14,22	13,44	12,67	12,79	13,05	12,15	10,14	12,64
20	29	7,29	4,68	2,66	3,41	3,84	4,89	5,13	4,56
21	30	4,98	5,19	4,90	4,05	3,79	5,35	5,33	4,80
22	31	5,13	5,11	5,97	5,79	6,09	6,25	6,47	5,83
Moyennes du	1–10	15,63	15,97	15,76	15,24	15,35	15,51	15,54	15,62
	11–20	11,98	12,00	11,35	11,03	10,75	11,56	11,98	11,50
	21–31	10,56	10,52	10,40	10,27	10,34	10,66	10,24	10,43
	Mois	12,68	12,75	12,44	12,12	12,09	12,51	12,51	12,45

Maximum : 19,66 observé le 2 à 10 h. P.M.
Minimum : 2,66 „ le 29 à 10 h. A.M.
} différence..... mm 17,00

TABLEAU METÉOROLOGIQUE.—*Octobre* 1874.

Humidité Relative.

Jours de la Lune	Jours du Mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
21	1	81	100	87	85	94	98	98	91,86
22	2	96	94	92	90	91	95	98	93,71
23	3	100	95	92	96	100	97	100	97,14
24	4	100	96	86	87	83	98	100	92,86
25	5	87	84	71	54	61	85	96	76,86
26	6	98	92	61	48	60	81	93	76,14
27	7	94	96	51	58	55	86	90	75,71
28	8	93	83	60	57	66	91	91	77,28
29	9	95	92	69	63	67	91	96	81,86
1	10	100	100	76	72	89	90	85	87,43
2	11	68	67	65	55	57	74	84	67,14
3	12	83	84	50	45	51	87	89	69,86
4	13	93	85	55	56	63	89	97	76,86
5	14	90	84	56	65	58	72	90	73,57
6	15	92	97	94	79	73	80	100	87,86
7	16	100	98	74	56	62	75	85	78,57
8	17	100	89	86	67	65	85	84	82,28
9	18	97	91	53	54	64	79	87	75,00
10	19	93	95	75	74	98	100	98	90,43
11	20	95	100	91	83	60	85	98	87,43
12	21	98	93	63	58	64	77	87	77,14
13	22	92	92	68	64	73	92	88	81,28
14	23	95	98	92	70	84	93	83	87,86
15	24	99	100	73	61	75	93	96	85,28
16	25	95	91	80	77	67	82	86	82,57
17	26	95	83	62	70	73	81	86	78,57
18	27	93	97	87	91	96	100	100	94,86
19	28	98	94	76	77	94	100	100	91,28
20	29	80	60	30	36	43	71	85	57,86
21	30	89	85	55	41	39	66	80	65,00
22	31	83	76	60	52	57	69	82	68,43
Moyennes du	1–10	94,4	93,2	74,5	71,0	76,6	91,2	94,7	85,09
	11–20	91,1	89,0	69,9	63,4	65,1	82,6	91,2	78,90
	21–31	92,5	88,1	67,8	63,4	69,5	84,0	88,4	79,10
	Mois	92,64	90,03	70,64	65,83	70,38	85,87	91,35	80,97

Maximum : 100 observé 18 fois
Minimum : 30 „ le 29 à 10 h. A.M. } différence 70

TABLEAU MÉTEOROLOGIQUE.—*Octobre* 1874.

ETAT DU CIEL 10.—*Nébulosité.*

Jours de la Lune	Jours du Mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
21	1	10 Br	10 Br	10 Br	10 Br	10	10	10	10,0
22	2	10 Br	10 Br	10 Br	10 Br	10 Br	10 Br	10	10,0
23	3	10 Bd	10 Br	10 Br	10	10 Br	10 Br	9	9,9
24	4	10 Br	10 Br	10	10	10	10 Br	10 Br	10,0
25	5	10 Br	7	5	7	3	0	0	4,4
26	6	0	1	3	5	2	0	0	1,3
27	7	0	0	3	7	8	0	0	3,0
28	8	0	0	7	5	1	1	0	2,0
29	9	0	0	1	0	0	0	0	0,1
1	10	0	5 Bd	8	7	10	10	10	7,1
2	11	10	10	10 Br	10 Br	10	10 Br	3	9,0
3	12	0	2	2	7	8	2	1	3,1
4	13	1	2	0	0	0	0	0	0,4
5	14	10 Br	10	9 Br	10 Br	10 Br	10 Br	10 Br	9,9
6	15	10 Bd	10 Br	10	10	10 Br	10	10 Br	10,0
7	16	10	10 Br	5	7	10 Br	10 Br	10 Br	9,0
8	17	10 Br	10	10	10	10	7 Br	5 Br	9,0
9	18	2	6	9	10 Br	10	10 Br	10 Br	8,1
10	19	10 Br	10 Br	10 Br	10 Br	10 Br	10 Br	10 Br	10,0
11	20	10 Br	10 Br	10	10	2	3	1	6,6
12	21	9 Br	9 Br	9	10	10	10 Br	10 Br	9,6
13	22	10 Br	10 Br	10 Br	10	9	9	4	9,1
14	23	8	8	9	9	3	0	1	5,4
15	24	0	2	7	7	5	0	1	3,1
16	25	6	2	5	5	5	1	1	3,6
17	26	1	7	7	9	10	10	10 Br	7,7
18	27	10 Br	10 Br	10 Br	10 Br	10 Br	10 Br	10 Br	10,0
19	28	10 Br	10 Br	10 Br	10 Br	10 Br	10 Br	10 Br	10,0
20	29	10 Br	1	1	1	1	1	1	2,3
21	30	0	3	9	7	9	1	1	4,3
22	31	0	2	1	9	5	10 Br	0	3,9
Moy. du Mois		6,3	6,2	7,3	7,7	6,9	5,6	5,6	6,51

NOMBRE DE JOURS DE :

Ciel beau, ou moins de $2\frac{1}{10}$ couvert	.. 2	Brouillard	 4
,, peu nuageux ou de 2 à $4\frac{1}{10}$,,	.. 7	Brume	20
,, nuageux, ou de 4 à $6\frac{1}{10}$,,	.. 3	Rosée	14
,, très-nuageux, ou de 6 à $8\frac{1}{10}$,,	.. 5	Pluie	14
,, couvert ou plus de $8\frac{1}{10}$,,	..14	Orage	 0

N.B.—La lumière zodiacale a été observée 5 fois.

TABLEAU METÉOROLOGIQUE.—*Octobre* 1874.

ETAT DU CIEL 2o.—*Forme et Direction des Nuages.*

Date.	4 h. M.		7 h. M.		10 h M.		1 h. S		4 h. S.		7 h. S.		10 h. S.	
	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.
1	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	N	NE	N	NE	N	NE	C	NE	N	NE	N	NE	N	NE
2	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	CN	E	CN	E	CN	E	CN	E	CN	E	K	E	N	,,
3	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	CN	E	N	E	N	E	N	E	CN	,,
4	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	CST	,,	,,	,,	CN	NW	CN	NW	CN	NW	N	,,	,,	,,
5	,,	,,	K	W	K	W	K	W	KST	,,	,,	,,	,,	,,
	C	,,	C	N	KC	N	KC	N	KC	N	,,	,,	,,	,,
6	,,	,,	,,	,,	,,	,,	,,	,,	KC	NE	,,	,,	,,	,,
	,,	,,	C	,,	C	NE	C	N	,,		,,	,,	,,	,,
7	,,	,,	,,	,,	KC	SE	K	SW	KC	S	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	AC	S	,,		,,	,,	,,	,,
8	,,	,,	,,	,,	AC	S	K	,,	KC	S	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	AC	S	,,	,,	C	,,	,,	,,
9	,,	,,	,,	,,	AC	S	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	C	,,	,,	,,	,,	,,	,,	,,
10	,,	,,	KC	W	K	W	K	W	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	AC	W	KC	W	CN	,,	N	,,	CN	,,
11	,,	,,	N	,,	,,	,,	,,	,,	KST	,,	,,	,,	CST	,,
	,,	,,	CST	,,	CN	NE	CN	NE	C	N	,,	,,	,,	,,
12	,,	,,	,,	,,	KST	W	K	W	KC	W	CST	,,	,,	,,
	,,	,,	K	,,	AC	E	AC	E	AC	E	,,	,,	C	,,
13	,,	,,	,,	,,	K	,,	,,	,,	,,	,,	,,	,,	,,	,,
	C	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	CN	W	CN	W	,,	,,	,,	,,	,,	,,	,,	,,
15	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	N	NE	CN	NE	CN	NE	CN	E	CN	E	N	,,
16	,,	,,	,,	,,	K	W	K	W	,,	,,	,,	,,	,,	,,
	N	,,	N	,,	AC	E	AC	NE	CN	NE	,,	,,	,,	,,
17	,,	,,	,,	,,	,,	,,	AC	W	AC	,,	K	W	,,	,,
	N	,,	N	,,	CN	N	CN	E	C	E	,,	,,	,,	,,
18	,,	,,	KST	,,	KST	W	,,	,,	,,	,,	,,	,,	,,	,,
	C	,,	C	,,	C	E	C	,,	C	,,	C	,,	,,	,,
19	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	C	E	C	S	N	,,	N	,,
20	,,	,,	,,	,,	KC	KC	,,	KST	,,		K	NE	KC	W
	N	,,	N	,,	CN	NE	CN	E	C	N	,,	,,	,,	,,
21	,,	,,	,,	,,	KST	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	CN	,,	N	,,	N	,,	,,	,,	C	,,
22	,,	,,	,,	,,	,,	,,	,,	,,	K	,,	KC	SW	KC	SW
	CN	,,	CN	SW	C	,,	N	E	C	E	,,	,,	,,	,,
23	KC	,,	KC	,,	K	,,	K	,,	K	,,	,,	,,	,,	,,
	,,	,,	,,	,,	CN	E	AC	NE	AC	E	,,	,,	CST	,,
24	,,	,,	K	,,	K	S	K	SE	KC	SE	,,	,,	K	N
	K	,,	C	,,	AC	W	AC	W	AC	SW	,,	,,	,,	,,
25	,,	,,	,,	,,	K	NE	K	W	K	NE	KST	,,	K	NW
	KST	,,	C	,,	AC	NE	AC	E	AC	E	,,	,,	,,	,,
26	AC	NE	AC	E	AC	E	CN	E	CN	E	,,	,,	,,	,,
	,,	,,	K	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
27	,,	,,	CST	,,	C	E	C	E	N	E	N	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
28	,,	,,	N	,,	C	NE	CN	NE	CN	E	N	,,	,,	,,
	,,	,,	KST	,,	KST	,,	KST	,,	KST	,,	KST	,,	KST	,,
29	C	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	CST	,,	CST	,,	KST	W	KST	W	CST	,,	CST	,,
30	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	K	N	KST	,,	KC	NE	KC	W	,,	,,	,,	,,
31	,,	,,	,,	,,	,,	,,	AC	W	AC	NE	C	,,	,,	,,

TABLEAU METEOROLOGIQUE.—*Octobre* 1874.

Direction du Vent; sa Vitesse par Seconde.

jours de la Lune	du Mois	Matin. 4 h. Dir.	Vit.	7 h. Dir.	Vit.	10 h. Dir.	Vit.	Soir. 1 h. Dir.	Vit.	4 h. Dir.	Vit.	7 h. Dir.	Vit.	10 h. Dir.	Vit.	Moyennes des 7 observations.
			m		m		m		m		m		m		m	m
21	1	NE	6,7	NE	9,6	NE	10,7	NE	9,5	NE	8,4	NE	7,6	NE	6,8	8 5
22	2	ENE	7,3	E	7,1	ENE	7,6	ENE	7,7	ENE	7,0	NE	5,7	NE	4,9	6,8
23	3	NNE	4,0	NNE	3,1	ENE	3,3	ENE	4,1	ENE	4,1	ENE	3,3	ENE	2,2	3,4
24	4	NNW	0,3	WNW	1,9	WNW	2,6	NW	4,0	NW	3,9	NNW	2,7	NE	4,3	2,8
25	5	NNW	3,0	N	2,2	N	3,9	N	3,9	NNE	3,9	N	1,9	N	1,0	2,8
26	6	NW	0,7	NNW	2,3	NNE	3,1	NNE	3,1	NE	3,9	NE	3,4	N	1,3	2,5
27	7	E	1,2	O	1,2	ESE	2,0	E	3,1	E	5,1	E	3,3	E	2,8	2,6
28	8	ESE	2,5	ESE	2,8	SSE	5,3	SSE	5,3	SE	5,7	E	3,1	SE	3,3	4,0
29	9	ESE	2,7	ESE	2,2	S	4,4	SSE	5,6	SSE	6,1	ESE	3,1	ESE	2,0	3,7
1	10	O	1,9	SW	0,4	WNW	3,5	WNW	6,0	NW	7,4	NNE	10,3	NNE	8,5	5,4
2	11	N	4,5	N	4,7	N	6,0	N	6,0	N	5,0	N	2,2	NNW	1,2	4,2
3	12	N	0,5	N	0,7	NE	2,4	NE	3,5	ENE	2,4	ENE	2,6	E	1,1	1,9
4	13	ESE	2,3	SSE	1,9	S	5,2	S	6,1	S	5,8	SSE	5,3	SSE	1,6	4,0
5	14	NNW	1,7	NNW	4,9	N	4,7	NW	3,9	N	4,4	N	2,6	N	1,7	3,4
6	15	N	1,4	N	3,1	NE	1,8	E	4,3	ENE	4,6	ENE	3,8	ENE	4,1	3,3
7	16	NE	2,8	NNE	4,2	NNE	3,2	NE	5,2	NE	5,2	NE	2,4	N	1,0	3,4
8	17	N	2,1	SE	1,3	NW	1,6	NNE	2,6	NE	1,9	NE	1,5	N	1,6	1,8
9	18	N	1,6	N	1,6	ENE	3,4	ENE	5,5	ENE	3,6	ENE	1,2	ENE	0,9	2,5
10	19	ENE	1,7	E	1,7	ESE	2,0	ESE	5,4	S	2,5	O	0,1	NW	0,1	1,9
11	20	NW	2,8	N	5,5	N	5,6	N	6,6	N	6,5	N	3,8	NW	1,7	4,7
12	21	NW	2,2	NNW	1,6	N	3,2	N	4,4	N	1,8	N	0,7	NNW	0,5	2,1
13	22	NW	1,2	N	1,2	ENE	1,5	E	2,6	NE	4,3	N	1,4	N	0,6	1,8
14	23	NNW	0,3	N	0,1	ENE	0,1	NNE	0,6	NE	1,3	ENE	1,7	ENE	1,9	0,9
15	24	ENE	0,7	E	1,6	ESE	2,4	SSE	2,8	E	3,2	E	3,5	ENE	3,2	2,5
16	25	ENE	2,5	ENE	1,2	ENE	4,6	NE	5,7	NE	6,3	NE	3,5	ENE	3,7	3,9
17	26	NNE	1,3	NE	1,9	NE	5,8	NE	6,9	NE	5,9	NNE	3,8	NNE	2,0	3,9
18	27	N	0,7	N	2,7	N	3,0	N	2,5	NNE	0,9	NNE	5,0	NNE	4,4	2,7
19	28	NNE	3,9	NNE	4,1	NE	3,5	NNE	4,5	NNW	2,7	NNW	5,5	NW	9,2	4,8
20	29	NNW	8,8	NNW	8,8	NNW	8,8	NNW	10,9	NNW	9,7	NW	4,6	NW	2,6	7,7
21	30	NW	2,4	NNW	2,8	NNW	1,3	NNW	5,3	NNW	5,7	NNW	3,7	NW	3,2	3,5
22	31	NNW	1,9	NNW	2,9	NNW	5,9	NNW	5,2	NNW	5,3	NNW	2,2	NNW	1,1	3,5
Moy. du Mois		2,5		2,9		3,9		4,9		4,7		3,4		2,7		3,6

Fréquence Relative des 16 Vents sur 100

N 18	W..... 0	S 2	E 5
NNW 13	WSW 0	SSE..... 2	ENE 14
NW 9	SW 0	SE 3	N 14
WNW 2	SSW 0	ESE 5	NNE 12

Calmes, sur 100 observations 2

N.B.—1o. Nous entendons par calme l'absence de vent capable d'agir sur l'anémomètre du Météorographe-Secchi.

2o. Au moyen de notre girouette *inscrivante*, nous relevons 24 fois chaque jour la direction du vent.

3o. La vitesse portée au tableau est la vitesse moyenne pendant 3h.

TABLEAU MÉTÉOROLOGIQUE.—*Octobre* 1874.

Jours de la Lune	Jours du Mois	Températures extrêmes à l'ombre. Minima	Maxima	Moyennes	Ozone. 7 h. M.	1 h. S.	7 h. S.	Moyennes	Évaporation. Sommes des 24 h.	Pluie. 7 h. M.	7 h. S.	Sommes des 24 h.	Température du Puits.
		o	o	o					mm	mm	mm	mm	o
21	1	19,6	21,1	20,35	20	9	9	12,7	0,70	4,7	6,8	11,5	...
22	2	20,1	23,6	21,85	...	11	12	11,5	0,40	3,0	0,0	3,0	...
23	3	21,4	23,4	22,40	13	17	10	13,3	0,40	9,5	0,7	10,2	16,4
24	4	19,1	22,6	20,85	20	10	9	13,0	1,00	1,3	0,0	1,3	...
25	5	16,9	25,0	20,95	17	14	8	13,0	3,90	3,3	0,0	3,3	...
26	6	14,5	24,6	19,55	13	12	7	10,6	3,60	0,0	0,0	0.0	...
27	7	13,1	26,3	19,70	11	9	8	9,3	4,00	0,0	0,0	0,0	...
28	8	16,9	26,5	21,70	6	10	9	8,3	4,60	0,0	0,0	0,0	...
29	9	18,3	27,4	22,85	...	9	9	9,0	4,10	0,0	0,0	0,0	...
1	10	17,1	27,2	22,15	...	...	...	...	1,35	0,0	0,0	0,0	...
2	11	15,3	20,4	17,85	17	12	9	12,7	5,10	0,0	0,0	0,0	...
3	12	10,5	24,0	17,25	17	9	10	12,0	3,91	0,0	0,0	0,0	...
4	13	13,3	24,6	18,95	11	8	9	10,6	3,95	0,0	0,0	0,0	...
5	14	16,6	21,5	19,05	14	8	9	10,3	2,55	0,0	0,0	0,0	...
6	15	15,1	18,8	16,95	20	13	9	14,0	1,55	5,2	2,4	7,6	...
7	16	14,4	21,0	17,70	19	11	8	12,7	1,80	15,6	0,0	15,6	16,5
8	17	14,8	20,2	17,50	19	15	8	14,0	2,40	2,8	0,0	2,8	...
9	18	11,7	21,8	16,75	18	9	8	11,6	3,00	0,0	0,0	0,0	...
10	19	15,4	22,8	19,10	18	17	11	15,3	1,50	0,3	21,2	21,5	...
11	20	15,7	21,4	18,55	16	19	9	14,6	1,15	10,0	0,5	10,5	...
12	21	12,1	20,0	16,05	20	15	8	14,3	2,25	0,0	0,0	0.0	...
13	22	13,0	22,3	17,65	18	9	9	12,0	2,15	0,0	0,2	0,2	...
14	23	12,8	23,3	18,05	20	16	9	15,0	1,85	0,0	1,0	1,0	...
15	24	12,8	24,1	18,45	9	12	9	10,0	2,35	0.0	0,0	0,0	...
16	25	15,6	23,3	19,45	20	12	9	13,7	3,50	0,0	0,0	0,0	...
17	26	13,1	19,9	16,50	18	11	9	12,7	4,00	0,0	0,0	0,0	...
18	27	16,1	18,3	17,20	20	17	19	18,7	0,55	0,0	1,4	1,4	...
19	28	16,1	19,7	17,90	21	14	7	14,0	0,95	2,3	3,1	5,4	...
20	29	7,5	10,8	9,15	20	8	8	12,0	6,50	0,0	0,0	0,0	...
21	30	2,1	12,2	7,15	16	9	8	11,0	4,20	0,0	0,0	0,0	...
22	31	3,0	13,3	8,15	16	9	8	11,0	4,30	0,0	0,0	0,0	16,4
Moyennes du	1-10	17,80	24,77	21,29	10,0	10,1	8,1	10,07	24,05	21,8	7,5	29,3	...
	11-20	14,28	21,65	17,97	17,3	12,1	9,0	12,78	26,91	33,9	24,1	58,0	...
	21-31	11,30	18,83	15,30	18,0	12,0	9,4	13,12	32,60	2,3	5,7	8,0	...
	Mois	14,35	21,66	18,00	15,2	11,4	8,8	12,02	83,56	58,0	37,3	95,3	...

	o		mm
Maximum:	27,4 observé le 9	20 observé 8 fois	Hauteur d'eau tombée 95,3
Minimum:	2,1 „ le 30	6 „ 1 fois	„ „ évaporée 83,6
Différence:	25,3	14	Différence 11,7

JOURNAL MÉTÉOROLOGIQUE.

Octobre 1874.

1. 4h. m.—Vent très-fort ; ciel uniformément couvert : quelques gouttes de pluie. 7h.—Pluie fine. 1h. S.—Il ne pleut plus. 7h.—Pluie fine. 10h.—La pluie continue—Tout le jour le vent a été très-constant en direction et en intensité.
2. 4h. m.—Cumulus vaporeux chassés rapidement par le vent : quelques gouttes de pluie. 7h.—La pluie a cessé ; le vent passe à l'E. 10h.—Ciel uniformément couvert. 1h. S. et 4.—Même ciel. 10h.—Pluie forte depuis 8½.
3. 4h. m.—Il ne pleut plus ; ciel brumeux ; thermomètres mouillés. 10h.—Il bruine ; la brume se forme en cumulus. 1h. S.—Il pleut de nouveau ; sorte de brouillard qui se condense. 4h.—Il bruine. 7h.—Id. 10h.—Quelques étoiles apparraissent au zénith.
4. 4h. m.—Cumulo-stratus à l'E. ; calme absolu. 5½h.—Averse au moment où le vent a passé à l'W. 10h.—La brume s'est formée en cumulus noirâtres qui viennent du N.W.—1h. S.—Cumulo-nimbus au zénith. 7h.—Il bruine ; le vent tourne au N. 9h.—Averse. 10h.—Ciel uniformément couvert.
5. 4h. m.—Cumulus laissant entr'eux quelques éclaircies. 7h.—Grande éclaircie au N., banquise de nuages au S. 1h.—La banquise a disparu en partie. 4h. S.—Cirro-stratus très-déliés ; alto-cumulus transparents. 7h.—Ciel splendide. 10h.—Même ciel ; Belle étoile filante avec traînée ; elle allait du S. au N. en passant près de l'étoile polaire.
6. 4h. m.—Beau clair de lune. 7h.—Rosée très-abondante ; gros cumulus à l'E. et au N ; ciel d'un beau bleu. 10h.—Les nuages viennent du N.E. 1h. S. et 4h.—Même ciel. 7h.—Ciel sans nuages. 10h.—Id.
7. 7h. m.—Ciel splendide ; calme, rosée très-abondante. 10h.—Le baromètre reste haut malgré le vent du S.E. 1h. S.—Cirrus venant du S.W. et alto-cumulus du S. 7h.—Ciel très-étoilé. 10h.—Id.
8. 4h. m.—Même ciel ; air tiède. 7h.—Rosée très-abondante. 10h.—Alto-cumulus venant du S. 1h. S.—Cirrus et alto-cumulus comme à 10h. 4h.—Les nuages disparaissent. 7h.—Cumulus compactes au N. ; reste du ciel très-pur. 10h.—Ciel sans nuages.
9. 4h. m.—On commence à apercevoir les premières lueurs de la lumière zodiacale ; étoiles brillantes. 7h.—Ciel très-pur. 10h.—Quelques alto-cumulus passent au zénith. 1h. S.—Quelques cumulus à l'horizon N.E. 4h. et 7h.—Ciel sans nuages. 10h.—Id. vent faible.
10. 4h. m.—Calme absolu ; rosée abondante qui se dépose sur les thermomètres ; ciel splendide ; lumière zodiacale très-effilée ; à 4h. 45m. elle s'élève jusqu'au *Gamma* et au *Delta* du Cancer. 7h.—Brouillard ; des cumulus arrivent rapidement de l'W. 10h.—Cirrus et alto-cumulus venant de l'W. 1h. S.—Vent très-fort. 4h.—Il passe au N.W. et forme subitement des cumulo-nimbus qui donnent quelques gouttes depluie. 7h.—Le vent de 6h. à 6½h. parcourt 10m. à la seconde. 10h.—Il souffle par rafales.

11. 4h. m.—Ciel uniformément couvert et sombre. 7h.—Il pleut. 10h.—Le vent augmente, le ciel s'obscurcit. 1h. s.—Au-dessous de la brume, cumulo-nimbus venant du N.E. 4h.—Cirro-stratus et cumulus couvrant tout le ciel. 7h.—Ciel uniformément couvert ; bande de corbeaux voyageurs.
12. 4h. m.—Etoiles très-brillantes, lumière zodiacale bien dessinée. 7h.—Peu de rosée ; banquise au s. 10h.—Deux couches de nuages allant en sens opposé. 1h. s.—Même ciel. 4h.—Eclaircie au S. Le ciel offre toutes les especes de nuages. 7h.—Quelques cumulo-stratus au N. 10h.—Vent presque nul.
13. 4h. m.—Lumière zodiacale comme hier ; çà et là quelques cumulus détachés. 7h.—Rosée abondante ; quelques cirrus ; ciel splendide. 10h.—Mêmes remarques. 1h. s.—Ciel sans nuages tout le reste du jour.
14. 4h. m.—Ciel uniformément couvert et sombre. 7h.—Quelques gouttes de pluie la brume se transforme en cumulus venant de l'W. 10h.—Eclaircie au S.W. 1h. s.—Le ciel se couvre de nouveau ; et reste couvert jusqu'au soir ; de 8h. à 9h. quelques gouttes de pluie.
15. 4h. m.—Même ciel. 7h.—Brouillard qui se condense en pluie. 10h.—Cumulus venant du N.E. 1h. s.—Même remarque. 4h.—Cumulo-nimbus sous la brume ; horizon sombre en différents points. 7h.—Il bruine. 10h.—Pluie.
16. 4h. m.—Pluie fine. 7h.—Id—Ciel uniformément couvert. 10h. —Deux couches de nuages allant en sens opposé. 1h. s.—Ciel découvert au N.; le reste comme à 10h. 4h.—Le ciel se couvre de nouveau. 7h. et 10h.—Ciel uniformément couvert ; vent faible.
17. 4h. m.—Quelques gouttes de pluie ; courbe du baromètre-Secchi très-sinueuse. 7h.—Il pleut. 10h.—Pluie fine ; gros-cumulus au S. 1h. s.—Alto-cumulus venant de l'W. et cumulo-nimbus de l'E. 4h.—Les alto-cumulus s'étendent en stratus. 7h.—Clair de lune et de VÉNUS. 10h.—Brume presque générale.
18. 4h. m.—Lumière zodiacale ; çà et là quelques cumulus ; froid piquant. 7h.—Cirro-stratus et cumulus occupant presque tout le ciel. 10h.—Mêmes nuages allant en sens opposé. 1h s.—Brume générale. 4h.—Ciel moutonné au zénith. 7h. et 10h.—Ciel uniformément couvert.
19. 4h. m.—Baisse considérable du baromètre. 7h. et 10h.—Brume générale. 1h. s.—Il pleut à l'W. 3h. ½.—Pluie abondante. 7h.—La pluie continue. 10h.—Id.
20. 4h. m.—Ciel uniformément couvert. 7h.—Pluie fine. De 10h. à 1h.—Averses de temps en temps. 4h. s.—Quelques cumulus venant du N. 7h.—Vénus est étincelante ; ciel couvert au N. à l'horizon. 10h.—Beau ciel ; rosée abondante.
21. 4h. m.—Les étoiles paraissent au zénith. 7h.—Nuages informes. Toute la journée ciel couvert ; de 9h. à 11h. quelques éclaircies. 10h. s.—Ciel moutonné ; nuages diaphanes.
22. 4h. m.—Gros-nimbus se détachant sur la brume. 7h.—Calme absolu. 10h.—Même ciel. 1h. ¼ s.—Coup de vent subit d'E.S.E.; pendant ¼ d'h. vitesse de 16 à 17 m. par seconde. 4h.—Ciel sombre à l'E. 7h.—Eclaircie au zénith ; nuages transparents. 10h.—Même ciel.

23. 4h. m.—La lumière zodiacale et les étoiles apparaissent à travers une brume légère ; rosée abondante. 9h.—Averse. 1h. s.—Nimbus orageux à l'W. 4h.—Alto-cumulus venant de l'E. 7h.—Clair de lune splendide. 10h.—Vent presque nul ; ciel comme à 7h.

24. 4h. m.—Même ciel ; rosée extraordinaire. 7h.—Cirrus au zénith ; gros cumulus à l'horizon S. et N. 1h. s.—Saute de vent du N.E. au S.E. 7h. et 10h.—Ciel comme hier.

25. 4h. m.—Beau clair de lune ; nuages transparents ; rosée peu abondante. 7h.—Vent faible, ciel comme à 4h. 10h. Cirrus et alto-cumulus venant les 1ers du N.E. les 2ds. de l'E. 1h. s.—Deux couches de nuages allant en sens opposé. 4h.—Ciel comme à 10h., plus sombre à l'horizon W. 7h. et 10h.—Ciel presque complètement découvert.

26. 4h. m.—Gros nimbus passant au zénith ; reste du ciel très-pur. 7h.—Rosée très-abondante ; les nuages viennent rapidement de l'E. 1h. s.—Cumulo-nimbus au zénith. 4h.—Mêmes nuages très-noirs passant sans donner de pluie. 7h. et 10h.—Ciel uniformément couvert.

27. 4h. m.—Même ciel ; air chaud et humide. 10h. et 1h. s.—Cumulus sous la brume ; il bruine. 4h.—Pluie fine. 7h. et 10h.—Id.

28. 4h. m.—Même ciel ; il bruine tout le jour jusqu'à 7h. du soir ; à ce moment le vent souffle en tempête et par rafales. 10h.—Id. pluie fine.

29. 4h. m.—Vent toujours très-fort, sec et froid. De 10h. à 4h. s. sécheresse extraordinaire. 7h.—Froid piquant. 10h.—Cirrus très-déliés à l'E.

30. 4h. m.—Ciel splendide ; froid vif. 7h.—Pas de rosée ; banquise au S. ; gelée blanche sur le bois. 10h.—Le ciel se couvre de nouveau ; éclaircie au N. 7h.—Cirro-stratus venant de l'W. 10h.—Ciel très-pur ; la banquise persévère au S.

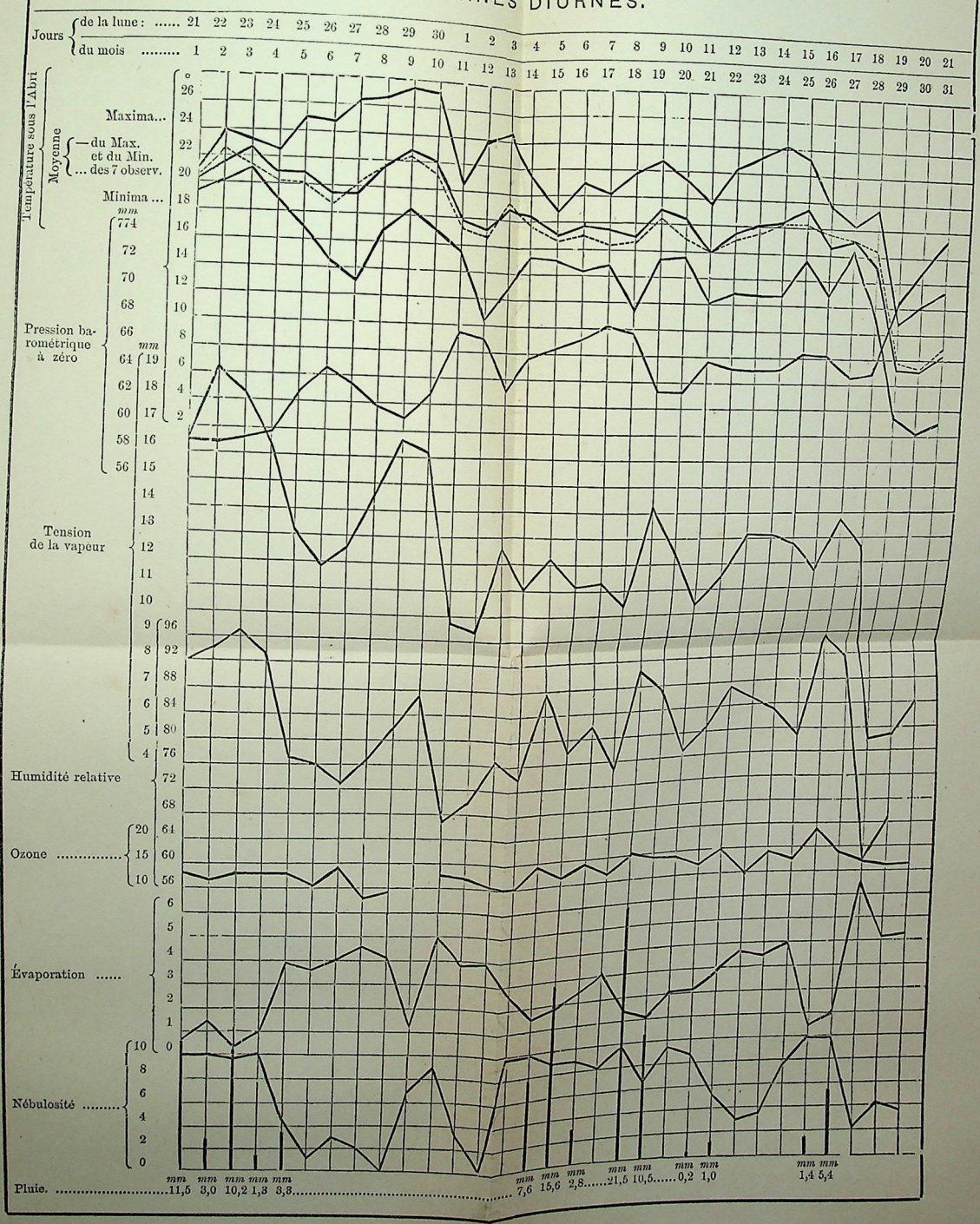
31. 4h. m.—Même ciel ; froid moins vif. 7h.—Peu de rosée. 1h. s.—Le ciel se couvre ; nuages allant en sens opposé. 7h.—Quelques cumulus sous une brume générale. 10h.—Ciel étincelant.

A. M. D. G.

OBSERVATOIRE DE ZI-KA-WEI

Résumé des Observations Météorologiques d'Octobre 1874.

MOYENNES DIURNES.



OBSERVATOIRE DE ZI-KA-WEI.

BULLETIN MÉTÉOROLOGIQUE,

NOVEMBRE 1874.

NOTA.—Pour la position géographique de l'observatoire, les instruments utilisés, les notations employées, etc., voir la note préliminaire placée en tête du Bulletin de Septembre 1874.

TABLEAU MÉTÉOROLOGIQUE.—*Novembre* 1874.

PRESSION BAROMÉTRIQUE À ZÉRO.

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
		mm	mm	mm	mm	mm	mm	mm	mm
23	1	774,77	775,42	775,64	773,83	773,28	773,89	773,87	774,39
24	2	72,03	73,53	72,98	71,51	70,94	71,46	71,77	72,03
25	3	70,48	71,51	71,76	69,77	69,33	70,25	70,52	70,52
26	4	69,49	70,55	70,52	69,09	68,53	69,41	69,59	69,60
27	5	67,89	68,24	68,00	66,65	66,10	67,06	68,09	67,43
28	6	68,23	68,95	69,84	68,95	69,21	69,88	70,65	69,39
29	7	70,38	71,37	72,17	70,89	70,52	70,94	71,60	71,12
30	8	70,28	70,87	71,05	69,29	69,07	69,20	69,01	69,82
1	9	67,19	67,59	69,37	65,46	65,21	66,32	67,18	66,90
2	10	67,31	68,37	69,19	68,28	67,94	67,93	68,65	68,24
3	11	67,87	68,66	68,85	67,23	66,96	67,72	68,46	67,96
4	12	67,91	70,86	72,36	71,79	71,73	72,77	73,02	71,75
5	13	73,21	74,49	75,18	73,74	73,61	74,17	73,64	74,01
6	14	72,37	72,15	71,75	69,23	68,78	69,41	70,12	70,54
7	15	69,97	71,13	72,11	70,87	70,68	70,81	70,92	70,93
8	16	68,91	68,94	68,93	66,59	66,13	66,75	68,08	67,76
9	17	68,60	68,91	69,33	67,54	67,24	66,59	66,72	67,85
10	18	66,29	67,30	67,85	66,10	65,88	67,18	67,18	66,83
11	19	66,72	66,61	67,09	64,95	64,45	65,04	65,18	65,72
12	20	63,94	65,16	65,86	64,52	64,34	64,92	65,49	64,89
13	21	65,18	66,12	66,39	64,15	63,52	63,23	62,94	64,50
14	22	61,29	61,47	62,18	60,70	60,62	61,86	62,23	61,48
15	23	60,68	60,29	60,07	58,99	63,62	68,48	71,04	63,31
16	24	72,18	73,74	75,03	73,68	73,66	75,10	76,09	74,21
17	25	74,84	74,74	75,65	73,98	73,71	74,19	74,92	74,58
18	26	74,02	75,30	75,48	73,86	74,17	75,18	75,17	74,74
19	27	72,27	73,35	72,82	70,61	69,97	70,41	70,55	71,43
20	28	70,21	71,10	71,68	70,31	70,48	71,19	71,20	70,88
21	29	70,59	70,93	71,64	69,91	69,73	70,56	70,61	70,57
22	30	69,87	70,71	71,13	69,75	70,04	71,07	71,51	70,58
Moyennes du	1–10	769,81	770,64	771,05	769,37	769,01	769,63	770,09	769,94
	11–20	68,58	69,42	70,03	68,26	67,98	68,54	68,88	68,82
	21–30	69,11	69,78	70,21	68,59	68,95	70,13	70,63	69,63
	mois	769,16	769,94	770,43	768,74	768,65	769,43	769,87	769,46

Maximum : 776,09 mm observé le 24 à 10 h. P.M.
Minimum : 758,99 mm „ le 23 à 1 h. P.M.
} différence :.....17,10 mm

TABLEAU MÉTÉOROLOGIQUE.—*Novembre* 1874.

TEMPÉRATURE À L'OMBRE.

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
		o	o	o	o	o	o	o	o
23	1	4,6	5,4	12,8	12,7	14,0	10,1	7,0	9,51
24	2	6,9	7,7	13,7	16,1	14,5	11,0	9,1	11,29
25	3	10,1	10,2	14,9	16,5	15,5	13,7	12,2	13,30
26	4	9,1	8,8	14,5	16,0	15,8	12,8	12,1	12,73
27	5	10,3	9,7	14,6	16,5	17,1	12,0	9,9	12,87
28	6	5,8	5,1	11,8	14,2	13,7	9,5	6,1	9,46
29	7	4,5	5,2	14,8	16,1	15,4	10,3	6,9	10,45
30	8	8,3	7,3	16,1	17,2	16,1	13,1	11,9	12,86
1	9	12,1	12,9	18,8	19,1	16,0	13,6	12,2	14,96
2	10	7,1	7,7	12,5	13,9	11,9	6,0	5,1	9,17
3	11	2,8	2,3	12,1	15,1	13,9	9,0	8,6	9,11
4	12	3,8	5,8	11,0	12,2	10,9	5,9	3,4	7,57
5	13	2,7	1,2	9,4	11,7	10,5	8,1	6,5	7,15
6	14	4,1	6,4	12,1	13,6	12,5	5,6	6,0	8,61
7	15	4,1	3,2	12,7	13,6	12,5	6,8	3,2	8,01
8	16	1,2	1,5	12,6	15,4	14,7	6,9	5,8	8,30
9	17	2,1	2,0	11,6	15,2	14,1	7,3	6,1	8,34
10	18	4,3	3,1	13,7	16,9	15,1	8,1	6,3	9,64
11	19	3,7	7,1	14,2	17,1	15,7	10,4	9,1	11,04
12	20	10,5	10,9	14,8	17,8	16,8	12,7	9,6	13,30
13	21	9,6	9,2	17,0	20,9	17,9	14,9	15,6	15,01
14	22	16,7	15,5	20,3	24,5	23,5	16,4	15,6	18,93
15	23	15,1	15,5	17,7	17,7	10,5	7,5	6,6	13,01
16	24	4,1	3,3	5,2	5,5	5,4	4,1	1,5	4,16
17	25	3,9	4,5	4,4	4,3	4,1	3,7	3,1	4,00
18	26	0,9	—0,5	2,1	4,2	3,8	0,5	—0,5	1,50
19	27	—3,1	—2,6	3,9	7,1	6,4	3,0	0,7	2,20
20	28	—1,3	—1,1	7,3	10,3	9,7	5,5	1,1	4,47
21	29	—1,4	—1,5	10,2	12,8	11,9	5,6	4,9	6,07
22	30	0,4	—0,3	12,1	13,8	14,9	9,3	5,6	7,97
Moyennes du	1–10	7,88	8,00	14,45	15,83	15,00	11,21	9,25	11,660
	11–20	3,93	4,35	12,42	14,86	13,67	8,08	6,46	9,107
	21–30	4,54	4,20	10,02	12,11	10,81	7,05	5,42	7,732
	mois	5,45	5,52	12,30	14,27	13,16	8,78	7,04	9,50

Maximum : o 24,5 observé le 22 à 1 h. P.M.
Minimum :— 3,1 „ le 27 à 4 h. A.M.
} différence ..... o 27,6

TABLEAU MÉTÉOROLOGIQUE.—*Novembre* 1874.

Tension de la vapeur.

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
23	1	6,14	6,40	6,88	7,90	6,87	7,71	7,06	7,00
24	2	6,90	7,18	7,41	6,71	6,93	7,85	7,47	7,21
25	3	8,03	8,57	8,48	7,86	7,98	9,07	9,20	8,46
26	4	8,35	8,20	8,46	9,21	7,41	8,32	9,26	8,46
27	5	9,10	8,63	7,11	6,32	8,41	7,13	6,30	7,57
28	6	5,82	5,84	7,37	6,63	5,74	5,99	5,99	6,20
29	7	5,90	6,52	6,51	6,08	5,80	7,47	7,12	6,49
30	8	7,59	7,42	8,23	8,35	8,49	9,70	9,38	8,45
1	9	9,65	10,04	11,23	10,48	9,47	9,62	9,20	9,96
2	10	6,78	6,64	4,45	4,71	4,66	5,94	5,74	5,55
3	11	5,52	5,32	6,39	5,50	6,10	5,31	5,04	5,60
4	12	5,51	6,16	4,88	3,83	4,17	5,06	5,07	4,95
5	13	4,98	4,82	4,23	4,78	5,29	4,79	5,10	4,86
6	14	5,13	5,06	5,79	6,52	5,91	5,94	5,50	5,69
7	15	5,83	5,57	5,67	3,64	4,09	5,46	5,48	5,11
8	16	4,92	5,14	6,21	5,20	3,26	6,39	5,12	5,46
9	17	5,34	5,24	5,28	5,20	4,22	5,27	5,14	5,09
10	18	5,61	5,63	6,93	6,48	5,26	7,05	7,04	6,29
11	19	5,97	7,54	9,03	6,23	7,08	7,97	8,63	7,49
12	20	9,22	8,74	9,41	7,99	8,46	9,02	8,45	8,76
13	21	8,57	8,57	9,39	10,37	11,64	12,20	12,54	10,47
14	22	13,56	12,68	13,16	11,20	11,81	11,72	11,08	12,17
15	23	12,47	12,96	14,45	13,86	8,75	7,09	6,56	10,88
16	24	5,53	5,03	5,68	6,00	4,85	5,43	5,04	5,37
17	25	4,97	4,89	5,45	5,41	5,23	4,99	5,05	5,14
18	26	4,24	3,55	3,71	4,09	3,67	3,75	3,44	3,78
19	27	3,55	3,11	3,61	3,34	3,48	3,53	3,81	3,49
20	28	4,00	3,65	4,92	4,97	4,89	4,29	4,94	4,52
21	29	4,14	4,11	5,47	4,23	4,66	5,74	6,36	4,96
22	30	4,72	4,50	8,38	6,52	6,33	6,22	6,26	6,13
Moyennes du	1–10	7,44	7,54	7,61	7,43	7,18	7,88	7,67	7,54
	11–20	5,80	5,92	6,38	5,53	5,58	6,23	6,06	5,93
	21–30	6,58	6,31	7,42	7,00	6,53	6,50	6,51	6,69
	mois	6,60	6,59	7,14	6,65	6,43	6,87	6,75	6,72

Maximum : 14,45 observé le 23 à 10 h. A.M. (mm)
Minimum : 3,11 „ le 27 à 7 h. A.M. (mm)
différence..... 11,34 (mm)

TABLEAU MÉTÉOROLOGIQUE.—*Novembre* 1874.

HUMIDITÉ RELATIVE.

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
23	1	97	96	62	72	58	83	94	80,28
24	2	93	91	63	50	56	80	86	74,14
25	3	86	93	67	56	60	77	87	75,14
26	4	97	97	69	68	55	76	87	78,43
27	5	97	96	58	46	58	68	69	70,28
28	6	84	88	71	55	49	67	85	71,28
29	7	93	98	52	44	44	80	95	72,28
30	8	93	97	60	57	62	86	90	77,86
1	9	92	90	71	64	70	83	87	79,57
2	10	90	84	41	40	45	85	87	67,43
3	11	98	97	61	42	51	62	61	67,43
4	12	92	90	50	35	43	73	87	67,14
5	13	89	96	47	46	56	59	70	66,14
6	14	83	70	55	57	54	88	79	69,43
7	15	95	97	51	31	38	74	95	68,71
8	16	97	100	57	39	42	85	74	70,57
9	17	100	97	51	40	35	69	73	66,43
10	18	90	98	59	45	41	88	98	74,14
11	19	100	100	74	43	53	84	100	79,14
12	20	97	90	75	53	60	82	95	78,86
13	21	96	98	65	57	76	97	96	83,57
14	22	96	97	74	49	55	84	84	77,00
15	23	95	99	96	92	92	91	89	93,43
16	24	90	86	86	89	73	89	97	87,14
17	25	81	77	87	87	85	83	88	84,00
18	26	87	68	69	66	60	80	77	72,43
19	27	96	96	59	44	46	61	79	68,71
20	28	96	89	65	52	54	63	100	74,14
21	29	100	100	59	38	45	84	98	74,86
22	30	100	100	79	56	50	71	93	78,43
Moyennes du	1–10	92,2	93,0	61,4	55,2	55,7	78,5	86,7	74,67
	11–20	94,1	93,5	58,0	43,1	47,3	76,4	83,2	70,80
	21–30	93,7	91,0	73,9	63,0	63,6	80,3	90,1	79,37
	mois	93,3	92,5	64,4	53,8	55,5	78,4	86,7	74,95

Maximum : 100 observé 10 fois
Minimum : 31 „ le 15 à 1 h. P.M. } différence 69

TABLEAU MÉTÉOROLOGIQUE.—*Novembre* 1874.

ÉTAT DU CIEL 1o.—*Nébulosité.*

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
23	1	0	0	1	7	7	0	0	2,1
24	2	2	5	3	6	4	0	2	3,1
25	3	10	10	10	8	10	10	10 Br	9,7
26	4	1	1	1	5	5	10 Br	10 Br	4,7
27	5	10 Br	5	2	1	0	0	0	2,6
28	6	0	0	0	0	5	0	0	0,7
29	7	0	0	0	4	7	0	0	1,6
30	8	0	5	2	3	1	10 Br	9 Br	4,3
1	9	9 Br	9	9	10 Br	10 Br	10 Br	2	8,4
2	10	0	0	0	0	0	0	0	0,0
3	11	0	0	0	0	0	0	0	0,0
4	12	2	1	1	1	1	0	0	0,9
5	13	0	1	0	1	1	0	0	0,4
6	14	8	9	9	9	7	0	0	6,0
7	15	0	0	0	0	0	0	1	0,1
8	16	0	0	0	0	0	0	0	0,0
9	17	0	0	0	0	0	1	3	0,6
10	18	2 Br	0 Br	0	0	0	0	0	0,3
11	19	0 Bd	8	1	2	9	9 Br	5 Br	4,8
12	20	9 Br	9 Br	10 Br	9 Br	8	1	0	6,6
13	21	5 Br	7 Br	10 Br	9	5 Br	0	1	5,3
14	22	5	3	8	3	2	2	9	4,6
15	23	10	10 Br	10 Bd	10 Br	10 Br	10 Br	10 Br	10,0
16	24	10	10	10	10 Br	10 Br	10 Br	10	10,0
17	25	10 Br	10 Br	10 Br	10 Br	10 Br	10 Br	10 Br	10,0
18	26	10	3	3	5	5	0	0	3,7
19	27	0	0	0	1	2	0	0	0,4
20	28	0	0	0	0	0	0	0	0,0
21	29	0	5	1	3	3	2	0	2,0
22	30	0	0	0	3	1	0	0	0,5
Moy. du mois		3,4	3,7	3,4	4,0	4,1	2,8	2,7	3,4

NOMBRE DE JOURS DE :

Ciel beau, ou moins de $2\frac{1}{10}$ couvert	14	Brouillard	2
,, peu nuageux ou de 2 à $4\frac{1}{10}$,,	4	Brume	11
,, nuageux, ou de 4 à $6\frac{1}{10}$,,	5	Rosée	9
,, très-nuageux, ou de 6 à $8\frac{1}{10}$,,	2	Pluie	4
,, couvert ou plus de $8\frac{1}{10}$,,	5	Neige	1
La lumière zodiacale a été observée 9 fois		Gelée blanche	4
Un halo lunaire	1 ,,		

TABLEAU MÉTÉOROLOGIQUE.—*Novembre* 1874.

ETAT DU CIEL 2o.—*Forme et Direction des Nuages.*

Date.	4 h. m.		7 h. m.		10 h. m.		1 h. s.		4 h. s.		7 h. s.		10 h. s.	
	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.
1	,,	,,	,,	,,	KC	N	KC	NE	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	AC	NW	CN	N	,,	,,	,,	,,
2	CST	N	KST	W	KST	W	KST	SW	KC	,,	,,	,,	,,	,,
	,,	,,	CST	N	CST	NE	,,	,,	,,	,,	,,	,,	CST	,,
3	,,	,,	,,	,,	KST	,,	KST	W	,,	,,	,,	,,	,,	,,
	C	,,	CN	,,	CST	,,	C	E	CN	,,	CN	,,	,,	,,
4	K	,,	,,	,,	,,	,,	K	W	K	W	,,	,,	,,	,,
	,,	,,	C	,,	C	,,	AC	N	AC	E	,,	,,	,,	,,
5	,,	,,	CS	NW	KST	W	K	W	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
6	,,	,,	,,	,,	,,	,,	,,	,,	KST	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
7	,,	,,	,,	,,	,,	,,	AC	N	CST	N	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
8	,,	,,	AC	E	AC	SE	AC	SE	CST	SE	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	C	,,
9	,,	,,	KC	SW	K	W	,,	,,	,,	,,	,,	,,	,,	,,
	C	,,	CST	,,	AC	S	CN	SW	C	W	N	,,	CN	,,
10	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
11	KC	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	W	,,	,,	,,	,,
12	K	,,	KS	W	KS	W	K	W	AC	W	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	C	N	,,	,,	,,	,,
13	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	K	SW	,,	,,	C	,,	C	N	,,	,,	,,	,,	,,	,,
14	CS	,,	AC	W	KC	W	KC	W	KC	W	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
15	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
16	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	K	,,	KST	,,
17	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
18	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	KST	W	KST	W	KST	W	KST	W	,,	,,	,,	,,
19	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	AC	W	KST	W	,,	,,	,,	,,
20	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	CST	,,	,,	,,	,,	,,	,,	,,	,,	,,	KST	,,
21	,,	,,	,,	,,	C	SW	C	SW	C	SE	,,	,,	,,	,,
	AC	,,	CST	,,	CST	SW	C	,,	C	,,	CST	,,	AC	,,
22	CST	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	CN	SW	,,	,,	,,	,,	N	N	N	N	N	N
23	CN	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	CN	NW	CN	NW	CN	N	CN	N	CN	N	CN	,,
24	CN	NW	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	N
	,,	,,	,,	,,	C	N	C	N	C	N	C	N	C	N
25	C	,,	C	N	,,	,,	K	,,	K	,,	,,	,,	,,	,,
	,,	,,	,,	,,	K	,,	AC	NW	CN	NW	,,	,,	,,	,,
26	CST	,,	CST	,,	AC	NW	K	,,	KST	,,	,,	,,	,,	,,
27	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
28	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	KST	,,	KST	,,	KST	,,	KST	,,	,,	,,	,,	,,
29	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	C	,,	C	,,	,,	,,	,,	,,
30	,,	,,	,,	,,	,,	,,								

TABLEAU MÉTÉOROLOGIQUE.—*Novembre* 1874.

DIRECTION DU VENT; SA VITESSE PAR SECONDE.

Jours de la lune	Jours du mois	Matin. 4 h. Dir.	4 h. Vit.	7 h. Dir.	7 h. Vit.	10 h. Dir.	10 h. Vit.	Soir. 1 h. Dir.	1 h. Vit.	4 h. Dir.	4 h. Vit.	7 h. Dir.	7 h. Vit.	10 h. Dir.	10 h. Vit.	Moyennes des 7 observations.
			m		m		m		m		m		m		m	m
23	1	NW	1,4	NW	1,6	NNW	0,6	N	6,8	NNE	3,1	N	2,0	NNW	0,7	2 3
24	2	NNW	1,3	NNW	1,3	NNE	2,2	NNE	1,9	N	2,0	NE	2,7	N	0,7	1,7
25	3	N	1,1	NW	0,4	NNE	1,9	N	1,6	N	0,7	NNW	0,4	N	0,3	0,9
26	4	NW	0,7	NW	1,5	NNW	2,4	NNW	3,1	N	1,7	O	0,1	O	0,1	1,4
27	5	NW	0,3	NW	0,3	WNW	2,3	WNW	5,7	WNW	6,6	O	2,8	NW	1,9	2,9
28	6	WNW	3,3	NW	2,2	NNW	4,0	N	4,6	NNW	4,4	N	2,4	O	1,0	3,1
29	7	NNW	1,2	N	1,2	NNE	3,6	N	3,1	NE	2,3	NNE	2,0	N	0,5	1,9
30	8	N	1,5	N	1,4	NE	2,3	NE	5,2	NE	3,9	NE	3,1	NE	1,0	2,6
1	9	NE	0,9	NE	0,7	SSE	2,0	WSW	2,0	WNW	4,1	WNW	4,8	WNW	4,5	2,7
2	10	WNW	3,5	NW	1,5	NW	5,2	NNW	9,0	NNW	7,2	NW	3,1	NNW	2,4	4,5
3	11	NW	1,3	NW	1,6	W	1,7	NNW	2,1	NW	3,8	N	3,4	N	1,8	2,2
4	12	NNW	1,8	NNW	2,6	NNW	5,6	N	6,4	N	5,4	NNW	2,1	NNW	1,8	3,7
5	13	NNW	0,2	NNW	1,4	N	2,1	N	2,8	N	2,7	N	1,9	N	1,5	1,8
6	14	N	1,7	N	1,9	SW	0,6	W	3,2	WNW	5,2	WNW	2,4	WNW	2,0	2,4
7	15	NW	2,9	WNW	2,2	NNW	3,6	NNW	6,6	N	6,0	NNE	1,8	NNW	0,9	3,4
8	16	O	0,4	W	0,3	SW	1,9	W	5,1	W	5,6	W	2,4	WNW	2,4	2,6
9	17	WNW	1,4	NW	1,7	NNW	2,6	NW	3,3	NW	4,7	O	0,5	O	0,0	2,0
10	18	W	2,0	NW	1,9	NNW	2,2	N	2,6	NE	1,9	ENE	1,9	E	1,5	2,0
11	19	E	0,4	E	1,3	SSE	2,0	SSE	4,9	SSE	4,5	O	0,7	O	0,0	2,0
12	20	SSW	0,1	S	0,5	WSW	1,0	WSW	1,7	SW	1,0	ESE	0,6	O	0,7	0,8
13	21	O	0,0	O	0,0	ESE	0,8	SE	4,0	SE	5,8	SE	4,2	SE	4,6	2,8
14	22	SSE	3,1	SSE	3,5	SSW	3,7	WSW	5,3	O	1,4	O	0,2	N	0,6	2,5
15	23	NE	1,1	N	1,0	ENE	0,7	NNW	1,4	N	11,1	N	13,8	N	8,3	5,3
16	24	NNW	7,5	NNW	6,8	NNW	5,8	NNW	7,4	NNW	7,0	NNW	5,3	NNW	5,2	6,4
17	25	NNW	4,9	NNW	6,6	N	6,6	N	6,8	NNW	7,2	NNW	5,0	NW	5,1	6,0
18	26	NW	5,6	NW	5,4	WNW	3,8	NW	4,6	NW	9,8	NW	5,0	NNW	..	4,9
19	27	W	..	SW	0,4	W	2,0	W	4,9	W	5,2	SW	0,7	SW	0,8	2,0
20	28	O	0,5	WSW	0,7	WNW	2,3	NW	3,8	NW	4,3	N	1,6	NNE	1,1	2,0
21	29	NW	0,3	W	0,8	SW	0,9	SSW	2,3	S	1,8	E	1,3	E	1,7	1,3
22	30	ESE	1,1	E	1,0	S	0,7	SE	2,4	WSW	1,5	SSW	1,2	SSW	1,5	1,3
Moy. du mois			1,7		1,8		2,6		4,2		4,4		2,7		1,8	2,7

FRÉQUENCE RELATIVE DES 16 VENTS SUR 100

N 21	W..... 6	S 1	E 4
NNW 20	WSW 3	SSE..... 3	ENE 1
NW 16	SW 3	SE 2	NE 5
WNW 8	SSW 2	ESE 3	NNE 3

Calmes, sur 100 observations 11

Vitesse moyenne maximum observée le 26 .....m 9,8

TABLEAU MÉTÉOROLOGIQUE.—*Novembre* 1874.

Jours de la lune	Jours du mois	Températures extrêmes à l'ombre. Minima	Maxima	Moyennes	Ozone. 7 h. m.	1 h. s.	7 h. s.	Moyennes	Évaporation. Sommes des 24 h.	Pluie. 7 h. m.	7 h. s.	Sommes des 24 h.	Température du puits.
		o	o	o					mm	mm	mm	mm	o
23	1	3,6	15,7	9,65	18	9	8	11,7	2,90	0,0	0,0	0,0	16,4
24	2	5,7	17,3	11,50	19	10	8	12,3	2,70	0,0	0,0	0,0	...
25	3	7,8	19,1	13,45	17	12	9	12,7	2,60	0,3	1,2	1,5	...
26	4	7,2	16,4	11,80	15	12	8	11,7	1,80	0,0	0,0	0,0	...
27	5	9,2	17,4	13,30	10	11	9	10,0	2,45	0,0	0,0	0,0	...
28	6	4,4	14,9	9,65	12	13	8	11,0	2,35	0,0	0,0	0,0	...
29	7	4,1	18,0	11,05	12	11	8	10,3	3,45	0,0	0,0	0,0	...
30	8	5,1	19,1	12,10	20	18	9	15,7	2,80	0,0	0,0	0,0	...
1	9	10,3	20,7	15,50	12	10	9	10,3	2,05	0,0	0,0	0,0	...
2	10	6,7	14,6	10,65	16	7	9	10,7	3,85	0,0	0,0	0,0	...
3	11	2,1	15,3	8,70	...	11	9	10,0	2,00	0,0	0,0	0,0	...
4	12	3,1	12,8	7,95	13	11	8	10,7	3,85	0,0	0,0	0,0	...
5	13	0,1	12,6	6,35	13	11	8	10,7	2,75	0,0	0,0	0,0	...
6	14	1,8	14,8	8,30	12	10	8	10,0	2,59	0,0	0,0	0,0	...
7	15	2,4	14,1	8,25	16	11	8	11,7	4,20	0,0	0,0	0,0	16,4
8	16	0,4	16,4	8,40	6	13	10	9,7	2,85	0,0	0,0	0,0	...
9	17	1,2	15,6	8,40	9	13	8	10,0	2,55	0,0	0,0	0,0	...
10	18	2,3	17,4	9,85	11	14	8	11,0	2,75	0,0	0,0	0,0	...
11	19	2,7	18,1	10,40	8	19	8	11,7	2,50	0,0	0,0	0,0	...
12	20	8,0	20,1	14,05	10	8	9	9,0	1,75	0,0			
13	21	8,2	21,5	14,85	...	11	9	10,0	1,85	0,0	0,0	0,0	...
14	22	14,7	25,6	20,15	19	11	8	12,7	2,45	2,7	4,4	7,2	...
15	23	6,6	20,2	13,40	10	10	13	11,0	0,30	0,0	0,2	0,2	...
16	24	3,1	6,4	4,75	20	15	9	14,7	1,95	0,0	1,0	4,4	...
17	25	1,3	5,1	3,20	21	19	10	11,7	0,35	3,4	0,0	0,0	...
18	26	−0,8	5,8	2,50	20	7	9	12,0	2,30	0,0	0,0	0,0	...
19	27	−3,1	8,0	2,45	16	18	7	13,7	2,60	0,0	0,0	0,0	...
20	28	−1,8	11,4	4,80	7	7	9	7,7	2,15	0,0	0,0	0,0	...
21	29	−2,2	13,9	5,85	6	12	9	9,0	1,75	0,0	0,0	0,0	15,8
22	30	−0,4	16,6	8,10	8	9	10	9,0	1,65	0,0	0,0	0,0	...
Moyennes du	1-10	6,41	17,32	11,87	15,1	11,3	8,5	11,6	26,95	0,3	1,2	1,5	...
	11-20	2,41	15,72	9,07	9,8	12,1	8,4	10,4	27,79	0,0	0,0	0,0	...
	21-30	2,56	13,45	8,01	12,7	11,9	9,3	11,6	17,35	6,1	5,6	11,7	...
	mois	3,79	51,50	9,65	13,40	11,77	8,73	11,24	72,09	6,4	6,8	13,2	...

	o			mm
Maximum:	25,6 observé le 22	21 observé le 25	Hauteur d'eau tombée	13,20
Minimum :	−3,1 „ le 27	6 „ le 16	„ „ évaporée	72,09
Différence:	28,7	15	Différence	58,89

JOURNAL MÉTÉOROLOGIQUE.

Novembre 1874.

1. 4h. m.—Ciel serein, étoiles très-brillantes ; vent presque nul. 7h.—Ciel sans nuages. 10h.—Quelques cirro-cumulus venant du N. 1h. s.—Deux couches de nuages venant l'une du N.W. l'autre du N.E. 4h.—Cumulo-nimbus occupant presque tout le ciel. 7h.—Ciel sans nuages. 10h.—Id. vent presque nul.
2. 4h. m.—Banquise au N.; rosée très-abondante. 7h.—Cirro-stratus venant de l'W.; la banquise monte au zénith. 10h.—Elle passe au S.E.; pas de maximum barométrique. 1h. s.—Cirro-stratus venant du S.W. 4h.—Çà et là quelques cirro-cumulus. 7h.—Ciel sans nuages; étoiles brillantes. 10h.—Cumulo-stratus en différents points du ciel.
3. 4h. m.—Ciel à peu près uniformément couvert ; air tiède ; pas de rosée. 7h.—Quelques gouttes de pluie ; arc-en-ciel. 10h.—Deux couches de nuages. 1h. s.—Même ciel, les cirro-stratus viennent de l'W., les cumulus de l'E. 4h.—Ciel uniformément couvert. 7h. et 10h.—Id. Vent très-faible tout le jour.
4. 4h. m.—Beau clair de lune ; air humide. 7h. et 10h.—Quelques cumulus épars dans le ciel. 1h. s.—Deux couches de nuages marchant à angle droit. 4h.—Même remarque. 7h.—Ciel très-noir. 10h.—Id. calme absolu.
5. 4h.—Ciel uniformément couvert: le calme continue. 7h.—Banquise de nuages arrivant en bloc du N.W. 10h.—Elle a disparu ; quelques cirro-stratus venant de l'W. 1h. s.—Même ciel ; le vent fraîchit. 4h. à 10h.—Ciel sans nuages ; le vent tombe sur le soir.
6. Jusqu'à 4h. p.m. ciel très-pur ; à ce moment il se couvre en partie de cirro-stratus qui disparaissent bientôt. 10h.—Ciel très-étoilé.
7. 4h. m.—Ciel très-pur ; lumière zodiacale s'élévant jusqu'au zénith. 7h.—Rosée très-abondante. 1h. s.—Le vent tourne au N.E. et amène des nuages qui disparaissent vers 7h. 4h.—Ciel bleuâtre. 10h.—Comme hier.
8. 4h. m.—Ciel très-pur ; étoiles étincelantes ; lumière zodiacale peu visible ; rosée abondante. 7h.—Rosée extraordinaire ; des nuages arrivent de l'E. 10h.—Même remarques ; ciel pur au zénith. 1h. s.—Id. 7h.—Le ciel se couvre subtement. 10h.—Quelques éclaircies à travers lesquelles on aperçoit les étoiles.
9. 4h. m.—Même ciel qu'à 10h.; calme absolu, pas de rosée. 7h.—Ciel moutonné au zénith ; banquise au N. et au S. 1h. s.—Nuages orageux au S.W. 4h.—Ciel moutonné. 7h.—Ciel très-sombre à l'W.; quelques gouttes de pluie. 10h.—Un gros cumulo-nimbus au S.E.; reste du ciel très-pur. Le vent a passé insensiblement du N.E. au N.W. par une rotation directe.
10. 4h. m.—Ciel splendide ; rosée abondante. La lumière zodiacale assez mal définie s'élève jusqu'à Régulus à 5h. ½ ; 4 à 5 étoiles filantes dont deux avec traînees ; ce sont des *Léonides*. Ciel sans nuages tout le jour ; vent très constant en direction.
11. 4h. m.—Air humide ; çà et là quelques cirro-cumulus. Ciel très-pur toute la journée.

12. 4h. m.—Quelques cirrus à l'horizon E. et W. 7h.—Cirro-stratus paraissant converger vers le S. 10h.—Mêmes nuages. 1h.—Un arc de cirrus va de l'E. à l'W. en passant par le zénith. 4h.—Quelques cumulus venant du N.; reste du ciel très-pur. 7h. et 10h.—Ciel sans nuages.
13. 4h. m.—Ciel splendide ; pas d'étoiles filantes ; glace. 7h.—Rosée peu abondante ; glace sur les flaques d'eau. A 1h. et à 4h. quelques cumulus épars dans le ciel ; le reste du jour ciel très-pur ; vent faible.
14. 4h. m.—Cumulo-stratus paraissant converger vers l'E. 7h.—Ciel moutonné. 10h et 1h. s.—Ciro-cumulus venant de l'W. 7h. et 10h.—Ciel sans nuages.
15. 4h m.—Peu de rosée. Ciel magnifique tout le jour : vers 10h. p.m. quelques cumulo-stratus à l'horizon ; calme absolu ; baromètre stationnaire pendant 9 heures.
16. 4h. m.—Humidité très-grande ; ciel très-pur ; le calme continue. 7h.—Gelée blanche partout ; lumière zodiacale un peu diffuse ; ciel sans nuages tout le jour ; vent fort depuis 1h. jusqu'à 7h. comme hier ; après quoi il tombe presque subitement.
17. 4h. m.—Ciel très-pur ; calme, humidité très-grande ; premières lueurs de la lumière zodiacale. Ciel sans nuages jusqu'à 7h. où apparait une banquise au S. Calme absolu pendant 6h.
18. 4h. m.—Ciel brumeux à l'E. et au S.; lumière zodiacale plus brillante que la voie lactée. Ciel sans nuages le reste du jour.
19. 4h. m.—Brouillard peu élevé. 7h.—Rosée très-abondante ; cirrus panachés venant de l'W. Même ciel jusqu'à 7h. p.m. où brume générale ; halo lunaire. 10h.—Le halo persévère ; calme absolu.
20. 4h. m.—Brume presque générale ; éclaircie au zénith ; calme à peu près absolu toute la nuit. 7h. et 10h.—Même ciel. 1h. s.—Ciel moutonné au zénith, brumeux à l'horizon ; maximum de température entre 1h. et 4h. 10h.—Léger brouillard, peu élevé ; beau clair de lune.
21. 4h. m.—Brume à l'horizon ; éclaircie au zénith ; rosée très-abondante. 7h.—Banquise au S.; ciel moutouné au zénith. 10h. et 1h. s.—Cumulus vaporeux venant du S.W. 7h.—Ciel serein. 10h.—Cirro-stratus orientés de l'E. à l'W.; air tiède.
22. 4h. m.—Ciel moutonné ; banquise au N.; température plus haute qu'hier soir. 7h.—Rosée très-abondante. 10h.—Éclaircie à l'W. et au N.W. 1h. s.—Cumulus épars dans le ciel. 4h.—Même remarque. 7h.—Banquise au N.W. 10h.—Alto-cumulus couvrant presque tout le ciel.
23. 4h. m.—Ciel uniformément couvert. 6h.—Pluie. 10h.—Brouillard ; la tour de la pagode de Long-Ho, située à 2000m. au S.E., complètement cachée. 1h. s.—Brume générale ; le vent fraîchit. De 3h. ½ à 4h. le vent fait 11m. par seconde. 7h.—Le vent souffle en tempête. (20m. par seconde par moment). Pluie. 10h.—Le vent tombe un peu.
24. 4h. m.—Vent encore fort et glacial. 7h.—Quelques gouttes de pluie. 10h.—Neige qui fond à mesure qu'elle tombe. Ciel brumeux et sombre toute l'après-midi.

25. 4h. m.—Froid moins vif qu'hier ; ciel brumeux. 7h.—Des cumulus venant du N. se détachent sur la brume. 10h.—Même ciel. 1h. s.—Quelques gouttes de pluie. 4h.—Bande d'oies sauvages se dirigeant vers le S. 7h. et 10h.—Ciel brumeux comme le matin.

26. 4h. m.—Air sec et piquant ; glace sur les flaques d'eau. Vers 10h. deux couches de nuages qui persévèrent jusqu'à 7h., où ciel découvert. 10h.—Id.

27. 4h. m.—Gelée blanche, froid moins sensible qu'hier. Évaporomètre glacé. 7h. et 10h.—Ciel sans nuages. 1h. s.—Quelques cirrus au zénith. 4h.—Id. 7h.—La lumière zodiacale, commence à paraître le soir. Ciel très-pur. 10h.—Id. Vent très-régulier ; faible le matin et le soir, assez fort vers midi.

28. 4h. m.—Givre : calme absolu. Ciel sans nuages tout le jour; vent comme hier. 7h.—Lumière zodiacale.

29. 5h. m.—Gelée blanche extrêmement abondante. 7h.—Glace ; cirrus couvrant la moitié du ciel. 10h.—Ils ont disparu presque complètement. 1h. s.—Cirro-stratus épars dans le ciel. 4h.—Même remarque. 7h.—Froid humide et pénétrant. 10h.—Ciel découvert.

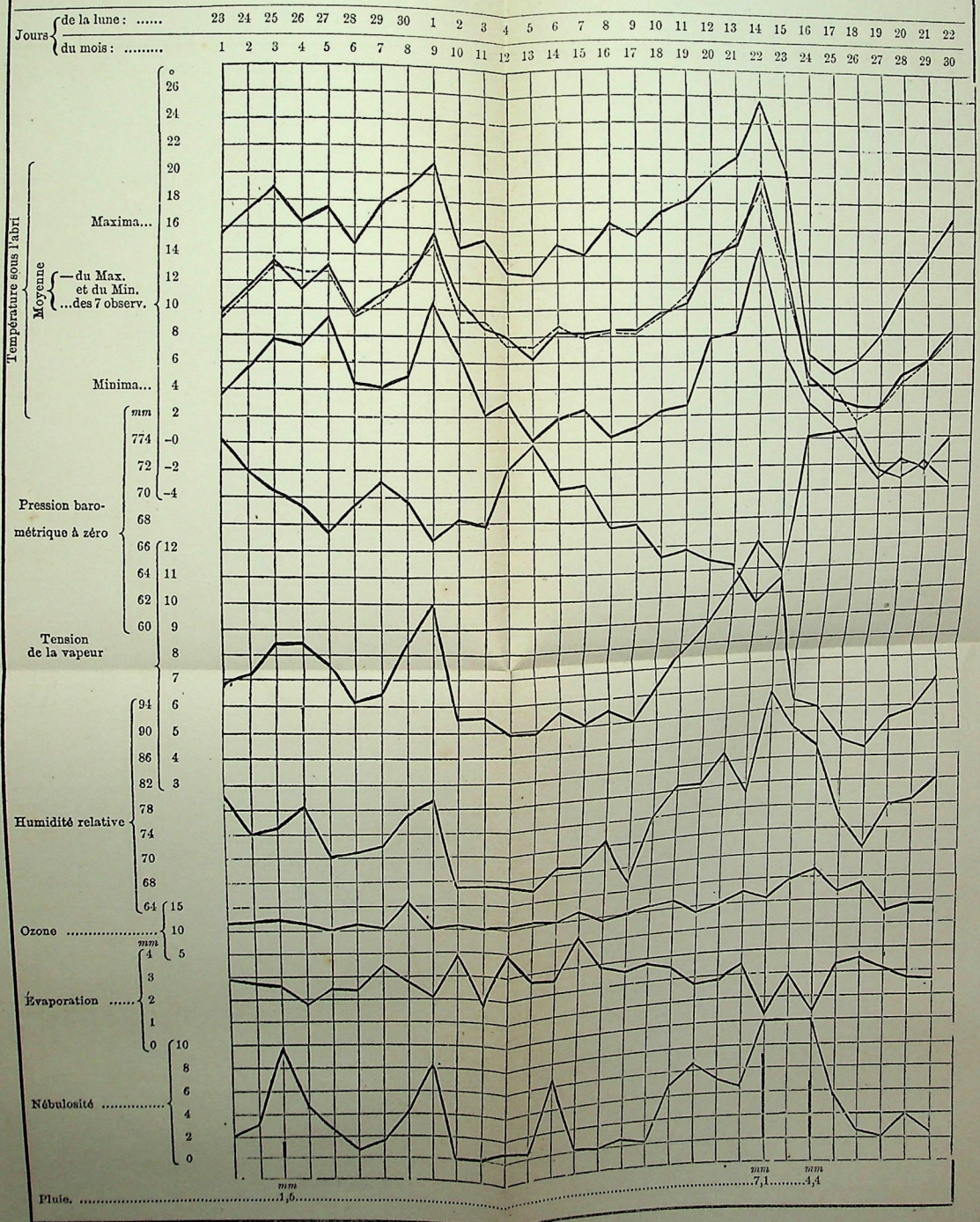
30. 4h. m.—Gelée blanche très-abondante ; léger brouillard s'élevant à la hauteur des maisons. 7h.—Brouillard très-épais. 1h. s. et 4h.—Quelques nuages épars dans le ciel ; le reste du jour ciel très-pur. 7h.—Lumière zodiacale.

A. M. D. G.

OBSERVATOIRE DE ZI-KA-WEI

Résumé des Observations Météorologiques de Novembre 1874.

MOYENNES DIURNES.



OBSERVATOIRE DE ZI-KA-WEI.

BULLETIN MÉTÉOROLOGIQUE,

DÉCEMBRE 1874.

NOTA.—Pour la position géographique de l'observatoire, les instruments utilisés, les notations employées, etc., voir la note préliminaire placée en tête du Bulletin de Septembre 1874.

TABLEAU MÉTÉOROLOGIQUE.—*Décembre* 1874.

PRESSION BAROMÉTRIQUE À ZÉRO.

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
		mm	mm	mm	mm	mm	mm	mm	mm
23	1	770,80	771,47	771,85	770,39	770,07	770,66	770,21	770,78
24	2	68,92	69,52	69,92	68,37	68,10	69,00	69,38	69,03
25	3	68,51	69,83	70,45	69,15	69,49	70,52	70,75	69,81
26	4	70,30	70,41	70,98	69,03	68,63	68,71	68,93	69,57
27	5	67,89	68,89	70,39	69,20	69,96	71,10	71,93	69,91
28	6	72,40	73,93	75,08	73,79	74,18	74,87	74,95	74,16
29	7	73,93	74,48	74,76	72,99	72,76	73,31	73,24	73,64
30	8	71,78	71,78	71,46	69,11	68,79	68,58	67,83	69,90
1	9	66,31	66,86	67,91	66,09	65,88	65,80	66,30	66,45
2	10	65,59	65,14	66,81	65,65	65,42	65,80	65,30	65,67
3	11	64,03	64,48	64,90	63,55	64,45	65,83	66,41	64,81
4	12	66,67	67,31	68,01	65,81	65,20	65,48	65,33	66,26
5	13	64,59	65,34	66,37	65,21	65,31	65,82	66,13	65,54
6	14	64,89	65,07	65,20	63,46	63,93	65,09	66,42	64,87
7	15	67,95	69,02	69,99	68,50	67,98	64,07	67,54	67,86
8	16	65,11	64,10	63,64	61,18	61,63	63,30	64,95	63,42
9	17	66,43	68,68	69,87	68,72	68,87	69,34	69,23	68,73
10	18	67,82	67,95	67,78	64,90	64,34	65,08	64,14	66,00
11	19	62,94	62,63	62,48	60,18	59,53	59,38	59,12	60,89
12	20	58,77	58,99	60,69	61,89	63,30	64,32	64,78	61,82
13	21	64,36	65,15	66,61	65,98	67,16	69,37	70,48	67,02
14	22	71,75	72,44	72,93	70,76	70,72	71,22	71,73	71,65
15	23	69,65	68,95	69,87	67,99	67,34	67,75	67,13	68,38
16	24	67,34	67,80	69,26	67,40	68,40	68,61	68,92	68,25
17	25	69,18	69,83	69,48	67,66	66,66	67,31	67,68	68,26
18	26	66,89	66,12	66,25	65,44	65,68	66,69	69,93	66,71
19	27	73,04	74,33	75,95	74,60	74,88	75,51	75,25	74,79
20	28	73,48	74,93	74,87	73,07	72,44	72,79	72,53	73,44
21	29	70,98	71,15	70,49	67,96	68,37	69,87	71,39	70,03
22	30	73,20	75,07	76,85	75,73	76,25	77,34	77,71	76,02
23	31	77,04	77,82	78,11	76,26	76,15	76,95	77,09	77,06
Moyennes du	1–10	769,64	770,23	770,96	769,38	769,33	769,84	769,88	769,89
	11–20	64,92	65,36	65,89	64,34	64,45	64,77	65,41	65,02
	21–31	70,63	71,23	71,87	70,25	70,37	71,21	71,80	71,05
	mois	768,47	769,01	769,65	768,06	768,12	768,69	769,11	768,73

Maximum : 778,11 mm observé le 31 à 10 h. P.M.
Minimum : 758,77 mm „ le 20 à 4 h. A.M.
} différence : 19,34 mm

TABLEAU MÉTÉOROLOGIQUE.—*Décembre* 1874.

TEMPÉRATURE À L'OMBRE.

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
		o	o	o	o	o	o	o	o
23	1	2,1	0,1	11,8	13,3	12,4	6,5	4,9	7,30
24	2	0,3	1,9	12,6	13,9	12,5	6,7	3,8	7,39
25	3	0,5	0,8	11,8	12,1	10,9	7,5	4,2	6,83
26	4	3,5	3,9	11,9	14,6	11,3	7,4	7,0	8,51
27	5	5,4	6,6	11,3	11,2	10,1	6,2	5,2	8,00
28	6	5,7	6,2	8,9	11,6	9,8	8,4	6,4	8,14
29	7	7,1	7,2	8,1	8,7	8,3	7,1	6,8	7,61
30	8	6,5	7,1	9,5	11,0	12,2	12,3	12,2	10,11
1	9	12,2	8,1	8,5	9,1	9,0	7,7	7,1	8,81
2	10	6,1	4,7	8,9	10,1	8,9	3,1	2,1	6,27
3	11	0,7	1,2	9,4	13,4	12,1	5,1	3,8	6,53
4	12	2,5	1,6	12,0	14,9	13,1	7,5	7,1	8,39
5	13	4,2	3,8	13,3	18,1	16,8	9,5	6,6	10,33
6	14	5,6	6,1	14,1	20,3	18,3	9,7	9,1	11,89
7	15	8,7	6,2	13,8	15,3	13,0	8,6	9,4	10,71
8	16	11,1	12,3	14,6	18,9	15,3	11,4	10,9	13,50
9	17	9,1	8,6	10,4	11,4	11,8	6,6	3,4	8,76
10	18	0,3	0,6	10,3	12,4	11,0	6,3	6,4	6,76
11	19	6,6	8,2	14,0	15,0	12,6	12,5	12,1	11,57
12	20	10,3	9,6	9,9	9,9	9,9	8,1	5,8	9,07
13	21	3,8	3,4	10,8	13,8	12,4	5,9	3,8	7,70
14	22	4,6	2,3	7,2	9,3	7,9	4,6	4,8	5,81
15	23	6,1	5,6	13,5	15,1	14,9	10,5	11,4	11,01
16	24	7,6	8,5	9,1	8,7	6,7	6,7	4,2	7,36
17	25	0,9	1,0	2,4	4,4	3,9	2,6	0,5	2,24
18	26	—0,9	—1,2	5,1	7,5	6,5	4,9	5,1	3,86
19	27	1,7	0,6	0,1	0,4	—1,6	—2,9	—3,9	—0,80
20	28	—6,6	—6,5	—2,2	0,7	—0,1	—2,1	—4,1	—2,99
21	29	—1,9	—0,9	5,6	5,8	7,1	7,1	4,1	3,84
22	30	2,7	2,6	2,7	3,1	1,4	—1,3	—1,0	1,46
23	31	—2,5	—2,4	—0,1	1,2	1,1	—1,2	—2,9	—0,97
Moyennes du	1-10	4,94	4,66	10,33	11,56	10,54	7,29	5,97	7,90
	11-20	5,91	5,82	12,18	14,96	13,39	8,53	7,46	9,75
	21-31	1,40	1,18	4,92	6,36	5,47	3,16	2,00	3,50
	mois	4,00	3,80	9,01	10,81	9,66	6,22	5,04	6,93

Maximum : o 20,3 observé le 14 à 1 h. P.M.
Minimum :— 6,6 „ le 28 à 4 h. A.M.
} différence ..... o 26,9

TABLEAU MÉTÉOROLOGIQUE.—*Décembre* 1874.

Tension de la vapeur.

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
		mm	mm	mm	mm	mm	mm	mm	mm
23	1	5,34	4,63	7,49	5,91	6,21	6,70	6,46	6,11
24	2	4,69	5,30	7,13	6,58	6,58	6,40	5,71	6,06
25	3	4,75	4,84	7,13	6,03	6,27	6,54	6,08	5,95
26	4	5,59	5,75	6,03	6,16	6,15	6,38	6,39	6,06
27	5	6,40	6,97	7,31	7,17	7,11	6,69	6,41	6,87
28	6	6,22	5,93	5,70	5,97	6,25	6,11	5,92	6,01
29	7	5,83	5,77	5,56	5,31	5,44	5,83	5,57	5,62
30	8	6,08	6,34	6,54	6,57	5,25	5,19	5,73	5,96
1	9	5,97	7,96	6,83	6,89	6,62	6,97	7,33	6,94
2	10	5,99	5,68	4,42	4,36	3,17	5,24	3,44	4,61
3	11	3,81	3,98	4,96	4,53	4,22	4,73	4,73	4,42
4	12	4,45	4,68	5,04	4,22	5,67	6,21	7,11	5,34
5	13	5,17	4,73	6,10	4,87	6,54	6,65	6,64	5,81
6	14	6,61	7,05	7,65	5,82	7,03	7,11	7,11	6,91
7	15	8,37	7,10	8,10	7,71	7,35	7,77	8,06	7,78
8	16	9,22	10,05	10,75	11,31	9,50	8,80	7,79	9,63
9	17	7,91	7,88	7,53	6,45	5,05	6,24	5,45	6,64
10	18	4,69	4,78	6,28	5,61	5,97	6,41	6,68	5,77
11	19	7,30	7,90	9,15	9,55	10,48	10,68	10,53	9,37
12	20	8,98	8,33	8,63	8,87	7,35	7,49	6,93	8,08
13	21	6,01	5,55	7,05	6,16	5,73	5,26	5,21	5,85
14	22	4,83	4,76	4,58	4,95	4,91	5,33	5,62	5,00
15	23	6,42	6,61	8,67	8,58	9,61	8,98	10,07	8,42
16	24	7,79	8,16	8,24	8,37	7,24	6,07	5,47	7,33
17	25	4,78	4,72	5,16	4,67	4,27	3,77	4,39	4,54
18	26	4,21	4,21	5,23	5,81	5,75	5,66	5,74	5,23
19	27	4,92	3,70	3,95	4,63	4,08	3,53	3,41	4,03
20	28	2,75	2,77	2,68	2,38	3,29	2,62	3,21	2,81
21	29	3,50	3,78	5,24	5,62	4,94	4,94	6,14	4,88
22	30	5,38	4,09	3,44	3,56	3,68	3,67	3,68	3,93
23	31	3,49	3,59	4,48	3,90	4,02	3,62	3,53	3,80
Moyennes du	1–10	5,69	5,92	6,41	6,10	5,91	6,21	5,90	6,02
	11–20	6,65	6,65	7,42	6,89	6,92	7,21	7,10	6,98
	21–31	4,92	4,72	5,34	5,33	5,23	4,86	5,13	5,07
	mois	5,72	5,73	6,36	6,08	5,99	6,05	6,02	5,99

Maximum : 11,31 observé le 16 à 1 h. P.M.
Minimum : 2,38 „ le 28 à 1 h. P.M.
} différence..... mm 8,93

TABLEAU MÉTÉOROLOGIQUE.—*Décembre* 1874.

HUMIDITÉ RELATIVE.

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
23	1	100	100	72	52	58	93	100	82,14
24	2	100	100	66	56	61	86	96	80,71
25	3	100	100	69	57	64	84	98	81,71
26	4	96	96	57	50	61	83	97	77,14
27	5	96	96	73	72	76	94	97	86,29
28	6	91	84	66	58	69	74	82	74,86
29	7	77	76	68	63	66	77	76	71,86
30	8	84	84	73	67	50	49	54	65,86
1	9	56	98	85	80	77	89	97	83,14
2	10	85	89	51	47	37	91	64	66,28
3	11	79	79	56	40	40	71	79	63,43
4	12	81	91	47	33	51	80	94	68,14
5	13	83	78	53	30	46	75	91	65,14
6	14	97	100	64	32	44	79	82	71,18
7	15	100	100	69	59	66	93	92	82,71
8	16	94	94	86	69	74	86	80	83,28
9	17	92	94	80	63	48	85	93	79,28
10	18	100	100	66	52	60	89	92	79,85
11	19	100	97	77	75	97	99	100	92,14
12	20	96	94	95	97	80	93	100	93,57
13	21	100	96	73	52	53	75	87	76,57
14	22	76	87	60	55	61	83	87	72,71
15	23	91	97	75	67	76	95	100	85,86
16	24	100	98	96	100	98	82	89	94,72
17	25	97	96	95	74	70	67	92	84,42
18	26	98	100	78	74	79	87	87	86,14
19	27	95	79	86	97	100	96	100	93,28
20	28	100	100	72	51	74	68	95	80,00
21	29	88	89	77	82	66	66	100	81,14
22	30	96	74	61	62	70	89	89	77,28
23	31	92	96	100	79	82	89	96	90,57
Moyennes du	1–10	88,5	92,3	68,0	60,2	61,9	82,0	86,1	77,00
	11–20	92,2	92,7	69,3	55,0	60,6	85,0	90,3	77,87
	21–31	93,9	92,0	79,4	72,1	75,4	81,5	92,9	83,88
	mois	91,61	92,32	72,45	62,74	66,26	82,81	89,87	79,72

Maximum : 100 observé 26 fois
Minimum : 30 „ le 13 à 1 h. P.M. } différence 70

TABLEAU MÉTÉOROLOGIQUE.—*Décembre* 1874.

ÉTAT DU CIEL 1o.—*Nébulosité.*

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
23	1	0	10 Bd	7 Bd	8 Bd	5	0	0	4,3
24	2	10 Bd	10 Bd	3 Bd	3	0	0	0	3,7
25	3	9 Bd	10 Bd	0	10 Br	7	5 Br	1 Br	5,3
26	4	0	1	0	2	0	2	10	2,1
27	5	0	9	1	5	2 Br	0	2	2,7
28	6	5	10	10	9	9	10	2	7,9
29	7	10	10	10 Br	10 Br	10 Br	10 Br	10 Br	10,0
30	8	10 Br	9 Br	10 Br	10 Br	10 Br	10 Br	10 Br	9,9
1	9	10	10	10	10	10	10	10	10,0
2	10	0	0	2	0	0	0	0	0,2
3	11	0	0	0	0	0	0	0	0,0
4	12	0	0	0	0	0	0	0	0,0
5	13	0	0	0	0	0	0	0	0,0
6	14	0	0 Bd	0	0	0	0	1	0,1
7	15	19 Br	2 Br	3	5	2	0	10	4,4
8	16	10 Br	10	10	8	9 Br	9 Br	9 Br	9,4
9	17	10 Br	8	9	7	3	0	0	5,3
10	18	0	0	2	0	0	0	2	0,6
11	19	2	5	10 Br	10 Br	10	10	10 Br	8,1
12	20	10 Br	10	10 Br	10 Br	8	7	0	7,9
13	21	0	0	0	0	0	0	0	0,0
14	22	5	0	0	2	0	0	8	1,4
15	23	1	C	1	8	5	1	10 Bd	3,7
16	24	10 Br	10	10	10	10	10	10	10,0
17	25	10	10	10	9	9	5 Br	1	9,0
18	26	9 Br	9	0	0	9 Br	8 Br	10 Br	6,4
19	27	10 Br	10 Br	5 Br	8	10 Br	1	2	6,6
20	28	0	0	0	0	0	0	0	0,0
21	29	2 Br	3	8	10	10 Br	10	10	7,6
22	30	10	10	5	7	5	5	10 Br	7,4
23	31	10 Br	10	3	7	2	0	0	4,6
Moy. du mois		5,3	5,5	4,5	5,4	4,7	3,6	4,6	4,8

NOMBRE DE JOURS DE :

Ciel beau, ou moins de $2_{1/0}$ couvert ..	9	Brouillard	4
,, peu nuageux ou de 2 à $4_{1/0}$,, ..	4	Brume	14
,, nuageux, ou de 4 à $6_{1/0}$,, ..	5	Rosée	7
,, très-nuageux, ou de 6 à $8_{1/0}$,, ..	6	Gelée blanche.....	5
,, couvert ou plus de $8_{1/0}$,, ..	7	Pluie	4
.....		Neige	2

Phénomènes divers observés.—Lumière zodiacale 7 fois ; halo solaire 1 ; halo [lunaire] 1.

TABLEAU MÉTÉOROLOGIQUE.—*Décembre* 1874.

ÉTAT DU CIEL 20.—*Forme et Direction des Nuages.*

Date.	4 h. m.		7 h. m.		10 h. m.		1 h. s.		4 h. s.		7 h. s.		10 h. s.	
	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.
1	,,	,,	,,	,,	KST	,,	K	,,	KST	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
2	,,	,,	,,	,,	KST	,,	AC	SW	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
3	KC	,,	K	,,	,,	,,	,,	,,	K	SW	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	CN	NE	,,	,,	,,	,,
4	,,	,,	KST	,,	KST	,,	AC	SE	CST	,,	CST	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	CN	,,
5	,,	,,	,,	,,	KC	W	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	CN	NW	C	,,	,,	,,	C	,,
6	,,	,,	C	,,	,,	,,	,,	,,	KC	,,	,,	,,	,,	,,
	C	,,	C	,,	C	E	C	E	C	E	CN	NE	CST	,,
7	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	C	,,	CN	,,	CST	,,	,,	,,	,,	,,	,,	,,	,,	,,
8	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	CN	,,	CN	,,	C	,,	,,	,,	C	,,	C	,,	,,	,,
9	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	N	NW	N	NW	CN	NW	CN	NW	CN	NW	CN	NW	CN	NW
10	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
11	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
12	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
13	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	KC	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
15	,,	,,	,,	E	KST	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	C	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
16	,,	,,	,,	,,	,,	,,	KC	,,	,,	,,	KC	W	,,	,,
	,,	,,	N	,,	N	,,	,,	,,	,,	,,	,,	,,	,,	,,
17	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	C	,,	N	N	CN	,,	C	N	,,	,,	,,	,,
18	,,	,,	,,	,,	KST	,,	,,	,,	,,	,,	,,	,,	KC	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
19	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	CST	,,	CN	,,	C	W	C	W	CN	W	CN	W	,,	,,
20	,,	,,	,,	,,	AC	,,	,,	,,	AC	N	AC	N	,,	,,
	C	,,	N	,,	N	,,	N	,,	CN	N	,,	,,	,,	,,
21	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
22	CK	NE	,,	,,	,,	,,	AC	W	,,	,,	,,	,,	K	,,
	,,	,,	N	,,	,,	,,	,,	,,	,,	,,	,,	,,	CST	,,
23	,,	,,	,,	,,	KC	,,	,,	,,	AC	W	,,	,,	,,	,,
	CST	,,	,,	,,	,,	,,	CST	,,	CST	,,	CST	,,	,,	,,
24	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	N	,,	N	,,	CN	NE	CN	,,	N	,,	N	,,	CN	,,
25	,,	,,	,,	,,	KC	W	KC	W	KC	W	W	,,	KC	,,
	N	,,	N	,,	C	N	C	N	C	N	,,	,,	,,	,,
26	KC	,,	,,	,,	,,	,,	,,	,,	K	,,	,,	,,	,,	,,
	,,	,,	CST	,,	,,	,,	,,	,,	C	,,	C	,,	N	,,
27	,,	,,	,,	,,	,,	,,	K	,,	,,	,,	,,	,,	,,	,,
	N	,,	C	N	C	N	N	N	N	,,	C	,,	CST	,,
28	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
29	,,	,,	KST	,,	KST	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	CN	,,	N	,,	N	,,	N	,,
30	,,	,,	,,	,,	K	W	,,	,,	,,	,,	,,	,,	,,	,,
	N	,,	N	,,	C	NE	N	,,	N	N	CN	,,	,,	,,
31	,,	,,	,,	,,	K	W	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	C	N	C	NE	C	N	C	N	,,	,,	,,	,,

TABLEAU MÉTÉOROLOGIQUE.—*Décembre* 1874.

DIRECTION DU VENT; SA VITESSE PAR SECONDE.

Jours de la lune	Jours du mois	Matin. 4 h. Dir.	Matin. 4 h. Vit.	Matin. 7 h. Dir.	Matin. 7 h. Vit.	Matin. 10 h. Dir.	Matin. 10 h. Vit.	Soir. 1 h. Dir.	Soir. 1 h. Vit.	Soir. 4 h. Dir.	Soir. 4 h. Vit.	Soir. 7 h. Dir.	Soir. 7 h. Vit.	Soir. 10 h. Dir.	Soir. 10 h. Vit.	Moyennes des 7 observations.
			m		m		m		m		m		m		m	m
23	1	NW	0,5	O	0,9	NE	0,4	NW	0,7	WSW	0,6	O	1,0	E	1,5	0 8
24	2	E	1,1	NE	1,4	NE	0,9	NW	1,2	NE	1,3	NE	1,4	NE	0,8	1,2
25	3	SE	0,7	SE	1,5	NNW	0,8	N	3,2	E	3,0	N	1,9	N	1 6	1,8
26	4	N	2,0	NNE	2,1	NE	1,8	ENE	1,3	ENE	3,1	ENE	2,9	ENE	1,8	2,1
27	5	NNE	0,6	NE	1,8	NW	0,7	W	3,1	NW	3,9	NNW	2,2	NNW	1,8	2,0
28	6	NNW	0,7	N	0,7	NNW	0,9	N	2,1	N	2,3	NNE	3,0	NNE	1,9	1,7
29	7	NNE	2,2	NNE	2,8	NNE	2,1	NNE	3,6	NNE	2,7	O	0,7	O	0,0	2,0
30	8	N	0,6	O	0,4	ENE	1,3	SE	2,8	SE	1,3	E	0,9	E	2,0	1,3
1	9	O	0,6	NW	1,5	NW	1,7	WNW	4.4	NW	4,6	O	1,3	O	1,1	2,2
2	10	O	0,0	O	0,9	WNW	4,3	NW	12,8	WNW	10,0	W	3,9	WNW	2,6	4,9
3	11	WSW	2,0	WSW	1,5	WSW	4,2	WNW	9,2	NW	7,6	O	0,2	O	0,1	3,5
4	12	O	0,0	O	0,0	SSW	0,5	SSW	4,1	S	4,1	S	2,3	S	2,0	1,9
5	13	S	1,6	O	0,0	WSW	0,7	NW	3,0	NW	2,6	NE	0,5	ENE	0,5	1,3
6	14	E	1,5	O	0,0	SSW	0,9	WSW	2 6	WNW	2,2	O	0,0	NW	0,9	1,2
7	15	N	2.7	O	1,3	ENE	2,5	ENE	6,7	ENE	5,3	ENE	3,1	ENE	2,0	3,4
8	16	ENE	1,8	SSE	3,8	S	4,0	SW	5,0	WNW	6,0	NW	4,7	NW	5,6	4,4
9	17	NW	6,2	NW	5,2	N	4,1	NNW	5.4	NNW	5,3	NNE	0,9	O	0,4	3,9
10	18	O	0,0	O	0,0	SSE	1,2	S	4,9	S	3,5	O	0,9	S	1,6	1,7
11	19	SSE	1,1	SSE	1,4	SSE	3,2	SSE	5.2	SSE	1,7	SSE	1,3	SSE	0,2	2,0
12	20	WNW	5,1	WNW	9,9	NW	13,6	NW	14,1	NW	7,4	W	3,2	W	2,3	7,9
13	21	WSW	2,7	WSW	3,9	W	3,9	NW	8,6	NNW	8,4	NNW	2,2	N	0,7	4,3
14	22	NNE	1,0	N	1,9	NNE	1,7	ENE	3,1	E	4,3	E	2,1	E	2.7	2,4
15	23	ESE	3,0	SE	1,9	SSE	2,5	S	8.2	S	6,1	O	0,4	O	0,0	3.2
16	24	N	3,3	N	8 9	N	7,0	N	4,6	N	9,3	N	7,1	N	8,2	6,9
17	25	NNW	2,4	NW	3,0	NW	4,1	NW	4,8	NW	2,5	NNW	0,9	O	0,0	2,5
18	26	O	0,0	O	0,0	O	0,1	NE	0,2	NNE	1,9	N	0,9	N	2,1	0,7
19	27	N	7,0	NNW	10,9	NNW	9,8	NNW	10,3	NNE	8,3	NW	7,1	NW	4,8	8,7
20	28	NW	1,6	NW	0,4	NNW	1,7	NW	1,1	N	1,0	O	0,3	O	0,0	0,9
21	29	N	0,1	NNE	0,1	E	0,9	O	0,6	ENE	0,1	O	0,0	NW	1,2	0,4
22	30	N	4,8	N	7,5	N	7,3	N	9,1	N	7,0	N	5,6	NNW	4,4	6,5
23	31	NNW	4,6	NNW	2,2	NNW	3,1	NNE	2,5	N	3,2	N	0,6	N	6,0	2,3
Moy. du mois		m 2,0		m 2,5		m 3,0		m 4,8		m 4,2		m 2,1		m 1,8		m 2,9

FRÉQUENCE RELATIVE DES 16 VENTS SUR 100

N 19	W..... 3	S 7	E 6
NNW 13	WSW 4	SSE..... 3	ENE 6
NW 14	SW 1	SE 3	NE 4
WNW 5	SSW 2	ESE 2	NNE 8

Calmes, sur 100 observations 15

Vitesse moyenne maximum m 14,1 .....observée le 20

TABLEAU MÉTÉOROLOGIQUE.—*Décembre* 1874.

Jours de la lune	Jours du mois	Températures extrêmes à l'ombre. Minima	Maxima	Moyennes	Ozone. 7 h. m.	1 h. s.	7 h. s.	Moyennes	Évaporation. Sommes des 24 h.	Pluie. 7 h. m.	7 h. s.	Sommes des 24 h.	Température du puits.
		o	o	o					mm	mm	mm	mm	o
23	1	−0,7	15,1	7,20	9	13	10	10,6	1,15	0,0	0,0	0,0	15,8
24	2	0,1	16,1	8,10	7	8	9	8,0	1,70	0,0	0,0	0,0	...
25	3	−0,4	13,3	6,45	8	12	9	9,7	1,70	0,0	0,0	0,0	...
26	4	2,1	15,7	8,90	18	12	10	13,3	1,70	0,0	0,0	0,0	...
27	5	4,2	13,8	9,00	12	14	12	12,7	1,25	0,0	0,0	0,0	...
28	6	4,6	13,0	8,80	18	11	14	14,3	2,10	0,0	0,0	0,0	...
29	7	5,7	9,1	7,40	16	12	10	12,7	2,55	0,0	0,0	0,0	...
30	8	6,3	12,4	9,35	17	11	9	12,3	1,40	0,0	0,0	0,0	...
1	9	8,1	9,4	8,75	17	14	10	13,7	0,90	3,2	0,0	3,2	...
2	10	4,2	10,6	7,42	16	13	12	13,7	4,05	0,0	0,0	0,0	...
3	11	−0,7	14,1	6,70	14	13	9	12,0	3,70	0,0	0,0	0,0	...
4	12	0,7	15,7	8,20	10	12	11	11,0	3,00	0,0	0,0	0,0	...
5	13	3,0	18,9	10,95	21	10	9	13,3	3,15	0,0	0,0	0,0	...
6	14	4,7	21,1	12,90	20	17	8	15,0	2,95	0,0	0,0	0,0	...
7	15	5,8	15,9	10,85	20	7	11	16,0	1,80	0,0	0,0	0,0	...
8	16	7,6	20,4	14,00	21	19	8	16,0	1,75	0,0	0,0	0,0	...
9	17	8,3	13,3	10,80	21	18	12	17,0	2,75	0,0	0,0	0,0	15,7
10	18	0,0	13,4	6,70	10	11	9	10,0	1,35	0,0	0,0	0,0	...
11	19	5,6	16,1	10,85	17	11	9	12,3	1,55	0,0	0,0	0,0	...
12	20	9,4	12,9	11,15	21	20	16	19,0	0,70	0,0	0,0	0,0	...
13	21	3,0	14,4	8,70	20	16	9	15,0	2,65	0,0	0,0	0,0	...
14	22	2,1	10,8	6,45	15	10	8	11,0	2,25	0,0	0,0	0,0	...
15	23	4,2	16,2	10,20	19	15	8	14,0	1,45	0,0	0,0	0,0	...
16	24	7,1	9,1	8,10	18	20	20	19,3	0,00	3,9	7,7	11,6	...
17	25	0,2	4,9	2,55	21	16	9	15,3	0,70	0,2	7,8	8,0	...
18	26	−1,8	8,8	3,50	16	10	14	13,3	0,90	0,0	0,0	0,0	15,3
19	27	−3,9	1,7	−1,10	15	13	13	13,7	1,20	0,0	0,0	0,0	...
20	28	−6,6	1,4	−2,60	17	13	11	13,7	0,00	0,0	0,0	0,0	...
21	29	−4,6	8,3	1,85	18	12	8	12,7	2,40	0,0	2,7	2,7	14,8
22	30	−1,3	5,3	2,00	21	13	20	18,0	2,28	9,8	0,0	9,8	...
23	31	−2,9	1,9	−0,50	16	13	9	12,7	1,00	0,0	0,0	0,0	14,6
Moyennes du	1-10	3,43	12,85	8,15	13,8	12,0	10,5	12,10	18,50	3,2	0,0	3,2	...
	11-20	4,44	16,18	10,31	17,5	14,8	10,2	14,16	22,70	0,0	0,0	0,0	...
	21-31	−0,41	7,52	3,56	17,8	13,7	11,8	14,42	14,83	13,9	18,2	32,1	...
	mois	2,39	12,03	7,21	16,4	13,5	10,8	13,60	56,03	17,1	18,2	35,3	...

	o		mm
Maximum: 21,1 observé le 14	21 observé 6 fois	Hauteur d'eau tombée	35,3
Minimum :—6,6 „ le 28	7 „ le 2...	„ „ évaporée	56,0
Différence: 27,7	14	Différence	20,7

JOURNAL MÉTÉOROLOGIQUE.

Décembre 1874.

1. 7h. m.—Brouillard ; limite de visibilité 4 à 500m. 10h.—Le brouillard persiste ; cirro-stratus. 1h. s. et 4h.—Mêmes remarques. 7h.—Lumière zodiacale. 10h.—Etoiles brillantes ; le baromètre baisse. Brises folles toute la journée.
2. 4h. m.—Brouillard ; limite de visibilité 100m. 7h.—Id. 10h.—Horizon brumeux ; cirro-stratus au zénith. 1h. s.—Alto-cumulus venant du S.W. 4h.—Ciel sans nuages. 7h. et 10h.—Même ciel. Brises folles comme hier ; à midi la girouette fait le tour complet du compas.
3. 4h. m.—Brouillard assez épais ; cirro-cumulus au zénith. 7h.—Gelée blanche; limite de visibilité du brouillard 2 à 300m. 10h.—Le vent passe du S.E. au N.W. par le S. Ciel sans nuages. 1h. s.—Brise régulière ; ciel uniformément couvert. 4h.—Cirrus venant du S.W. et cumulo-nimbus du N.E. 7h.—Ciel brumeux au N. 10h.—Ciel de couvert ; brise régulière.
4. 4h. m.—Ciel sans nuages. 7h.—Peu de rosée ; çà et là quelques cirro-stratus. 10h.—Mêmes nuages ; le vent a passé insensiblement du N. à l'E. 1h. s.—Alto-cumulus venant du S.E. 4h.—Long cumulo-stratus s'étendant du S.E. au S.W. 7h.—Le stratus persiste. 10h.—Des cumulo-nimbus ont envahi tout le ciel.
5. 4h. m.—Ciel sans nuages ; peu de rosée. 7h.—Le ciel s'est couvert vers 6h. d'une brume très-légère. 10h.—Cirro-cumulus venant de l'W. 1h. s.—Les cirrus ont disparu et sont remplacés par des cumulus noirâtres venant du N. ; horizon brumeux. 4h.—Ceinture de gros cumulus à l'horizon N. 7h.—Ciel sans nuages ; lumière zodiacale diffuse. 10h.—Quelques cumulus épars dans le ciel. Le vent a passé du N.E. à l'W de 7h. du matin à 4h. du soir.
6. 4h. m.—Brise faible et régulière. 7h.—Ciel moutonné ; pas de rosée. 10h.—Ciel uniformément couvert. 1h. s.—Les cumulus viennent de l'E. ; quelques éclaircies. 4h.—Ciel sombre en quelques points. 7h.—Même ciel ; on aperçoit des étoiles au zénith. 10h.—Ciel presque complètement découvert.
7. 4h. m.—Ciel uniformément couvert et sombre. 7h.—Même ciel. 10h.—Ciel brumeux ; cumulo-stratus à l'horizon E. 1h. s.—Ciel uniformément couvert jusqu'au soir. 7h.—Calme absolu. 10h.—Id.
8. 4h. m.—Ciel toujours très-sombre ; quelques gouttes de pluie. 7h.—Eclaircie à l'horizon N.; calme. 10h.—Vent faible ;
9. 4h. m.—Ciel très-sombre ; pluie fine ; calme. 7h.—Nimbus venant du N.W.; pluie. 10h.—Nuages bas et vaporeux. 1h. s.—Vent fort ; mêmes nuages et même direction. 4h.—Id. 7h.—Ciel très-sombre ; calme. 10h.—Petite brise régulière.
10. 4h. m.—Ciel très-pur ; étoiles brillantes ; calme. 7h.—Ciel splendide ; pas de rosée. 10h.—Quelques cirrus épars dans le ciel. 1h. s. et 4h.—Ciel sans nuages ; vent très-fort. 7h.—Le vent tombe ; étoiles peu brillantes. 10h.—Le baromètre baisse.

11. 4h. m.—Ciel serein ; froid piquant. 7h.—Même ciel ; gelée blanche. 10h.—Vent très-fort. 1h. s. et 4h.—Id. 7h.—Calme ; lumière zodiacale et étoiles peu brillantes. 10h.—Ciel serein ; le calme continue.
12. 4h. m.—Ciel splendide ; le baromètre monte ; calme. 7h.—Gelée blanche ; le calme continue. 10h.—Le baromètre monte malgré le vent du S. 1h. s.—Vent fort. 4h. et 7h.—Id. 10h.—Ciel très-étoilé ; brise régulière.
13. 4h. m.—Ciel étincelant ; lumière zodiacale très-belle. 7h.—Rosée peu abondante. 10h.—Taches nombreuses sur le soleil. 1h. s.—Depuit 10h. le vent a passé du S.W. au N.W. 4h.—Vent faible, ciel découvert jusqu' à 10h.
14. 4h. m.—Ciel serein ; étoiles brillantes. 7h.—Même ciel ; rosée abondante. 7h. ½ Brouillard très-épais ; calme. 10h.—Ciel sans nuages ; vent faible et intermittent. 1h. s.—Depuis 7h. le vent a passé insensiblement de l'E. à l'W. par le S. 4h.—Vent faible. 7h.—Calme. 10h.—Quelques cirro-cumulus. N.B.—Le ciel est resté sans nuages depuis 5 jours.
15. 4h. m.—On aperçoit les étoiles à travers la brume au zénith ; avant 4h. pluie non accusée par le pluviomètre ; thermomètres mouillés. 6h.—Grosses nuées venant de l'E. avec rapidité, pendant que le vent souffle du N. 7h.—Brouillard qui se dépose sur les thermomètres. 10h.—Quelques cirro-stratus, le vent est passé à l'E.N.E. 1h. s.—Vent fort. 4h.—Id. 7h.—Ciel sans nuages. 10h.—Les nuages ont de nouveau envahi tout le ciel.
16. 4h. m.—Ciel uniformément couvert. 7h. et 10h.—Id. Le baromètre a baissé de 6mm. depuis hier. 1h. s.—Vent fort. 4h.—Ciel très-sombre à l'W. 7h.—Le vent a passé insensiblement du S S.E. au N.W. par l'W. depuis 7h. ce matin. 10h.—Le vent augmente ; le baromètre monte rapidement.
17. 4h. m.—Ciel uniformément couvert ; vent toujours fort. 7h.—Eclaircie au zénith. 10h.—Gros nimbus au S.; çà et là quelques éclaircies. 1h. s.—Vent de force et de direction constantes ; les cumulue viennent du N. 7h.—Ciel sans nuages. 10h.—Magnifique clair de lune ; calme.
18. 4h. m.—Calme absolu tout la nuit ; ciel splendide. 7h.—Le calme continue ; gelée blanche. 10h.—Cirro-stratus au N. 1h. s. Ciel sans nuages jusqu'à 10h. ; vent régulier. 10h.—Cirro-cumulus au zénith ; le vent qui était tombé à 7h. reprend de nouveau.
19. 4h. m.—Banquise au S.W. 7h.—Calme, pas de rosée. 10h.—Ciel uniformément couvert. 1h. s.—Ciel id. ; vent fort pendant quelques heures. Pluie entre 1h. et 4h.—Nuages transparents. 10h.—Brume générale.
20. 4h. m.—Vent très-fort ; il a commencé vers minuit. 7h.—Il bruine. 10h.—On aperçoit au-dessus de la brume des alto-cumulus. 1h. s.—Le vent atteint son maximum de vitesse moyenne pendant ½h. ; elle a été de 17m. par seconde. 4h.—Le vent tombe presque subitement ; deux couches de nuages venant du N. 7h.—Le vent passe à l'W. 10h.—Ciel entièrement découvert.
21. 4h. m.—Ciel très-pur ; air vif ; rosée abondante. 5h. ½.—Lumière zodiacale un peu diffuse. 7h.—Rosée très-abondante. Ciel sans

nuages tout le jour ; le vent souffle avec force de 10h. à 4h. et tombe complètement vers 10h. du soir.

22. 4h. m.—Des cumulo-cirrus se forment au zénith. 7h.—Calme absolu, peu de rosée. Le vent continue aujourd'hui sa rotation de l'W. vers l'E. par le N. commencée hier. 1h. s.—Quelques alto-cumulus viennent de l'E. Ciel sans nuages jusqu'à 10h. du soir où on voit quelques cirrus au zénith et des stratus à l'horizon W.

23. 4h. m.—Banc de cumulus compactes au N. ; le thermomètre monte ; pas de rosée. 7h.—Calme ; ciel serein, peu de rosée. 10h.—Quelques cirro-cumulus à l'horizon N.E. 1h. s.—Le vent continue son nouvement vers le S. 4h.—Alto-cumulus venant de l'W. 7h.—Long stratus à l'horizon E. s'étendant du N. au S. ; calme absolu depuis 5h. p.m. 10h.—Le calme continue ; brouillard.

24. 4h. m.—Vers minuit le vent a passé brusquement du S. au N. par l'W. ; pluie peu abondante. 7h.—Ciel uniformément couvert ; pluie abondante, vent fort. 10h.—Mêmes remarques. 1h. s.—Il ne pleut plus. 4h.—Averse qui dure peu. 7h.—Il bruine. 10h.—Quelques gouttes de pluie ; le vent souffle par rafales.

25. 5h. m.—Neige depuis minuit ; elle fond rapidement ; thermomètres mouillés. 7h.—Il ne neige plus. 10h.—La neige a disparu partout. 10h.—Cirro-cumulus venant de l'W. et cumulus du N. 1h. s.—Mêmes nuages ; vent régulier. 4h.—Çà et là quelques éclaircies. 7h.—Les étoiles apparaissent au zénith à travers la brume. 10h.—Cirrus panachés ; calme absoln depuis 7h.

26. 4h. m.—Le calme continue depuis hier ; halo lunaire ; glace. 7h.—Evaporomètre et thermomètre humide gelés. 10h.—Ciel sans nuages ; le vent se lève vers 11h. et souffle faiblement tout le jour. 4h.—Halo incomplet ; au dessous ciel très-noir ; stratus à l'horizon, brume au zénith. 7h.—Etoiles au zénith. 10h.—Gros nimbus au S. ; le baromètre monte rapidement.

27. 4h. m.—Le vent souffle avec force depuis minuit ; quelques gouttes de pluie ; thermomètres mouillés. 7h.—Le ciel après s'être éclairci vers 5h. $\frac{1}{2}$ se couvre de nouveau ; froid très-vif ; le baromètre continue à monter rapidement. 10h.—Cumulus venant du N. et laissant entr'eux des éclaircies. 1h. s.—Des nimbus très-noirs passent au zénith. 4h.—Quelques flocons de neige. 7h.—Çà et là quelques cumulus ; froid très-vif. 10h.—Le thermomètre atteint son minimum. A 8h. $\frac{1}{2}$ on apercevait encore la lumière zodiacale s'élevant en fuseau très-effilé presque jusqu'au zénith.

28. 4h. m.—Ciel très-pur ; froid moins sensible bien que le thermomètre soit plus bas qu'hier ; pas de gelée. 7h.—Evaporomètre et thermometre mouillé gelés. Brise faible et ciel sans nuages toute la journée. 10h. s.—Ciel splendide ; calme absolu.

29. 4h. m.—Brume à l'horizon E. et W. ; air très-sec ; pas de gelée. 7h.—Gelée blanche ; évaporomètre gelé comme hier ; glace sur l'étang de l'W. (1) 10h.—Cirro-stratus par tout le ciel. 1h. s.—Ciel uniformément couvert et moutonné ; quelques gouttes de pluie. 4h.—Le baromètre monte. 7h.—Grosse pluie ; ciel très-sombre. 10h.—La pluie continue. Calme ou vent presque nul tout le jour.

(1) Cet étang a 3 à 4m de large et 1m environ de profondeur.

30. Le vent s'est levé de nouveau vers minuit. 4h. m.—Ciel uniformément couvert. 7h.—Même ciel. 10h.—Cirrus venant de l'W. et cumulus du N.E. 1h. s.—Un nimbus énorme passe au zénith. 4h. et 7h.—Quelques nimbus épars dans le ciel. 10h.—Ciel uniformément couvert ; le vent tombe.

31. 4h. m.—Même ciel qu'à 10h. ; froid très-piquant. 7h.—Id. plus de gelée blanche ; thermomètre mouillé et évaporomètre gelés. 10h.—Cirrus venant de l'W. et cumulus du N.E. 1h. s.—L'évaporomètre est encore gelé ; cumulus par tout le ciel. 7h.—Ciel splendide ; lumière zodiacale nettement dessinée. 10h.—Même ciel ; calme absolu.

ERRATA.

	au lieu de	*lisez*
p. 2	astérique	astérisque
p. 5	| 22,6 | 24,3 | etc.	| 22,6 (o) | 24,3 (o) | etc.
p. 6	| 20,38 | 18,42 | etc.	| 20,38 (mm) | 18,42 (mm) | etc.
p. 8	$2_{\frac{2}{10}}$ couverts	couvert
p. 10	astérique	astérisque
,,	N 18,2	NE 18,2
p. 22	SSE 2	SSE 3
p. 34	ESE 3	ESE 2
p. 35	Pluie 7,2	7,1

N.B.—En faisant entrer les *calmes* dans le calcul de la fréquence relative des 16 vents sur 100 pour le mois de Septembre, comme nous l'avons fait à partir du mois d'Octobre pour tous les autres mois (v.p. 22) ; les chiffres portés au tableau de la p. 10 se trouvent légèrement modifiés ainsi qu'il suit :

N 12	W 2	S 2	E 12
NNW 8	WSW 0	SSE 1	ENE 16
NW 5	SW 0	SE 3	NE.....16
WNW 2	SSW 0	ESE 12	NNE 9

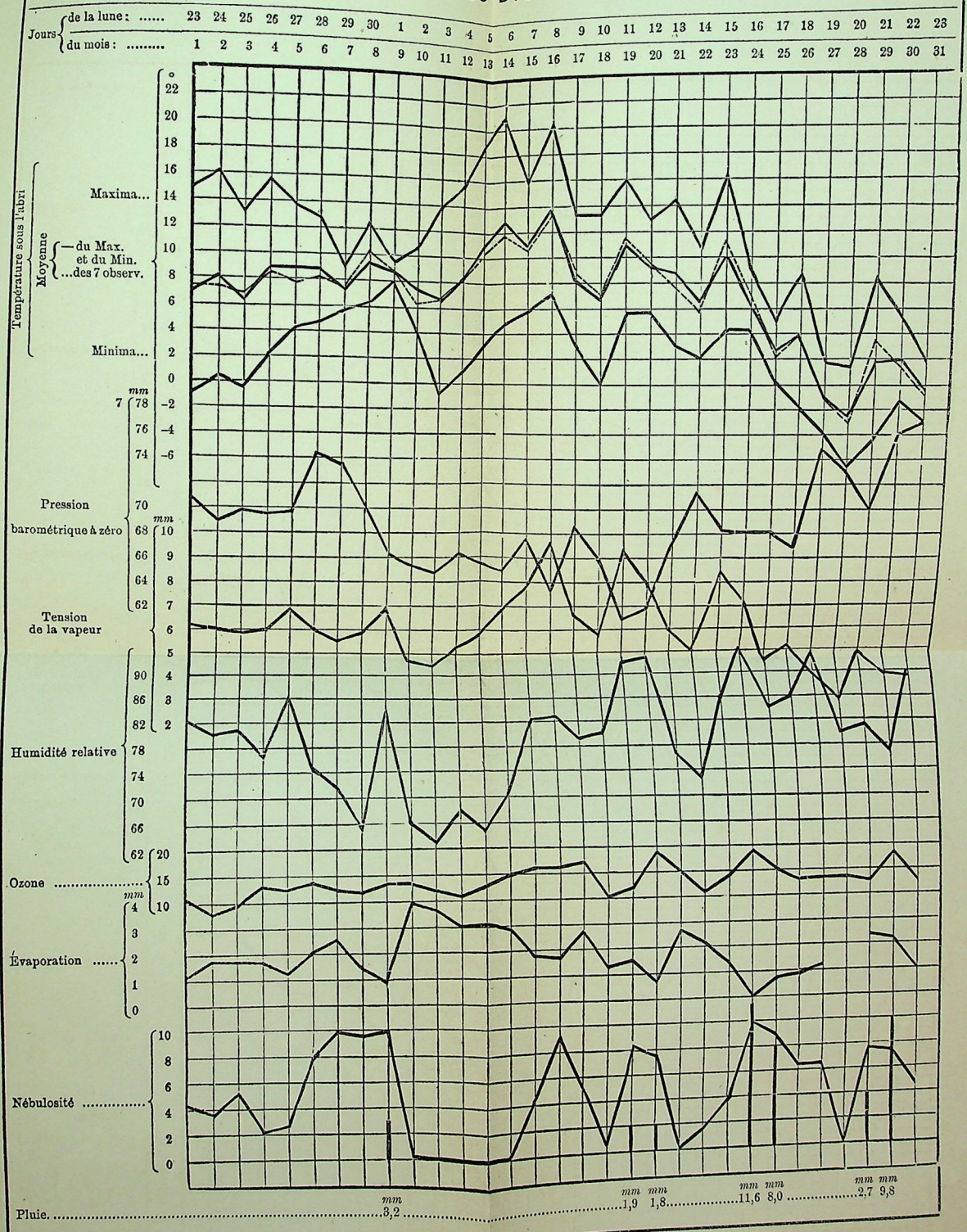
Calmes sur 100 observations.....12

A. M. D. G.

OBSERVATOIRE DE ZI-KA-WEI.

Résumé des Observations Météorologiques de Décembre 1874.

MOYENNES DIURNES.



A. M. D. G.

OBSERVATOIRE

MÉTÉOROLOGIQUE ET MAGNÉTIQUE

des Pères de la Compagnie de Jésus

á

ZI-KA-WEI.

MAGNÉTISME

1874-1875.

OBSERVATOIRE MÉTÉOROLOGIQUE ET MAGNÉTIQUE DE ZI-KA-WEI, PRÈS CHANG-HAI, CHINE.

Longitude 7h. 56m. 24s. E. de Paris. Latitude 31° 12′ 30″ Nortd.

OBSERVATIONS MAGNÉTIQUES.

faites à partir du mois d'Avril 1874 jusqu'au mois d'Avril 1875.

PRÉLIMINAIRES.

L'Observatoire météorologique de Zi-ka-wei date de 1872 : mais les observations magnétiques n'ont été faites régulièrement que depuis le commencement du printemps de 1874.

Les instruments dont on s'est servi sont ceux que Mr. le Major-Général Sabine décrit dans ses "*Instructions for magnetic survey by sand and sea.*" Ils ont été portés à l'Observatoire de Kew avant d'être expédiés en Chine, et on y a déterminé les constantes et les corrections qui entrent dans le calcul de l'Intensité horizontale.

Mes observations ont embrassé les divers éléments du Magnétisme terrestre : la *Déclinaison* de l'aiguille aimantée, son *Inclinaison* par rapport à l'horizon et l'*Intensité* de la force magnétique du globe.

Quant à l'Intensité, la composante *horizontale* seule est obtenue directement en valeur absolue ; la composante *verticale* et l'intensité *totale* sont ensuite données par le calcul. Cette détermination en valeur absolue de la composante horizontale a été faite au moins deux fois par mois ; depuis le 1 Janvier 1875, quatre observations complètes donnent la moyenne mensuelle.

Je ne donnerai qu'une valeur approchée de l'Inclinaison magnétique, bien que j'aie fait chaque mois quatre observations de cet important élément du magnétisme terrestre ; mais parmi ces observations, les unes ont été faites sur des pieds mobiles en différents endroits, d'autres sur un pilier en bois, d'autres enfin sur un pilier de briques; or, j'ai tout dernièrement reconnu que ces briques, provenant du Tché Kiang, sont notablement magnétiques (celles qui viennent de Tien-tsin ou du Tché-ly le sont au même degré) et que la correction à apporter à ces dernières observations est assez forte ; mais comme il me serait presque impossible de les reconnaître au milieu des autres, je préfère, pour ne point donner de valeurs erronnées, rejeter toute cette série et ne présent'er que les valeurs dont je puis répondre.

Jobserve toujours directement l'Inclinaison dans deux Azimuts rectangulaires en dehors du Méridien magnétique et je calcule l'Inclinaison vraie par la formule "$\text{Cotg.}^2 I = \text{cotg.}^2 i' + \text{cotg.}^2 i''$."

La Déclinaison magnétique est le seul élément que la nature de mes appareils m'ait permis d'étudier avec suite Je me suis servi du Magnétomètre unifilaire de déclinaison comme d'une boussole des variations ; quatre fois par mois pendant l'année 1874, et 8 fois depuis le commencement de l'année 1875, j'ai relevé de demi-heure en demi-heure, depuis 6h. du matin jusqu'à 6h. du soir, la position de l'axe magnétique

de l'aimant par rapport au réticule de la lunette fixe. Pendant la nuit le mouvement de l'aiguille, chaque fois que j'ai fait des observations de 24 heures, a été excessivement faible et difficile à saisir avec le déclinomètre ; néanmoins je donnerai ce que j'ai pu obtenir à cet égard. J'ai réduit toutes ces observations horaires de la déclinaison au Temps vrai de Zi-ka-wei.

La Déclinaison et l'Intensité horizontale ont été corrigées de l'erreur que le voisinage des briques magnétiques, dont j'ai parlé plus haut, avait introduite dans les valeurs absolues de ces deux éléments : des observations spéciales ont été faites dans ce but en 4 endroits différents(1) assez distants de l'Observatoire qui est tout entier construit avec ces mêmes briques. La correction pour la déclinaison a été —2′ 30″.

Le terrain de toute la contrée est entièrement sédimentaire : soumise à l'épreuve de la boussole, la terre du pays n'a présenté aucun caractère magnétique sensible.

L'observatoire de Zi-ka-wei est à 6 kilom. environ au SO de Chang-Hai et à 30 kilom. de la mer de Chine.

M. Dechevrens, s.j.

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(1) Le pilier qui m'a servi pendant toute cette année à déterminer la Déclinaison en valeur absolue est à 10 mètres de l'Observatoire. Deux autres piliers en bois ont été établis l'un à 70 mètres environ, l'autre à 100 mètres au moins de tout bâtiment en briques ; enfin une observation a été faite sur pied mobile à plus de 500 mètres en rase compagne. Cette dernière observation, aussi bien que celles qui ont été faites à diverses reprises sur les deux nouveaux piliers m'ont montré la nécessité de faire la correction indiquée ici. Pour toutes ces observations de comparaison, le Méridien astronomique a été donné par l'observation répétée de la Polaire à son élongation maxima et par le Passage de quelques étoiles au Méridien.

I.—DÉCLINAISON MAGNÉTIQUE.

§ 1.—*Tableaux des Observations Horaires de la Déclinaison, Avril 1874—Avril 1875.*

Les grandes perturbations magnétiques, je le sais, ont été rares cette année et elles ont pu se manifester en des jours où je n'ai pas fait d'observations horaires ; cependant, on peut justement encore s'étonner de l'extrême régularité des mouvements de l'aiguille de déclinaison à Zi-ka-wei, régularité attestée non-seulement par la courbe diurne moyenne, mais encore et aussi bien par chacune des courbes particulières obtenues durant le printemps, l'été et l'automne. J'excepte les observations d'hiver qui indiquent toutes une oscillation diurne remarquablement faible et une certaine hésitation dans la marche de l'aiguille.

Je ne puis mieux commencer cet article qu'en donnant les deux belles courbes diurnes, obtenues l'une le 23 Mars 1874, l'autre le 22 Mars 1875, jours où s'est rencontré l'équinoxe de printemps (Tableau 1.). Ouvrant et fermant cette première année d'observations magnétiques à Zi-ka-wei, elles sont un remarquable exemple de la régularité des mouvements diurnes de l'aiguille de déclinaison, en même temps qu'elles manifestent une différence notable entre l'amplitude de l'oscillation pendant le jour et celle de l'oscillation pendant la nuit. Enfin on pourra juger d'un coup d'œil le changement de déclinaison survenu entre les deux époques, changement confirmé par les observations ultérieures.

La Déclinaison magnétique à Zi-ka-wei est Occidentale et elle va en augmentant. Le 23 Mars 1874 l'observation a commencé à 6h. du matin, et non à minuit comme le 22 Mars 1875 : j'ai donc été obligé de rapporter au commencement de la courbe, en le corrigeant de la variation d'un jour à l'autre, ce qui appartient réellement au 24 Mars 1874.

Ayant commencé, sans parti pris, cette série d'observations horaires le jour même de l'équinoxe de Printemps, j'ai été naturellement amené à les diviser en 4 parties, correspondant aux quatre saisons de l'année. Chaque partie contient donc 3 mois d'observations et généralement chacun d'eux comprend 4 observations régulierement distribuées.

Un tableau spécial, annexé à chaque saison, donne le minimum et le maximum semi-diurnes des jours d'observation, la moyenne de ces deux valeurs, enfin l'amplitude de l'oscillation semi-diurne, ou différence entre les maximum et minimum principaux de chaque jour.

Comme je n'ai observé que pendant le jour, et que je ne parlerai jamais que des maximum et minimum principaux, j'appellerai désormais *Oscillation diurne* et non semi-diurne, le mouvement de l'aiguille effectué d'Orient en Occident entre 9h. du matin et 2h. de l'après-midi. Les autres inflexions de la courbe, qui pourraient se rencontrer dans l'intervalle des 13 heures d'observation, je les désignerai toujours par les noms de Minima et Maxima secondaires.

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

I.—Printemps 1874.

Temps vrai.	23 Mars 1874	29 Mars 1874	6 Avril 1874	12 Avril 1874	30 Avril 1874	3 Mai 1874	11 Mai 1874
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
6h. M.	1 53 17	1 53 47	1 49 19	1 50 12	1 51 24	1 51 8	1 48 24
7h. ,,	52 43	52 13	48 17	48 44	50 4	49 18	47 5
8h. ,,	51 5	49 58	47 41	46 59	49 9	48 48	46 56
9h. ,,	49 7	46 58	47 7	46 38	48 49	49 52	48 9
10h. ,,	48 53	45 18	48 33	47 42	50 53	52 19	49 32
11h. ,,	50 6	49 7	50 54	49 10	54 19	54 29	51 23
Midi	52 29	51 37	53 16	50 29	55 19	56 18	52 48
1h. S.	55 4	52 43	55 17	51 49	56 14	57 17	53 17
2h. ,,	56 21	52 46	56 5	51 49	55 44	56 38	52 25
3h. ,,	55 15	50 56	55 23	50 46	54 29	55 30	51 49
4h. ,,	53 38	49 44	54 21	49 44	53 29	54 11	51 26
5h. ,,	52 12	49 3	53 12	49 8	52 37	52 58	51 2
6h. ,,	52 21	48 30	52 9	49 3	52 49	52 54	50 26
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	1 52 30	1 50 12	1 51 39	1 49 23	1 52 43	1 53 13	1 50 22

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Minima	1 48 48	1 45 4	1 47 6	1 46 30	1 48 38	1 48 44	1 46 52
Maxima	56 24	53 6	56 5	52 3	56 44	57 17	53 17
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	1 52 36	1 49 5	1 51 35	1 49 16	1 52 41	1 53 0	1 50 4
	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
Amplit.	7 36	8 2	8 59	5 33	8 6	8 33	6 25

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

I.—Printemps 1874.

Temps vrai.	17 Mai 1874	23 Mai 1874	31 Mai 1874	6 Juin 1874	14 Juin 1874	Moyennes horaires.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
6h. M.	1 47 12	1 48 19	1 47 6	1 48 10	1 49 4	1 49 46
7h. ,,	46 11	47 15	45 59	46 13	47 50	48 29
8h. ,,	46 24	46 34	45 47	45 11	47 3	47 38
9h. ,,	47 4	47 12	47 13	45 29	47 0	47 33
10h. ,,	48 34	48 9	48 18	46 15	47 20	48 29
11h. ,,	50 44	49 11	50 44	49 56	48 53	50 44
Midi	52 29	50 25	52 12	52 50	51 22	52 38
1h. S.	52 59	51 14	52 54	53 55	54 13	53 55
2h. ,,	52 56	51 43	53 3	54 29	54 34	54 3
3h. ,,	52 31	51 36	52 34	54 16	53 40	53 14
4h. ,,	52 8	50 54	52 28	52 32	52 12	52 14
5h. ,,	51 44	49 44	51 54	51 48	50 27	51 14
6h. ,,	50 42	49 29	50 23	50 28	49 32	50 43
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	1 49 59	1 49 22	1 50 6	1 50 7	1 50 15	1 50 49

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	
Minima	1 45 42	1 46 36	1 45 43	1 45 10	1 46 46	
Maxima	53 44	51 46	53 10	54 30	54 54	
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	1 49 43	1 49 11	1 49 26	1 49 50	1 50 50	1 50 37
	′ ″	′ ″	′ ″	″	′ ″	′ ″
Amplit.	8 2	5 10	7 27	9 20	8 8	7 36

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

II.—Eté 1874.

Temps vrai.	22 Juin 1874	29 Juin 1874	1 Juillet 1874	5 Juillet 1874	29 Juillet 1874	5 Août 1874	12 Août 1874
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
6h. M.	1 45 55	1 44 45	1 46 0	1 46 24	1 47 39	1 47 53	1 47 30
7h. ,,	45 26	43 18	44 43	45 57	46 20	47 9	45 30
8h. ,,	45 18	42 20	43 27	45 37	46 26	46 58	44 34
9h. ,,	44 57	41 58	43 37	45 44	47 52	48 6	46 2
10h. ,,	46 15	43 21	45 58	47 31	51 6	49 43	48 25
11h. ,,	47 20	46 6	48 37	49 14	53 22	50 26	51 32
Midi	49 14	48 40	50 44	50 19	54 25	51 56	52 52
1h. S.	49 44	50 37	52 32	51 52	54 46	53 10	53 42
2h. ,,	50 14	51 51	52 12	52 6	54 48	53 24	52 46
3h. ,,	50 14	51 51	51 3	51 18	53 20	53 3	51 20
4h. ,,	50 2	51 9	49 40	50 14	52 2	52 20	49 35
5h. ,,	49 47	48 58	48 12	50 2	50 49	51 44	48 35
6h. ,,	48 24	48 20	48 12	50 2	49 58	51 6	49 10
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	1 47 57	1 47 10	1 48 5	1 48 57	1 50 59	1 50 32	1 49 21

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Minima	1 44 57	1 41 58	1 43 21	1 46 4	1 45 44	1 46 37	1 44 32
Maxima	50 28	52 14	53 9	52 38	54 54	53 24	53 48
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	1 47 42	1 47 6	1 48 15	1 49 21	1 50 19	1 50 0	1 49 10
	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
Amplit.	5 31	10 16	9 48	6 34	9 10	6 47	9 16

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

II.—Eté 1874.

Temps vrai.	20 Août 1874	27 Août 1874	4 Sept. 1874	12 Sept. 1874	21 Sept. 1874	Moyennes horaires.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
6h. M.	1 49 39	1 48 24	1 48 59	1 49 10	1 49 21	1 47 38
7h. „	47 34	47 3	47 26	48 11	48 56	46 28
8h. „	46 15	46 21	46 45	47 17	47 49	45 45
9h. „	46 15	47 17	48 21	47 17	47 31	46 15
10h. „	47 21	49 17	50 53	49 7	48 56	48 9
11h. „	48 45	51 49	53 11	51 36	50 2	50 13
Midi	50 45	54 7	54 54	53 6	51 19	51 52
1h. S.	52 7	55 16	55 29	54 7	52 46	53 1
2h. „	52 34	55 6	54 48	53 51	52 54	53 8
3h. „	51 25	53 40	53 22	52 41	51 59	52 6
4h. „	50 16	52 30	51 48	51 17	50 46	50 59
5h. „	49 21	51 22	51 20	50 48	50 16	50 6
6h. „	49 50	51 7	50 39	50 28	50 16	49 47
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	1 49 24	1 51 2	1 51 23	1 50 41	1 50 13	1 49 39

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	
Minima	1 46 8	1 46 22	1 46 39	1 47 0	1 47 23	
Maxima	52 35	55 44	55 34	54 20	53 3	
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	1 49 22	1 51 3	1 51 6	1 50 40	1 50 13	1 49 31
	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
Amplit.	6 27	9 22	8 55	7 20	5 40	7 55

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

III.—Automne 1874.

Temps vrai.	26 Sept. 1874	2 Oct. 1874	10 Oct. 1874	18 Oct. 1874	25 Oct. 1874	1 Nov. 1874	9 Nov. 1874
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
6h. M.	1 55 19	1 57 44	1 59 22	2 1 38	2 2 2	2 2 35	2 1 38
7h. ,,	54 29	57 24	57 34	1 30	1 55	2 45	1 33
8h. ,,	53 29	56 34	27 21	1 59 58	0 41	2 24	1 33
9h. ,,	53 24	56 1	56 37	59 3	0 38	1 37	1 30
10h. ,,	55 4	56 34	57 3	59 24	0 53	0 28	2 28
11h. ,,	57 30	57 56	58 27	2 0 27	1 34	1 9	2 42
Midi	59 59	2 0 4	2 0 29	2 4	3 10	2 17	1 40
1h. S.	2 0 57	1 14	2 34	3 30	3 44	1 32	1 33
2h. ,,	1 59 44	1 8	2 14	3 26	3 0	1 55	0 34
3h. ,,	58 44	1 59 58	1 18	2 50	2 31	1 23	1 59 50
4h. ,,	57 14	58 44	1 59 53	1 36	1 45	0 35	2 0 6
5h. ,,	56 24	58 18	59 14	1 9	1 37	0 11	0 6
6h. ,,	56 48	58 18	59 23	1 29	1 48	0 1	0 20
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	1 56 51	1 58 27	1 59 21	2 1 23	2 1 57	2 1 27	2 1 11

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Minima	1 53 12	1 55 59	1 56 34	1 58 37	2 0 33	2 0 14	1 59 46
Maxima	2 0 59	2 1 30	2 2 49	2 3 24	3 51	2 32	2 3 9
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	1 57 0	1 58 44	1 59 41	2 1 1	2 2 12	2 1 23	2 1 27
	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
Amplit.	7 47	5 31	6 15	4 47	3 18	2 18	3 23

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

III.—Automne 1874.

Temps vrai.	17 Nov. 1874	25 Nov. 1874	1 Déc. 1874	9 Déc. 1874	16 Déc. 1874	Moyennes horaires.
	° ′ ″	° ′ ″	° ′ °	° ′ ″	° ′ ″	° ′ ″
6h. M.	1 59 40	1 59 2	1 58 14	1 59 52	1 59 27	1 59 43
7h. ,,	59 49	58 55	58 14	59 52	59 38	59 28
8h. ,,	59 1	57 46	57 39	59 30	59 5	58 45
9h. ,,	58 27	57 12	56 17	58 44	58 22	58 9
10h. ,,	58 40	57 0	56 26	58 30	58 1	58 23
11h. ,,	59 56	57 54	57 46	58 55	58 35	59 24
Midi	2 1 3	59 40	58 48	59 11	2 0 25	2 0 39
1h. S.	1 18	59 54	59 3	58 58	1 59 46	1 10
2h. ,,	1 38	59 26	59 20	58 30	2 0 16	0 56
3h. ,,	1 24	59 9	57 55	58 27	1 59 52	0 16
4h. ,,	0 50	58 49	57 6	58 27	58 52	1 59 30
5h. ,,	0 29	58 21	56 35	58 30	58 20	59 6
6h. ,,	1 59 35	58 35	56 20	58 18	57 40	59 3
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	2 0 8	1 58 36	1 57 40	1 58 54	1 59 1	1 59 35

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	
Minima	1 58 27	1 57 0	1 56 5	1 58 24	1 57 58	
Maxima	2 1 52	2 0 15	59 30	59 31	2 0 27	
	° ′ °	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	2 0 9	1 58 37	1 57 48	1 58 57	1 59 13	1 59 41
	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
Amplit.	3 25	3 15	3 25	1 7	2 29	3 55

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

IV.—Hiver 1874-75.

Temps vrai.	23 Déc. 1874	31 Déc. 1874	8 Jan. 1875	15 Jan. 1875	22 Jan. 1875	29 Jan. 1875	6 Fév. 1875
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
6h. M.	1 59 20	2 0 54	1 59 13	2 0 21	2 0 6	1 59 20	1 59 28
7h. ,,	2 0 10	0 52	59 44	1 59 30	1 59 53	58 51	59 54
8h. ,,	1 59 0	1 59 29	58 37	58 39	58 13	58 34	59 44
9h. ,,	58 26	58 10	57 32	58 52	57 50	57 42	59 0
10h. ,,	58 11	58 54	57 56	2 0 14	58 17	58 6	58 47
11h. ,,	2 0 9	59 54	59 17	1 37	58 58	59 5	59 20
Midi	2 6	2 0 35	2 0 35	2 35	58 58	2 0 20	59 45
1h. S.	1 52	1 0	0 16	2 16	58 51	1 59 52	59 41
2h. ,,	1 3	1 27	1 59 48	1 29	58 38	59 11	58 47
3h. ,,	1 59 56	1 59 52	59 3	0 25	58 38	58 37	58 20
4h. ,,	59 20	59 38	58 12	1 59 24	58 53	58 10	58 20
5h. ,,	59 20	59 13	57 51	59 50	59 18	58 10	58 54
6h. ,,	59 6	59 19	58 19	59 54	59 18	58 37	59 0
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	″ ′ ″	° ′ ″	° ′ ″
Moys.	1 59 50	1 59 42	1 58 59	2 0 24	1 58 55	1 58 49	1 59 14

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Minima	1 57 44	1 58 8	1 57 25	1 58 32	1 57 39	1 57 28	1 58 40
Maxima	2 2 17	2 1 2	2 0 35	2 2 40	2 0 6	2 0 37	2 0 1
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	2 0 0	1 59 35	1 59 0	2 0 36	1 58 53	1 59 2	1 59 20
	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
Amplit.	4 33	2 54	3 10	4 8	2 27	3 9	1 21

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

IV.—Hiver 1874-75.

Temps vrai.	13 Fév. 1875	20 Fév. 1875	28 Fév. 1875	8 Mars 1875	14 Mars 1875	Moyennes horaires.
	° ′ ″	° ′ ″	″ ′ ″	° ′ ″	° ′ ″	° ′ ″
6h. M.	1 59 25	1 58 20	1 58 46	1 57 24	1 57 42	1 59 12
7h. ,,	58 47	58 42	58 17	57 38	57 6	59 12
8h. ,,	58 30	58 24	57 39	56 40	55 30	58 15
9h. ,,	58 30	58 1	56 35	55 14	54 28	57 32
10h. ,,	58 19	58 14	57 42	55 35	54 12	57 53
11h. ,,	58 53	57 47	58 17	56 31	55 30	58 46
Midl	59 55	58 13	58 37	58 13	57 50	59 48
1h. S.	2 0 0	58 42	59 8	2 0 5	59 9	2 0 5
2h. ,,	1 59 27	58 42	58 58	0 1	59 9	1 59 44
3h. ,,	59 0	58 7	58 46	1 59 12	58 29	59 2
4h. ,,	59 0	57 37	58 29	57 44	57 33	58 32
5h. ,,	58 33	57 40	57 52	56 50	56 39	58 21
6h. ,,	58 50	57 54	58 24	58 5	57 19	58 41
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moys.	1 59 1	1 58 11	1 58 16	1 57 38	1 56 58	1 58 51

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	
Minima	1 58 2	1 57 34	1 57 13	1 55 1	1 53 55	
Maxima	2 0 15	58 42	59 18	2 0 10	59 29	
	° ′ ″	° ′ ″	° ′ °	° ′ °	° ′ ″	° ′ ″
Moys.	1 59 8	1 58 8	1 58 15	1 57 35	1 56 42	1 58 55
	′ ″	′ ″	′ ″	′ ″	′ ″	′″
Amplit.	2 13	1 8	2 5	5 9	5 34	5 12

§2.—VARIATION DIURNE DE LA DÉCLINAISON EN 1874-75.

Les moyennes horaires pour le Printemps et l'Eté, pour l'Automne et l'Hiver, présentent assez de ressemblance pour qu'il soit naturel de les combiner ensemble respectivement ; on partage ainsi l'année en deux parties, la première comprenant les six mois d'été écoulés entre l'équinoxe de printemps et l'equinoxe d'automne, la seconde renfermant les résultats des six autres mois, qui seront les mois d'hiver. Cette division de l'année a encore cet avantage qu'elle mettra en évidence une relation entre l'oscillation diurne de l'aiguille et la déclinaison du soleil.

Le Tableau V donne les moyennes horaires absolues pour ces deux parties de l'année ; voici d'après ce tableau la variation horaire diurne de la déclinaison magnétique pour l'Eté et l'Hiver et la variation diurne moyenne pour l'année 1874-75 à Zi-Ka-Wei.

VARIATION HORAIRE DIURNE DE LA DÉCLINAISON.

Heures t.v. de Zi-ka-wei.	Eté Soleil ds. l'hém. N.	Hiver Soleil ds. l'hém. S.	Moyennes annuelles.
6h. matin	2′,00	1′,61	1′,80
7h. ,,	0 ,78	1 ,45	1 ,11
8h. ,,	0 ,00	0 ,42	0 ,21
9h. ,,	0 ,21	0 ,00	0 ,10
10h. ,,	1 ,63	0 ,29	0 ,96
11h. ,,	3 ,78	1 ,24	2 ,51
Midi	5 ,30	2 ,40	3 ,85
1h. soir	6 ,77	2 ,78	4 ,77
2h. ,,	6 ,86	2 ,49	4 ,67
3h. ,,	5 ,97	1 ,82	3 ,89
4h. ,,	4 ,91	1 ,17	3 ,04
5h. ,,	3 ,97	0 ,88	2 ,42
6h. ,,	3 ,56	1 ,02	2 ,29

Les valeurs portées dans la 4ème colonne donnent la courbe graphique du Tableau II.

N'ayant point fait assez d'observations de nuit pour pouvoir donner ici la variation diurne en dehors des heures du jour, je me contenterai de transcrire le résultat de l'observation semi-horaire du 22 Mars 1875 dont j'ai déjà donné, Tableau I, la courbe complète.

VARIATION HORAIRE DE LA DÉCLINAISON LE 22 MARS 1875.

Minuit	2′,83	Midi	4′,99
1h. matin	2 ,10	1h. soir	6 ,70
2h. ,,	1 ,93	2h. ,,	7 ,04
3h. ,,	2 ,44	3h. ,,	5 ,34
4h. ,,	2 ,61	4h. ,,	3 ,75
5h. ,,	2 ,95	5h. ,,	2 ,60
6h. ,,	2 ,84	6h. ,,	2 ,53
7h. ,,	2 ,15	7h. ,,	3 ,29
8h. ,,	0 ,79	8h. ,,	3 ,29
9h. ,,	0 ,00	9h. ,,	3 ,06
10h. ,,	0 ,28	10h. ,,	3 ,05
11h. ,,	2 ,16	11h. ,,	2 ,95

D'après ces deux tableaux la déclinaison magnétique à Zi-ka-Wei en 1874-75 aurait en moyenne, dans l'intervalle de 24 heures, présenté 3 minima orientaux et 3 maxima occidentaux ; le minimum dans la matinée et le maximum de l'après-midi sont de beaucoup les plus importants et c'est, comme je l'ai dit, leur difference que j'ai prise comme amplitude de l'oscillation diurne

1	Minimum	vers 2h. m.	1	Maximum	entre 5 et 7h. m.
2	Id.	vers 9h. ,,	2	Id.	entre 1 et 2h. s.
3	Id.	entre 5 et 7h. s.	3	Id.	entre 7 et 9h. ,,

Depuis le lever jusqu'au coucher du Soleil, l'aimant prend successivement trois directions dans sa marche ; son pôle nord part de l'Occident vers le lever du Soleil, atteint sa plus grande élongation orientale vers 9h. du matin ; puis il revient sur ses pas avec un maximum de vitesse entre 10h. et 11h. ; entre 1h. et 2h. de l'après-midi, il est à sa plus grande élongation occidentale; dès lors il reprend sa marche vers l'Orient pour s'arrêter encore entre 5h. et 6h. du soir et commencer son excursion nocturne en sens inverse.

Telle est la marche générale du phénomène ; en hiver le Maximum du matin se présente après 6h. ; de même le Minimum du soir se rencontre avant 5h. ; de telle sorte que dans l'intervalle de 12 heures, on peut observer dans la courbe semi-diurne deux minima et deux maxima; bien plus j'ai été assez étonné plusieurs fois, entr'autres jours le 6 Février 1875, de constater l'existence, dans le même intervalle de temps, de trois mouvements complets de va-et-vient très-bien marqués et presque d'égale amplitude. Cette courbe est assez intéressante pour que l'on puisse la reproduire exactement au moyen des valeurs suivantes et de celles qui sont portées à cette date dans le tableau des observations, page 12.

1	Minimum	6h.	10m.	1°	59′	27″
1	Maximum	7	20	2	0	1
2	Minimum	9	45	1	58	40
2	Maximum	12	30	2	0	1
3	Minimum	3	35	1	58	12
3	Maximum	5	30	1	59	0

§ 3.—AMPLITUDE DE L'OSCILLATION DIURNE DE LA DÉCLINAISON.

Plusieurs fois, pendant l'hiver, la courbe diurne ne présenta pas ses inflexions normales ; j'ai été alors forcé de prendre comme amplitude de l'oscillation la différence entre la plus forte et la plus faible déclinaison de la journée à quelqu'heure qu'elles se soient rencontrées.

Voici les moyennes mensuelles de l'amplitude de l'oscillation diurne à Zi-ka-wei, pendant l'anné 1874-75. Voir Tableau IV.

AMPLITUDE DE L'OSCILLATION DIURNE DE LA DÉCLINAISON.

Avril	1874	7′,53	Octobre	1874	4′,96
Mai	,,	7 ,40	Novembre	,,	3 ,20
Juin	,,	9 ,06	Décembre	,,	2 ,95
Juillet	,,	8 ,50	Janvier	1875	3 ,30
Août	,,	7 ,96	Février	,,	1 ,92
Septembre	,,	6 ,81	Mars	,,	5 ,77

Le Maximum d'amplitude en Juin et le Minimum en Décembre se détachent nettement. Le mois de Février présente une anomalie; les deux moyennes de Janvier et de Mars paraissent être régulières, celle de Février, qui est plus faible même que celle de Décembre, demande à être expliquée ou à être rectifiée.

Le ferai encore une remarque qui peut avoir son intérêt : l'oscillation diurne, le jour de l'Equinoxe de Printemps, a été plus forte que l'oscillation diurne, le jour du Solstice d'été ; de même l'oscillation, le jour de l'Equinoxe d'Automne surpassa celle du jour du Solstice d'hiver; enfin la moyenne des oscillations pour les jours des Equinoxes est plus élevée que la moyenne correspondante pour les jours des Solstices : voici ces valeurs comparées:

Equinoxes.		Solstices.	
Printemps.....	7′,59	6′,51	Eté
Automne	5 ,66	4 ,55	Hiver
Moyenne	6 ,62	5 ,53	Moyenne

Partageons encore ici l'année en deux grandes périodes ; et nous trouverons que les fortes amplitudes coincident avec la présence du Soleil dans l'hémisphère Nord, les faibles avec sa présence dans l'hémisphère opposé:

Soleil dans l'hémisphère N.	Soleil dans l'hémisphère S.
Printemps et Eté	Automne et Hiver
Amplitude moyenne..7′ 88	3″ 55..Amplitude moyenne

La différence est notable ; mais elle apparaîtra mieux encore par le contraste des deux courbes diurnes Minimum et Maximum de l'année.

Le Maximum d'amplitude de l'oscillation diurne, à Zi-ka-wei, en 1874-75, a été observé le 1 Juin 1874: 11′ 05.

Le Minimum, qui a été de 1′ 13, appartient au 20 Février 1875.

Les deux courbes diurnes de ces deux jours extrêmes sont tracées dans le Tableau III.

Ces deux courbes extrêmes offrent très-heureusement un exemple frappant des caractères divers qu'a affectés la marche de l'aiguille de de déclinaison en été et en hiver. Dans l'un et l'autre cas, absence absolue de toute irrégularité, si ce n'est une légère hésitation vers 10h. du matin dans la courbe du 20 Février. Les trois mouvements de l'aiguille le 1 Juin, se sont, le 20 Février, augmentés de deux autres, de telle sorte qu'outre les deux inflexions principales de l'été, la courbe diurne en hiver possède en plus un maximum à 7h. du matin et un minimum secondaire vers 4½ du soir.

On voit enfin, par la comparaison de ces deux courbes extrêmes, que la variation annuelle de l'amplitude de l'oscillation diurne de la déclinaison magnétique à Zi-ka-wei est assez faible puisqu'elle n'a pas dépassé 9′ 92. Il est probable que cette limite variera d'une année à l'autre.

§ 4.—MOYENNES MENSUELLES DE LA DÉCLINAISON.

Le Tableau IV montre la courbe moyenne que l'aiguille de déclinaison a décrite pendant les différents mois de l'année 1874-75, à Zi-ka-wei : c'est la ligne moyenne qui traverserait les courbes partielles de la variation diurne mensuelle. Elle serait tracée au moyen des valeurs

suivantes qui sont les moyennes des observations horaires faites chaque mois.

MOYENNES MENSUELLES DE LA DÉCLINAISON EN 1874-75.

Avril	1874	1° 51′,25	Occid.	Octobre	1874	2° 0′,28	Occid.
Mai	,,	50 ,60	,,	Novembre	,,	0 ,34	,,
Juin	,,	48 ,82	,,	Décembre	,, 1	59 ,02	,,
Juillet	,,	49 ,37	,,	Janvier	1875	59 ,28	,,
Août	,,	50 ,07	,,	Février	,,	58 ,67	,,
Septembre	,,	52 ,28	,,	Mars	,,	57 ,66	,,

D'après ce Tableau, l'aiguille aimantée (pôle N.) de déclinaison aurait fait à Zi-ka-wei, pendant l'année 1874-75, une excursion complète d'Orient en Occident ; sa plus grande élongation orientale a eu lieu en Juin et sa plus grande élongation occidentale entre Octobre et Novembre 1874.

Un fait intéssant à noter, et déjà connu, est le brusque changement de déclinaison arrivé en Septembre, presqu'au moment où le Soleil traversait l'Equateur.(1)

Ainsi, le 21 septembre, la declinaison moyenne était de 1° 50′ 13″ ; le 24, elle était de 1° 55′ 38″ ; le 26 de 1° 56′ 51″, s'étant ainsi accrue de plus de 6 minutes en 6 jours. Le 25 octobre elle atteignit 2° 1′ 57″; enfin cefut le 8 novembre qu'elle arriva à son maximum de l'année; la moyenne fut trouvée de 2° 2′ 24″. Ce jour fut observée la plus grande élongation occidentale du pôle N. de l'aiguille aimantée à Zi-Ka-Wei pendant cette année ; à 11h. 15m., temps vrai de Zi-ka-wei, la déclinaison observée directement fut 2° 3′ 49″ ; la courbe diurne de ce jour présente une anomalie assez rare ici, c'est l'existence du maximum principal avant midi.

D'autre part, la plus faible déclinaison moyenne diurne observée s'est rencontrée le 29 Juin ; elle a été de 1° 47′ 10″ et ce jour aussi, l'aiguille atteignit sa plus grande élongation orientale, c. à. d. 1° 41′ 58″ à 9h. du matin.

Le tableau suivant rendra ces rapprochements plus saisissables ; on y a joint quelques autres valeurs qui peuvent être utilement comparées aux précedentes.

RÉSUMÉ DES VARIATIONS DE LA DÉCLINAISON A ZI-KA-WEI EN 1874-75.

Déclinaison	diurne moyenne	la plus forte	2° 2′ 24″	le 8 Nov. 1874	
		la plus faible	1° 47′ 10″	le 29 Juin ,,	
		différence	15′ 14″		
					h. m.
	Maxima observée	la plus forte	2° 3′ 49″	le 8 Nov. 1874	à 11 15m.
		la plus faible	1° 50′ 28″	le 22 Juin ,,	à 2.30s.
		différence	13′ 21″		
					h. m.
	Minima observée	la plus forte	2° 0′ 59″	le 8 Nov. 1874	à 9 15m.
		la plus faible	1° 41′ 58″	le 29 Juin ,,	à 9 0,,
		différence	19′ 1″		

Différence entre la *plus forte* déclinaison *Maxima* et la *plus faible Minima* 21′,51.

Déclinaison moyenne pour 1874-1875 : 1° 54′,72 Occidentale.

(1) Cette particularité n'a pas été observée en 1875 : après un maximum en Août, la déclinaison a diminué, au contraire, en Septembre et en Octobre.

§ 5.—VARIATION ANNUELLE DE LA DÉCLINAISON.

Tant de régularité dans tous les mouvements de l'aiguille me faisait espérer qu'une observation semi-horaire comprenant les 24 heures du 22 Mars 1875 et comparée à une observation semblable faite à pareil jour en 1874, me donnerait une valeur assez exacte de la variation annuelle de la déclinaison à Zi-ka-wei pour 1874-75. On peut voir Tableau I, les deux courbes tracées avec les valeurs observées.

Voici ce que je crois pouvoir conclure de ces deux observations, et ce que confirment pleinement, du reste, les observations faites pendant les premiers mois qui ont suivi celle du 22 Mars 1875.

Le 23 Mars 1874, déclinaison occidentale moyenne..1° 52′,43
22 „ 1875, „ „ „ ..1 58 ,28

d'où :

Variation annuelle de la Déclinaison Magnétique à Zi-ka-wei pour 1874-75.
5′,85.

§6. DÉCLINAISON MAGNÉTIQUE DANS SES RAPPORTS AVEC LA DECLINAISON DU SOLEIL.

La position de l'aiguille aimantée à un instant quelconque dépend de la situation du soleil relativement au Méridien du lieu d'observation et à l'Equateur terrestre. La première de ces deux influences est la plus importante et elle est facilement déterminée en calculant la variation horaire moyenne de l'année au moyen de toutes les observations faites dans tous les mois. On élimine ainsi ce qu'il y a de variable dans chacune de ces observations pour ne plus laisser subsister que ce qu'elles renferment de constant, le mouvement diurne de l'aiguille aimantée sous l'influence de la rotation diurne apparente du soleil autour de la Terre. Le Tableau II montre ce mouvement pour l'année 1874-75 à l'Observatoire de Zi-ka-wei.

La seconde influence, que le soleil a sur les mouvements de l'aiguille, tient à son changement de déclinaison durant le cours de l'année. Pendant les six mois que le soleil est dans l'hemisphère nord, l'amplitude de l'oscillation diurne est notablement supérieure à celle que l'on observe pendant les six autres mois de l'année : on est donc naturellement amené à rechercher la nature de cette influence de la déclinaison du soleil.

Je ne veux point ici déterminer la perturbation apportée, chaque mois, dans le mouvement moyen de l'aiguille, par la variation de la déclinaison du soleil ; je me contenterai de l'indiquer pour les quatre saisons de l'année.

Au moyen des observations horaires faites dans chaque mois, je calcule les moyennes horaires de chaque trimestre ; j'ai ainsi pour chaque heure quatre valeurs de la déclinaison dont la moyenne est évidemment la position qu'occuperait à cette heure-là, par rapport au Méridien du lieu d'observation, l'aiguille aimantée si la déclinaison du soleil était constante. Cela fait, on n'a plus qu'à retrancher chacune de ces valeurs moyennes de chaque valeur correspondante de la déclinaison dans les quatre saisons: le reste est évidemment l'effet du changement de position du soleil par rapport à l'Equateur ou de sa variation en déclinaison.

Les tableaux suivants donnent ces différentes valeurs ainsi que les courbes qui représentent ces effets. Les Tableaux V et VI en particulier montrent en valeur absolue et relative la variation diurne de la déclinaison en été et en hiver, c.à.d. quand le soleil était au-dessus ou au-dessous de l'Equateur. La Moyenne de ces deux courbes est la reproduction de celle du Tableau II et n'est autre que la courbe de la variation diurne de la déclinaison magnétique sous la seule influence de la rotation diurne apparente du soleil. Le Tableau VII au contraire montre les perturbations apportées dans la variation diurne de la déclinaison par ce changement de position du soleil sur l'Ecliptique.

VARIATION DIURNE CORRESPONDANT AUX QUATRE SAISONS DE L'ANNÉE.

Temps vrai.	Printemps.	Eté.	Automne.	Hiver.	Moyennes annuelles.
6h. matin	— 1′ 21″	— 1′ 52″	+ 0′ 12″	+ 0′ 34″	— 0′ 36″,7
7h. ,,	— 2 33	— 3 9	+ 0 4	+ 0 17	— 1 20 ,2
8h. ,,	— 3 41	— 3 53	— 0 42	— 0 46	— 2 18
9h. ,,	— 3 24	— 3 18	— 1 22	— 1 30	— 2 23 ,5
10h. ,,	— 2 21	— 1 21	— 0 35	— 1 18	— 1 23 ,7
11h. ,,	0	+ 0 48	— 0 16	— 0 22	+ 0 2 ,5
Midi	+ 1 54	+ 2 28	+ 0 59	+ 0 50	+ 1 32 ,8
1h. soir	+ 3 4	+ 3 35	+ 1 21	+ 1 26	+ 2 21 ,5
2h. ,,	+ 3 32	+ 3 23	+ 1 16	+ 1 16	+ 2 21 ,7
3h. ,,	+ 2 41	+ 2 15	+ 0 28	+ 0 33	+ 1 29 ,2
4h. ,,	+ 1 24	+ 0 58	— 0 13	— 0 7	+ 0 30 ,5
5h. ,,	+ 0 44	+ 0 9	— 0 33	— 0 27	— 0 1 ,8
6h. ,,	+ 0 4	+ 0 1	— 0 38	— 0 9	— 0 10 ,5
Amplitude	7′ 18″	7′ 35″	2′ 47″	3′ 4″	5′ 2″

PERTURBATIONS DUES AU CHANGEMENT DE LA DÉCLINAISON DU SOLEIL.

Temps vrai.	Printemps.	Eté.	Automne.	Hiver.
6h. matin	— 0′ 44″,3	— 1′ 15″,3	+ 0′ 48″,7	+ 1′ 10″,7
7h. ,,	— 1 12 ,8	— 1 48 ,8	+ 1 24 ,2	+ 1 37 ,2
8h. ,,	— 1 23	— 1 35	+ 1 36	+ 1 32
9h. ,,	— 1 0 ,5	— 0 54 ,5	+ 1 1 ,5	+ 0 53 ,5
10h. ,,	— 0 57 ,3	+ 0 2 ,7	+ 0 48 ,7	+ 0 5 ,7
11h. ,,	— 0 2 .5	+ 0 45 ,5	— 0 18 ,5	— 0 24 ,5
Midi	+ 0 21 ,2	+ 0 55 ,2	— 0 33 ,8	— 0 42 ,8
1h. soir	+ 0 42 ,5	+ 1 13 ,5	— 1 0 ,5	— 0 55 ,5
2h. ,,	+ 1 10 ,3	+ 1 1 ,3	— 1 5 ,7	— 1 5 ,7
3h. ,,	+ 1 11 ,8	+ 0 45 ,8	— 1 1 ,2	— 0 56 ,2
4h. ,,	+ 0 53 ,5	+ 0 27 ,5	— 0 43 ,5	— 0 37 ,5
5h. ,,	+ 0 45 ,8	+ 0 10 ,8	— 0 31 ,2	— 0 25 ,2
6h. ,,	+ 0 14 ,5	+ 0 11 ,5	— 0 27 ,5	+ 0 1 ,5

NOTA.—Le signe + indique que l'aiguille est à l'Occident de sa position moyenne et le signe — qu'elle est à l'Orient.

(*Tableaux graphiques* V, VI et VII).

Tel serait dans les quatre saisons de l'année l'effet du déplacement du Soleil sur l'Ecliptique. On peut remarquer que ces quatre courbes (Tableau VII) sont d'une forme pareille à celle de la courbe diurne annuelle, due à la rotation diurne apparente du Soleil ; qu'elles sont opposées pour les époques de déclinaison opposée ; qu'elles sont un peu moins prononcées pour les deux saisons équinoxiales. La plus grande excursion a lieu en Eté et la plus faible au Printemps ; lorsque le Soleil est au-dessus de l'Equateur, son action perturbatrice est en tous points inverse de celle qu'il possède dans l'hémisphère austral, et de plus elle est de même sens que l'action constante due à sa rotation : de là les grandes amplitudes en Eté et les faibles en Hiver.

§ 7.—VARIATION DIURNE DE LA VITESSE DE L'AIGUILLE DE DÉCLINAISON.

On détermine cette variation en calculant les différences successives que présentent entr'elles les valeurs des déclinaisons horaires moyennes pour l'été et pour l'hiver. Voici ces valeurs pour Zi-ka-wei, en 1874-75.

VARIATION DIURNE DE LA VITESSE DE L'AIGUILLE DE DÉCLINAISON.

Intervalles de Temps vrai.	Eté.	Hiver.	Vitesse moyenne.
6h. - 7h. matin	— 1′ 13″,8	— 0′ 9″,5	— 0′ 41″,6
7h. - 8h. ,,	— 0 46 ,7	— 0 47 ,5	— 0 47 ,1
8h. - 9h. ,,	+ 0 12 ,5	— 0 39 ,7	— 0 13 ,6
9h. - 10h. ,,	+ 1 25 ,2	+ 0 17 ,5	+ 0 51 ,3
10h. - 11h. ,,	+ 2 9	+ 0 57 ,5	+ 1 33 ,3
11h. - 12h. ,,	+ 1 46 ,8	+ 1 8 ,5	+ 1 27 ,6
0h. - 1h. soir	+ 0 57 ,7	+ 0 23 ,5	+ 0 40 ,6
1h. - 2h. ,,	+ 0 20 ,3	— 0 17 ,5	+ 0 1 ,4
2h. - 3h. ,,	— 0 53	— 0 40 ,3	— 0 46 ,6
3h. - 4h. ,,	— 1 3 ,8	— 0 39	— 0 51 ,4
4h. - 5h. ,,	— 0 56 ,2	— 0 17	— 0 36 ,6
5h. - 6h. ,,	— 0 25	+ 0 8	— 0 8 ,5

Le signe + indique que le sens du mouvement de l'aiguille (pôle N.) est occidental et le signe — qu'il est oriental par rapport à la position moyenne.

Les deux courbes du Tableau VIII représentent les valeurs portées dans les deux colonnes du Tableau précédent intitulées : Eté—Hiver. La courbe pleine intermédiaire est la vitesse moyenne de l'aiguille pendant l'année 1874-75.

En résumé

	Vitesse maxima		Vitesse nulle	
	Eté	Hiver	Eté	Hiver
Orientale	de 6h. à 7h. m.	de 7h. à 8h. m.	vers 8h. 15m. m.	vers 6h. 0m. m.
Occidentale	10h. à 11h. m.	11h. à 12h. m.	1h. 30m. s.	9h. 15m. m.
Orientale	3h. à 4h. s.	2h. à 3h. s.	6h. 0m. s.	1h. et 5h. s.

Ainsi en Eté l'aiguille de déclinaison possède sa vitesse maxima le matin, une heure plus tôt et, le soir, une heure environ plus tard qu'en Hiver.

En moyenne, c'est vers 11h. du matin qu'elle a eu en 1874-75, à Zi-ka-wei, sa plus grande vitesse; alors elle se dirigeait vers l'Occident et sa marche moyenne à cet instant a été d'environ 1″ 5 par minute de temps.

C'est aussi à ce moment qu'elle occupe sensiblement sa position moyenne diurne.

II.—INCLINAISON MAGNÉTIQUE.

Je l'ai dit dans les préliminaires, je ne puis donner qu'une valeur approchée de cet élément du Magnétisme terrestre à Zi-ka-wei pour 1874-75. La multiplicité des positions où j'ai fait ces observations autour de l'Observatoire ne me permet pas de retrouver celles qui ont été faites dans de mauvaises conditions, et qui par conséquent devraient recevoir une correction : malheureusement ces observations défectueuses forment la plus grande partie de la série.

La moyenne annuelle que j'avais obtenue ainsi pour 1874-75 donnait pour Inclinaison de l'aiguille aimantée à Zi-ka-wei

46° 10.

De nouvelles observations faites dans de meilleures conditions m'ont donné pour la dernière quinzaine du mois d'Avril 1875 (2 observ. comt plètes) 46° 17′,5 ; 4 autres observations donnent pour moyenne pendan- le mois de Mai 1875 46° 13′,4.

On peut donc admettre sans craindre de trop s'écarter de la verité que l'Inclinaison de l'aiguille aimantée à Zi-ka-wei est de

46° 15′ environ.

Comment varie l'Inclinaison à cette station ?

En Juin 1843 sir E. Home trouve pour Inclinaison magnétique à Chang-hai 44° 45′.

En Juin 1858 le capitaine Shadwell obtient 45° 18′.

Ainsi en 15 années l'Inclinaison aurait augmenté de 33′, c.à.d. d'un peu plus de 2′ par an.

De 1858 à 1875 la variation aurait été d'environ 57′ ou d'un peu plus de 3′ chaque année, ce qui s'accorde assez bien avec la valeur que cette variation prend dans d'autres régions du globe, notamment avec la variation en Europe où elle est de 3′,5 environ.

III.—INTENSITÉ MAGNÉTIQUE.

Je ne puis donner, pour cette année 1874-75, que les valeurs de la *Composante horizontale*, trouvée directement par l'observation de l'oscillation d'un aimant et la déviation qu'il fait subir à une aiguille librement suspendue à la distance de 1 pied et de 1,3 pied anglais. N'ayant qu' une valeur approximative de l'Inclinaison, pour cette année, je ne calculerai qu'une valeur également approchée de la *Composante verticale* et de *l'Intensite totale*. On trouvera ces résultats dans le résumé général.

DÉTERMINATION DE LA COMPOSANTE HORIZONTALE DE L'INTENSITÉ MAGNÉTIQUE A ZI-KA-WEI, POUR L'ANNÉE 1874-1875.

Mois.	Jours du mois.	Temps moyen.	Durée corrigée de l'oscillation de l'aimant.	Moment magnétique de l'aimant.	Composante horizontale.
Avril 1874	11	9h. 15m. m.	2s. 7754	0. 83807	6. 94193
	19	9 5	7759	83803	93924
	25	10 85	7702	83915	96042
Mai „	7	9h. 20m. m.	2s. 7740	0. 83816	6. 94871
	24	12 15 s.	7749	83698	95436
Juin „	10	2h. 30m. s.	2s. 7771	0. 83636	6. 94860
	21	9 0 m.	7772	83605	95169
Juillet „	4	8h. 30m. m.	2s. 7798	0. 83565	6. 94179
	30	8 0	7770	83561	95562
Août „	10	8h. 10m. m.	2s. 7802	0. 83587	6. 93734
	23	8 0	7774	83557	95419
Septembre „	..	....	....	....	....
Octobre „	10	9h. 40m. m.	2s. 7786	0. 83506	6. 95221
	23	8 40	7852	83210	94275
Novembre „	15	8h. 45m. m.	2s. 7806	0. 83389	6. 94860
	30	8 45	7808	83365	94868
Décembre „	6	8h. 40m. m.	2s. 7812	0. 83346	6. 94806
	14	10 0	7822	83239	95223

La publication des observations magnétiques faites pendant l'année 1875 devant suivre de très-près cette première publication pour 1874, je renvoie le détail des observations des trois premiers mois de 1875 au bulletin de 1875 qui comprendra ainsi une année complète de magnétisme à partir du 1 Janvier. Je donne néanmoins dans le tableau suivant toutes les moyennes relatives à l'insensité horizontale jusqu' à Avril 1875.

COMPOSANTE HORIZONTALE DE L'INTENSITÉ MAGNÉTIQUE.

Mois.	Durée moyenne corrigée de l'oscillation de l'aimant.	Moment magnétique moyen de l'aimant.	Composante horizontale moyenne de l'Intensité.
Avril 1874	2s. 7738	0. 8384	6. 94719
Mai ,,	7744	8376	95153
Juin ,,	7772	8362	95014
Juillet ,,	7784	8356	94870
Août ,,	7788	8357	94576
Septembre ,,	7790 ?	8350 ?	94648 ?
Octobre ,,	7819	8336	94749
Novembre ,,	7807	8338	94864
Décembre ,,	7817	8329	95014
Janvier 1875	7838	8316	95018
Février ,,	7847	8316	94881
Mars ,,	7832	8322	94900
Moyennes	2s. 7798	0. 8345	6. 94867

1.—L'intensité horizontale du Magnétisme terrestre, à Zi-ka-wei, en 1874-75, aurait présenté un *minimum* pendant l'été, c'est-à-dire, quand le Soleil était le plus éloigné de la Terre, et un *maximum* pendant l'hiver, quand le Soleil était le plus rapproché de la Terre.

2.—Le moment magnétique de l'aimant, qui m'a constamment servi pour ces observations, a diminué régulièrement pendant l'année : l'affaiblissement a été de 0,006 unité environ ou de $\frac{1}{130}$ de sa force moyenne.

RÉSUMÉ GÉNÉRAL.

1874-1875.

1—Déclinaison magnétique ..... 1° 54′,72 Occidentale.

2—Inclinaison magnétique .....46° 15′,00 environ.

3—Intensité magnétique		Unités anglaises	Unités métriques
	Composante horizontale	6. 94867	3. 20389
	Composante verticale	7. 25868	3. 34683
	Intensité totale	10. 04850	4. 63316

M. Dechevrens, s.j.

A. M. D. G.

OBSERVATOIRE

MÉTÉOROLOGIQUE ET MAGNÉTIQUE,

des Pères de la Compagnie de Jésus

à ZI-KA-WEI.

BULLETIN MÉTÉOROLOGIQUE,

JANVIER 1875.

NOTA.—Pour la position géographique de l'observatoire, les instruments utilisés, les notations employées, etc., voir la note préliminaire placée en tête du Bulletin de Septembre 1874.

TABLEAU MÉTÉOROLOGIQUE.—Janvier 1875.

Pression barométrique à zéro.

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
		mm	mm	mm	mm	mm	mm	mm	mm
24	1	776,54	777,16	776,88	774,79	774,74	775,53	774,82	775,78
25	2	73,79	74,36	75,09	73,22	73,83	74,27	74,82	74,20
26	3	74,89	75,55	76,10	74,47	74,05	74,47	73,93	74,78
27	4	71,95	72,01	71,85	70,01	69,17	70,48	70,12	70,80
28	5	70,95	71,46	72,78	71,87	72,40	73,28	73,48	72,32
29	6	73,39	73,82	74,82	73,42	73,28	73,86	73,17	73,68
30	7	71,89	71,70	71,98	69,06	68,16	67,77	65,97	69,50
1	8	62,62	61,80	61,69	60,10	59,67	60,39	60,63	60,99
2	9	62,58	64,33	66,64	66,69	68,36	71,05	72,00	67,38
3	10	73,06	73,31	73,77	71,95	72,08	72,21	70,32	72,39
4	11	68,81	68,42	68,90	66,60	66,76	66,01	68,09	67,94
5	12	68,51	68,85	69,62	67,50	67,70	68,04	67,74	68,28
6	13	68,86	71,04	72,04	70,76	71,67	73,03	72,83	71,46
7	14	72,30	72,41	72,75	70,38	70,44	71,54	71,15	71,57
8	15	68,83	68,98	68,68	65,71	68,58	64,97	63,66	67,06
9	16	61,83	63,08	63,72	62,89	63,88	65,22	65,65	63,75
10	17	65,86	66,49	67,73	66,05	66,98	67,89	67,96	66,99
11	18	68,54	69,18	70,48	69,85	70,41	71,14	72,47	70,30
12	19	72,02	72,67	72,81	72,71	72,42	72,61	73,17	72,63
13	20	71,99	72,31	73,56	71,75	71,91	72,53	72,49	72,36
14	21	72,58	72,56	73,03	72,25	72,29	73,04	72,10	72,55
15	22	71,41	71,45	72,09	70,10	69,67	70,05	69,48	70,61
16	23	69,09	69,27	69,88	68,68	69,11	69,87	70,31	69,46
17	24	69,99	70,29	70,37	69,44	69,16	68,85	68,42	69,50
18	25	68,47	69,98	71,46	70,32	71,08	71,61	71,91	70,69
19	26	71,84	72,29	73,00	70,99	70,56	71,12	71,22	71,57
20	27	71,33	71,79	72,72	70,82	70,56	70,93	70,45	71,23
21	28	69,06	68,52	69,03	66,94	68,66	70,77	72,23	69,33
22	29	71,48	71,70	72,24	70,14	69,84	70,47	70,60	70,92
23	30	70,22	70,66	71,40	69,58	69,16	69,52	69,86	70,06
24	31	68,69	68,47	68,66	66,60	66,04	67,62	69,92	68,00
Moyennes du	1–10	771,17	771,55	772,16	770,56	770,57	771,33	770,93	771,18
	11–20	68,76	69,34	70,03	68,42	69,08	69,50	69,52	69,28
	21–31	70,38	70,64	71,26	69,62	69,65	70,35	70,59	70,36
	mois	770,11	770,52	771,15	769,54	769,76	770,39	770,35	770,26

Maximum : 777,16 observé le 1 à 7 h. A.M.
Minimum : 759,67 „ le 8 à 4 h. P.M.
} différence : ..... 17,49 mm

TABLEAU MÉTÉOROLOGIQUE. — Janvier 1875.

Température sous l'abri.

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
		o	o	o	o	o	o	o	o
24	1	—4,3	—3,8	1,7	4,0	4,7	0,5	—1,3	0,21
25	2	—2,5	—1,6	4,4	6,6	6,4	2,7	1,1	2,44
26	3	—2,5	—2,3	3,5	6,6	6,5	2,3	1,0	2,16
27	4	0,3	0,2	5,4	8,0	7,8	3,3	1,3	3,76
28	5	—1,6	—2,1	4,0	5,7	4,0	2,4	1,5	1,99
29	6	1,2	0,3	3,0	5,0	4,2	2,0	—1,2	2,07
30	7	—0,2	0,2	4,6	9,3	8,0	5,0	5,4	4,61
1	8	7,1	7,0	11,0	13,3	13,0	10,7	8,7	10,11
2	9	7,0	6,2	6,0	8,9	6,8	3,5	1,2	5,66
3	10	—3,0	—2,3	3,7	4,5	4,3	3,4	2,7	1,90
4	11	3,5	0,1	8,9	12,0	10,7	7,8	7,0	7,14
5	12	6,0	5,8	6,3	6,8	6,3	5,2	5,8	6,03
6	13	2,8	2,2	2,6	4,0	3,2	1,7	0,8	2,47
7	14	1,0	0,8	3,4	4,8	4,2	3,5	3,0	2,96
8	15	4,0	4,1	7,7	8,1	6,9	6,4	7,4	6,37
9	16	7,0	6,6	6,4	6,0	6,4	5,4	5,0	6,11
10	17	3,7	1,9	6,1	7,5	6,8	5,4	4,0	5,08
11	18	3,9	3,0	5,0	5,6	3,8	1,4	0,0	3,24
12	19	—2,0	—2,0	0,7	1,7	0,4	—0,2	—0,1	—0,21
13	20	—0,5	—0,4	0,4	1,4	0,8	0,4	—0,7	0,20
14	21	—3,0	—2,8	—0,6	—0,3	—0,7	—1,3	—1,6	—1,47
15	22	—2,8	—3,2	0,4	1,6	1,0	—0,1	—0,2	—0,47
16	23	—1,0	—1,5	1,2	3,2	3,3	1,6	—1,4	0,77
17	24	—4,0	—4,9	3,8	5,4	5,6	2,0	0,0	1,13
18	25	0,7	0,6	1,1	3,0	2,5	0,5	—1,8	0,94
19	26	—4,6	—4,8	1,8	4,9	4,3	2,0	—1,0	0,37
20	27	—3,1	—4,4	3,0	5,6	6,5	1,3	0,1	1,28
21	28	0,0	0,0	5,9	8,9	2,7	—0,8	—1,8	2,13
22	29	—4,3	—4,3	0,3	3,8	4,0	—0,7	—2,0	—0,46
23	30	—5,3	—5,5	3,2	7,2	7,5	1,9	—0,9	1,16
24	31	—1,2	—2,0	5,8	10,8	11,0	5,9	2,7	4,71
Moyennes du	1–10	1,50	1,80	4,73	7.19	6,57	3,58	2,04	3,49
	11–20	2,94	2,21	4,75	5,79	4,95	3,70	3,22	3,94
	21–31	—2,60	—3,98	2,35	4,92	4,34	1,12	—0,72	0,92
	mois	0,07	—0,29	3,89	5,93	4,93	2,75	1,44	2,72

Maximum : 13,3 observé le 8 à 1 h. P.M.
Minimum : — 5,5 „ le 30 à 7 h. A.M.
} différence ..... o 18,8

Température maxima au soleil.
boule noire : 21,6 observée le 11
boule blanche : 15,9 „ „
} différence maxima des 2 thermomètres 6°,2 observée le 1er.

TABLEAU MÉTÉOROLOGIQUE.—Janvier 1875.

Tension de la vapeur.

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
		mm	mm	mm	mm	mm	mm	mm	mm
24	1	3,00	3,20	3,59	3,75	3,14	4,00	4,10	3,54
25	2	3,81	4,54	4,27	3,06	3,48	4,33	3,95	3,92
26	3	3,81	4,26	4,71	4,94	4,49	4,86	4,81	4,55
27	4	4,42	4,41	4,45	4,30	4,02	4,53	4,54	4,38
28	5	3,78	4,26	4,95	3,93	3,49	3,56	3,74	3,96
29	6	2,73	4,05	3,79	3,65	3,87	4,88	4,07	3,86
30	7	3,63	4,10	5,07	5,29	5,56	5,84	5,70	5,03
1	8	6,72	6,45	6,99	6,52	7,29	7,61	7,65	7,03
2	9	6,34	6,20	6,00	5,86	5,16	4,45	3,92	5,42
3	10	3,69	3,82	4,23	4,05	3,97	4,35	4,37	4,07
4	11	5,25	4,57	6,19	6,03	5,54	6,41	6,56	5,79
5	12	5,99	6,32	6,46	6,17	5,92	6,68	6,60	6,31
6	13	5,12	4,72	4,69	4,15	3,77	3,62	3,95	4,29
7	14	3,95	4,33	4,25	4,17	4,13	4,45	5,54	4,40
8	15	5,93	5,47	6,03	5,90	6,79	7,14	7,52	6,40
9	16	7,17	6,86	6,76	6,59	6,14	6,29	6,68	6,63
10	17	5,81	5,30	5,82	5,42	5,26	5,70	5,63	5,56
11	18	5,19	5,14	5,13	4,08	3,61	3,37	3,55	4,30
12	19	3,82	3,91	3,66	3,62	4,08	3,71	3,83	3,80
13	20	4,04	3,74	3,82	3,89	4,15	4,39	3,81	3,98
14	21	3,53	3,59	3,35	3,68	3,32	3,03	3,11	3,37
15	22	3,34	3,31	3,56	3,53	4,04	3,66	3,48	3,56
16	23	3,63	3,48	3,74	3,09	3,12	2,93	3,83	3,40
17	24	3,41	3,14	2,55	1,69	3,40	3,53	4,63	3,19
18	25	4,21	4,36	3,71	3,12	3,07	3,60	3,47	3,65
19	26	3,27	3,14	3,34	3,16	3,61	3,16	3,89	3,37
20	27	3,66	3,29	2,94	3,20	3,06	3,95	4,57	3,52
21	28	4,46	4,21	4,10	3,51	2,71	3,44	3,47	3,70
22	29	2,40	2,40	3,03	2,37	2,17	3,48	3,68	2,65
23	30	3,08	3,03	2,64	1,79	1,71	3,47	3,58	2,76
24	31	4,07	3,82	3,87	2,17	2,35	3,71	3,65	3,38
Moyennes du	1–10	4,19	4,53	4,81	4,54	4,45	4,84	4,69	4,58
	11–20	5,23	5,04	5,28	5,00	4,94	5,18	5,36	5,15
	21–31	3,55	3,43	3,35	2,85	2,96	3,45	3,67	3,32
	mois	4,30	4,30	4,44	4,09	4,08	4,46	4,54	4,32

Maximum : 7,65 observé le 8 à 10 h. P.M.
Minimum : 1,69 „ le 24 à 1 h. P.M.
} différence..... mm 5,96

TABLEAU MÉTÉOROLOGIQUE.—Janvier 1875.

Humidité relative.

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
24	1	90	93	67	62	48	84	98	77,43
25	2	100	84	69	41	49	78	80	71,57
26	3	100	90	80	67	62	89	98	83,71
27	4	95	94	66	54	51	79	91	75,71
28	5	92	86	80	56	58	65	74	73,00
29	6	53	86	66	56	62	90	96	72,71
30	7	78	86	80	60	67	90	84	77,86
1	8	88	85	70	56	64	80	92	76,43
2	9	84	88	88	68	69	76	78	78,71
3	10	100	96	70	65	64	73	81	78,43
4	11	89	96	72	57	58	80	88	77,14
5	12	85	91	89	83	82	100	96	89,43
6	13	91	87	84	67	66	70	79	77,71
7	14	79	88	70	64	67	75	97	77,14
8	15	97	89	76	72	91	98	97	88,57
9	16	95	94	94	94	85	94	100	93,71
10	17	97	100	82	69	71	84	92	85,00
11	18	86	89	78	60	60	68	76	73,86
12	19	96	98	75	70	86	81	82	84,00
13	20	92	81	80	76	85	92	87	84,71
14	21	96	96	77	81	77	72	76	82,14
15	22	87	92	75	68	81	78	75	79,43
16	23	84	84	74	53	53	56	92	70,86
17	24	100	100	42	25	49	67	100	69,00
18	25	87	92	74	54	56	74	86	74,71
19	26	100	100	64	48	58	59	90	74,14
20	27	100	99	50	46	42	78	97	73,14
21	28	97	89	58	40	50	80	84	71,14
22	29	73	73	63	39	34	78	68	61,14
23	30	100	100	45	22	22	65	82	62,29
24	31	96	96	56	23	24	53	65	59,00
Moyennes du	1–10	88,0	88,8	73,6	58,5	59,4	80,4	87,2	76,56
	11–20	90,7	91,3	80,0	71,2	75,1	84,2	89,4	83,13
	21–31	92,7	92,8	61,6	45,4	49,6	69,1	83,2	70,64
	mois	90,55	91,03	71,42	57,93	61,00	67,61	86,48	76,57

Maximum : 100 observé 14 fois
Minimum : 22 „ le 30 à 1h. et à 4h. P.M. } différence 78

TABLEAU MÉTÉOROLOGIQUE.—Janvier 1875.

État du ciel 1o.—*Nébulosité.*

Jours de la lune	Jours du mois	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 7 observations.
24	1	0	0	5	7 Br	1	0	0	1,9
25	2	0	0	0	0	0	0	0	0,0
26	3	0	0	0	5	7	1	0	1,9
27	4	0	2	7	3	2	0	0	2,0
28	5	0	0	0	9	9	10 Br	10 Br	5,4
29	6	10 Br	10 Br	9	8	9	5	2 Br	7,6
30	7	2	9	7	5	3	9 Br	2 Br	5,3
1	8	4	6	10 Br	10 Br	10 Br	10 Br	10 Bd	8,6
2	9	10 Br	10 Br	10 Br	8	9 Br	2	0	7,0
3	10	1	2	7	10	10	10	8	6,9
4	11	8	0	0	2	5	10	10	5,0
5	12	10 Br	10 Br	10 Br	10 Br	10 Br	10	10	10,0
6	13	10 Br	10 Br	10 Br	10 Br	10 Br	3	7	8,6
7	14	10 Br	10 Br	10 Br	9	10	10	10	9,9
8	15	10 Br	10 Br	10	9	10	10	10	9,9
9	16	10 Br	10	10	10	10 Br	10	10	10,0
10	17	8	5	9	10 Br	10 Br	10 Br	10 Br	8,9
11	18	10	7	9	8	9	9	3	7,9
12	19	5	6	10	10 Br	10 Br	10 Br	10 Br	8,7
13	20	10	10	10 Br	10 Br	10 Br	10 Br	9	9,9
14	21	1	2	2	10	9	5	10	5,6
15	22	10	7	2	7	9	10 Br	10 Br	7,9
16	23	10 Br	8 Br	3 Br	5	2	0	0 Bd	4,0
17	24	0	10	0	8	7	0	8	3,3
18	25	8	10 Br	8	4	4	7	4	6,4
19	26	1 Br	2	0	1	2	0	2 Br	1,1
20	27	0	0	0	4	2	0	2	1,1
21	28	5	4	0	9	10	4 Bd	7 Bd	5,6
22	29	0	0	0	0	0	0	0	0,0
23	30	2	2	0	0	0	0	0	0,6
24	31	0	0	0	0	0	4	10 Br	2,0
Moy. du mois		5,0	4,9	5,1	6,5	6,4	5,5	5,6	5,6

Nombre de jours de :

Ciel beau, ou moins de 2_{10}^{1} couvert ..	9	Brouillard	2
,, peu nuageux ou de 2 à 4_{10}^{1} ,, ..	2	Brume	19
,, nuageux, ou de 4 à 6_{10}^{1} ,, ..	5	Gelée blanche.....	14
,, très-nuageux, ou de 6 à 8_{10}^{1} ,, ..	7	Pluie	4
,, couvert ou plus de 8_{10}^{1} ,, ..	8	Neige	1

Phénomènes divers observés.—Lumière zodiacale 6 fois ; halo lunaire 1 ; parasélène 1 le 24.

TABLEAU MÉTÉOROLOGIQUE.—Janvier 1875.

État du ciel 2o.—*Forme et Direction des Nuages.*

Date.	4 h. m.		7 h. m.		10 h m.		1 h. s.		4 h. s.		7 h. s.		10 h. s.	
	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.	For.	Dir.
1	,,	,,	,,	,,	K	,,	,,	,,	K	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,	C	,,	,,	,,	,,	,,	,,	,,
2	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
3	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	C	E	CN	N	CST	,,	,,	,,
4	,,	,,	KST	,,	KST	W	KST	W	K	,,	,,	,,	,,	,,
	,,	,,	,,	,,	AC	E	AC	E	,,	,,	,,	,,	,,	,,
5	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	CN	N	CN	N	,,	,,	,,	,,
6	,,	,,	,,	,,	AC	N	AC	NE	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	C	NE	C	,,	,,	,,
7	,,	,,	AC	,,	KST	,,	K	SW	K	W	,,	,,	,,	,,
	C	,,	,,	,,	,,	,,	AC	S	,,	,,	,,	,,	,,	,,
8	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	C	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
9	,,	,,	,,	,,	,,	,,	K	W	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	C	N	C	N	CN	N	C	,,	,,	,,
10	,,	,,	,,	,,	KST	,,	,,	,,	C	E	CN	,,	CST	,,
	CST	,,	CST	,,	C	E	C	NE	,,	,,	,,	,,	,,	,,
11	,,	,,	,,	,,	,,	,,	AC	S	K	W	,,	,,	,,	,,
	CN	,,	,,	,,	,,	,,	,,	,,	C	S	CN	,,	,,	,,
12	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	C	,,	C	NE	CST	,,	,,	,,	N	,,	N	,,
13	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	KST	,,
	N	,,	N	,,	CN	,,	C	N	C	NE	C	,,	,,	,,
14	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	CN	,,	CN	,,	N	,	N	,,
15	,,	,,	,,	,,	AC	,,	K	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	CN	,,	CN	E	CN	,,	CN	,,
16	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	N	,,	CN	NW	CN	NW	CN	NW	CN	,,	CN	,,
17	,,	,,	K	,,	AC	W	,,	,,	,,	,,	,,	,,	AC	,,
	CST	,,	CST	,,	C	NE	C	N	C	,,	,,	,,	,,	,,
18	AC	,,	K	,,	AC	N	K	SW	K	W	K	,,	KST	,,
	,,	,,	C	N	C	NW	CN	NW	CN	N	,,	,,	,,	,,
19	KST	,,	KST	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	C	N	C	,,	CN	NW	CN	NW	CN	,,	CN	,,
20	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	C	,,	C	N	C	N	C	N	C	N	CN	,,	C	,,
21	KST	,,	,,	,,	C	,,	C	NW	CN	NW	CN	N	C	N
	,,	,,	CN	,,	C	,,	K	W	,,	,,	,,	,,	,,	,,
22	,,	,,	AC	,,	AC	N	C	NE	CN	N	CST	,,	,,	,,
	C	N	,,	,,	,,	,,	KST	,,	AC	N	,,	,,	,,	,,
23	,,	,,	K	,,	K	W	AC	N	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	K	W	KST	W	,,	,,	K	,,
24	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
25	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	CST	,,	,,	,,	C	N	C	,,	C	,,	CN	,,	CST	,,
26	,,	,,	KST	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	C	,,	C	,,	,,	,,	,,	,,
27	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	C	,,	C	,,	,,	,,	,,	,,
28	KST	,,	KST	,,	,,	,,	K	,,	K	,,	K	,,	,,	,,
	CN	,,	CN	,,	,,	,,	CN	,,	,,	,,	,,	,,	,,	,,
29	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
30	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	CST	,,	CST	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
31	,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	CST	,,	,,	,,

TABLEAU MÉTÉOROLOGIQUE.—Janvier 1875.

Direction du vent; sa vitesse par seconde.

Jours de la lune	Jours du mois	Matin. 4 h. Dir.	Matin. 4 h. Vit.	Matin. 7 h. Dir.	Matin. 7 h. Vit.	Matin. 10 h. Dir.	Matin. 10 h. Vit.	Soir. 1 h. Dir.	Soir. 1 h. Vit.	Soir. 4 h. Dir.	Soir. 4 h. Vit.	Soir. 7 h. Dir.	Soir. 7 h. Vit.	Soir. 10 h. Dir.	Soir. 10 h. Vit.	Moyennes des 7 observations.
			m		m		m		m		m		m		m	m
24	1	O	0,0	NNW	0,2	N	0,7	NNE	0,9	O	0,0	O	0,0	O	0,0	0 3
25	2	O	0,0	O	0,4	NE	0,0	N	0,4	N	0,9	NNE	1,9	N	1,6	0,7
26	3	NNW	1,1	NW	2,4	NNW	2,8	N	3,6	NNE	4,2	NNE	2,0	N	2,0	2,6
27	4	N	1,5	N	1,7	NE	1,4	NNE	1,7	N	0,6	NNE	1,5	NNE	2,0	1,5
28	5	N	2,0	NNW	1,9	NNW	3,3	N	6,9	N	6,9	N	4,7	N	3,8	4,2
29	6	NNW	2,7	NNW	1,8	NNW	3,5	N	3,6	NNE	2,7	NNE	2,0	..	0,4	2,4
30	7	N	1,1	N	1,8	NNE	0,8	SE	4,5	SE	5,4	E	3,7	SE	6,6	3,4
1	8	SSE	4,5	SSE	5,7	S	5,2	SW	4,3	SSW	3,3	SSW	0,8	NW	0,2	3,4
2	9	NNW	2,0	NNW	2,4	NNW	5,0	NNW	4,9	NNW	7,3	NNW	5,0	NNW	3,1	4,2
3	10	NW	2,4	NW	1,8	N	1,8	NE	3,3	E	2,5	ESE	1,8	NE	1,0	2,1
4	11	NE	3,3	NE	1,7	ENE	0,2	S	1,4	NE	0,8	NE	1,9	N	1,0	1,5
5	12	NE	3,1	NNE	3,2	NNE	3,8	NNE	4,8	NNE	4,1	NNE	4,1	NNE	4,2	3,8
6	13	N	7,5	N	8,5	N	6,5	N	4,2	NNE	5,9	N	5,3	N	3,9	6,0
7	14	NNW	2,5	N	2,9	NNE	3,2	NE	4 5	NE	4,6	NNE	4,1	NE	5,1	3,8
8	15	NE	2 3	NE	4,8	ENE	4,0	ENE	5,5	NE	6,3	ENE	4,8	NE	5,3	4,7
9	16	NNE	3,5	NW	3,7	NNW	4,7	NW	4,4	NNW	5,3	NNW	5,2	NNW	3,1	4,3
10	17	NNW	1,3	NW	0,7	NNE	1,0	N	1,5	N	2,6	NNE	1,0	N	0,7	1,3
11	18	N	1,1	N	1,3	N	2,0	NNW	5,9	N	5,4	N	7,4	N	3,5	3,8
12	19	NNW	1,5	NW	1,1	NNW	1,4	NNW	4 3	NNW	4,5	NNW	3,4	NNW	2,9	2,7
13	20	NNW	4,8	NNW	4,5	NNW	4,4	NNW	6,5	N	6,8	NNW	4,0	NNW	2,7	4,8
14	21	NW	3,7	NNW	4,0	NNW	5,2	NNW	7,0	NNW	8,2	NNW	6,7	NW	5,8	5,8
15	22	NW	5,6	NW	5,2	NNW	5,8	N	4,6	N	3,5	NNW	1,9	N	1,3	4,0
16	23	NNW	1,6	WNW	1,7	NNW	3,2	NNW	3,5	N	3,2	N	1,6	O	0,9	2,2
17	24	NNW	0,4	NNW	0,2	O	0,0	SW	2,1	W	2,4	O	1,2	SW	1,3	1,1
18	25	NW	0,6	NW	1,4	NNW	3,3	NNW	3,4	NNW	3,4	NNW	4,1	N	2,7	2,7
19	26	NNW	0,5	NW	1,2	NW	1,4	WNW	2,0	N	2,9	N	1,8	N	0,5	1,5
20	27	N	0,7	O	0,0	NW	0,1	NNW	2,1	NW	3,0	ESE	1,8	ESE	2,9	1,5
21	28	SSE	0,0	S	3,0	WSW	4,7	NW	9,1	NNW	9,8	NNW	10,0	NNW	3,9	5,8
22	29	NW	5,6	WNW	5,6	NW	7,3	NW	7,0	NW	8,3	NW	4,1	NNW	1,3	5,6
23	30	WNW	1,3	WSW	1,7	SW	2,0	W	4,1	WNW	4,1	WNW	1,2	S	2,0	2,3
24	31	S	2,9	S	3,1	SW	2,9	W	7,5	NW	6,9	NW	4,8	NNW	5,3	4,8
Moy. du mois			m 2,3		m 2,6		m 3,0		m 4,2		m 4,4		m 3,4		m 2,6	m 3,2

Fréquence relative des 16 vents sur 100

N 26	W..... 2	S 3	E 0
NNW 29	WSW 1	SSE..... 1	ENE 1
NW 11	SW 2	SE 1	NE 8
WNW 3	SSW 1	ESE 2	NNE 9

Calmes, sur 100 observations 6

Vitesse moyenne maximum observée le 28..... m 10,0

TABLEAU MÉTÉOROLOGIQUE.—Janvier 1875.

Jours de la lune	Jours du mois	Températures extrêmes sous l'Abri. Minima	Maxima	Moyennes	Ozone. 7 h. m.	1 h. s.	7 h. s.	Moyennes	Évaporation. Total des 24 h.	Pluie. Jardin Total des 24h.	Toit Total des 24h.	Différence.	Température du Puits.
		o	o	o					mm	mm	mm	mm	o
24	1	−4,5	4,7	0,10	20	11	9	13,3	0,90	0,0	0,0	0,0	14,1
25	2	−3,2	7,5	2,15	20	16	9	15,0	1,80	0,0	0,0	0,0	14,0
26	3	−2,8	7,8	2,50	18	18	13	16,0	1,95	0,0	0,0	0,0	14,1
27	4	−0,5	9,2	4,35	19	13	10	14,0	1,40	0,0	0,0	0,0	14.2
28	5	−2,9	7,1	2,10	21	13	8	14,0	2,20	0,0	0,0	0,0	14,2
29	6	−1,2	6,4	2,60	12	10	13	11,7	2,60	0,0	0,0	0,0	14,1
30	7	−2,1	10,0	3,95	13	10	14	12,3	1,70	0,0	0,0	0,0	14,0
1	8	4,5	13,9	9,20	21	9	12	14,0	2,60	0,0	0,0	0,0	14,1
2	9	1,2	9,2	5,20	17	9	14	13,3	2,05	0,0	0,0	0,0	14.2
3	10	−3,4	4,9	0,75	21	19	19	19,7	1,40	0,0	0,0	0,0	14,2
4	11	−0,3	12,5	6,10	18	19	10	15,7	1,65	0,0	0,0	0,0	14.2
5	12	5,4	7,2	6,30	14	20	19	17,7	0,75	0,2	0,0	0,2	14,1
6	13	0,8	4,2	2,50	20	20	20	20,0	1,25	6,6	...	...	14,0
7	14	−0,2	5,1	2,45	21	13	17	17,0	2,30	0,0	0,0	0,0	14,0
8	15	1,9	7,9	4,90	21	19	20	20,0	1,35	7,7	...	...	13,9
9	16	5,0	7,6	6,30	20	19	21	20,0	...	13,7	9,2	4,5	13,8
10	17	1,4	8,5	4,95	20	20	19	19,7	1,30	0,0	0,0	0,0	13,7
11	18	0,0	5,9	2,95	13	19	9	13,7	2,20	0,0	0,0	0,0	13,6
12	19	−2,4	1,9	−0,25	16	17	18	17,0	0,90	0,0	0,0	0,0	13,6
13	20	−0,9	1,9	0,50	20	17	20	19,0	1,00	0,0	0,0	0,0	13.5
14	21	−3,2	0,9	−1,15	19	16	17	17,3	...	0,0	0,0	0,0	13,4
15	22	−3,5	2,9	−0,30	18	19	15	17,3	0,60	0,0	0,0	0,0	13,3
16	23	−2,9	4,8	0,95	12	9	12	11,0	1,40	0,0	0,0	0,0	13,3
17	24	−5,4	6,3	0,45	16	18	12	15,3	1,50	0,0	0,0	0,0	13,2
18	25	−1,8	4,2	1,20	21	19	14	18,0	1,90	0,0	0,0	0,0	...
19	26	−5,2	6,4	0,60	20	16	13	16,3	1,60	0,0	0,0	0,0	...
20	27	−4,5	6,7	1,10	18	16	16	16,7	1,70	0,0	0,0	0,0	...
21	28	−1,8	10,0	4,10	21	11	8	13,3	2,80	0,0	0,0	0,0	...
22	29	−4,7	4,8	0,05	17	10	9	12,0	1,00	0,0	0,0	0,0	...
23	30	−6,5	8,4	0,95	13	14	9	12,0	2,90	0,0	0,0	0,0	...
24	31	−2,2	11,8	4,80	18	17	9	14,7	4,30	0,0	0,0	0,0	11,5
Moyennes du	1-10	−1,49	8,07	3,29	18,2	12,8	12,1	14,37	18,60	0,0	0,0	0,0	...
	11-20	1,07	6,27	3,67	18,3	18,3	17,3	17,97	12,70	28,2	...	...	...
	21-31	−3,79	6,11	1,16	17,5	15,0	12,2	14,91	19,70	0,0	0,0	0,0	...
	mois	−1,48	6,79	2,65	18,0	15,4	13,8	15,72	51,00	28,2	...	...	...

	o		mm
Maximum:	13,9 observé le 8	21 observé 8 fois	Hauteur d'eau tombée 28,2
Minimum :	−6,5 „ le 30	8 „ 2 „	„ „ évaporée 51,0
Différence:	20,4	13	Différence 22,8

JOURNAL MÉTÉOROLOGIQUE.

Janvier 1875.

1. 4h. m.—Ciel sans nuages ; calme. 7h —Gelée blanche ; glace sur l'étang pour la première fois. 10h.—Cirrus épars dans le ciel ; brume à l'horizon. 1h. s.—Vent faible et régulier. 4h.—Çà et là quelques cirrus ; calme. 7h.—Ciel serein ; lumière zodiacale aussi brillante que la voie lactée. 10h.—Même ciel ; le calme continue depuis 4h.
2. 4h. m.—Air humide. 7h.—Quelques cirrus isolés ; gelée blanche. 10h.—Ciel sans nuages. 1h. s.—Même remarque. 4h.— Le vent se lève après un calme de 24h. 7h.—Lumière zodiacale comme hier ; ciel très-étoilé. 10h.—Ciel splendide ; petite brise régulière.
3. 4h. m.—Mêmes remarques qu'à 10h. 7h.—Gelée blanche. 10h.—Ciel très-pur. 1h. s.—Des cumulus nombreux arrivent de l'E. 4h.—De gros cumulo-nimbus passent au zénith ; plusieurs bandes de corbeaux voyageurs. 7h.—Long stratus à l'W. 10h.—Ciel serein ; le baromètre baisse.
4. 4h. m.—Ciel comme à 10h. ; froid moins vif ; brise régulière. 7h. —Gelée blanche ; cirro-stratus panachés et orientés E.—W. 10h.— Les cirrus persévèrent ; des alto-cumulus occupent presque tout le ciel. 1h. s.—Les nuages vont en sens contraire. 4h.—Quelques cirrus épars dans le ciel. 7h.—Lumière zodiacale comme les jours précédents ; brume à l'horizon. 10h.—Le baromètre baisse. Brises folles depuis 9h. A.M.
5. 4h. M.—Ciel serein ; étoiles brillantes ; brise régulière. 7h.— Gelée blanche. 10h.—Légère brume à l'horizon. 1h. s.—De gros cumulo-nimbus venant du N. ont envahi tout le ciel ; vent fort et régulier. 4h.—Mêmes remarques. 7h.—Ciel uniformément couvert. 10h.—Le vent tombe.
6. 4h. m.—Même ciel qu'hier ; vent régulier. 7h.—Mêmes remarques. 10h.—Alto-cumulus laissant entr'eux des éclaircies. 1h. s. et 4h.— Même ciel. 7h.—La moitié S. du ciel est entièrement découverte. 10h.—Brume à l'horizon N.E. ; calme.
7. 4h. m.—Banc brumeux à l'W.; petite brise régulière. 7h.—Evaporomètre gelé ; gelée blanche peu abondante. 10h.—Cirro-stratus diffus à l'horizon. 1h. s.—Cirrus venant du S.W. et alto-cumulus du S. 4h.—Les cumulus ont disparu ; les cirrus viennent de l'W. 7h.—Ciel brumeux. 10h.—Brume à l'horizon N. Le baromètre baisse rapidement.
8. 4h.—Banc à l'horizon N. et S.; le baromètre continue à baisser. 7h.—Léger voile de vapeurs obscurrissant le ciel ; pas de rosée. 10h.—Ciel uniformément couvert. Vent fort et régulier depuis hier. 1h. s.—Mêmes remarques. 4h.—Le baromètre atteint son minimum ; il a baissé de 10mm. en 24h. 7h.—Le vent passe brusquement du S.S.W. au N.W.; il reste faible et régulier jusqu'à 11h. 10h.—Ciel très-sombre ; temps lourd.
9. 4h. m.—Mêmes remarques qu'à 10h. P.M. 7h.—Le vent se lève. 10h.—Une couche épaisse et uniforme de brume et de cumulus couvre tout le ciel ; ceux-ci viennent du N. avec rapidité ; le vent souffle avec force. 1h. s.—Eclaircie au zénith ; on y aperçoit des

cirrus venant de l'W.; cumulus toujours rapides. 4h.—Gros cumulo-nimbus épars dans le ciel. 7h.—Banc brumeux au S.; le vent faiblit. 10h.—Ciel sans nuages et très-étoilé.

10. 4h. m.—Quelques stratus à l'horizon W.; froid vif. 7h.—Glace et gelée blanche ; stratus en différents points du ciel. 10h.—Le vent passe du N.W. au N.E.; cirro-stratus semblant converger à l'W.; des cumulus arrivent de l'E. avec rapidité. 1h. s.—Le vent prend de la force et continue son mouvement giratoire vers l'E. 4h.—Cumulus compactes. 7h.—Ciel sombre surtout en quelques endroits. 10h.—Stratus orientés N. et S. où ils semblent converger, laissant entr'eux des éclaircies ; tout le ciel présente cet aspect bizarre.

11. 4h. m.—Ciel chargé au zénith, découvert à l'horizon W. et S.W. 7h.—Ciel pur ; calme ; pas de gelée. 10h.—Ciel splendide ; brume légère à l'horizon. 1h. s.—Quelques alto-cumulus épars dans le ciel. 4h.—Eclaircie à l'E.; calme ; deux couches de nuages marchant à angle droit. 7h.—Ciel sombre ; des cumulo-nimbus se détachent sur la brume. 10h.—Ciel uniformément couvert. Des brises folles on fait faire à la girouette le tour entier du compas en 24h.

12. 4h. m.—Même ciel. 7h.—Des cumulus apparaissent au-dessous de la brume. 10h.—Brume générale ; les cumulus viennent du N.E. pendant que le vent souffle du N. 1h. s.—La brume est ondulée en certains endroits. 7h.—Il bruine depuis 5h. ; les thermomètres sont mouillés. 10h.—Il bruine encore sans que les pluviomètres l'accusent. Tout le jour la direction et l'intensité du vent ont été d'une constance remarquable.

13. 4h. m.—Il a plu toute la nuit ; le vent souffle par rafales. 7h.—Neige qui fond bientôt. 10h.—Il ne pleut, ni ne neige. 1h. s.—Ciel uniformément couvert. 4h.—Ciel pommelé. 7h.—Ceinture de gros cumulus tout autour de l'horizon. 10h.—Cirro-stratus qui semblent converger à l'W.; éclaircie au N.

14. 4h. m.—Nuages informes ou légèrement stratifiés. 7h.—Même ciel. 10h.—Vent régulier. 1h. s.—Brume générale au-dessous de la quelle on aperçoit quelques cumulo-nimbus. 4h.—Même remarque. 7h.—Neige qui fond en tombant ; ciel uniformément couvert. 10h.—Il pleut.

15. 4h. m.—Il ne pleut plus ; ciel uniformément couvert toute la matinée. 1h. s.—Le ciel se découvre au zénith, où on aperçoit quelques cirrus ; horizon sombre. 4h.—Pluie. 7h.—Des cumulo-nimbus occupent tout le ciel. 10h.—Même remarque. Le baromètre baisse depuis ce matin.

16. 4h. m.—Pluie fine ; le baromètre a atteint son minimum et remonte rapidement. 7h.—Le vent passe du N.E. au N.W.; pluie assez forte. 10h.—Il bruine. 1h. s.—Id. 4h.—De gros cumulo-nimbus arrivent du N. avec rapidité. 7h.—Il bruine de nouveau. 10h.—Ciel uniformément couvert.

17. 4h. m.—Eclaircie au zénith. 7h.—Brume à l'horizon. 10h.—Le baromètre monte depuis hier ; ciel sombre au S.W. 1h. s.—Au S. nuages bas et blanchâtres se détachant sur la brume. 4h.—Brume générale ; quelques cumulus à l'E. 7h.—Ciel uniformément couvert. 10h.—Alto-cumulus transparents par tout le ciel.

18. 4h. m.—Quelques étoiles au zénith. 7h.—Eclaircie au N. ; cirrus à l'E. 10h.—Deux couches de nuages marchant presqu'à angle droit. 1h. s.—Eclaircie au zénith ; ciel très-sombre en différents points. 4h.—Même ciel. 7h.—Ciel pommelé au zénith. 10h.—Cirro-stratus ; il s'y forme un halo.
19. 4h. m.—Froid vif ; évaporomètre gelé. 7h.—Horizon chargé ; faible gelée blanche ; legère couche de glace sur l'étang. 10h.—Cumulus compactes et uniformes. 1h. s.—De gros cumulo-nimbus venant du N.W. se détachent sur la brume. Même ciel jusqu'au soir.
20. 4h. m.—Couche uniforme de cumulus compactes, comme hier. 7h.—Id. 10h.—Ciel gris toute la journée ; vers 1h. s. des cumulus arrivent du N. en grand nombre. 7h.—De gros cumulo-nimbus occupent tout le N. 10h.—Eclaircie au zénith.
21. 4h. m.—Bandes de cirro-stratus à l'horizon W. et N. 7h.—Glace sur l'étang ; cumulo-nimbus à l'horizon. 10h.—Ceinture de cumulus à l'horizon. 1h. s.—Ciel uniformément couvert. 4h.—Gros cumulo-nimbus très-noirs laissant entr'eux des éclaircies. 7h.—Ciel chargé à l'W. 10h.—Ciel uniformément couvert de cumulus transparents. Le vent à soufflé du N. à peu près constamment depuis 4 jours.
22. 4h. m.—Mêmes nuages qu'à 10h. ; froid extrêmement vif. 7h.—Pas de gelée ; glace sur l'étang ; alto-cumulus petits et nombreux. 10h.—Brume à l'horizon ; alto-cumulus au zénith. 1h. s.—Eclaircie où l'on aperçoit des cirrus ; le temps se radoucit. 4h.—Cumulo-nimbus très-noirs par tout le ciel. 7h.—Quelques stratus à l'E. 10h.—Brume générale.
23. 4h. m.—Ciel uniformément couvert. 7h.—Beaucoup de cirrus ; horizon sombre. 10h.—Les cirrus viennent de l'W. ; brume au S. 1h. s.—Cirro-stratus à l'horizon E. 4h.—Ciel très-pur ; quelques alto-cumulus épars çà et là. 7h.—Ciel splendide : lumière zodiacale brillante. 10.—Léger brouillard ; calme.
24. 4h. m.—Gelée blanche très-abondante. 7h.—Glace sur l'étang. 10h.—Calme. 1h. s.—Le ciel, sans nuages depuis ce matin, se couvre de cirrus venant de l'W. ; le vent se lève. 4h.—Léger voile de cirro-stratus. 7h.—Ciel très-pur ; calme. 8h. 45m.—Parasélène (1). 10h.—Brume. Le vent a passé du N.W. au S.W. par l'W. depuis ce matin.
25. 4h. m.—Ciel légèrement voilé ; vent piquant ; l'eau du psychromètre est gelée. 7h.—Ciel uniformément couvert. 10h.—Ciel un peu chargé. 1h. s.—Quelques cumulus épars dans le ciel ; vent

(1) Le phénomène a été observé simultanément par le P. Chauvin et le P. Dechevrens ; (celui-ci avait été chargé momentanément en une absence des observations météorologiques). Voici les principaux détails qu'ils ont notés. La lune, alors à son 17e jour, était à 12° au-dessus de l'horizon E., au milieu d'un halo de 22° 41′ de rayon. Un premier centre lumineux apparaissait dans la verticale de la lune, deux autres à 90° de celui-ci sur une même ligne horizontale. Un 4e se trouvait, sans doute, au-dessous de l'horizon dans une position symétrique de celle du premier. Leur grandeur apparente était celle de la lune. Sans avoir des contours bien déterminés, ils tranchaient sur la couleur pâle et grisâtre du halo. Des cirrus légers, à peu près également distribués, occupaient le ciel à ce moment.

régulier. 4h.—Mêmes remarques. 7h.—Le ciel s'assombrit. 10h.—Stratus vaporeux.

26. 4h. m.—Gelée blanche ; ciel assez pur; vent faible. 7h.—Glace sur l'étang ; quelques cirro-stratus. 10h.—Ciel sans nuages. 1h s.—Çà et là quelques cumulus. 4h.—Id. 7h.—Ciel brillant ; lumière zodiacale magnifique. 10h.—Le ciel se voile légèrement.

27. 4h. m.—Ciel assez pur; gelée blanche. 7h.—Ciel sans nuages ; calme. 10h.—Même ciel; vent très-faible. 1h. s.—Quelques cumulus. 4h.—Id. 7h.—Ciel complètement découvert. 10h.—Brume à l'horizon E.

28. 4h. m.—Eclaircie au zénith, et à l'E et à l'W. ; horizon sombre au S. et au N. 7h.—Faible gelée blanche. 1h. s.—Horizon W. sombre ; beaucoup de cirrus. 4h.—Tout le ciel est chargé de nuages de poussière. 7h.—Vent violent; étoiles très-peu brillantes. Nuage isolé de forme lenticulaire paraissant immobile ; il est oblique par rapport à la lumière zodiacale ; il se dissipe entre 7h. $\frac{1}{4}$ et 7h. $\frac{1}{2}$. 10h.—Le ciel se voile de plus en plus ; brouillard sec.

29. 4h. m.—Même ciel ; vent piquant. Toute la journée l'atmosphère a été chargée de poussière. Le vent est tombé vers 10h.

30. 4h m.—Quelques stratus ; la gelée commence à se former. 7h.—Gelée abondante ; les stratus persévèrent. Le reste du jour le ciel est pur et sans nuages 7h. s.—Lumière zodiacale très-vive. Le vent passe subitement de l'W. au S.S.E par le S.

31. 4h. m.—Ciel pur. 7h.—Id. ; gelée assez forte. Ciel sans nuages jusqu'à 7h. s ; a 10h. il est complètement couvert. Le vent, fort depuis 10h. A.M, a passé insensiblement du S. au N.N.W. par l'W.

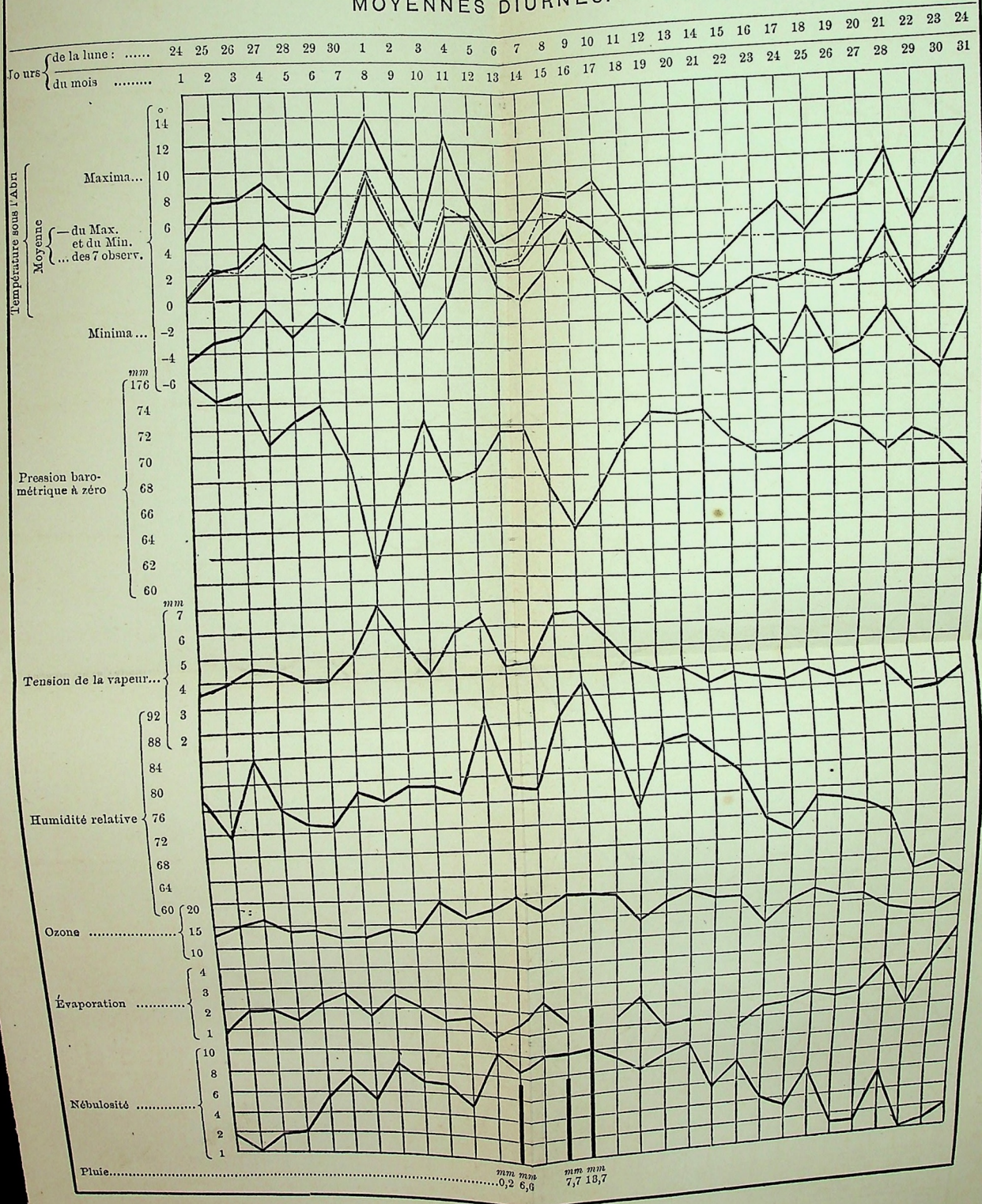
H. LE LEC., S.J.

A. M. D. G.

OBSERVATOIRE DE ZI-KA-WEI

Résumé des Observations Météorologiques de Janvier 1875.

MOYENNES DIURNES.



A. M. D. G.

OBSERVATOIRE

MÉTÉOROLOGIQUE ET MAGNÉTIQUE,

des Pères de la Compagnie de Jésus

à ZI-KA-WEI.

BULLETIN MÉTÉOROLOGIQUE,

FÉVRIER 1875.

NOTA.—Pour la position géographique de l'observatoire, les instruments utilisés, les notations employées, etc., voir la note préliminaire placée en tête du Bulletin de Septembre 1874.

TABLEAU MÉTÉOROLOGIQUE.—Février 1875.

Pression barométrique à zéro.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
25	1	771,20	771,69	772,00	771,64	769,47	768,87	768,99	768,93	770,35
26	2	*68,39	76,85	68,06	68,03	65,04	64,38	64,25	64,74	66,34
27	3	*64,49	65,12	66,16	67,22	66,19	66,20	67,50	68,14	66,38
28	4	*67,47	66,80	66,98	67,78	66,20	65,28	65,08	65,74	66,42
29	5	65,63	65,38	65,62	65,72	63,56	62,80	64,01	65,54	64,78
1	6	67,98	69,89	72,95	75,13	74,74	74,88	75,58	75,46	73,33
2	7	74,92	74,44	74,60	74,12	72,31	69,92	70,02	69,63	72,50
3	8	*68,97	68,30	68,57	69,03	67,47	66,94	67,48	66,59	67,92
4	9	65,87	64,15	65,02	64,05	64,29	64,59	66,00	66,41	65,05
5	10	66,76	66,98	68,05	68,39	66,94	67,48	68,87	69,65	67,89
6	11	69,85	69,06	69,56	69,68	68,72	68,15	68,61	68,85	69,06
7	12	69,31	68,93	69,63	69,74	69,04	69,40	69,41	70,75	69,53
8	13	71,13	70,82	70,86	72,51	70,96	70,66	71,18	71,38	71,19
9	14	71,16	69,97	71,11	70,89	68,77	67,93	68,41	68,72	69,62
10	15	*69,22	69,25	69,47	70,59	69,53	68,68	68,98	69,91	69,45
11	16	70,49	70,34	71,53	71,71	70,34	68,75	69,30	69,01	70,18
12	17	*67,85	67,44	68,06	68,82	68,51	68,08	69,62	70,03	68,55
13	18	70,09	69,19	69,62	69,67	68,36	67,42	67,01	67,22	68,57
14	19	67,16	67,11	68,43	69,53	69,03	69,32	70,62	70,53	68,97
15	20	70,13	69,01	68,83	68,05	66,50	66,51	67,47	69,39	68,24
16	21	69,82	69,83	70,93	71,39	70,37	70,49	70,70	70,77	70,54
17	22	70,07	69,21	70,20	70,65	68,53	67,63	67,88	67,70	68,98
18	23	*71,71	66,62	67,17	67,56	66,85	66,76	66,81	67,35	67,60
19	24	67,98	68,14	69,55	70,29	70,36	69,90	69,98	70,78	69,62
20	25	70,80	69,88	70,31	69,65	68,84	68,15	69,15	69,93	69,59
21	26	69,68	68,79	68,93	69,71	68,72	68,05	69,13	69,67	69,09
22	27	69,22	68,62	69,46	69,78	68,95	68,55	69,30	70,56	69,31
23	28	70,13	69,28	70,35	70,97	69,51	68,90	69,78	71,00	69,98
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
Moyennes du	1–10	768,17	768,06	768,80	769,11	767,62	767,13	767,78	768,08	768,09
	11–20	69,64	69,11	69,71	70,12	68,98	68,49	69,06	69,58	69,34
	21–28	69,93	68,79	69,61	70,00	69,02	68,55	69,09	69,72	69,34
	mois	769,20	768,64	769,35	769,73	768,50	768,02	768,97	769,09	768,89

Maximum : 775,58 observé le 6 à 7 h. P.M.
Minimum : 762,80 „ le 5 à 4 h. P.M.
} différence : ..... 12,78 mm

TABLEAU MÉTÉOROLOGIQUE.—Février 1875.

Température sous l'abri.

Jours de la lune	Jours du mois	Matin. 1 h.	4 h.	7 h.	10 h.	Soir. 1 h.	4 h.	7 h.	10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
25	1	* -0,2	—3,0	—3,2	0,8	4,1	4,9	—0,4	—2,6	0,05
26	2	* -3,2	—4,9	—3,7	4,8	8,8	7,0	3,8	4,5	2,14
27	3	* 2,4	0,3	—1,1	9,3	13,3	13,0	5,0	2,7	5,61
28	4	* 2,2	1,8	0,0	8,8	14,3	12,0	5,7	2,0	5,85
29	5	0,4	—2,2	—1,0	9,4	13,8	13,7	6,6	5,0	5,71
1	6	3,7	1,8	0,0	1,0	1,7	0,3	—1,1	—1,7	0,71
2	7	—1,3	—1,2	—0,7	2,2	3,8	3,3	2,3	2,4	1,35
3	8	* 3,2	4,0	4,2	5,4	6,3	6,4	6,0	6,0	5,19
4	9	6,4	6,0	6,2	6,8	6,7	5,8	5,7	5,3	6,11
5	10	5,1	5,2	4,8	5,6	5,4	3,2	2,2	2,0	4,19
6	11	2,2	2,5	2,3	4,4	4,5	3,5	2,7	2,4	3,06
7	12	2,5	1,8	1,8	3,7	4,1	3,8	1,9	1,8	2,68
8	13	0,3	0,0	0,0	1,8	2,9	3,0	0,0	—1,7	0,79
9	14	—3,0	—2,8	—3,0	2,9	6,6	7,0	3,4	2,9	1,75
10	15	* 1,9	1,0	—0,3	4,0	7,6	7,7	2,0	0,2	3,01
11	16	0,7	—1,0	—1,5	4,2	7,0	4,7	2,7	2,9	2,46
12	17	* 3,4	4,0	4,2	4,8	4,8	4,0	3,0	2,8	3,88
13	18	3,4	3,6	3,8	4,9	4,4	3,8	4,2	4,2	4,04
14	19	3,2	2,2	2,6	4,4	5,8	5,8	4,6	4,2	4,10
15	20	4,4	4,2	4,0	4,8	4,4	3,0	2,4	1,2	3,55
16	21	1,2	1,0	1,0	2,1	4,9	5,0	1,8	—0,2	2,10
17	22	—0,6	—0,8	—0,6	5,0	8,4	7,0	5,4	5,8	3,70
18	23	* 5,5	5,2	4,1	10,0	10,3	10,0	6,8	5,4	7,16
19	24	5,2	5,0	5,5	6,2	6,6	5,6	5,0	4,9	5,50
20	25	4,2	3,6	2,9	4,6	4,5	1,4	0,8	1,6	2,95
21	26	2,0	2,6	3,0	3,8	5,0	4,6	3,9	3,6	3,56
22	27	3,3	2,9	2,6	4,5	7,0	6,1	6,0	2,0	4,30
23	28	1,0	0,9	—0,2	7,6	10,2	9,3	5,7	4,8	4,91
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
Moyennes du	1–10	1,87	0,78	0,55	5,41	7,82	6,96	3,58	2,56	3,69
	11–20	1,90	1,55	1,39	3,99	5,21	4,63	2,69	2,09	2,93
	21–28	2,72	2,55	2,29	5,47	7,11	6,13	4,42	3,49	4,27
	mois	2,13	1,56	1,35	4,92	6,68	5,89	3,50	2,66	3,59

Maximum : 14,3 observé le 4 à 1 h. P.M.
Minimum :— 4,9 „ le 2 à 4 h. A.M.
} différence ..... o 19,2

TABLEAU MÉTÉOROLOGIQUE.—Février 1875.

Tension de la vapeur.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 1 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
25	1	* 4,13	3,44	3,48	3,10	2,28	1,99	3,14	3,23	3,10
26	2	* 3,13	2,96	2,80	3,22	2,09	1,81	3,31	4,65	3,00
27	3	* 4,51	4,45	3,86	3,27	3,11	3,07	4,05	4,27	3,82
28	4	* 4,43	4,50	4,29	5,08	5,01	5,67	5,22	5,18	4,92
29	5	4,75	3,53	4,13	5,78	4,59	3,74	3,78	6,04	4,54
1	6	5,03	3,65	3,27	3,08	3,62	3,79	3,76	3,00	3,65
2	7	3,03	3,40	3,47	3,32	3,61	4,01	4,90	5,16	3,86
3	8	* 5,48	5,79	5,87	6,40	6,74	6,68	6,48	6,05	6,19
4	9	6,25	6,70	6,80	6,85	6,91	6,38	6,44	6,22	6,57
5	10	6,14	6,08	6,12	5,74	5,60	5,09	4,72	4,64	5,52
6	11	4,72	5,10	4,70	4,01	4,05	4,09	4,27	4,84	4,47
7	12	4,39	4,28	4,10	4,33	3,93	3,41	4,35	4,01	4,10
8	13	4,31	4,21	4,11	3,56	3,85	2,85	3,10	3,58	3,70
9	14	2,89	3,10	3,37	3,00	3,98	3,64	4,51	4,71	3,65
10	15	* 4,70	4,66	4,36	4,65	3,98	3,32	3,80	3,68	4,14
11	16	3,58	4,30	3,81	3,47	2,96	3,18	3,87	4,05	3,65
12	17	* 4,21	4,45	4,91	5,25	5,51	5,29	4,91	5,02	4,94
13	18	5,17	5,25	5,31	5,45	5,15	5,41	5,67	5,67	5,39
14	19	5,28	4,92	5,04	5,75	5,92	5,92	5,94	5,77	5,57
15	20	5,75	5,57	5,69	5,51	5,75	5,20	5,00	4,69	5,40
16	21	4,51	4,27	4,09	4,10	4,41	4,53	4,50	4,31	4,34
17	22	4,26	4,11	4,35	4,93	4,55	5,14	5,30	5,36	4,75
18	23	* 5,50	5,72	5,98	6,99	6,69	6,75	6,46	6,34	6,30
19	24	6,46	6,34	6,50	6,30	6,52	4,97	5,23	5,50	5,85
20	25	4,97	4,55	4,71	4,25	4,51	4,80	4,57	4,88	4,67
21	26	5,04	5,24	5,40	5,41	5,39	5,13	4,47	4,65	5,10
22	27	4,63	4,51	4,29	3,81	4,30	4,84	4,20	4,94	4,44
23	28	4,72	4,78	4,53	5,42	6,01	6,11	6,11	6,22	5,49
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
Moyennes du	1–10	4,69	4,45	4,41	4,58	4,36	4,22	4,58	4,84	4,52
	11–20	4,50	4,58	4,54	4,50	4,51	4,23	4,54	4,60	4,50
	21–28	5,01	4,94	4,98	5,15	5,17	5,28	5,10	5,27	5,12
	mois	4,71	4,64	4,62	4,72	4,64	4,53	4,72	4,88	4,68

	mm		mm
Maximum :	6,91 observé le 9 à 1 h. P.M.	différence.....	5,10
Minimum :	1,81 „ le 2 à 4 h. P.M.		

TABLEAU MÉTÉOROLOGIQUE.—Février 1875.

Humidité relative.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
25	1	* 98	92	96	66	36	30	70	89	72,1
26	2	* 87	92	80	49	25	23	54	72	60,3
27	3	* 82	95	90	36	26	26	61	75	61,4
28	4	* 82	85	93	58	41	54	75	96	73,0
29	5	100	89	96	64	39	32	51	91	70,3
1	6	83	71	72	62	70	84	88	73	75,4
2	7	72	80	82	61	60	67	89	95	75,8
3	8	* 95	95	95	96	94	92	93	87	93,4
4	9	87	96	95	93	94	93	94	94	93,3
5	10	94	92	95	85	84	88	87	87	89,0
6	11	87	93	86	65	65	67	75	88	78,3
7	12	79	82	79	73	65	57	82	77	74,3
8	13	92	89	89	67	68	50	66	88	76,1
9	14	78	82	92	52	54	48	76	83	70,6
10	15	* 89	93	97	75	51	42	71	78	74,5
11	16	74	100	92	55	40	48	69	70	68,5
12	17	* 71	71	80	81	85	87	86	89	81,3
13	18	89	89	89	84	82	90	91	91	88,1
14	19	91	90	90	91	86	86	93	93	90,0
15	20	91	90	93	85	91	91	90	94	90,8
16	21	90	87	84	77	68	69	85	94	81,8
17	22	96	94	98	74	55	69	78	77	80,1
18	23	* 81	86	97	75	71	73	86	94	82,9
19	24	97	97	96	88	76	73	79	84	86,3
20	25	80	76	83	66	71	95	95	95	82,6
21	26	94	95	94	90	82	80	73	73	85,1
22	27	80	80	78	61	57	69	60	93	72,3
23	28	96	98	100	69	64	70	90	97	85,5
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
Moyennes du	1–10	88,0	88,7	89,4	67,0	56,9	58,9	76,2	85,9	76,38
	11–20	84,1	87,9	88,7	72,8	68,7	66,6	79,9	85,2	79,24
	21–28	89,3	89,1	91,3	75,0	68,0	74,8	80,8	88,4	82,06
	mois	86,96	88,53	89,68	71,36	64,29	66,18	78,82	86,35	79,02

Maximum : 100 observé 3 fois
Minimum : 23 „ le 2 à 4h. p.m. } différence 77

TABLEAU MÉTÉOROLOGIQUE.—Février 1875.

État du ciel.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. m.			4h. m.			7h. m.			10h. m.		
	Nébul.	Nuages sup.	Nuages inf.	Nébul.	Nuages sup.	Nuages inf.	Nébul.	Nuages sup.	Nuages inf.	Nébul.	Nuages sup.	Nuages inf.
1	..	..	..	0	..	..	2	..	cst ..	0	..	..
2	..	..	..	0	..	..	0	..	..	0	..	..
3	..	..	..	0	..	..	0	..	..	1 Br	..	..
4	..	..	..	2	..	cst ..	3	..	cst ..	0	..	..
5	0 Bd	..	..	0 Bd	..	..	3 Bd	..	cst ..	0	..	..
6	0	..	..	0	..	..	5 Br	ac ..	..	9	ac NE	..
7	10 Br	..	..	10 Br	..	..	10 Br	..	..	9	ac W	c E
8	10	..	..	10 Br	..	..	10 Br	..	..	10	..	n ..
9	10 Br	..	..	10	..	n ..	10	..	n E	10	cn E	cn E
10	10 Br	..	..	10 Br	..	..	10 Br	..	..	10 Br	..	NE
11	10 Br	..	..	10 Br	..	..	10 Br	..	..	10 Br	..	c NE
12	10 Br	..	..	9 Br	..	..	10	ac ..	n ..	10	ac W	c NE
13	5 Br	..	..	10	..	cst ..	6	ac ..	c ..	7	k W	c N
14	0	..	..	0	..	..	1	kst ..	0	0	..	..
15	0	..	..	0	..	..	0	..	..	1	ac W	..
16	9 Br	kst ..	..	0	..	..	7	k ..	cst ..	7	kst ..	..
17	10	..	..	10 Br	..	c ..	10 Br	..	cst ..	10	..	n ..
18	10	..	cn ..	10 Br	..	..	10 Br	..	cn NE	10 Br	..	..
19	10 Br	..	..	10 Br	..	n ..	10 Br	..	..	10 Br	..	c NE
20	10 Br	..	..	10 Br	..	..	10 Br	..	..	10 Br	..	cn NE
21	10 Br	..	cn ..	10 Br	..	..	10	..	c NW	10	ac N	..
22	7	k ..	..	0	..	..	3	k ..	..	3 Br	k W	..
23	10 Br	..	..	10 Br	..	..	6	kst ..	cst ..	4	ac ..	..
24	8	ac W	..	8	kc ..	..	10 Br	..	c NE	10 Br	ac E	..
25	10	..	..	10 Br	..	..	10 Br	..	..	10 Br	..	c E
26	10	..	n ..	10 Br	..	n ..	10 Br	..	n ..	10 Br	..	cn N
27	10 Br	..	..	10 Br	..	cst ..	10 Br	..	c ..	8	k SW	cst ..
28	1	kst ..	..	9	kst ..	c ..	3	kst ..	cn ..	7	ac E	..
..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..
Moy. du mois	6,3	..	..	6,4	..	..	6,8	..	..	6,6	..	..

Nombre de jours de :

Ciel beau, ou moins de $2_{1/0}$ couvert	4	Brouillard	2
,, peu nuageux ou de 2 à $4_{1/0}$,,	4	Brume	21
,, nuageux, ou de 4 à $6_{1/0}$,,	2	Rosée	2
,, très-nuageux, ou de 6 à $8_{1/0}$,,	5	Gelée blanche	8
,, couvert ou plus de $8_{1/0}$,,	13	Pluie	12
		Neige	2

TABLEAU MÉTÉOROLOGIQUE.—Février 1875.

État du ciel.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. s.			4h. s.			7h. s.			10h. s.			Moyennes des 8 observations.
	Nébul.	Nuages sup.	Nuages inf.	Nébul.	Nuages sup.	Nuages inf.	Nébul.	Nuages sup.	Nuages inf.	Nébul.	Nuages sup.	Nuages inf.	
1	0	..	..	0	..	..	0	..	..	0	..	..	0,8
2	0	..	..	7 Br	k W	..	10	..	n ..	10	..	n ..	3,9
3	0	..	..	0	..	..	0	..	..	2 Br	..	..	0,3
4	7 Br	k W	..	5 Br	k ..	..	1 Br	..	..	0	..	..	2,6
5	0	..	..	1	kst ..	..	0	..	..	0	..	..	0,5
6	5	ac NE	..	9	ac ..	n ..	9	..	cn ..	8	..	c ..	5,6
7	10	ac W	c SE	10 Br	..	c E	10	..	n ..	10	..	n ..	9,9
8	10	..	..	10	..	n ..	10	..	n ..	10	..	n ..	10,0
9	10 Br	..	..	10	..	n ..	10	..	n ..	10	..	n ..	10,0
10	10 Br	..	c NE	10	..	n ..	10	..	n ..	10	..	n ..	10,0
11	10 Br	..	c NE	10 Br	..	c NE	10 Br	..	..	10 Br	..	..	10,0
12	10	..	cn N	9	ac ..	c N	8 Br	k ..	..	10 Br	..	..	9,5
13	7	k W	c N	5	k W	c N	2 Br	kst ..	..	1 Br	..	..	5,4
14	1	ac W	..	10 Br	..	c ..	5 Br	k ..	..	10 Br	..	..	3,4
16	1	ac NW	..	1	ac NW	..	0	..	..	4	..	cst ..	1,0
16	7 Br	kst ..	..	10 Br	ac W	c W	10	ac SW	..	10	ac SW	..	7,5
17	10 Br	..	n E	10	..	cn E	10	..	cn ..	10	..	cn ..	10,0
18	10	..	cn E	10 Br	..	cn NE	10 Br	..	cn NE	10 Br	..	cn NE	10,0
19	10	..	c NE	10	..	c NE	10 Br	..	n ..	10 Br	..	..	10,0
20	10	..	n ..	10	..	n ..	10 Br	..	cn ..	10 Br	..	cn ..	10,0
21	9	ac N	..	5	ac N	..	2	ac ..	..	0 Bd	..	..	7,0
22	7	k W	cst ..	9 Br	..	..	10 Br	..	cst ..	10	..	c ..	6,1
23	10	a S	..	9	ac S	..	1	..	cst ..	8	..	cst ..	7,3
24	9	ac E	..	9 B	ac E	c E	10 Br	..	..	10	..	c ..	9,3
25	10 Br	..	cn E	10	..	n ..	10	..	n ..	10	..	n ..	10,0
26	10 Br	..	c N	10 Br	..	c N	10 Br	..	..	10 Br	..	..	10,0
27	5	k W	ac E	9	ac NE	..	9 Br	..	..	0	..	..	7,6
28	5	ac SE	..	4	ac SE	..	1	k ..	..	2 Br	..	..	4,0
..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..
Moy. du mois	6,9	..	..	7,6	..	..	6,7	..	..	7,0	..	..	6,8

Phénomènes divers observés :

Lumière zodiacale 2 fois 2

Halos lunaires 2

Brouillard sec ou sablonneux observé le 5 1

TABLEAU MÉTÉOROLOGIQUE.—Février 1875.

Direction du vent; sa vitesse par seconde.

Jours de la lune	Jours du mois	Matin. 1 h. Dir.	Matin. 1 h. Vit.	Matin. 4 h. Dir.	Matin. 4 h. Vit.	Matin. 7 h. Dir.	Matin. 7 h. Vit.	Matin. 10 h. Dir.	Matin. 10 h. Vit.	Soir. 1 h. Dir.	Soir. 1 h. Vit.	Soir. 4 h. Dir.	Soir. 4 h. Vit.	Soir. 7 h. Dir.	Soir. 7 h. Vit.	Soir. 10 h. Dir.	Soir. 10 h. Vit.	Moyennes des 8 observations.
			m		m		m		m		m		m		m		m	m
25	1	NNW	5,5	NNW	2,5	NW	0,9	NW	2,8	NW	3,7	NW	4,3	NE	1,8	SE	0,7	2 8
26	2	SE	2,0	SE	0,5	S	2,0	S	2,6	SSE	3,1	S	4,1	S	3,9	S	2,5	2,6
27	3	NNW	3,5	NNW	0.8	NW	2,0	NW	3,3	NW	6,7	NW	5,8	E	2,7	E	2.3	3,4
28	4	ENE	1,2	ENE	0,1	ENE	1,3	ENE	1,9	SE	1,3	ESE	2,8	E	2,6	NE	0,8	1,5
29	5	ENE	0,0	N	0,2	NW	0,3	NW	1,1	W	3,4	WNW	6,9	WNW	4,5	NNW	3,2	2,5
1	6	N	7,2	N	7,8	N	7,3	N	8,1	N	8,2	N	7,8	N	5,6	N	3,0	6,9
2	7	N	3,2	N	0,4	N	1,2	NE	3,0	E	5,7	E	5,3	E	3,9	ENE	3,4	3,3
3	8	E	4,3	E	3,4	ENE	3,6	ENE	4,6	ENE	5,2	E	5,9	E	6,8	E	7,7	5,2
4	9	E	7,6	ENE	7,4	ENE	7,6	ENE	8,4	NE	7,0	NNE	6,3	NNE	4,5	N	3,8	6,6
5	10	N	4,1	N	4,6	N	5,8	NNE	4,2	NNE	6,1	NNE	7,0	N	5,8	N	4,4	5,3
6	11	N	3,9	N	3.3	N	4,4	NNE	6,4	N	5,4	NNE	5,7	N	3,8	N	2,0	4,4
7	12	N	3,2	N	5,6	N	4,4	N	5,2	NNW	4,8	NNW	5,0	NNW	2,2	NW	2,3	4,1
8	13	NW	3,4	NW	2,3	NW	3,5	NNW	5,1	NNW	7,6	NNW	7,0	N	3,3	NNW	0,7	4,1
9	14	NNW	0,8	WNW	0,3	W	1,6	WSW	2,5	WNW	4 5	NW	4,4	W	1,8	WSW	2,1	2,3
10	15	NW	3,4	NW	1,5	NW	2,9	NNW	3,6	NW	3,4	NW	4,6	ENE	2,7	ENE	2,3	3,1
11	16	ENE	1,1	ENE	0,7	ENE	0,1	ENE	1,9	E	2,7	E	3,6	E	4,4	E	3,7	2,3
12	17	E	5,0	E	4,7	SE	5,1	SE	5,1	ESE	6,9	E	7,2	ENE	7,8	ENE	7,0	6,1
13	18	ENE	5,9	ENE	5,0	ENE	6,0	ENE	5,8	E	8,0	ENE	7,6	ENE	7,0	NE	7,7	6,6
14	19	NE	7,3	NE	3,8	NNE	7,0	NNE	6,0	N	5 2	N	5,3	N	3,9	N	2,7	5,2
15	20	N	3,1	N	2,6	NNE	3,1	NE	4,2	NNE	3,8	NNE	3,8	N	4,3	NNW	6,8	4,0
16	21	NNW	3,5	NNW	5,1	WNW	6,4	NW	5,5	NW	6,0	NW	5,6	NNW	3,1	NNE	0.6	4,5
17	22	NNE	1,4	ENE	1,6	NE	0,1	SE	1,7	SE	5,6	SE	6,4	ESE	6,4	SSE	5,4	3,6
18	23	S	8.0	S	5,3	S	2 8	SSE	3,7	SSE	4,2	S	4,8	SE	3,5	E	1,0	4,2
19	24	E	1,5	NNE	2,1	NNE	2,0	NE	5,2	NE	10,4	NE	9,7	NE	6,0	NE	2,8	5,0
20	25	NE	1,5	NE	3,1	NE	3,0	NE	7,3	NE	6,8	NE	5,5	NNE	2,6	NNE	4,2	4,2
21	26	N	3,2	N	3,5	N	3,4	N	4,4	N	5,7	N	6,1	N	5,3	N	4,5	4,5
22	27	NNW	3,3	N	2,4	N	2,4	N	4,3	N	4,2	NNE	3,1	NE	3,1	NNE	1,4	3,0
23	28	NNE	1,1	NNE	1,4	NNW	1,4	E	0,9	ESE	3,0	ESE	5,0	E	4,6	ENE	2,7	2,5
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Moy. du mois			m 3,5		m 2,9		m 3,3		m 4,2		m 5,3		m 5,6		m 4,2		m 3,3	m 4,0

Fréquence relative des 16 vents sur 100

N 22	W..... 2	S 4	E 12
NNW 9	WSW 1	SSE..... 2	ENE 12
NW 10	SW 0	SE 4	NE 8
WNW 2	SSW 0	ESE 2	NNE 11

Calmes, sur 100 observations 3

Vitesse moyenne maximum observée le 24..... m 10,4

TABLEAU MÉTÉOROLOGIQUE.—Février 1875.

Ozone.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
25	1	...	...	16	...	12	...	9	...	12,3
26	2	...	...	17	...	13	...	9	...	13,0
27	3	...	...	14	...	13	...	8	...	11,7
28	4	...	...	10	...	11	...	8	...	9,7
29	5	...	...	8	...	18	...	10	...	12,0
1	6	9	19	25	18	21	18	24	21	19,4
2	7	14	12	7,5	15	8	13	16	21	13,3
3	8	...	21	18	18	20	19	20	20	19,4
4	9	20	20	15	18	19	18	19	18	18,4
5	10	16	19	20	18	13	16	20	20	17,8
6	11	14	13	9	5	16	15	15	11	12,3
7	12	8	8	15	9	8	6	16	13	10,4
8	13	9	16	8	9	4	9	8	5	8,5
9	14	8	9	9	3	16	10	8	7	8,8
10	15	...	17	14	13	12	10	10	9	12,1
11	16	11	9	7	11	9	9	9	9	9,3
12	17	...	10	13	13	16	12	20	20	14,9
13	18	20	18	20	20	18	19	20	20	19,4
14	19	...	21	18	20	14	17	12	18	17,1
15	20	20	19	17	13	18	18	13	21	17,4
16	21	19	21	15	14	8	10	8	8	12,9
17	22	11	12	12	11	4	5	13	17	10,6
18	23	...	6	17	12	10	10	7	7	9,9
19	24	9	10	13	9,5	8,5	4,8	6	9	8,7
20	25	...	5,5	9	8,5	3	10	10	16	8,9
21	26	14	14	11	11	11	9	10	9	11,1
22	27	8	9	9	9	7	6	4	6	7,3
23	28	9	10	9	9	4	3	4,5	10	7,3
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
Moyennes du	1–10	...	...	...	...	...	...	...	...	...
	11–20	9,0	14,0	13,0	11,6	13,1	12,5	13,1	13,3	13,00
	21–28	...	...	...	...	...	...	...	...	...
	mois	...	...	...	...	...	...	...	...	...

Maximum : 24 et 25 observés le 6 } Différence..... 21
Minimum : 3 observé 3 fois }

N.B.—1.—Les chiffres obtenus le 6 sont le résultat d'observations horaires.

2.—Les observations pendant ce mois ayant été faites à des intervalles inégaux, la moyenne du mois n'a pu être calculée. Nous avons constaté, en effet, que le papier est d'autant moins sensible, qu'il a subi plus longtemps l'action de l'ozone ; de sorte que l'interpolation ne nous semble pas possible.

TABLEAU MÉTÉOROLOGIQUE.—Février 1875.

Jours de la lune	Jours du mois	Températures extrêmes. sous l'Abri. Minima	Maxima	Moyennes	au Soleil. Max. boule noire.	Max. boule blanche.	Différence.	Évaporation. Total des 24 h.	Pluie. Jardin. Total des 24h.	Toit. Total des 24h.	Différences	Température du Puits.
		o	o	o	o	o	o	mm	mm	mm	mm	o
25	1	−3,5	6,0	1,25	11,9	8,1	3,8	2,30	0,0	0,0	0,0	...
26	2	−5,2	9,5	2,15	20,1	14,5	5,6	4,10	0,0	0,0	0,0	...
27	3	−1,6	14,2	6,30	20,8	17,3	3,5	4,60	0,0	0,0	0,0	...
28	4	−0,5	15,5	7,50	26,7	20,5	6,2	2,15	0,0	0,0	0,0	...
29	5	−3,5	14,6	5,55	20,4	17,0	3,4	3,41	0,0	0,0	0,0	...
1	6	−1,7	2,7	0,50	10,6	6,7	3,9	1,54	0,0	0,0	0,0	...
2	7	−2,0	4,2	1,10	9,8	6,6	3,2	2,10	0,3	0,0	0,3	12,7
3	8	1,5	1,2	4,35	...	...	...	?	3,4	0,0	0,3	...
4	9	5,3	6,9	6,10	...	...	...	0,20	19,9	16,9	3,0	...
5	10	2,0	5,9	3,95	...	...	...	0,30	13,9	3,1	0,5	...
6	11	0,7	5,2	2,95	11,8	8,4	3,4	2,00	1,9	1,0	0,9	...
7	12	0,9	5,5	3,20	...	...	...	2,40	0,0	0,0	0,0	...
8	13	−0,8	4,2	1,70	13,6	8,8	4,8	2,40	0,0	0,0	0,0	...
9	14	−3,8	8,0	2,10	16,1	11,8	4,3	1,75	0,0	0,0	0,0	12,6
10	15	−0,7	8,3	3,80	16,6	12,5	4,1	2,45	0,0	0,0	0,0	...
11	16	−2,2	7,6	2,70	17,6	12,7	4,9	2,25	0,0	0,0	0,0	...
12	17	1,9	5,1	3,50	...	...	...	1,60	4,3	3,4	0,9	...
13	18	2,3	5,2	3,75	...	...	...	0,60	6,3	5,2	1,1	...
14	19	1,8	6,1	3,95	...	...	...	0,35	13,9	10,2	3,7	...
15	20	1,2	4,9	3,05	...	...	...	0,25	7,3	4,9	2,4	...
16	21	−0,2	5,2	2,50	12,6	9,4	3,2	1,30	2,0	0,5	1,5	...
17	22	−1,7	8,9	3,60	19,2	14,1	5,1	1,80	0,0	0,0	0,0	...
18	23	3,5	12,6	8,05	26,6	20,1	6,5	2,30	0,0	0,0	0,0	...
19	24	4,1	7,2	5,65	13,8	10,5	3,3	1,65	0,0	0,0	0,0	...
20	25	0,8	4,5	2,65	...	...	...	1,50	4,0	2,8	1,2	...
21	26	0,4	5,5	2,95	...	...	...	0,45	6,6	2,4	4,2	...
22	27	2,0	7,1	4,55	...	...	...	2,20	0,0	0,0	0,0	...
23	28	−0,5	11,2	5,35	21,5	17,1	4,4	1,55	0,0	0,0	0,0	12,5
...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...
Moyennes du	1-10	−0,92	8,67	3,88	...	...	...	20,70	37,5	33,4	4,1	...
	11-20	0,13	6,01	3,07	...	...	...	16,05	33,7	24,7	9,0	...
	21-28	1,05	7,77	4,41	...	...	...	12,75	12,6	5,7	6,9	...
	mois	0,02	7,46	3,74	...	...	...	49,50	83,8	63,8	20,0	...

	o	o	mm
Maximum:	15,5 observé le 4	Max. boule noire	26,7	Hauteur d'eau tombée	83,8
Minimum:	−5,2 „ le 2	„ blanche	20,5	„ évaporée	49,5
Différence:	20,7	Différence max.	6,5	Différence	34,3

JOURNAL MÉTÉOROLOGIQUE.

Février 1875.

1. 5h. 30m. m.—Pas de rosée ; ciel sans nuages ; vent fort. 7h.—Quelques stratus. Le reste du jour ciel très-pur, vent régulier qui passe du N.W. au S.E. par le N. de 4h. à 10h. P.M.
2. 4h. m.—Gelée blanche. Ciel sans nuages jusqu'à 4h. P.M.; à ce moment des cirrus viennent de l'W. et la brume devient presque générale. 7h.—Ciel sombre à l'W. 10h.—Ciel uniformément couvert.
3. 4h. m.—Ciel serein ; étoiles peu brillantes. 7h.—Faible gelée blanche. Ciel splendide jusqu'à 10h. P.M.; alors l'horizon W. s'assombrit.
4. 4h. m.—Nuages à l'horizon E. et S. 7h.—Même ciel. 10h.—Ciel légèrement brumeux, horizon sablonneux. 1h. s.—Cirrus au zénith, brume à l'horizon. 4h.—Même remarque. 7h.—Quelques nuages indistincts à l'horizon W.
5. 1h. m.—Brouillard peu élevé ; calme absolu. 4h.—Gelée blanche qui se dépose sur les thermomètres ; brouillard épais. 7h.—Quelques stratus. 10h.—Ciel splendide. 1h. s.—Horizon jaunâtre et sablonneux. 4h.—Cirro-stratus au S.E. 7h.—Lumière zodiacale 3 fois plus brillante que la voie lactée. 10h.—Ciel très-pur. Aujourd'hui le baromètre est descendu et est remonté rapidement.
6. 1h. m.—Ciel comme à 10h. 4h.—Étoiles brillantes. 7h.—Pas de gelée. 10h.—Des alto-cumulus viennent rapidement du N.E. 1h. s.—Ciel blanchâtre. 4h.—Des nimbus ont envahi presque tout le ciel. 7h.—Eclaircie à l'W. ; reste du ciel très-sombre. 10h.—Quelques éclaircies. Le vent a soufflé avec force toute la journée et dans la même direction.
7. 1h. m.—Ciel uniformément couvert. 4h. et 7h.—Id. 10h.—Ciel moutonné ; des cumulus viennent rapidement de l'E. 1h. s.—Couche d'alto-cumulus compactes couvrant tout le ciel ; au-dessous des cumulus viennent du S.E. 4h.—Nimbus et stratus au S. ; quelques gouttes de pluie. 7h.—Pluie fine. 10h.—Id.
8. 4h. m.—La pluie continue. 7h.—Id. 10h.—Il bruine et ainsi jusqu'au soir ; le vent va en augmentant sans changer de direction.
9. 1h. m.—Il ne bruine plus ; ciel très-sombre ; air tiède. 4h.—Pluie très-abondante. 7h.—Il pleut par averse. 10h.—Il bruine ; les cumulo-nimbus viennent de l'E. 1h. s.—Mêmes remarques. 4h.—Quelques stratus à l'horizon. 7h.—Ciel uniformément couvert ; il bruine un peu. 10h.—Mêmes remarques.
10. 1h. m.—Brume générale ; il ne pleut plus. 4h.—Ciel très-sombre. 7h.—Il pleut de nouveau. 10h.—Ciel chargé en différents points ; brume ondulée de l'E. à l'W. 1h. s.—Ciel moutonné. 4h.—Pluie abondante ; ciel uniformément couvert. 7h.—Petite pluie. 10h.—Id. Ciel très-sombre.
11. 1h. m.—Il ne pleut plus ; ciel sombre. 4h.—Ciel uniformément couvert tout le jour. De 10h. à 4h. on distingue quelques cumulus venant du N.E.
12. 1h. m.—Quelques grosses gouttes de pluie. 4h.—On aperçoit des étoiles au zénith. 7h.—Nuages peu épais. 10h.—Deux couches

de nuages allant presque en sens contraire et rapidement. 1h. s.— Des cumulo-nimbus ont envahi tout le ciel. 4h.—Eclaircie au zénith où on distingue des cirrus. 10h.—Longs stratus en différents points du ciel.

13. 1h. m.—Ciel brumeux à l'horizon ; étoiles brillantes au zénith. 4h.—Stratus par tout le ciel ; ils partent du S.W. en divergeant. 7h.—Gelée blanche en quelques endroits. 10h.—Deux couches de nuages allant à angle droit ; les cumulus sont très-rapides. 1h. s.— Même ciel. 4h.—Horizon sombre à l'W. et au S.W. 7h.—Cirro-stratus convergeant vers le N.; horizon S. brumeux. 8h. ½.—Halo lunaire. 10h.—Horizon brumeux ; reste du ciel très-pur.

14. 1h. m.—Ciel splendide ; calme absolu ; froid peu sensible. 4h.— Étoiles très-brillantes ; gelée blanche. 7h.—Quelques cirrus épars dans le ciel ; légère couche de glace sur l'étang de l'W. 10h.— Temps magnifique. 1h. s.—Ciel bleuâtre. 4h.—Brume générale ; au dessous se détachent quelques cumulus. 7h.—Cirrus au zénith. 10h. ½.—Halo lunaire.

15. 4h. m.—Ciel très-pur. 7h.—Gelée blanche. 10h.—Ciel blanchâtre à l'horizon. 1h. s.—Alto-cumulus venant du N.W.; brume à l'horizon S. 4h.—Horizon un peu brumeux. 7h.—Beau clair de lune. 10h.—Quelques stratus.

16. 1h. ½ m.—Longs cirro-stratus paraissant converger au S. 4h.— Légère brume à l'horizon S.; calme absolu. 7h.—Le calme continue ; gelée blanche. 10h.—Ciel toujours brumeux au S. 1h. s.— Cirro-stratus comme à 1h. ce matin. 4h.—Nuages indistincts. 7h.—Ciel moutonné au zénith. 10h.—Même remarque.

17. 4h. m.—Quelques gros cumulus au S. sur un fond brumeux. 7h.—Ciel chargé en plusieurs points. 10h.—Pluie. 1h. s.—La pluie continue. 4h.—Id ; cumulo-nimbus par tout le ciel. 7h. et 10h.—Mêmes remarques. Le vent a passé du S.E. au N.E. par l'E.

18. 1h. m.—Même ciel qu'à 10h. 4h.—Quelques gouttes de pluie ; ciel uniformément couvert. 10h.—Ciel gris. 1h. s.—Des cumulo-nimbus occupent tout le ciel. 4h.—Pluie fine ; nuages très-bas. 7h.—Mêmes remarques. 10h.—Pluie abondante ; lune complètement invisible. Le vent a été très-constant en force et en direction toute la journée.

19. 4h.—Pluie ; ciel uniformément couvert ; vent toujours très-fort. 7h.—La pluie a cessé ; il bruine. 10h.—Les cumulus occupent tout le ciel. 4h.—Même remarque. 5h.—Il bruine. 7h —Id. 10h.—Brume générale.

20. 1h. m.—Même ciel qu'à 10h. ; le vent tombe. 7h.—Id. 10h.— Il bruine ; ciel gris. 1h. s.—Il pleut. 3h. ½.—Il neige et il pleut en même temps. 7h.—Pluie peu abondante. 10h.—Id.

21. 1h. m.—Pluie non accusée par le pluviomètre. 4h.—Il ne pleut plus ; vent froid. 7h.—Cumulus venant du N.W. 10h.—Eclaircies d'un bleu foncé. 1h. s.—Eclaircies bleuâtres ; ciel chargé au N. 4h.—Gros alto-cumulus transparents à peu près également distribués dans le ciel. 7h.—Stratus épars. 10h.—Clair de lune splendide ; brouillard léger et peu élevé au-dessous du sol.

22. 1h. m.—Cirrus panachés ; grande éclaircie du S.W. au N.W. ; calme. 4h.—Ciel très-pur ; calme absolu ; gelée blanche très-

abondante. 7h.—Quelques cirrus vaporeux ; légère couche de glace sur l'étang. 10h.—Ceinture de brume à l'horizon ; cirrus très-déliés au zénith ; ciel d'un bleu foncé. 1h. s.—Les cirrus deviennent vaporeux, le ciel blanchâtre ; ciel moutonné au S. ; stratus orienté E.-W. 4h.—Brume générale, ciel sombre au N. ; éclaircie et cirrus vaporeux au S. 7h.—Long stratus orienté E.-W. 10h.—Cumulus par tout le ciel ; vent fort ; il a passé du N.E. au S.E. par l'E.

23. 4h.—Ciel uniformément couvert ; lune à peine visible. 7h.—Cirro-stratus orientés N.E.-S.W. ; ceinture de cumulus à l'horizon. 10h.—Cumulo-stratus orientés E.-W. 10h.—Cumulus compactes couvrant tout le ciel et venant lentement du S. 4h.—Grande éclaircie blanchâtre au zénith. 7h.—Long stratus à l'horizon W. : il est orienté N.-S. ; lumière zodiacale 4 ou 5 fois plus brillante que la voie lactée. 10h.—Bandes noirâtres au N. ; elles sont orientées N.-S. ; vent très-régulier.

24. 1h. m.—Éclaircie tout autour de l'horizon ; reste du ciel moutonné. 4h.—Cirro-stratus ; vent très-régulier. 7h.—Cumulus compactes. 10h.—Cumulus venant très-rapidement du N.E. 1h. s.—Les cumulus prennent une teinte grisâtre au S. 4h.—Ciel gris ; éclaircie bleuâtre au N.E. 7h.—Ciel très-sombre. 10h.—Éclaircie au S.E. ; stratus orientés N.-S.

25. 5h. m.—Brume générale ; quelques gouttes de pluie. 7h.—Pluie fine. 10h.—Ciel gris ; cumulus rapides. 1h. s.—Il pleut. 4h.—Neige. 7h.—Id. 10h.—Pluie et neige en même temps.

26. 1h. m.—Pluie fine. 4h.—Il ne pleut plus ; la neige a disparu. 7h.—Pluie fine. 10h.—Ciel gris ; cumulo-nimbus diffus venant du N. Même ciel jusqu'au soir.

27. 1h. m.—Brume générale comme hier. 4h.—Stratus vaporeux orientés N.-S. 7h.—Brume ondulée à l'horizon. 10h.—Nuages transparents et également distribués dans le ciel. 1h. s.—Ciel bleuâtre ; nuages comme à 10h. 4h.—Ceinture presque complète de gros cumulus noirâtres tout autour de l'horizon. 7h.—Éclaircie au N.E. reste du ciel sombre et uniformément couvert. 10h.—Ciel splendide ; étoiles brillantes ; rosée.

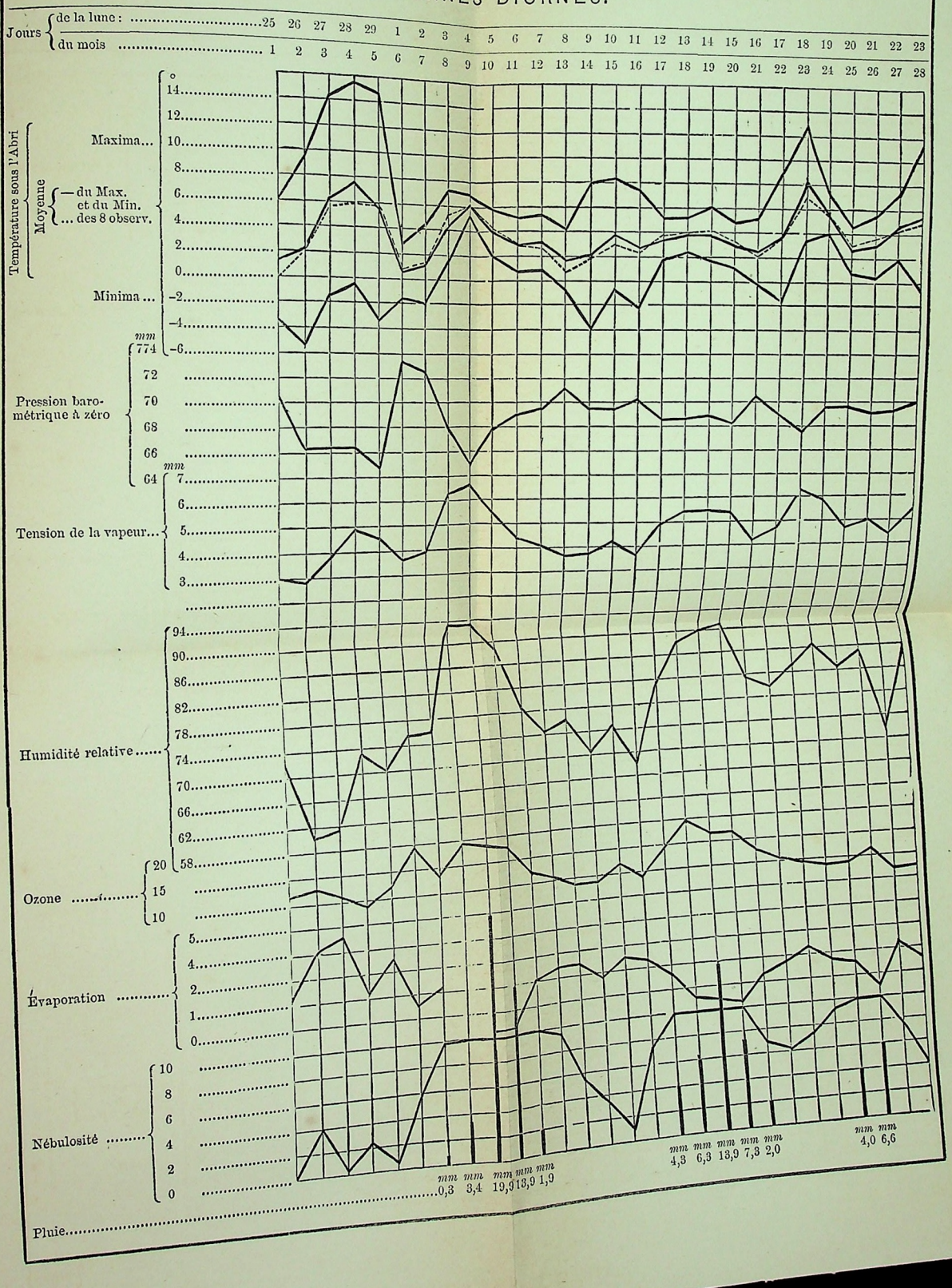
28. 1h. m.—Gelée blanche ; long cirro-stratus paraissant converger vers l'E. 7h.—Mêmes remarques. 10h.—Cumulus *balles de coton* très-transparents. 1h. s.—Les nuages viennent rapidement du S.E. 4h—Gros alto-cumulus compactes occupant l'horizon de l'E. à l'W. par le S. 7h.—Cirrus partant de l'W. en divergeant ; étoiles brillantes. 10h.—Ciel brumeux au S. ; le reste est découvert et très-pur.

A. M. D. G.

OBSERVATOIRE DE ZI-KA-WEI

Résumé des Observations Météorologiques de Février 1875.

MOYENNES DIURNES.



A. M. D. G.

OBSERVATOIRE

MÉTÉOROLOGIQUE ET MAGNÉTIQUE,

des Pères de la Compagnie de Jésus

à ZI-KA-WEI.

BULLETIN MÉTÉOROLOGIQUE,

MARS 1875.

NOTA.—Pour la position géographique de l'observatoire, les instruments utilisés; les notations employées, etc., voir la note préliminaire placée en tête du Bulletin de Septembre 1874.

TABLEAU MÉTÉOROLOGIQUE.—Mars 1875.

Pression barométrique à zéro.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
24	1	770,42	769,06	768,44	769,15	768,36	766,91	767,33	767,26	768,37
25	2	66,86	66,56	67,87	69,41	68,69	68,35	69,40	70,12	68,41
26	3	69,04	68,51	68,40	68,94	68,01	67,12	68,49	69,40	68,49
27	4	* 69,37	68,46	69,18	70,13	68,34	67,21	66,99	67,46	68,39
28	5	* 67,39	65,97	66,81	67,63	65,96	64,70	65,03	65,27	66,10
29	6	64,18	62,89	63,06	62,89	60,80	59,34	59,84	59,66	61,58
30	7	58,83	56,55	57,00	58,70	58,05	58,48	60,15	61,78	58,74
1	8	62,67	63,31	65,12	67,22	66,10	66,08	66,76	67,97	65,65
2	9	67,33	66,84	67,24	67,79	66,41	65,13	64,88	64,95	66,32
3	10	* 63,71	62,14	62,04	61,33	60,01	59,25	59,15	59,88	60,94
4	11	59,88	58,79	60,05	60,66	60,55	60,23	61,37	61,96	60,44
5	12	62,10	61,22	60,47	60,56	58,94	57,51	56,45	57,00	59,28
6	13	56,24	57,10	58,60	60,96	60,60	61,23	62,67	63,91	60,16
7	14	64,32	63,21	64,01	63,09	61,95	59,96	59,02	58,17	61,72
8	15	56,45	56,69	59,85	62,14	62,26	63,20	64,63	66,59	61,48
9	16	66,68	67,60	69,18	69,87	69,59	69,74	70,17	70,34	69,15
10	17	69,91	68,44	69,04	69,14	67,89	66,78	66,61	67,59	68,19
11	18	66,39	65,69	65,90	66,27	65,80	65,22	66,12	67,00	66,05
12	19	67,00	66,64	67,88	68,47	67,29	67,25	68,90	70,10	67,94
13	20	70,04	69,20	69,35	69,14	66,98	64,85	64,35	64,33	67,28
14	21	62,79	60,77	60,47	60,78	60,93	62,40	63,80	* 66,38	62,29
15	22	67,03	65,78	66,64	66,86	65,43	65,02	66,28	67,10	66,27
16	23	66,81	66,54	67,44	68,02	66,67	65,49	65,39	65,36	66,47
17	24	64,73	63,43	63,64	63,85	62,09	61,34	61,47	61,42	62,75
18	25	60,57	59,81	60,82	60,96	60,18	60,16	62,82	64,64	61,25
19	26	65,93	66,42	67,39	67,92	66,63	65,79	66,38	65,63	66,51
20	27	65,45	63,70	62,51	62,62	60,03	57,83	56,57	56,45	60,65
21	28	56,37	56,76	59,51	61,35	62,51	62,56	64,01	65,33	61,05
22	29	64,55	63,81	64,37	64,34	63,37	62,29	63,24	63,83	63,73
23	30	63,27	63,11	65,27	65,01	64,06	64,17	64,89	66,25	64,50
24	31	64,99	64,23	64,53	64,72	63,32	62,17	62,97	62,93	63,73
Moyennes du	1–10	765,98	765,07	765,52	766,32	765,07	764,26	764,80	765,38	765,30
	11–20	63,90	63,46	64,43	65,03	64,19	63,60	64,03	64,70	64,17
	21–31	63,86	63,12	63,87	64,22	63,20	62,66	63,44	64,12	63,56
	mois	764,56	763,86	764,58	765,16	764,12	763,48	764,07	764,71	764,32

Maximum : 770,42 observé le 1 à 4 h. A.M.
Minimum : 756,24 „ le 13 à 4 h. A.M.
} différence : ..... 14,18 *

TABLEAU MÉTÉOROLOGIQUE.—Mars 1875.

Température sous l'abri.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
24	1	4,2	4,0	5,3	11,3	11,3	9,4	8,2	8,0	7,71
25	2	7,6	6,8	5,2	5,0	5,9	4,8	2,8	0,4	4,81
26	3	1,8	1,0	0,5	6,2	8,9	9,4	4,8	2,4	4,38
27	4	* 1,2	1,0	2,0	9,9	11,3	10,5	6,2	6,0	6,01
28	5	* 5,5	5,0	5,0	13,0	16,2	15,4	10,0	9,5	9,95
29	6	10,2	10,0	9,4	17,1	21,0	19,4	13,9	13,4	14,30
30	7	13,4	13,0	13,7	14,8	16,0	16,2	14,9	13,4	14,43
1	8	9,6	8,0	8,3	7,3	10,9	11,0	8,9	8,0	9,00
2	9	7,9	8,0	8,3	11,5	13,1	10,3	10,0	9,9	9,88
3	10	*10,1	10,4	11,0	12,9	14,5	14,7	13,2	12,1	12,36
4	11	11,0	12,1	13,8	15,4	16,7	14,3	11,2	10,3	13,10
5	12	9,7	7,7	8,2	10,8	10,2	11,2	11,3	12,3	10,17
6	13	13,2	14,2	13,6	14,4	15,2	14,6	10,0	8,2	12,92
7	14	8,1	7,8	7,5	8,7	10,5	9,5	9,7	10,5	9,04
8	15	11,9	12,3	9,3	9,0	9,9	9,8	9,0	8,4	9,95
9	16	7,9	7,9	7,5	10,0	12,2	11,0	7,3	6,0	8,72
10	17	4,4	5,4	5,4	9,2	12,8	10,3	9,3	9,2	8,25
11	18	9,2	9,3	9,3	10,5	10,6	11,5	9,5	7,2	9,64
12	19	4,5	4,6	6,0	13,4	17,4	12,7	8,3	5,2	9,01
13	20	2,8	3,4	1,8	9,8	12,0	10,5	8,8	8,7	7,23
14	21	8,9	9,2	9,9	16,0	17,1	13,7	10,0	* 7,8	11,58
15	22	5,7	4,5	4,3	9,7	12,9	13,1	7,2	5,1	7,81
16	23	3,8	3,0	5,2	11,7	14,0	13,7	9,2	9,0	8,70
17	24	9,3	9,0	9,8	16,0	19,0	19,2	13,8	12,0	13,51
18	25	12,7	13,0	12,9	20,4	25,6	22,9	13,0	10,8	16,41
19	26	9,7	9,0	9,1	13,0	13,0	11,8	9,4	9,0	10,50
20	27	9,2	8,9	10,8	12,4	12,7	14,1	14,0	14,2	12,04
21	28	13,5	10,1	8,5	8,3	7,8	7,5	6,7	6,4	8,60
22	29	5,1	3,5	5,7	10,7	11,6	11,0	9,4	8,6	8,20
23	30	7,5	8,0	6,5	10,0	12,8	11,8	7,9	5,6	8,76
24	31	3,0	3,5	4,8	10,1	11,8	12,8	6,3	4,9	7,15
Moyennes du	1–10	7,15	6,72	6,87	10,90	12,91	12,11	9,29	8,31	9,28
	11–20	8,27	8,47	8,24	11,12	12,75	11,54	9,44	8,60	9,80
	21–31	8,04	7,23	7,95	12,57	14,39	13,78	9,72	8,49	10,30
	mois	7,82	7,53	7,70	11,56	13,38	12,51	9,49	8,47	9,81

Maximum : o 25,6 observé le 25 à 1 h. P.M.
Minimum : 0,4 „ le 2 à 10 h. P.M.
différence ..... o 25,2

TABLEAU MÉTÉOROLOGIQUE.—Mars 1875.

ACTINOMÈTRE : 1° *thermomètre à boule nue.*

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
24	1	3,6	3,6	7,4	14,2	13,3	9,4	7,7	...	8,46
25	2	...	6,3	4,7	6,2	6,7	5,1	2,3	—0,4	4,41
26	3	1,2	0,2	3,1	17,2	19,4	18,1	2,3	0,0	7,69
27	4	*—0,5	—0,9	4,6	20,3	22,7	19,5	5,5	5,3	9,56
28	5	* 4,5	3,6	7,1	23,7	27,1	24,1	9,3	8,8	13,52
29	6	9,3	8,6	12,1	27,6	31,3	25,5	18,1	12,7	17,53
30	7	11,3	12,5	13,3	14,8	18,3	16,3	14,3	12,5	14,29
1	8	9,0	7,5	8,2	8,3	18,4	14,7	8,8	8,1	10,38
2	9	7,6	8,1	8,6	16,4	19,5	10,7	9,9	9,7	11,31
3	10	*10,0	10,3	11,1	13,8	17,3	15,8	13,3	12,3	12,99
4	11	11,3	11,3	13,5	18,3	19,1	15,9	11,3	10,3	13,87
5	12	9,4	7,2	8,5	12,2	11,6	11,7	11,3	12,3	10,52
6	13	12,9	13,8	13,3	18,2	23,0	17,0	9,7	8,0	14,49
7	14	8,2	7,6	7,8	10,5	14,3	10,5	9,7	10,3	9,86
8	15	11,7	12,3	9,3	10,8	11,9	11,3	8,7	8,2	10,52
9	16	7,4	7,4	7,8	17,6	23,8	19,5	6,5	5,2	11,90
10	17	3,5	4,6	5,5	13,3	20,3	11,9	9,3	8,9	9,66
11	18	9,2	9,1	9,3	13,5	12,2	16,5	8,2	6,0	19,50
12	19	3,6	3,5	6,5	24,2	26,3	14,3	7,5	4,6	11,31
13	20	1,6	1,6	3,6	20,0	22,7	14,3	8,3	8,3	10,05
14	21	8,3	8,5	14,6	26,3	24,3	16,6	9,4	* 7,2	14,40
15	22	5,1	3,3	5,9	21,1	24,1	21,6	6,4	4,3	11,47
16	23	2,4	2,2	10,1	22,6	25,2	22,3	8,6	8,3	12,71
17	24	8,4	7,8	14,1	26,5	29,7	27,6	13,1	11,4	17,32
18	25	11,5	12,0	16,3	30,4	34,3	30,1	12,3	11,1	19,75
19	26	9,1	8,3	9,6	23,3	23,6	19,0	9,3	8,6	13,85
20	27	8,8	8,4	14,6	14,1	14,6	15,7	13,6	14,0	12,97
21	28	13,3	10,1	8,5	10,6	8,9	9,1	6,4	6,3	9,15
22	29	4,8	3,0	6,4	19,8	17,7	12,2	9,3	8,2	10,17
23	30	7,2	7,8	8,0	20,2	23,6	17,3	7,1	5,0	12,02
24	31	2,0	2,4	7,7	20,4	21,5	22,2	5,3	3,5	10,62
Moyennes du	1–10	5,70	5,98	8,02	16,25	19,40	15,92	8,65	7,67	11,01
	11–20	7,88	7,84	8,51	15,86	18,52	14,29	9,05	8,21	11,27
	21–31	7,35	6,71	10,53	21,39	22,50	19,43	9,16	7,99	13,13
	mois	7,22	6,83	9,07	17,95	20,21	16,63	8,97	7.97	11,85

Moyennes du mois { Therm. à boule noirçie : o 15,36 ; Therm. à boule nue : 11,85 } différence ..... o 3,51

N.B.—*Voir une note à la fin de ce mois.*

TABLEAU MÉTÉOROLOGIQUE.—Mars 1875.

ACTINOMÈTRE : 2° *thermomètre à boule noirçie.*

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
24	1	3,4	3,4	11,3	19,6	16,9	10,4	7,6	...	10,37
25	2	...	6,2	4,8	6,1	8,3	6,0	2,2	—0,5	4,73
26	3	1,1	0,2	8,2	31,6	33,5	30,7	2,2	—0,1	13,43
27	4	*—0,5	—0,9	10,2	35,6	38,9	33,2	5,4	5,2	15,89
28	5	* 4,3	3,4	12,1	38,4	42,5	37,3	9,2	8,7	19,49
29	6	9,2	8,5	17,7	41,6	46,6	35,7	13,1	12,5	23,11
30	7	12,2	12,5	13,4	16,2	22,0	17,2	14,2	12,4	15,01
1	8	8,9	7,4	8,5	10,2	28,9	20,2	8,7	8,0	12,60
2	9	7,5	8,0	9,2	24,7	29,3	11,2	9,8	9,5	13,65
3	10	* 9,8	10,2	11,2	16,2	22,8	17,7	13,2	12,2	14,16
4	11	11,2	11,2	13,8	23,6	22,6	18,2	11,2	10,2	15,25
5	12	9,3	7,1	9,0	14,2	14,7	12,8	11,2	12,2	11,31
6	13	12,8	13,7	14,1	23,7	33,2	20,5	9,5	7,9	16,92
7	14	8,1	7,5	8,1	14,0	20,4	12,0	9,6	10,2	11,24
8	15	11,6	12,2	9,7	13,3	14,9	13,2	8,6	8,1	11,45
9	16	7,3	7,3	9,0	28,9	38,2	32,2	6,4	5,2	16,81
10	17	3,4	4,5	6,2	20,4	31,4	14,4	9,2	8,8	12,29
11	18	9,1	9,0	9,4	18,1	15,2	24,2	8,1	6,1	12,40
12	19	3,6	3,5	8,5	37,5	39,2	16,5	7,4	4,5	15,09
13	20	1,5	1,5	7,8	33,2	39,1	20,2	8,2	8,2	14,96
14	21	8,2	8,4	22,2	39,8	35,2	21,7	9,4	* 7,2	19,01
15	22	5,1	3,2	9,8	35,9	40,2	34,7	6,3	4,2	17,42
16	23	2,3	2,0	19,0	37,2	41,2	35,4	8,5	8,2	19,22
17	24	8,3	7,7	21,6	40,4	45,1	41,0	13,1	11,3	23,56
18	25	11,4	11,9	22,6	43,4	48,2	40,5	12,2	11,0	25,15
19	26	9,0	8,2	10,8	37,2	38,3	30,3	9,2	8,5	18,94
20	27	8.8	8,3	21,3	16,2	18,5	18,5	13,6	13,9	14,89
21	28	13,2	10,0	8,7	15,0	10,3	11,3	6,3	6,2	10,12
22	29	4,7	2,8	8,2	32,8	27,8	14,3	9,2	8,1	13,49
23	30	7,1	7,8	11,0	33,1	39,6	26,2	7,1	5,0	17,11
24	31	2,0	2,4	13,7	34,2	37,7	37,6	5,2	3,4	17,02
Moyennes du	1–10	6,21	5,89	10,66	24,02	28,97	21,96	8,56	7,54	14,24
	11–20	7,79	7,75	9,56	22,69	26,89	18,42	8,94	8,14	13,77
	21–31	7,28	6,61	15,35	33,20	34,74	28,32	9,10	7,91	17,81
	mois	7,13	6,74	11,97	26,85	30,34	23,07	8,87	7,88	15,36

Maximum observé le 25 { Therm. à boule noirçie : 48,2 / Therm. à boule nue : 34,3 } différence ..... o 13,9

TABLEAU MÉTÉOROLOGIQUE.—Mars 1875.

Tension de la vapeur.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	m.m
24	1	6,08	6,10	6,46	7,79	8,03	8,06	7,76	7,66	7,24
25	2	7,24	6,85	5,48	5,60	5,46	4,91	3,87	4,13	5,44
26	3	3,89	3,64	3,90	4,47	3,67	3,17	4,23	4,31	3,91
27	4	* 4,26	4,01	4,35	4,77	4,37	4,30	4,78	5,00	4,48
28	5	* 5,04	5,09	5,29	6,16	7,04	6,75	7,29	7,78	6,31
29	6	8,09	7,97	7,53	7,50	9,05	11,46	9,31	9,61	8,81
30	7	10,92	8,97	9,33	10,21	11,11	11,84	11,78	10,78	10,62
1	8	8,33	7,66	7,37	7,10	7,01	7,61	7,48	7,33	7,60
2	9	7,50	8,02	7,84	7,91	8,26	7,91	7,97	8,51	7,99
3	10	* 8,96	9,41	9,79	10,43	11,60	11,90	11,30	10,53	10,47
4	11	9,40	10,04	11,33	12,32	11,66	10,77	9,67	9,35	10,57
5	12	8,15	7,84	7,90	8.68	8,69	9,67	10,00	10,67	8,95
6	13	10,90	11,61	10,40	10,18	10,11	9,53	8,21	7,90	9,86
7	14	7,96	7,45	7,30	7,82	8,39	8,27	8,39	9,22	8,10
8	15	10,42	10,54	8,39	8,30	9,11	9,05	7,75	7,78	8,92
9	16	7,61	7,50	7,09	7,29	7,13	4,88	5,60	5,80	6,61
10	17	5,96	6,06	6,40	6,83	7,96	7,71	8,39	8,45	7,22
11	18	8,45	8,63	8,63	8,51	8,33	7,91	7,89	7,37	8,21
12	19	6,10	6,14	6,81	7,95	7,71	7,65	6,61	6,18	6,89
13	20	5,62	5,65	4,86	5,05	5,97	5,61	6,41	6,47	5,71
14	21	6,68	6,50	7,71	9,34	9,59	6,10	5,69	* 5,58	7,15
15	22	5,48	5,09	5,61	5,11	5,67	5,43	5,55	5,13	5,38
16	23	5,21	5,01	5,98	5,00	4,41	5,07	6,72	6,62	5,50
17	24	7,10	6,84	7,17	7,42	7,78	10,14	10,41	9,71	8,32
18	25	9,68	9,76	9,16	10,54	10,71	10,82	9,50	8,68	9,86
19	26	5,11	5,20	7,00	5,37	6,52	5,97	6,38	7,28	6,10
20	27	7,29	7,48	8,45	8,95	10,55	11,15	11,34	11,61	9,61
21	28	11,25	8,75	7,83	7,48	6,47	6,54	6,07	6,03	7,55
22	29	6,14	5,69	6,33	6,39	5,72	5,86	7,17	7,52	6,35
23	30	7,19	5,80	4,80	3,87	4,12	3,96	5,13	5,54	5,05
24	31	5,01	5,30	5,51	4,76	5,16	4,01	5,22	7,16	5,00
Moyennes du	1–10	7,03	6,77	6,73	7,19	7,65	7,79	7,58	7,56	7,29
	11–20	8,06	8,15	7,91	8,29	8,51	8,11	7,89	7,92	8,10
	21–31	6,92	6,49	6,87	6,75	6,97	6,82	7,20	7,16	6,90
	mois	7,32	7,12	7,16	7,40	7,68	7,55	7,55	7,53	7,41

mm
Maximum : 12,32 observé le 11 à 10 h. A.M.
Minimum : 3,17 „ le 3 à 4 h. P.M.
} différence..... mm 9,15

TABLEAU MÉTÉOROLOGIQUE.—Mars 1875.

Humidité relative.

Jours de la lune	Jours du mois	Matin. 1 h.	4 h.	7 h.	10 h.	Soir. 1 h.	4 h.	7 h.	10 h.	Moyennes des 8 observations.
24	1	97	100	97	77	80	92	95	95	91,6
25	2	93	93	83	86	78	76	69	87	83,1
26	3	74	74	82	63	42	35	66	79	64,4
27	4	* 80	81	82	52	44	44	67	72	65,3
28	5	* 76	78	81	55	51	52	79	87	69,9
29	6	86	86	85	52	49	68	79	84	73,6
30	7	95	80	80	81	82	86	93	94	86,4
1	8	94	95	90	92	81	77	87	91	88,4
2	9	94	100	96	78	74	84	86	94	88,3
3	10	* 97	100	100	94	93	95	100	100	97,4
4	11	96	95	97	95	82	89	97	100	93,9
5	12	91	100	97	90	94	97	100	100	96,1
6	13	96	96	90	83	78	77	89	97	88,2
7	14	98	94	94	93	87	93	94	97	93,8
8	15	100	98	96	97	100	100	91	94	97,0
9	16	95	94	91	79	67	50	73	83	79,0
10	17	96	91	96	79	72	82	96	97	88,6
11	18	97	97	97	90	86	78	89	97	91,4
12	19	97	97	97	70	52	70	81	94	82,2
13	20	100	97	93	55	57	59	76	77	76,8
14	21	78	75	84	69	67	52	62	* 71	69,8
15	22	80	80	98	56	50	48	73	78	69,4
16	23	87	88	97	48	37	43	77	77	68,5
17	24	81	80	96	54	47	61	89	93	73,0
18	25	88	87	83	59	44	53	85	90	73,5
19	26	56	61	94	48	58	57	72	85	64,8
20	27	84	83	78	83	97	93	95	96	90,3
21	28	98	95	94	92	82	84	82	84	88,9
22	29	94	97	93	67	56	60	85	90	79,8
23	30	93	72	66	41	37	37	64	81	61,4
24	31	88	90	85	51	49	36	73	76	68,5
Moyennes du	1–10	88,6	88,7	87,6	73,0	67,0	70,9	82,1	88,3	80,8
	11–20	96,6	95,9	94,8	83,1	77,5	79,5	88,6	93,6	88,7
	21–31	84,3	83,0	84,6	60,7	56,7	56,7	77,6	83,7	73,4
	mois	89,6	89,0	88,9	71,9	66,9	68,6	82,6	88,4	80,74

Maximum : 100 observé 14 fois
Minimum : 35 „ le 3 à 4h. P.M. } différence 65

TABLEAU MÉTÉOROLOGIQUE.—Mars 1875.

Ozone.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
24	1	8,5	10	11	8	2	10	8,5	7,5	8,2
25	2	10	9	3	7,5	4	2	5,5	5	5,8
26	3	5	6,5	8	7	7	7	7	7	6,8
27	4	...	10	8	8	2	6,5	9	5,5	7,0
28	5	...	12	3	9	9	4	8	5	7,1
29	6	12	13	11	4	5	5,5	7	5,5	7,9
30	7	8	7,5	10	8	3	10	8	9	7,9
1	8	9	10	12	9,5	11	11	9	11,5	10,4
2	9	14	15	20	15	9	13	13	11	13,8
3	10	...	20	13	13,5	10	12,5	8,5	8	17,8
4	11	8	9	7	10	5,5	8,5	8	14	8,7
5	12	14	12	21	18	18	18	8	8	14,6
6	13	9	9,5	8	7	11	9	10,5	12	9,5
7	14	12	15	18	12	13,5	15	16	20	15,2
8	15	18	14	11	19	20	18	19	13	16,5
9	16	20	11	10	9	8	9	4	9	10,0
10	17	8	8,5	7	2	8,5	10	10	12	8,3
11	18	9	9	9	17	18	19	7	7	11,9
12	19	8	8	6	6	10	2	6	10	7,0
13	20	9,5	11	4	9,5	8,5	8	6	5,5	7,8
14	21	9,5	7	9	8,5	8	8	8,5	...	8,4
15	22	12	9	9	9	8	7	9	10	9,1
16	23	10	10,5	9	8,5	6	7	8	11	8,8
17	24	10	10	9	8,5	7	6	8,5	9,5	8,6
18	25	16	10	8	...	8,5	5	10	10	9,6
19	26	10	9	8	8	7	8	9	9,5	8,6
20	27	10	10	15	9	16	17	16	16	13,6
21	28	13	15	16	11	17	12	10	9	12,9
22	29	10	9	10,5	8,5	19	13	8,5	8,5	10,9
23	30	10	12	9	10	9	8	8,5	8,5	9,4
24	31	7	9,5	9	9	8,5	9	9	8,7	8,7
Moyennes du	1–10	6,7	11,3	9,9	8,9	6,2	8,2	8,3	7,5	8,7
	11–20	11,6	10,7	10,1	11,0	12,1	11,6	9,4	11,1	10,9
	21–31	10,7	10,1	10,1	8,2	10,4	9,1	9,5	10,1	9,9
	mois	10,7	10,7	10,0	9,6	9,6	9,6	9,1	9,5	9,9

Maximum : 21 observé le 12 à 7 h. A.M.
Minimum : 2 „ 4 fois
} Différence..... 19

TABLEAU MÉTÉOROLOGIQUE.—Mars 1875.

Direction du vent; sa vitesse par seconde.

Date	Matin. 1 h. Dir.	Matin. 1 h. Vit.	Matin. 4 h. Dir.	Matin. 4 h. Vit.	Matin. 7 h. Dir.	Matin. 7 h. Vit.	Matin. 10 h. Dir.	Matin. 10 h. Vit.	Soir. 1 h. Dir.	Soir. 1 h. Vit.	Soir. 4 h. Dir.	Soir. 4 h. Vit.	Soir. 7 h. Dir.	Soir. 7 h. Vit.	Soir. 10 h. Dir.	Soir. 10 h. Vit.	Moyennes des 3 observations.
		m		m		m		m		m		m		m		m	m
1	E	2,1	E	3,2	E	3,8	ESE	4,1	E	3,0	ENE	3,6	NE	3,0	N	2,8	3 2
2	N	3,9	N	5,9	N	9,9	N	8,7	NNW	7,3	NW	8,2	NW	7,7	NW	7,0	7,3
3	WNW	0,4	WNW	7,2	W	4,9	WNW	6,5	NW	11,0	NW	10,0	NNW	4,0	WSW	1,5	5,7
4	WSW	1,1	WSW	1,2	SW	2,4	S	3,7	S	7,3	SSE	8,4	SSE	7,6	SSE	7,2	4,9
5	SSE	6,8	S	6,2	S	4,0	S	5,6	S	5,6	SSE	6,1	SE	5,0	SSE	5,2	5,6
6	SSE	5,6	S	5,6	SSE	4,4	S	4,4	S	8,4	SSE	6,4	SSE	5,3	S	6,2	5,8
7	S	6,1	S	4,0	SW	3,8	WNW	3,3	N	1,9	NW	2,5	NW	4,4	NNW	2,1	3,5
8	NNE	4,4	NNE	5,6	N	4,3	N	4,4	NNE	4,1	NE	4,6	NE	3,5	NE	3,9	4,4
9	NE	3,3	ENE	2,2	E	4,3	ESE	5,1	ESE	7,9	ESE	8,1	ESE	7,2	ESE	7,2	5,7
10	ESE	9,4	SE	6,5	SE	6,2	SE	6,6	SE	4,6	ESE	3,9	NE	2,7	S	1,5	5,2
11	S	1,5	W	1,3	NW	0,6	NNW	2,7	W	2,7	N	2,7	NE	2,7	NE	2,7	2,1
12	NE	2,8	ENE	3,6	E	3,9	ESE	5,4	E	4,3	E	7,0	ESE	5,9	SSE	2,8	4,5
13	S	1,5	WNW	2,6	NW	3,4	NW	5,9	NNW	4,1	NNE	3,2	NE	3,1	E	3,5	3,4
14	NE	2,6	ENE	4,1	E	4,6	E	6,1	E	7,0	E	8,6	ESE	8,4	ESE	7,6	6,1
15	SE	5,6	W	2,5	NNW	7,6	NNW	6,6	N	7,3	N	6,4	N	5,9	N	4,0	5,7
16	N	5,6	N	2,1	N	4,0	NNE	5,0	NE	10,0	NE	3,6	NE	5,0	NE	2,0	4,7
17	NNW	2,0	NE	1,9	NNE	0,9	ENE	3,3	ENE	2,8	ENE	5,4	ENE	4,0	ENE	1,4	2,7
18	ENE	1,8	ENE	0,1	NNW	1,2	NNW	2,7	NNW	4,8	NNW	5,1	NW	2,9	NW	7,0	2,5
19	WNW	1,4	WNW	2,4	NW	2,0	NW	1,6	WNW	2,5	NE	3,9	NNE	5,7	N	2,6	2,8
20	NW	1,4	W	1,7	W	0,8	S	2,8	SSE	3,1	SE	7,6	SE	6,8	SE	6,9	3,9
21	SSE	6,6	SSE	6,0	SSE	4,6	SSW	4,3	WNW	9,4	NW	11,1	NW	7,3	N	11,5	7,6
22	N	8,9	NNW	2,2	NW	0,8	SE	1,5	SE	1,8	ESE	1,9	SE	4,2	SE	3,8	3,1
23	SE	3,3	SE	2,9	SE	2,6	SSE	2,3	SSE	7,8	SE	7,7	ESE	7,0	SE	7,9	5,2
24	SE	10,2	SSE	7,1	S	6,2	S	6,2	S	6,4	SSE	5,6	SE	4,4	SE	5,3	6,4
25	SSE	4,7	S	5,6	S	4,6	SSW	6,0	WSW	6,0	N	4,4	NNE	7,1	NNE	4,6	5,4
26	NNE	4,9	NE	4,5	NE	3,2	ENE	5,4	ENE	6,5	ENE	8,7	ENE	7,5	E	5,5	5,8
27	E	7,6	E	3,9	ESE	7,0	SE	8,0	SE	7,4	SE	6,9	SE	6,7	SE	3,7	6,4
28	WNW	3,4	NW	8,6	NW	9,7	NNW	9,0	NNW	9,3	NNW	6,9	NNW	9,4	NW	4,1	7,6
29	WNW	3,9	WNW	2,0	NW	1,6	NNW	2,5	NW	3,8	WNW	3,1	WNW	2,5	WNW	1,2	2,6
30	WNW	2,3	WNW	6,0	WNW	7,9	NW	8,8	NW	9,8	NW	10,0	NNW	4,4	WNW	2,5	6,5
31	NW	2,2	W	3,0	W	4,2	WNW	6,2	NW	10,5	WNW	9,9	WNW	4,7	WNW	3,8	5,6
Moy. du mois		m 4,1		m 3,9		m 4,2		m 5,0		m 6,1		m 6,2		m 5,4		m 4,3	m 4,9

Fréquence relative des 16 vents sur 100

N 8	W..... 2	S 8	E..... 7
NNW 9	WSW 1	SSE..... 9	ENE 6
NW 11	SW 1	SE 10	NE 6
WNW 9	SSW 1	ESE 7	NNE 5

Calmes, sur 100 observations 0

Vitesse moyenne maximum observée le 21..... m 11,5

TABLEAU MÉTÉOROLOGIQUE.—Mars 1875.

ÉTAT DU CIEL.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. m.			4h. m.			7h. m.			10h. m.		
	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.
1	1	kcst	..	3 Br	kcst	..	3	kst	..	10	c SE	..
2	10	..	n	10 Br	..	cn	10	..	cn	10 Br	..	cn N
3	2	cst	..	0	..	..	0	..	..	1	ac NW	..
4	0	..	..	1	kst	..	0	..	..	0	..	..
5	0	..	..	0	..	..	1	..	c	1	kc W	ac
6	0	..	..	0	..	..	0	..	..	0	..	..
7	2 Br	..	..	10	ac	cn	10	..	cn	10 Br	..	n
8	10 Br	..	..	10 Br	..	..	10 Bd	..	n	10 Bd	..	..
9	10 Br	..	..	10 Br	..	..	10 Bd	ac SW	c SE	8	ac SW	c SE
10	10	..	..	10 Bd	..	..	10 Bd	..	..	10 Bd	..	..
11	8 Br	..	..	10 Bd	..	..	10 Bd	..	..	10 Bd	..	c
12	7 Br	..	..	10 Bd	..	..	10 Br	..	cn	10	..	cn E
13	10	..	n	10	..	n	10	ac	cn	10 Br	..	cn NW
14	10 Br	..	..	9	..	c	10	..	cn	10 Br	cn SW	c E
15	10 Br	..	..	10 Br	..	n	10	..	n	10	..	cn N
16	9 Br	..	n	10 Br	..	cn	9	kc	cn	8	ac NE	..
17	10 Br	..	..	7 Br	..	..	9 Br	..	..	10	..	cn
18	10 Br	cn	..	10 Br	..	n	10	..	n	10	..	n
19	2	kst	..	3	kst	c	7 Bd	k	..	2	..	cst
20	2	k	ac	1	acst	..	2 Bd	kst	..	6	kst	ac
21	7	k	ac W	8 Br	kst	ac	8 Br	kst	..	8 Br	k	acst
22	10 Br	kst	..	9 Br	cst	..	5	ac NW	..	1	kc	ac NW
23	0	..	..	0	..	..	0	..	..	0	..	..
24	0	..	..	0	..	..	0	..	..	0	..	..
25	0	..	..	0	..	..	0	..	..	0	..	..
26	10 Br	..	..	0	..	..	6	ck	ac N	5 Br	ck N	..
27	8	ac	..	9	c W	..	9	kcst	..	10 Br	c SE	..
28	10	..	n	10	..	n	10	..	n	10	..	n
29	1	cst	..	0 Br	..	..	10	acst	..	9 Br	..	c
30	9 Br	..	c	10	..	c	9 Br	kst	..	4 Br	kst	..
31	0	..	..	0	..	..	5	acst	c	8	..	cn
Moy. du mois	5,6	..	..	5,8	..	..	6,5	..	..	6,5	..	..

NOMBRE DE JOURS DE :

Ciel beau, ou moins de $2\frac{1}{10}$ couvert	.. 7	Brouillard	5
,, peu nuageux ou de 2 à $4\frac{1}{10}$,,	.. 3	Brume	17
,, nuageux, ou de 4 à $6\frac{1}{10}$,,	.. 3	Rosée	11
,, très-nuageux, ou de 6 à $8\frac{1}{10}$,,	.. 7	Gelée blanche	3
,, couvert ou plus de $8\frac{1}{10}$,,	.. 11	Orage avec éclairs et tonnerre	2
Pluie	17	Grêle	1

TABLEAU MÉTÉOROLOGIQUE.—Mars 1875.

ÉTAT DU CIEL.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. s.			4h. s.			7h. s.			10h. s.			Moyennes des 8 observations.
	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	
1	10 Br	..	cn SE	10	..	n	10	..	n	10	..	n	7,1
2	10 Br	..	cn NW	10	ac	cn NW	3	..	cst	0	..	..	7,9
3	1	ac NW	..	1	ac	..	0	..	..	0	..	..	0,6
4	0	..	..	0	..	..	0	..	..	0	..	..	0,1
5	0	..	..	0	..	..	0	..	..	0	..	..	0,3
6	1	kst	..	5 Br	kst	..	5	kst	cn	8 Br	..	cn	2,4
7	10 Br	..	cn W	10 Br	..	W	10 Br	..	..	10 Br	..	..	9,0
8	9	..	c E	8	..	c NE	10	..	..	10	..	c	9,6
9	8	ac S	c SE	10 Br	..	c SE	10 Br	..	..	10	..	cn	9,5
10	10 Bd	..	..	10 Bd	..	..	10 Bd	..	..	10 Bd	..	..	10,0
11	10 Br	..	c W	10 Br	..	c N	10 Bd	..	..	10 Br	..	..	9,1
12	10 Bd	..	..	10 Br	..	..	10 Bd	..	..	10 Bd	..	..	9,6
13	7	kst W	ac N	9	ac W	c N	1	..	cst	3	ac W	cst	7,5
14	10 Br	..	c SE	10 Br	..	c SE	10 Br	..	c SE	10 Br	..	..	9,9
16	10	..	cn	10	..	n	10 Br	..	c N	10 Br	..	n	10,0
16	5	ac NE	..	0	..	..	1	kst	..	5 Br	kst	..	5,9
17	9	k W	c SE	10	k W	c SE	10 Br	ac	..	10 Br	..	n	9,4
18	10	..	cn	7	k W	c N	6	k W	cst	1	..	cst	8,0
19	7	cst	c W	10	ac	cn	2	ac N	..	0	..	..	4,1
20	5	kst	ac	7	acst	..	10	ac	..	10	ac	..	5,4
21	10 Br	..	c W	10 Br	..	..	10 Br	..	cst	10 Br	..	..	8,9
22	1	ac	..	1	ac NE	cn SE	0	..	..	0	..	..	3,4
23	0	..	..	0	..	..	0	..	..	0	..	..	0,0
24	0	..	..	2	kst	..	2	kst	..	0	..	..	0,5
25	0	..	..	0	..	..	0	..	..	5 Br	kst	..	0,6
26	10 Br	..	..	3 Br	k	..	8	ck	c	7	ck	c	6,1
27	10	..	n	10	..	n	10	..	n	10	..	n	9,5
28	10	..	n	10	..	n	10	..	cn	10	..	cn	10,0
29	10 Br	c NW	..	10 Br	c NW	..	9 Br	c	..	10 Br	..	..	7,4
40	3 Br	..	c	10 Br	..	c W	9 Br	..	c	1	ac	..	6,9
31	1	..	cn	6	c	cn	0	..	..	0	..	..	3,1
Moy. du mois	6,5	..	..	6,7	..	..	6,0	..	..	5,8	..	..	6,18

PHÉNOMÈNES DIVERS OBSERVÉS :

Lumière zodiacale 4 fois 4

Halo solaire 3 ,, ... 3

Halo lunaire 3 ,, ... 2

Glace sur les flaques d'eau 2 fois 2

TABLEAU MÉTÉOROLOGIQUE.—Mars 1875.

Evaporation sous l'abri.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Total des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
24	1	0,10	0,00	0,07	0,18	0,30	0,10	0,00	0,00	0,75
25	2	0,00	0,05	0,20	0,10	0,15	0,25	0,20	0,30	0,75
26	3	0,10	0,40	0,10	0,40	1,00	1,20	0,70	0,30	4,20
27	4	* 0,00	0,00	0,20	0,30	1,20	1,20	0,80	0,45	4,15
28	5	* 0,27	0,28	0,20	0,50	1,05	1,20	0,60	0,15	4,25
29	6	0,20	0,20	0,15	0,60	1,80	1,05	0,45	0,30	4,75
30	7	0,35	0,20	0,30	0,20	0,10	0,10	0,10	0,05	1,40
1	8	0,00	0,00	0,10	0,00	0,20	0,35	0,25	0,10	1,00
2	9	0,10	0,00	0,05	0,15	0,45	0,35	0,10	0,15	1,35
3	10	* 0,07	* 0,08	0,00	0,00	0,05	0,10	0,00	0,00	0,30
4	11	0,00	0,00	0,10	0,00	0,24	0,15	0,15	0,00	0,64
5	12	0,05	0,00	0,05	0,05	0,05	0,05	0,05	0,00	0,30
6	13	0,00	0,00	0,02	0,13	0,35	0,40	0,25	0,10	1,25
7	14	0,00	0,10	0,06	0,09	0,15	0,10	0,10	0,05	0,65
8	15	0,05	0,00	0,05	0,05	0,05	0,05	0,00	0,05	0,30
9	16	0,00	0,00	0,15	0,30	0,55	0,85	0,70	0,20	2,75
10	17	0,10	0,05	0,10	0,20	0,30	0,40	0,10	0,05	1,30
11	18	0,00	0,00	0,00	0,00	0,10	0,20	0,30	0,05	0,65
12	19	0,00	0,00	0,05	0,15	0,60	0,55	0,45	0,15	1,95
13	20	0,00	0,05	0,00	0,30	0,80	...	1,35	0,35	2,85
14	21	0,30	0,35	0,40	0,50	0,95	1,00	0,75	* 0,30	4,55
15	22	0,30	0,15	0,05	0,30	0,65	0,65	0,45	0,20	2,75
16	23	0,05	0,10	0,10	0,45	1,40	0,14	0,70	0,25	4,45
17	24	0,35	0,30	0,20	0,75	1,25	1,20	0,45	0,15	4,65
18	25	0,10	0,20	0,25	0,70	1,25	1,25	0,70	0,30	4,75
19	26	0,40	0,70	0,30	0,65	0,88	0,92	0,55	0,30	4,70
20	27	0,10	0,20	0,10	0,20	0,22	0,08	0,00	0,15	1,05
21	28	0,00	0,07	0,08	0,18	0,27	0,27	0,28	0,20	1,35
22	29	0,15	0,01	0,04	0,27	0,53	0,55	0,25	0,08	1,88
23	30	0,02	0,30	0,55	0,70	1,30	1,25	0,70	0,20	5,02
24	31	0,05	0,08	0,12	0,40	0,90	1,00	0,78	0,13	3,46
Total du	1–10	1,19	1,21	1,37	2,43	6,30	5,90	3,20	1,80	23,40
	11–20	0,20	0,20	0,58	1,27	3,90	2,75	3,45	1,00	12,64
	21–31	1,82	2,46	2,19	5,10	9,60	9,57	3,69	2,26	38,61
	mois	3,21	3,87	4,14	8,80	19,00	18,22	12,26	5,06	74,65

Maximum en 24h. : 4,75 observé le 6 et le 25
Minimum „ : 0,25 „ le 2
} différence ..... mm 4,50

TABLEAU MÉTEOROLOGIQUE.—Mars 1875.

Jours de la lune	Jours du mois	Températures extrêmes. Sous l'Abri. Minima	Maxima	Différences	Moyennes	au Soleil. Max. boule noire.	Max. boule blanche.	Différences	Pluie. Jardin Total des 24h.	Toit Total des 24h.	Différences	Température du Puits.
		o	o	o	o	o	o	o	mm	mm	mm	o
24	1	3,6	11,9	8,3	7,75	...	...	...	8,2	7,1	1,1	...
25	2	0,4	6,2	5,8	3,30	...	...	...	16.6	12.8	3,8	...
26	3	−0,2	10,2	10,4	5,00	16,6	13,3	3,3	0,0	0,0	0,0	12,5
27	4	0,0	12,2	12,2	6,10	21,8	17,5	4,3	0,0	0,0	0,0	12,5
28	5	3,8	17,1	13,3	10,45	27,1	22,5	4,6	0,0	0,0	0,0	12,6
29	6	5,6	22,2	16,6	13,90	32,1	26,5	5,6	0,0	0,0	0,0	12,6
30	7	11,8	16,1	4,3	13,95	...	...	...	2.6	2,5	0,1	12,6
1	8	7,4	12,7	5,3	10,05	22,7	18,6	4,1	0,0	0,0	0,0	12,6
2	9	7,3	14,3	7,0	10,80	21,4	20,1	1,3	0,0	0,0	0,0	12,7
3	10	9,4	15,8	6,4	12,60	...	...	...	2,1	?	?	12,8
4	11	10,8	17,2	6,4	14,00	25,1	23,1	2,0	0,0	0,0	0,0	12,8
5	12	6,7	11,5	4.8	9,10	...	...	...	5,5	?	?	12,9
6	13	8,2	17,2	9,0	12,70	28,8	23,0	5,8	7,3	?	?	12,9
7	14	6,9	11,0	4.1	8,95	...	...	...	6,6	?	?	12,9
8	15	8.5	12,3	3,8	10,40	...	...	...	5,1	?	?	13,0
9	16	6,0	13,0	7,0	9,50	20,8	16,7	4,1	5,2	?	?	13,0
10	17	4,0	13,7	9,7	8,85	...	...	...	1,0	0.8	0,2	13,1
11	18	8,7	12,0	3,3	10,35	...	...	...	6,3	5,1	1,2	13,1
12	19	3,6	18,1	14,5	10,85	29,0	23,6	5,4	0,0	0,0	0,0	13,1
13	20	−0,5	12,4	12,9	5,95	23,6	17,3	6,3	0,0	0,0	0,0	13,1
14	21	8,2	18,6	10,4	13,40	24,2	21,3	2,9	0,0	0,0	0,0	13,1
15	22	2,9	14,2	11,3	8,55	22.0	19.2	2,8	0,0	0,0	0,0	13,1
16	23	2,1	15,2	13,1	8,65	25,8	19,9	5,9	0,0	0,0	0,0	13,0
17	24	8,2	20,4	12,2	14,30	31,5	25,3	6,2	0,0	0,0	0,0	13,1
18	25	11,5	25,9	14,4	18,70	33.6	28.8	3,8	0.0	0,0	0,0	13,1
19	26	7,6	14,4	6,8	11,00	20,1	17,3	2,8	0,0	0,0	0,0	13,1
20	27	8,4	14,3	5,9	11,35	...	...	...	5,0	?	?	13,1
21	28	6,4	14,4	8,0	10,40	...	...	...	12,8	?	?	13,1
22	29	3,1	12,7	9,6	7,90	19,0	15.9	3,1	0,0	0,0	0,0	13,1
23	30	3,8	13,6	9,8	8,70	20,1	16,9	3,2	0,0	0,0	0,0	13,0
24	31	2,6	13,3	10,7	7,95	...	...	...	0,0	0,0	0,0	13,0
Moyennes du	1-10	4,91	13,87	8,96	9,39	...	...	...	29,5	...	...	...
	11-20	6,29	13,84	7,55	10,07	...	...	...	37,0	...	...	...
	21-31	5,89	16,09	10,20	10,99	...	...	...	17,8	...	...	...
	mois	5,70	14,64	8,94	10,18	...	...	...	84,3	...	...	...

	o	o	mm
Maximum:	25,9 observé le 25	Max. boule noire	32,6	Hauteur d'eau tombée	84,30
Minimum:	−0,2 „ le 3	„ blanche	28,8	„ évaporée	74,65
Différence:	26,1	Différence max.	6,3	Différence	9,65

JOURNAL MÉTÉOROLOGIQUE.

Mars 1875.

1. 1h. m.—A l'W. longs stratus orientés N.W.-S.E ; rosée très abondante. 4h.—Les stratus persistent ; brume à l'horizon excepté au S. ; beau clair de lune. 7h.—Rosée très-abondante ; légers cirrus à l'horizon. 10h.—Une couche de cumulus compactes couvre tout le ciel. 1h. s.—Ciel sombre à l'W.; quelques gouttes de pluie. 4h.—Il pleut. 7h.—Id. 10h.—Pluie fine. Le vent après avoir passé de l'E. au S.E. est revenu au N. par l'E.
2. 1h. m.—Pluie abondante ; ciel très-sombre. 4h.—Il ne pleut plus ; vent violent et soufflant par rafales ; cumulo-nimbus à l'E. 7h.—Mêmes remarques. 10h.—Les nuages viennent rapidement du N. 1h. s.—Ciel gris ; quelques gouttes de pluie. 4h.—La brume se transforme en cumulus ; horizon très-noir en différents points. 7h.—Stratus au N. ; vent piquant. 7h. ½.—Lumière zodiacale splendide. 10h.—Ciel très-pur ; étoiles brillantes. Le vent a continué sa rotation vers l'W.
3. 1h. m.—Longs stratus paraissant converger à l'E. et à l'W.; étoiles légèrement voilées. 4h.—Ciel sans nuages ; pas de rosée ; air vif, étoiles brillantes. 7h.—Ciel pur ; glace sur les flaques d'eau ; gelée blanche sur le bois. 10h.—Des alto-cumulus arrivent rapidement du N.W. ; ils longent l'horizon ; ciel d'un bleu foncé au zénith ; vent violent. 1h. s.—Les nuages passent au zénith. 4h.—Quelques cumulus à l'horizon S W.; vent toujours très-fort et soufflant par rafales. 7h.—Ciel splendide ; étoiles très-brillantes. 10h.—Id. pas de rosée. Rotation du vent dans le même sens qu'hier.
4. 4h. m.—Ciel très-étoilé ; gelée blanche. 7h.—Glace sur les flaques d'eau. 10h.—Ciel très-pur et d'un beau bleu au zénith, pâle à l'horizon ; vent fort et régulier. 1h. s.—Mêmes remarques. 7h.—Ciel sans nuages ; 7h. ½ lumière zodiacale. 10h.—Ciel serein. Le vent a fait en 4 jours le tour complet du compas.
5. 1h.—Ciel comme à 10h. ; pas de rosée ; vent très-régulier. 7h.—Soleil blanchâtre. 10h.—Quelques cirrus au S. ; alto-cumulus au N. ; ciel d'un bleu pâle au zénith. 1h. s.—Beau temps. 4h.—Ciel d'un bleu foncé. 7h.—Etoiles et lumière zodiacale brillantes. 10h.—Ciel très-pur ; vent glacial.
6. 1h.—Etoiles peu brillantes ; rosée faible. 4h.—Id. ; vent très-régulier. 7h.—Ciel serein. 10h.—Ciel bleuâtre au zénith ; vent violent. 1h. s.—Quelques cirro-stratus d'orientations diverses à l'W. 4h.—Cirrus vaporeux à l'W. et au S. ; temps lourd, chaleur étouffante. 7h.—Cirrus à l'W. ; ciel sombre au N.E. et au S.W. ; éclaircie au zénith. 10h.—Brume presque générale ; horizon sombre au S. ; étoiles à peine visibles.
7. 1h. m.—Horizon brumeux, reste du ciel découvert ; pas de rosée ; vent régulier. 4h.—Gros cumulo-nimbus à l'horizon S.W. ; alto-cumulus au zénith, leurs bords sont éclairés ; étoiles dans les éclaircies. 7h.—Brume générale ; quelques gouttes de pluie. 8h.—Ciel très-noir à l'W. ; nimbus orageux au zénith. 8h. ½.—Pluie d'orage. 10h.—Ciel uniformément couvert. 1h. s—Quelques gouttes de pluie. 4h.—Ciel chargé à l'W. 7h.—Ciel uniformé-

ment couvert. 10h.—Id. rosée. Le vent a passé du S. au N.W. par l'W. ; brises folles depuis 9h. A.M. jusqu'à 10h. P.M. Baisse extraordinaire du baromètre.

8. 1h. m.—Ciel très-sombre ; vent fort ; il s'est levé à 11h. P.M. 4h.—Il bruine. 7h.—De gros nimbus couvrent tout le ciel ; brouillard à l'horizon. 10h.—Le brouillard se résout en pluie fine ; la tour de la pagode est invisible. 1h. s.—Le brouillard se lève et se forme en cumulus transparents; quelques éclaircies au zénith. 4h.—Cumulus diffus ; éclaircies bleuâtres. 7h.—Ciel uniformément couvert et sombre. 10h.—Mêmes remarques. Le vent continue sa rotation du N. vers le S. par l'E.

9. 1h. ½ m.—Brume générale peu épaisse. 4h.—Léger dépôt de rosée ; même ciel. 7h.—Ciel couvert d'alto-cumulus ; brouillard à l'horizon. 10h.—Le brouillard se forme en nuages qui sont emportés rapidement par le vent de S.E. 1h. s.—Mêmes remarques ; horizon S.W. orageux. 4h.—Brume épaisse ; quelques cumulus longent l'horizon. 5h. ½.—Pluie. 7h.—Ciel sombre, 10h.—Il ne pleut plus. Le vent a achevé après 3 jours sa rotation complète.

10. 4h. m.—Il bruine ; ciel très-sombre. 7h.—Brouillard épais ; pluie fine. 10h.—Quelques gouttes de pluie, tour cachée par le brouillard. 1h. s.—Tour légèrement voilée ; ciel uniformément couvert; temps lourd. 4h.—Mêmes remarques. 7h.—Brouillard ; limite de visibilité 250 à 300m. thermomètres mouillés. 10h.—Limite de visibilité 150 à 200m. Brises folles depuis 5h. P.M. ; le vent recommence une nouvelle rotation directe.

11. 1h. m.—Brume à l'horizon ; étoiles voilées. 4h.—Brume générale; rosée très-abondante ; étoiles visibles au zénith ; 4h. ½ unchangement de vent produit un brouillard très-épais en quelques minutes. 7h.—Tour invisible. 10h.—Elle est encore voilée ; le brouillard se transforme en cumulus diffus ; temps lourd. Le brouillard en se déposant à fait monter le pluviomètre de 0,2mm. 1h. s.—Cumulus vaporeux venant lentement de l'W. 4h.—Quelques cumulus se détachent sur un fond brumeux. 7h.—Brouillard assez épais. 10h.—Brume générale.

12. 1h m.—Grande éclaircie au zénith ; étoiles peu brillantes ; pas de rosée. 4h.—Ciel uniformément couvert ; la rosée se dépose sur les thermomètres. 7h.—Le brouillard et la rosée ont disparu. 10h.—Cumulus grisâtres et diffus ; quelques gouttes de pluie. 11h.—Orage à l'W. ; coup violent de tonnerre presqu'instantané, grosse pluie. 11h. ½.—L'orage passe brusquement à l'E.; la courbe du barographe et de la girouette l'accusent nettement. Cas de foudre auprès de la Tour. 11h. 50m.—Coup sec au N. ; cas de foudre auprès Chang-Hai. De 11 à midi bruit du tonnerre d'abord sourd et lointain, puis bruyant et sec. Midi ½ orage au N.E. ; nuages bas longeant rapidement l'horizon. 1h. s.—L'orage a complétement disparu. 4h.—Brume générale. 7h.—Brouillard ; limite de visibilité 200m. environ ; papier ozonométrique décomposé. 10h.—Mêmes remarques. Rotation complète du vent.

13. 1h. m.—Tonnerre lointain et à longs intervalles ; éclairs très-brillants ; pluie abondante. 4h.—Pluie ; ciel très-sombre. 7h.—Ciel couvert au zénith ; alto-cumulus à l'E. ; cumulus à l'W.

10h.—Nimbus orageux au S.W. et au S.E. 1h. s.—Eclaircies bleuâtres ; cumulus transparents. 4h.—Cumulus compactes ; éclaircie au N. d'un bleu pâle 7h.—Beau clair de lune ; stratus à l'W. ; pas de rosée. 10h.—Long stratus au S.E. ; cumulus transparents et rapides ; peu de rosée. Le vent commence une nouvelle rotation directe

14. 1h. m.—Brume à travers laquelle on aperçoit les étoiles, pas de rosée. 4h.—Cumulus diffus ; on aperçoit quelques étoiles dans les éclaircies. 7h.—Ciel uniformément couvert. 9h. 35m.—Averse. 10h.—Des nimbus orageux se forment à l'W. et au S. ; des nuages bas arrivent rapidement de l'E. 1h. s.—Cumulus grisâtres. 7h.—Lune à peine visible. 10h.—Ciel uniformément couvert.

15. 1h. m.—Eclairs sans tonnerre et peu brillants ; rosée très-abondante ; ciel uniformément couvert. 4h.—Pluie ; ciel très-sombre. 7h.—Horizon S.W. chargé. 10h.—Cumulo-nimbus diffus ; il bruine ; vent très-fort. 1h. s.—Pluie fine. 4h.—Id. 7h.—Ciel uniformément couvert. 10h.—Il pleut. Le vent achève sa rotation commencée le 13 et continue dans le même sens.

16. 2h. ½.—Brume générale ; quelques gouttes de pluie. 4h.—Cumulo-nimbus inégalement distribués ; vent régulier. 7h.—Cirro-cumulus au zénith et à l'W. ; cumulo-nimbus à l'E. 10h.—Cumulus *balles-de-coton* venant rapidement du N.E. ; éclaircies d'un bleu foncé au zénith. 1h. s.—Alto-cumulus transparents. 4h.—Ciel sans nuages et d'un bleu clair. 7h.—Brume transparente et stratifiée de l'E. à l'W. à l'horizon S. Halo.

17. 1h. m.—Brume légère sur tout le ciel ; halo ; vent régulier. 4h.—Etoiles peu distinctes ; rosée faible ; éclaircie au zénith. 7h.—Stratus à l'E. ; rosée abondante. 10h.—Des cumulo-nimbus couvrent tout le ciel. 1h. s.—Cumulus venant rapidement du S.E., cirrus de l'W. 4h.—Même remarque. 7h.—Ciel moutonné au zénith, brumeux à l'horizon ; vent régulier. 10h.—Pluie abondante ; calme.

18. 1h. m.—Brume transparente ; quelques cumulo-nimbus au zénith ; calme. 4h.—Pluie ; le vent passe subitement au N. ; ciel uniformément couvert. 7h.—La pluie continue. 10h.—Il ne pleut plus ; ciel chargé au N.N.E. 1h. s.—Même ciel. 1h. ½.—Pluie. 4h.—Cirrus très-déliés et cumulus *balles-de-coton ;* ciel très-sombre au S. 7h.—Grande éclaircie au zénith ; ciel pur ; stratus à l'horizon E. et W. 10h.—Long stratus orienté S.-N.E. ; étoiles brillantes.

19. 1h. m.—Stratus orientés E.-W. ; ils occupent toute la partie S. du ciel et semblent converger à l'W. ; rosée très-abondante. 4h.—Nimbus à l'W. le reste id. 7h.—Cirrus d'une grande beauté ; horizon au N. ; brouillard, qui en se condensant fait monter le pluviomètre. 10h.—Cumulus compactes à l'horizon S.E ; ciel d'un bleu pâle. 1h. s.—Gros cumulus noirâtres venant de l'W. ; horizon sombre au N.E. 2h. ½.—Un nimbus orageux en passant au zénith donne quelques gouttes de pluie et va se décharger au S.E. 4h.—Nuages orageux comme à 1h. 7h.—Alto-cumulus compactes chassés rapidement et en bloc par le vent du N. 10h.—Ciel très-pur.

20. 1h. m.—Halo ; cirro-cumulus compactes au S. ; rosée abondante. 4h.—Mêmes nuages. 7h.—Brouillard ; limite de visibilité 2 à

300m. ; gelée blanche sur le bois ; calme. 10h.—Halo peu distinct et incomplet ; cirro-stratus orientés E.-W. et convergeant en ces deux points ; alto-cumulus à l'horizon E. 1h. s.—Cirrus panachés ; ciel bleuâtres au zénith. 4h. et 7h.—Ciel moutonné. 10h.—Nuages indistincte ; vent fort et régulier.

21. 1h. m.—Grande éclaircie au zénith ; alto-cumulus transparents. 4h.—Eclaircie bleuâtre au S.; cumulus vaporeux. 6h.—Stratus orientés E.-W. et paraissant converger en ces deux points. 7h.—Soleil blanchâtre ; ciel brumeux. 10h.—Halo incomplet ; stratus comme à 6h. ; ils couvrent tout le ciel excepté au zénith. 1h. s.—Cumulus blanchâtres ; brume générale ; vent violent. 4h.—Brume jaunâtre. 7h.—Lune voilée ; au S. Stratus orientés E.-W. Le vent a passé du S.-E. au N. par l'W.

22. 1h. m.—Ciel brumeux ; quelques stratus. 4h.—Même ciel ; calme. 7h.—Horizon vaporeux ; ciel d'un beau bleu au N. 10h.—Alto-cumulus épars venant du N.W. ; cirro-cnmulus peu nombreaux. 1h. s.—Ciel pur, quelques cumulus épars. Double couche de nuages comme à 10h. l'une venant du N.E. l'autre du S.E. 7h.—Ciel sans nuages et trés-pur. 10h.—Magnifique clair de lune ; pas de rosée. Brises folles toutes la journée.

23. 1h. m.—Ciel splendide ; vent régulier ; peu de rosée. 4h. et 7h.—Mêmes remarques. 10h.—Ciel d'un bleu foncé au zénith, pâle à l'horizon. 1h. s.—Vent fort, le reste comme à 10h., et ainsi jusqu'au soir.

24. 1h. m.—Ciel très-pur ; vent fort et régulier, pas de rosée. Mêmes remarques jusqu'à 1h. P.M. ; à ce moment le ciel devient légèrement bleuâtre. 4h.—Cirro-stratus compactes au N. ; vent faible ; étoiles brillantes ; lumière zodiacale un peu diffuse. 10h.—Ciel très-pur ; pas de rosée.

25. De 1h. m. à 10h. mêmes ciel ; alors vent fort et soufflant par rafales. 1h. s.—Ciel d'un bleu pâle ; le vent faiblit. 4h.—Horizon jaunâtre et sablonneux ; sécheresse extrême. 7h.—Horizon brumeux. 10h.—Cirro-stratus épars et diffus ; étoiles voilées ; vent régulier, pas de rosée. Le vent passe du S. au N. par l'W.

26. 1h. m.—Brume générale et transparente ; vent irrégulier. 4h.—Atmosphère sablonneuse ; grande sécheresse. 7h.—Cumulo-cirrus à l'E. surtout. 10h.—Ciel blanchâtre. 1h. s.—Un léger voile de brume obscurcit tout le ciel. 4h.—Cirrus au S. ; horizon jaunâtre. 7h.—Grande éclaircie au S., le reste couvert. 10h.—Même remarque.

27. 1h. m.—Alto-cumulus transparents ; éclaircies vaporeuses ; vent régulier ; pas de rosée. 4h.—Ciel moutonné ; le reste id. 7h.—Cirro-cumulus stratifiés et d'orientations diverses ; éclaircie au N. ; pas de rosée. 10h.—Cumulus compactes couvrant tout le ciel : 11h. pluie. 1h. s.—La pluie continue. 4h.—Il ne pleut plus ; ciel chargé ; averses de 4h. à 7h. 10h.—Ciel sombre ; air tiède.

28. 1h. m.—Pluie. A minuit le vent a passé brusquement du S.E. au N.W. par l'W. 4h.—Il ne pleut plus ; ciel chargé ; vent fort. 7h.—Id. 10h.—Horizon N.W. très-noir ; cumulo-nimbus par tout, le ciel ; 10h. ¼ averse. 1h. s.—Même ciel. 4h.—Ciel très-charge au N.W. ; pluie fine ; cumulus au S.W. 4h.—Quelques gouttes de pluie. 10h.—Nimbus très-noirs en différents points du ciel.

29. 1h. m.—Ciel pur ; stratus au S.E. 4h.—Lune légèrement voilée ; vent faible ; rosée. 7h.—Ciel moutonné au S. 10h.—Brume générale et transparente. 1h. s.—Des cumulo-nimbus se détachent sur la brume. 4h.—Même remarque. 7h.—Vent faible et régulier ; éclaircie au S.W. 10h.—Ciel brumeux ; étoiles au zénith ; vent presque nul.

30. 1h. m.—La brume se forme en cumulus diffus ; étoiles dans les éclaircies. 4h.—Cumulus diffus par tout le ciel ; vent fort. 7h.—Mêmes nuages ; pas de rosée. 10h.—Long cirro-stratus orienté W.-N.E. ; brume à l'horizon S. 1h. s.—Un léger voile de vapeurs obscurcit le ciel. 1h. ¾.—Halo presque complet et pâle. 4h.—Brume générale ; au-dessous quelques cumulus ; vent fort. 7h.—Eclaircie au N.W. ; cumulus à l'W. 10h.—Alto-cumulus au S. et à l'W. ; étoiles peu brillantes.

31. 1h. m.—Vent régulier ; étoiles voilées comme à 10h. ; faible dépôt de rosée. 4h.—Beau clair de lune. 7h.—Alto-cumulus ; quelques uns sont stratifiés. 10h.—Gros cumulus nombreux. 10h. ¼.—Il pleut entre Zi-ka-wei et Chang-Hai. 11h. ¾.—Grêle à Zi-ka-wei et à Chang-Hai ; elle ne dure que peu d'instants. 1h. s.—Nuages orageux ; 2h. ¼ quelqnes gouttes de pluie. 4h.—Vent violent ; ciel d'un bleu foncé ; çà et là des cumulo-nimbus. 7h.—Ciel très-pur. 10h.—Même ciel ; petite brise régulière ; pas de rosée.

H. Le Lec., s.j.

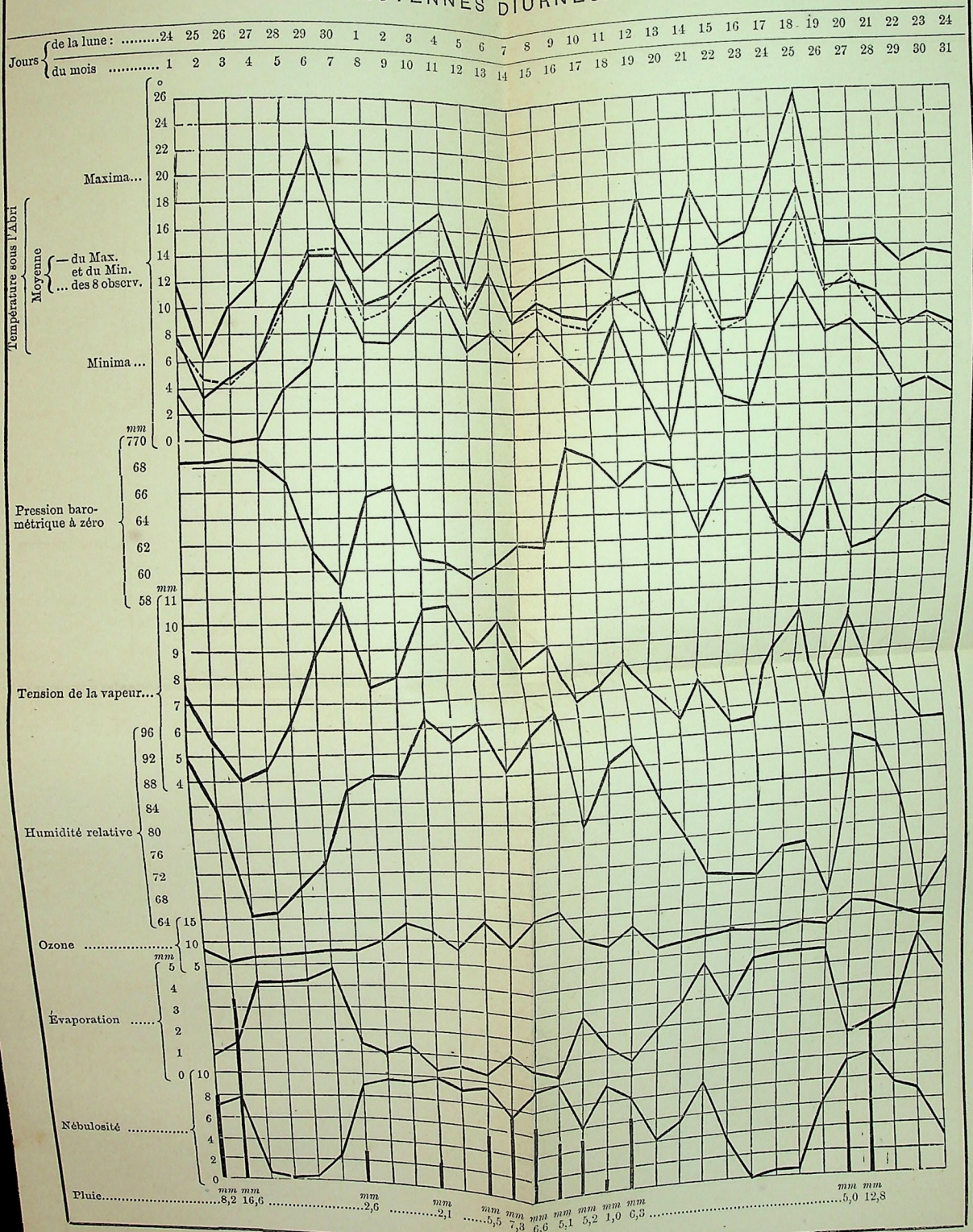
Note.—Pour ramener les indications de notre Actinomètre à la constante solaire 100, il faut multiplier la différence de la température des 2 thermomètres par 6,09. Ce nombre a été déterminé du moyen de comparaisons faites avec l'Actinomètre No. 5251 et 5252 construit par Baudin et comparé lui-même avec celui de Montsouris le 22 et le 23 Avril 1875.

A. M. D. G.

OBSERVATOIRE DE ZI-KA-WEI

Résumé des Observations Météorologiques de Mars 1875.

MOYENNES DIURNES.



A. M. D. G.

OBSERVATOIRE

MÉTÉOROLOGIQUE ET MAGNÉTIQUE,

des Pères de la Compagnie de Jésus

à ZI-KA-WEI.

BULLETIN MÉTÉOROLOGIQUE,

AVRIL 1875.

NOTA.—Pour la position géographique de l'observatoire, les instruments utilisés, les notations employées, etc., voir la note préliminaire placée en tête du Bulletin de Septembre 1874.

TABLEAU MÉTÉOROLOGIQUE.—Avril 1875.

Pression barométrique à zéro.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
25	1	762,60	761,53	761,35	760,21	757,73	756,37	754,94	754,87	758,70
26	2	* 54,67	54,67	56,46	57,84	57,58	57,56	59,18	61,72	57,46
27	3	61,66	61,32	62,61	63,44	61,64	60,09	59,61	59,73	61,26
28	4	59,14	58,73	59,12	59,05	58,63	58,07	59,47	61,51	59,22
29	5	61,18	60,28	61,75	62,66	62,20	62,62	65,05	66,80	62,82
1	6	66,94	66,88	68,50	69,65	68,91	68,51	69,56	70,17	68,64
2	7	* 69,67	69,05	68,74	68,49	67,81	65,98	66,39	67,04	67,90
3	8	66,50	65,24	66,13	66,91	65,72	65,11	65,49	66,20	65,91
4	9	65,83	64,70	65,09	64,66	63,80	62,75	62,78	63,50	64,14
5	10	63,06	62,32	63,08	64,81	65,32	64,61	65,13	66,44	64,35
6	11	66,48	66,26	67,09	67,59	66,32	65,01	65,12	65,30	66,15
7	12	64,45	63,80	64,71	65,12	63,92	62,83	62,93	63,47	63,90
8	13	63,17	62,39	63,13	63,89	62,96	61,27	60,45	59,14	62,05
9	14	* 57,56	55,98	56,96	57,60	57,26	58,95	61,49	63,42	68,65
10	15	63,34	62,94	64,29	65,04	63,98	62,99	63,83	64,50	63,86
11	16	64,20	63,34	63,84	64,60	63,16	62,47	62,99	64,11	63,59
12	17	64,20	63,44	64,11	64,65	63,17	61,91	62,20	63,38	63,38
13	18	62,29	62,06	63,00	63,53	62,43	61,66	62,41	63,73	62,64
14	19	63,07	63,09	63,54	63,69	62,09	60,76	60,81	60,73	62,22
15	20	59,58	58,11	58,88	59,40	58,78	57,99	59,26	61,59	59,20
16	21	61,92	61,93	63,31	63,87	62,82	61,48	61,31	61,54	62,27
17	22	60,25	59,15	58,86	58,28	56,88	55,35	55,85	56,28	57,61
18	23	55,98	55,03	55,11	54,84	53,70	53,34	54,56	55,88	54,81
19	24	56,65	56,52	58,44	60,26	60,78	60,96	61,43	62,61	59,71
20	25	62,12	62,22	62,68	63,29	62,44	62,22	62,99	63,50	62,68
21	26	62,08	62,28	61,73	61,48	59,58	58,45	60,11	61,72	60,93
22	27	61,24	61,16	61,81	62,02	62,20	62,02	62,47	63,95	62,11
23	28	63,54	63,56	64,39	64,62	63,87	62,97	63,22	64,21	63,80
24	29	63,65	63,24	63,71	63,79	62,01	61,60	64,22	65,99	63,53
25	30	66,08	66,40	68,07	68,39	67,04	66,03	66,67	67,78	67,06
Moyennes du	1–10	763,13	762,47	763,28	763,77	762,93	762,17	762,76	763,80	763,04
	11–20	62,83	62,11	62,96	63,51	62,41	61,58	61,15	62,94	62,56
	21–30	61,35	61,15	61,81	62,08	61,13	60,04	61,28	62,35	61,45
	mois	762,44	761,92	762,68	763,12	762,16	761,40	762,06	763,03	762,35

Maximum : 770,17 mm observé le 6 à 10 h. P.M.
Minimum : 753,34 mm „ le 23 à 4 h. P.M.
} différence : 16,83 mm

TABLEAU MÉTÉOROLOGIQUE.—Avril 1875.

Température sous l'abri.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
25	1	3,5	3,5	7,5	13,7	16,2	15,1	12,7	12,0	10,52
26	2	* 9,4	11,0	10,3	21,6	26,1	26,7	17,1	13,8	17,00
27	3	12,7	12,1	13,9	15,0	18,7	16,0	14,5	14,5	14,68
28	4	16,0	15,9	16,7	22,8	24,5	17,2	12,4	11,8	17,16
29	5	11,5	10,4	11,0	12,2	14,3	14,0	11,0	9,3	11,71
1	6	8,2	7,3	7,2	9,5	9,7	9,4	7,9	7,0	8,28
2	7	* 5,3	3,3	6,2	9,6	9,0	8,0	7,3	6,9	6,95
3	8	5,1	5,3	5,8	7,7	9,6	10,2	8,4	8,0	7,51
4	9	7,2	6,5	7,4	12,0	15,5	12,3	9,2	7,9	9,75
5	10	7,7	8,1	9,5	14,9	15,4	15,3	9,3	7,0	10,90
6	11	6,2	5,0	7,8	14,0	16,0	15,0	10,1	7,8	10,24
7	12	8,2	7,5	10,9	18,0	20,0	21,0	15,0	9,7	13,79
8	13	13,0	13,0	14,5	15,5	16,5	14,6	13,8	14,0	14,36
9	14	* 12,2	10,4	15,8	20,0	21,3	20,8	16,3	12,2	16,12
10	15	10,3	9,1	10,3	13,0	13,8	13,3	10,0	8,2	11,00
11	16	7,2	4,4	7,8	14,0	16,1	16,0	10,7	8,1	10,54
12	17	7,8	5,2	9,9	18,8	21,1	20,2	13,7	11,7	13,55
13	18	10,7	11,0	12,6	16,1	22,5	21,8	15,8	12,7	15,40
14	19	11,4	11,0	14,3	23,1	26,3	23,0	17,7	15,0	17,72
15	20	15,6	15,9	15,5	17,1	18,7	19,3	16,4	13,2	16,46
16	21	10,3	8,0	10,6	15,7	21,0	20,0	13,0	10,0	13,57
17	22	8,7	8,5	12,6	19,2	22,7	21,5	16,0	14,8	15,50
18	23	14,1	14,3	16,7	26,0	29,2	30,0	18,3	16,1	20,59
19	24	14,0	12,6	13,4	17,3	18,0	16,3	12,9	11,7	14,53
20	25	11,3	11,8	12,7	14,9	16,3	13,0	11,9	11,9	12,98
21	26	11,6	10,0	9,8	8,7	8,0	8,0	7,3	7,2	8,83
22	27	6,9	6,0	8,0	10,7	12,0	12,0	9,1	8,8	9,19
23	28	7,7	5,4	9,4	15,2	17,0	17,3	13,7	10,3	12,00
24	29	9,4	9,3	12,4	18,7	22,5	22,0	15,2	11,5	15,13
25	30	11,3	10,9	12,1	16,1	20,0	19,9	13,0	11,4	14,34
Moyennes du	1–10	8,66	8,34	9,55	13,90	15,90	14,42	10,98	9,82	11,45
	11–20	10,26	9,25	11,94	16,96	19,23	18,50	13,95	11,26	13,92
	21–30	10,53	9,68	11,77	16,25	18,67	18,00	13,04	11,37	13,66
	mois	9,82	9,09	11,09	15,70	17,93	16,97	12,66	10,82	13,01

Maximum : o 30,0 observé le 23 à 4 h. P.M.
Minimum : 3,5 „ le à 1 4 h. A.M.
} différence ..... o 26,5

TABLEAU MÉTÉOROLOGIQUE.—Avril 1875.

Actinomètre : 1° *thermomètre à boule nue.*

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
25	1	1,3	1,8	12,4	23,5	26,0	17,0	12,0	11,6	13,20
26	2	* 8,3	10,1	14,5	30,8	35,8	33,6	16,5	13,3	20,36
27	3	12,3	11,7	17,9	19,3	25,1	17,8	14,6	13,8	16,56
28	4	15,3	14,7	20,3	26,5	30,2	18,6	12,2	11,4	18,65
29	5	11,3	10,3	11,3	15,3	17,1	17,3	10,6	8,7	12,74
1	6	8,2	7,0	9,8	18,2	17,5	11,3	7,5	6,3	10,72
2	7	* 4,1	1,9	10,8	18,2	16,3	9,3	7,3	4,1	9,00
3	8	5,0	5,3	6,0	9,3	14,3	12,7	7,7	7,3	8,45
4	9	7,0	6,3	9,6	18,3	24,3	15,4	8,5	7,3	12,09
5	10	7,3	7,3	13,9	22,3	26,3	23,6	8,6	6,4	14,46
6	11	5,5	3,7	12,3	24,8	27,3	23,3	9,5	7,2	14,20
7	12	7,4	6,7	15,6	28,5	28,3	29,5	14,4	12,6	17,87
8	13	12,3	12,3	14,6	17,9	20,2	15,6	13,4	13,4	14,96
9	14	* 11,7	10,1	15,5	27,3	31,8	29,3	15,5	11,6	19,10
10	15	9,4	7,6	11,3	18,3	16,3	17,4	9,4	7,3	12,12
11	16	6,3	3,3	13,0	25,6	27,3	24,9	10,0	6,3	14,59
12	17	6,2	4,3	15,5	29,0	32,3	29,3	12,6	11,2	17,55
13	18	9,8	9,9	14,3	21,0	33,3	29,3	15,1	11,5	18,02
14	19	10,6	10,5	19,2	33,4	35,9	26,4	17,3	14,6	20,99
15	20	15,3	15,3	15,4	18,3	21,5	21,3	15,5	13,1	16,96
16	21	9,5	6,7	17,2	27,4	30,7	28,4	12,3	9,2	17,67
17	22	7,6	7,5	19,2	30,3	33,6	30,6	15,2	14,0	19,75
18	23	13,5	13,3	20,6	36,2	39,3	36,4	18,0	16,0	24,16
19	24	14,2	12,3	15,6	28,4	29,2	23,2	12,0	10,8	18,21
20	25	11,3	11,5	14,8	21,3	25,4	15,1	11,7	11,5	15,32
21	26	11,5	9,6	10,0	8,6	10,1	9,3	7,1	6,5	9,09
22	27	6,1	6,0	10,5	17,5	19,1	15,6	7,6	7,3	12,21
23	28	7,2	4,4	15,1	25,7	24,7	20,3	12,3	12,0	15,21
24	29	8,2	7,6	19,0	29,6	31,1	29,1	14,3	10,5	18,67
25	30	11,1	10,3	13,6	25,1	29,7	26,3	12,6	11,3	17,50
Moyennes du	1–10	8,01	7,64	12,65	20,17	23,29	17,66	10,55	9,02	13,62
	11–20	9,45	8,37	14,67	24,41	27,42	24,63	13,27	10,88	16,64
	21–30	10,02	8,92	15,56	25,01	27,29	23,43	12,31	10,91	16,68
	mois	9,16	8,31	14,29	23,19	26,00	21,91	12,04	10,27	15,47

Moyennes du mois { Therm. à boule noirçie : 20,21 / Therm. à boule nue : 15,47 } différence 4,74

TABLEAU MÉTÉOROLOGIQUE.—Avril 1875.

Actinomètre : 2° *thermomètre à boule noirçie.*

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 1 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
25	1	1,2	1,7	21,6	37,2	39,6	20,0	12,0	11,6	18,11
26	2	* 8,2	10,0	22,2	44,1	50,7	45,8	16,5	13,2	26,34
27	3	12,2	11,7	24,8	26,5	35,0	20,7	14,5	13,7	19,89
28	4	15,2	14,6	27,2	32,3	38,7	20,2	12,1	11,3	21,45
29	5	11,2	10,2	11,8	20,0	21,2	22,2	10,6	8,7	14,49
1	6	8,1	7,0	14,2	30,1	28,2	14,2	7,4	6,2	14,42
2	7	* 4,0	1,9	19,4	30,4	25,9	11,2	7,2	4,0	13,00
3	8	4,9	5,2	6,3	11,8	21,2	16,8	7,7	7,2	10,14
4	9	7,0	6,2	14,1	28,7	38,2	20,2	8,4	7,2	16,25
5	10	7,2	7,2	22,1	32,6	40,5	36,3	8,5	6,3	20,09
6	11	5,4	3,6	21,2	39,9	43,6	37,2	9,4	7,1	20,92
7	12	7,3	6,7	24,3	42,9	40,5	43,4	14,4	12,5	24,00
8	13	12,2	12,2	15,4	22,2	26,2	18,2	13,4	13,4	16,65
9	14	* 11,7	10,0	15,8	37,4	47,0	43,6	15,5	11,5	24,06
10	15	9,4	7,5	13,3	26,2	20,2	23,9	9,4	7,2	14,64
11	16	6,2	3,2	23,2	40,1	42,9	39,2	9,9	6,2	21,36
12	17	6,1	4,2	26,5	43,5	48,2	44,2	12,6	11,1	24,55
13	18	9,8	9,9	18,5	28,4	48,4	42,2	15,1	11,4	22,96
14	19	10,5	10,4	28,5	47,9	51,2	32,1	17,2	14,6	26,55
15	20	15,2	15,3	16,2	21,2	28,0	25,9	15,5	13,1	18,80
16	21	9,4	6,6	28,9	42,2	46,8	43,2	12,2	9,1	24,80
17	22	7,5	7,5	30,4	45,6	49,5	45,4	15,1	13,9	26,86
18	23	13,4	13,2	28,2	50,0	53,6	48,0	17,9	16,0	30,04
19	24	14,1	12,2	18,8	42,4	45,5	33,4	11,9	10,7	23,62
20	25	11,2	11,5	18,5	31,2	40,0	18,2	11,7	11,7	19,22
21	26	11,4	9,6	11,1	10,2	14,2	12,4	9,0	6,5	10,30
22	27	6,1	5,9	15,1	27,9	29,0	21,2	7,0	7,2	14,99
23	28	7,1	4,3	25,3	40,2	35,8	25,2	12,2	11,0	20,14
24	29	8,1	7,6	30,2	44,2	44,2	40,7	14,2	10,4	24,95
25	30	11,0	10,2	17,3	37,2	45,2	37,3	12,6	11,2	22,75
Moyennes du	1–10	7,92	7,57	18,37	29,37	33,92	22,76	10,49	8,94	17,42
	11–20	9,38	8,30	20,29	34,97	39,62	34,99	13,24	10,81	21,45
	21–30	9,93	8,86	22,38	37,11	40,38	32,50	12,23	10,77	21,77
	mois	9,08	8,24	20,35	33,82	37,97	30,08	11,99	10,17	20,21

Maximum observé le 23 { Therm. à boule noirçie : o 53,6 ; Therm. à boule nue : 39,3 } différence ..... o 14,3

TABLEAU MÉTÉOROLOGIQUE.—Avril 1875.

Tension de la vapeur.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	m,m
25	1	4,81	4,71	6,43	5,74	5,07	6,08	6,03	6,00	5,61
26	2	* 6,27	5,83	6,87	8,27	8,73	8,49	9,19	9,37	7,88
27	3	8,76	8,98	9,44	11,86	13,25	12,79	11,88	11,17	11,02
28	4	11,54	11,74	11,81	13,71	14,52	13,26	10,21	9,70	12,06
29	5	9,75	8,92	9,52	9,33	9,72	9,02	6,81	4,95	8,50
30	6	4,62	5,16	4,28	4,17	3,72	3,77	3,26	4,30	4,16
1	7	* 4,46	4,63	5,08	4,44	5,31	4,50	5,38	5,32	4,89
2	8	6,47	6,35	6,16	6,53	6,15	6,34	6,55	6,89	6,43
3	9	7,05	7,03	6,93	7,25	6,81	7,55	7,29	7,17	7,14
4	10	7,40	7,82	8,27	8,35	5,90	3,27	6,66	6,62	6,79
5	11	5,82	5,60	6,14	5,56	4,83	4,28	5,96	7,01	5,65
6	12	7,10	7,19	7,91	9,30	8,96	8,78	7,76	6,99	8,00
7	13	6,09	6,16	8,07	9,64	10,81	11,11	10,94	10,56	9,17
8	14	* 9,74	8,92	12,78	14,13	11,79	10,15	10,51	8,68	10,84
9	15	7,79	7,80	8,63	8,58	8,62	7,29	6,46	6,12	7,66
10	16	6,28	4,85	6,14	4,06	4,89	4,16	6,99	6,73	5,51
11	17	6,47	6,52	7,47	7,38	6,49	5,40	7,17	7,19	6,76
12	18	6,39	6,69	6,76	5,96	5,53	7,59	10,45	9,55	7,37
13	19	9,55	9,79	11,03	10,69	9,80	10,02	12,32	12,43	10,70
14	20	12,33	12,29	12,68	13,47	12,19	11,52	12,55	10,12	12,14
15	21	8,98	7,77	7,85	6,95	6,42	5,26	9,10	8,33	7,58
16	22	7,60	7,72	9,22	10,56	9,75	10,18	9,34	10,07	9,31
17	23	10,89	10,65	11,25	10,62	11,74	9,93	12,59	13,01	11,34
18	24	11,91	10,88	11,05	7,02	6,73	4,41	6,22	6,95	8,15
19	25	7,11	6,81	6,70	6,21	5,48	6,16	6,15	6,27	6,36
20	26	6,93	6,93	6,25	7,46	7,33	7,33	7,31	6,61	7,02
21	27	5,95	6,70	6,89	6,87	6,77	5,61	7,35	6,96	6,64
22	28	7,07	6,29	7,17	6,87	7,43	6,89	9,33	9,08	7,52
23	29	8,33	7,79	9,08	9,05	7,02	8,03	6,02	7,07	7,80
24	30	7,11	7,23	7,19	5,48	5,87	4,93	7,59	7,49	6,61
Moyennes du	1–10	7,11	7,12	7,48	7,97	7,92	7,51	7,33	7,15	7,45
	11–20	7,76	7,58	8,76	8,88	8,39	8,03	9,11	8,54	8,38
	21–31	8,19	7,88	8,27	7,71	7,45	6,87	8,10	8,18	7,83
	mois	7,69	7,53	8,17	8,18	7,92	7,47	8,18	7,96	7,89

mm
Maximum : 14,52 observé le 4 à 1 h. A.M.
Minimum : 3,26 „ le 6 à 7 h. P.M.
} différence..... mm 11,26

TABLEAU MÉTÉOROLOGIQUE.—Avril 1875.

Humidité relative.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
25	1	82	80	83	49	37	47	55	58	61,37
26	2	* 71	60	73	43	35	32	64	80	57,25
27	3	80	86	80	93	83	95	97	91	88,12
28	4	85	87	83	66	63	91	95	94	83,00
29	5	96	95	97	87	80	76	69	56	82,00
1	6	57	67	56	46	41	43	40	57	50,87
2	7	* 68	80	72	50	62	57	70	83	67,75
3	8	98	95	90	83	69	69	79	86	83,62
4	9	92	97	90	69	52	71	84	90	80,62
5	10	94	97	93	66	45	26	76	88	73,12
6	11	82	86	77	47	35	33	64	89	64,12
7	12	88	93	81	61	51	48	61	77	70,00
8	13	54	55	65	74	77	90	93	89	74,62
9	14	* 92	95	96	81	63	56	76	82	80,12
10	15	83	91	93	77	73	64	71	75	78,37
11	16	83	77	77	34	35	31	72	83	61,50
12	17	82	98	81	46	32	30	61	70	62,50
13	18	66	68	62	43	27	39	78	87	58,75
14	19	95	100	91	51	39	48	82	98	75,50
15	20	93	91	97	93	76	69	90	89	87,25
16	21	96	97	82	52	63	31	81	91	70,37
17	22	90	93	85	64	48	53	69	80	72,75
18	23	91	88	80	43	39	31	80	96	68,50
19	24	100	100	97	48	43	32	56	68	68,00
20	25	71	66	61	49	40	55	58	59	57,37
21	26	68	75	69	89	91	91	95	87	83,12
22	27	79	95	86	71	65	54	85	82	77,12
23	28	90	94	81	54	52	47	80	96	74,25
24	29	95	89	85	57	35	41	47	70	64,87
25	30	71	74	68	40	33	28	68	74	57,00
Moyennes du	1–10	82,3	84,4	81,7	65,2	56,7	60,7	72,9	78,3	72,77
	11–20	81,8	85,4	82,0	60,7	50,8	50,8	74,8	83,9	71,27
	21–30	85,1	87,1	79,4	56,7	47,9	46,3	71,9	80,3	69,34
	mois	83,1	85,6	81,0	60,9	51,8	52,6	73,2	80,8	71,18

Maximum : 100 observé 3 fois
Minimum : 26 „ le 10 à 4h. P.M. } différence 74

TABLEAU MÉTÉOROLOGIQUE.—Avril 1875.

Ozone.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
25	1	6	9,5	9	9,5	8,5	6	9	9	8,3
26	2	*9,5	9	8,5	8	7	3	8	12	8,1
27	3	11,5	10	8,5	10	10	10	21	14	11,9
28	4	9	9	9	8	8	9	12	19	10,4
29	5	18	20	20	19	9	9	9,5	9	14,2
1	6	...	9,5	9	9	5	6	8,5	10	8,1
2	7	*10	10	8	7	8	8,5	8	9,5	8,6
3	8	9,5	10,5	9	10,5	8	5	8	7,5	8,5
4	9	9,5	8	9	5	9	8	8,5	8,5	8,2
5	10	11	19	10	4	3	8	7	9	8,9
6	11	9	9	9	...	5	3	9	11	7,9
7	12	19	9	11	12	9	7	7	6	10,0
8	13	8,5	9,5	11	9,5	9	6,5	20	20	11,8
9	14	*20	20	18	10	...	3	10	12	13,3
10	15	10	11	10	11	12	5	6	10	9,4
11	16	8	11	9	8	9	3	4	8	7,5
12	17	10	8	9	12	7	3	7	13	8,6
13	18	10,5	8,5	9,5	8,5	8	3	8	7	7,9
14	19	10	9	8,5	6	8	5,5	8	9	8,0
15	20	14	9,5	7,5	5,5	10	10,5	8,5	18	10,4
16	21	19	20	10	10,5	8,5	6	8,5	11	11,7
17	22	11	13	11,5	3	8	7	8,5	9	8,9
18	23	9	8	10	3	7	2,5	7,5	9,5	7,1
19	24	12	9	9	8,5	8	8	8	9	8,9
20	25	7	10	9	1	8,5	8	6	6	6,9
21	26	8	19	13	6	20	20	19	20	15,6
22	27	8	18	4	2	8,5	11	6	4	7,7
23	28	8,5	8	8	8	9	8	8,5	5	7,9
24	29	9	12	9,5	8	10	7	7	8	8,8
25	30	7,5	7,5	3	4	6	4	8,5	8	6,1
Moyennes du	1–10	10,4	11,5	10,0	9,0	7,6	7,3	10,0	10,8	9,5
	11–20	11,9	10,5	10,3	9,2	8,6	5,0	8,8	11,4	9,5
	21–30	9,9	12,5	8,7	5,4	9,4	8,2	8,8	9,0	9,0
	mois	10,70	11,45	9,65	7,81	8,48	6,78	9,15	10,36	9,31

Maximum : 21 observé le 3 à 7 h. P.M.
Minimum : 1 „ 25 à 10 h. A.M.
} Différence..... 20

TABLEAU MÉTÉOROLOGIQUE.—Avril 1875.

Direction du vent; sa vitesse par seconde.

Date.	Matin. 1 h. Dir.	Matin. 1 h. Vit.	Matin. 4 h. Dir.	Matin. 4 h. Vit.	Matin. 7 h. Dir.	Matin. 7 h. Vit.	Matin. 10 h. Dir.	Matin. 10 h. Vit.	Soir. 1 h. Dir.	Soir. 1 h. Vit.	Soir. 4 h. Dir.	Soir. 4 h. Vit.	Soir. 7 h. Dir.	Soir. 7 h. Vit.	Soir. 10 h. Dir.	Soir. 10 h. Vit.	Moyennes des 8 observations.
		m		m		m		m		m		m		m		m	m
1	WSW	1,8	SW	2,6	S	3,6	S	1,6	S	5,9	SSE	9,5	SSE	9,0	SSE	7,5	5 2
2	S	4,8	S	6,6	SW	2,9	W	2,3	WNW	1,7	NW	0,9	E	3,1	ENE	4,3	3,3
3	E	5,1	E	5,7	E	6,9	ESE	8,8	ESE	10,8	ESE	9,1	ESE	7,6	SE	5,4	7,4
4	SSE	4,4	SSE	7,7	S	4,7	SSW	5,2	WNW	6,8	NNE	4,5	NNE	4,4	NE	3,9	5,2
5	N	2,8	NNE	5,5	N	2,8	NNE	4,0	NNE	3,3	N	6,2	N	8,0	N	8,0	5,1
6	NW	6,8	WNW	6,4	N	3,8	N	4,7	N	4,7	N	4,4	NNE	4,1	NNE	2,7	4,7
7	NNE	1,9	NNE	1,1	E	2,0	E	2,3	E	1,0	E	1,9	E	1,9	E	0,7	1,6
8	NNW	1,7	NNW	0,8	N	0,7	N	2,0	N	2,3	NE	2,1	NE	0,0	NE	2,0	1,5
9	N	1,2	N	1,0	N	1,2	N	1,2	N	1,2	SE	2,6	SE	4,2	SE	2,8	1,9
10	SE	2,1	S	2,1	SW	1,4	NW	3,6	N	7,3	NNW	5,7	NE	4,0	E	2,5	3,6
11	ENE	2,3	SSE	0,9	SE	1,7	ESE	4,0	S	3,1	SSE	5,2	SE	3,7	ESE	3,1	3,0
12	SE	3,7	SE	3,3	SSE	2,7	SSE	4,6	SSE	4,5	SSE	5,5	SE	4,1	SE	4,4	4,1
13	SE	5,4	SSE	4,6	SE	5,7	S	6,5	SSE	8,8	SSE	9,5	SE	9,1	SSE	9,1	7,3
14	SSE	10,1	S	6,1	WSW	4,3	W	7,0	WNW	11,4	NW	11,1	NNW	6,6	N	4,7	7,7
15	N	2,9	NE	1,0	N	2,3	NNE	3,6	N	2,0	NNE	4,2	N	4,1	N	2,2	2,8
16	N	0,9	N	1,3	N	1,0	N	3,1	N	4,0	NNE	4,0	ENE	2,4	E	0,7	2,2
17	SE	1,5	SE	1,9	SE	0,9	SW	2,7	SSW	2,1	S	4,1	SSE	4,4	SSE	4,4	2,7
18	SSE	4,4	SSE	4,0	S	4,2	S	5,8	SSW	4,8	SSE	5,0	SSE	3,3	SSE	2,0	4,2
19	SE	1,9	O	0,6	SE	0,0	SE	0,5	SE	2,3	SE	3,4	SE	3,5	SE	2,4	1,8
20	SE	1,9	NW	1,9	NW	0,0	NW	1,3	N	2,0	E	0,9	WNW	0,5	N	3,3	1,5
21	N	3,1	N	1,0	N	0,7	N	1,7	NNE	0.7	E	2,0	E	2,8	E	1,8	1,7
22	ESE	3,3	SE	2,6	SSE	4,3	SSE	4,4	SSE	6,8	SSE	7,1	SSE	5,9	SSE	5,3	5,0
23	SSE	4,9	SSE	3,1	S	3,1	SSW	5,5	SW	5,6	WNW	4,4	N	3,7	N	1,4	4,0
24	N	4,4	N	0,8	NNE	2,5	NNE	7,0	NE	8,8	NE	7,0	ENE	4,0	ENE	1,3	4,5
25	ENE	0,9	E	1,9	E	2,5	E	5,6	E	6,8	ENE	7,3	ENE	6,8	ENE	5,8	4,7
26	ENE	6,2	ENE	5,9	ENE	6,5	ENE	9,4	ENE	8,5	ENE	8,2	NNE	6,4	NNE	6,6	7,2
27	NNE	3,1	NNW	1,7	NW	2,5	N	4,5	NNW	4,1	NNW	3,9	NW	1,7	N	0,2	2,7
28	N	0,2	NW	1,7	NW	0,9	NNW	3,1	NNW	1,7	NNW	1,3	S	0,8	S	1,0	1,3
29	S	1,0	S	0,9	SSW	2,6	SW	4,5	WSW	6,1	WNW	7,3	N	6,3	NNW	2,2	3,9
30	NW	1,3	NW	1,1	NW	0,7	NNW	1,9	NNW	3,1	NW	3,8	ENE	3,3	ENE	1,2	2,1
Moy. du mois		m 3,2		m 2,9		m 2,6		m 4,1		m 4,7		m 5,1		m 4,3		m 3,4	m 3,8

Fréquence relative des 16 vents sur 100

N 17	W..... 1	S 7	E 6
NNW 6	WSW 2	SSE.....13	ENE 7
NW 6	SW 2	SE 12	NE 6
WNW 2	SSW 3	ESE 3	NNE 7

Calmes, sur 100 observations 1

Vitesse moyenne maximum observée le 14..... m 11,4

TABLEAU MÉTÉOROLOGIQUE.—Avril 1875.

État du ciel.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. m.			4h. m.			7h. m.			10h. m.		
	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.
1	0	..	..	0	..	..	0	..	..	5	k NW	kst NW
2	3 Br	..	..	..	..	..	3 Br	cst	..	0	..	..
3	0	..	..	0	..	..	0 Br	..	..	10	..	c SE
4	0	..	..	0	..	..	1	..	cst	5 Br	k	..
5	10	..	n	10	..	n	10	..	n	10 Br	..	c NE
6	10 Br	..	..	10 Br	..	..	8 Br	kst	..	9	ac SW	cn
7	0	..	..	0	..	..	5	cst	..	9 Br	..	cn
8	10 Br	..	..	10 Br	..	..	10 Br	..	cn	10 Br	..	n
9	10 Br	..	..	10 Br	..	..	8 Br	k	cn	9 Br	k W	c E
10	8 Br	..	..	1 Br	..	..	4 Br	kst	..	10 Br	..	c NW
11	5 Br	..	..	0	..	..	0	..	..	0	..	..
12	2 Br	..	..	0	..	..	0	..	..	5	k	..
13	10 Br	c	..	10 Br	cst	..	10 Br	..	cn	10 Br	..	cn
14	10	..	..	10	..	n	10	cst	n	10 Br	..	cn W
15	5 Br	k	..	2	cst	..	9	cst	..	10 Br	..	cn NE
16	8 Br	kst	..	1	c	..	0	..	..	0	..	..
17	0	..	..	0	..	..	0	..	..	0	..	..
18	8	k	..	9	cst	..	9	cst	..	9 Br	..	..
19	8	ac	..	10 Br	..	..	1 Br	kst	..	1 Br	..	..
20	10	c	..	10 Br	c	..	10 Br	..	..	10 Br	..	..
21	6 Br	kst W	..	0	..	..	0	..	..	0	..	..
22	8	kst	..	8	kst NW	..	3	kst	..	1	ac W	kst SSW
23	0	..	..	0	..	..	0	..	..	0	..	..
24	10 Bd	..	..	10 Bd	..	..	10 Bd	..	..	9	cst	..
25	10 Br	..	c W	10 Br	..	c NNW	10	kst	c	10	cst	..
26	10	cst	..	10	cst	..	10	cst	..	10	..	n
27	8	kst	c	9	kst	c	10	kst	..	10 Br	..	c N
28	8	cst	..	1	kc W	..	4	k	cst	9 Br	ac W	..
29	1 Br	..	..	0	..	..	0	..	..	0	kst W	..
30	10 Bd	..	..	10 Br	..	..	0 Br	..	cst	5 Bd	..	..
Moy. du mois	5,9	..	..	4,9	..	..	5,0	..	..	6,2	..	..

Nombre de jours de :

Ciel beau, ou moins de $2\frac{1}{10}$ couvert	.. 7	Brouillard	.. 2
,, peu nuageux ou de 2 à $4\frac{1}{10}$,,	..10	Brume	..22
,, nuageux, ou de 4 à $6\frac{1}{10}$,,	.. 9	Rosée	..13
,, très-nuageux, ou de 6 à $8\frac{1}{10}$,,	.. 4	Pluie	.. 9
,, couvert ou plus de $8\frac{1}{10}$,,	..10		

TABLEAU MÉTÉOROLOGIQUE.—Avril 1875.

État du ciel.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. s.			4h. s.			7h. s.			10h. s.			Moyennes des 8 observations.
	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	
1	9	kst	ac NW	9 Br	..	n	2 Br	..	..	0	..	..	3,1
2	4 Br	k	..	0	..	..	2 Br	..	..	0	..	..	1,5
3	10	..	c SE	10 Br	..	..	10 Br	..	..	0	..	..	5,0
4	10 Br	k W	..	10 Br	..	n	10 Br	..	n	10	..	n	5,8
5	10	n	c	9	n	c	10 Br	..	..	10 Br	..	n	9,9
6	10 Br	ac W	..	10	ac SW	..	10	c	..	8 Br	cst	..	8,7
7	10 Br	..	cn	10 Br	..	..	10 Br	..	..	10 Br	..	n	6,7
8	10 Br	..	cn	10 Br	cn N	c	10 Br	cst	..	10 Br	..	..	10,0
9	7	c NW	..	9	cn	..	7 Br	k	..	5 Br	..	..	8,1
10	10 Br	..	..	5 Br	k	..	10 Br	kst	..	8 Br	kst	..	7,0
11	0	..	..	0	..	..	8 Br	k	..	0	..	..	1,6
12	10 Br	k	..	5	kst	..	10 Br	cst	..	10 Br	c	..	5,3
13	10 Br	..	cn	10 Br	cn	c SE	10 Br	ac	c SE	10	cst	n	10,0
14	5	kst W	c WNW	4	kc NW	c W	5	cst	..	10 Br	..	..	8,0
15	10 Br	..	cn NE	10 Br	kc	cn	10 Br	cst	..	10 Br	..	..	8,2
16	0	..	..	0	..	..	0	..	..	0	..	..	1,1
17	0	..	..	1	kst	..	1	c	..	0	..	..	0,3
18	1	ac	..	7	k W	..	8 Br	c	..	0	..	..	6,4
19	8	kst W	..	10	ac	..	10 Br	cst	..	5 Br	kc W	..	6,6
20	10 Br	..	c	10 Br	..	cn	9 Br	..	cn	8	c NNE	..	9,8
21	0	..	..	0	..	..	0	..	..	0	..	..	0,7
22	1	cst	..	0	..	..	0	..	..	0	..	..	1,4
23	0	..	..	0	..	..	0	..	..	0	..	..	0
24	6	kc W	..	5	ac NW	..	1 Br	k	..	4 Br	..	..	6,9
25	10	cst	..	10	cst	..	10	cst	..	10	cst	..	10,0
26	10 Br	..	cn E	10 Br	..	cn NE	10 Br	..	cn	10 Br	..	cn	10,0
27	10 Br	..	c N	10	ac W	c N	5 Br	..	..	5 Br	..	..	8,4
28	5	k W	ac W	5	kst W	cn N	5	k	cn	0	..	..	4,0
29	5	kst	..	7	k W	cn	8 Br	kc W	c	9 Br	..	..	3,8
30	5 Bd	..	..	5 Bd	..	..	5 Bd	..	..	10 Bd	..	..	6,9
Moy. du mois	6,5	..	..	6,4	..	..	6,5	..	..	5,3	..	..	5,8

Phénomènes divers observés :

Eclipse partielle de soleil le 6	
Lumière zodiacale 3 fois	3
Halos solaires	5
Halos lunaires	5
Arc-en-ciel solaire	1
Brouillard sec 1 fois, le 30	1
Efflorescence de salpêtre à la surface du sol le 11	

TABLEAU MÉTÉOROLOGIQUE.—Avril 1875.

Evaporation sous l'abri.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Total des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
25	1	0,13	0,16	0,12	0,58	1,52	1,58	1,12	0,81	6,02
26	2	* 1,30	0,45	0,38	0,70	1,20	1,20	0,72	0,28	6,23
27	3	0,30	0,25	0,30	0,33	0,32	0,30	0,15	0,05	2,00
28	4	0,25	0,25	0,20	0,80	1,40	0,50	0,10	0,10	3,60
29	5	0,03	0,07	0,00	0,12	0,28	0,57	0,63	0,80	2,50
1	6	0,75	0,75	0,60	0,80	1,10	1,15	0,85	0,65	6,65
2	7	* 0,66	0,67	0,10	0,50	0,68	0,52	0,30	0,12	3,55
3	8	0,00	0,00	0,10	0,10	0,30	0,40	0,40	0,10	1,40
4	9	0,10	0,10	0,10	0,20	0,50	0,70	0,30	0,10	2,10
5	10	0,10	0,00	0,10	0,40	0,95	1,45	0,80	0,10	3,90
6	11	0,10	0,03	0,11	0,52	1,18	1,30	0,86	0,20	4,30
7	12	0,10	0,10	0,05	0,55	1,10	1,30	0,75	0,55	4,50
8	13	0,80	0,80	0,65	0,63	0,70	0,56	0,16	0,20	4,50
9	14	* 0,00	0,10	0,10	0,15	0,73	1,14	0,83	0,37	3,42
10	15	0,28	0,15	0,10	0,30	0,41	0,64	0,70	0,40	2,98
11	16	0,20	0,10	0,04	0,80	1,44	1,47	0,77	0,13	4,95
12	17	0,15	0,05	0,05	1,21	0,69	1,70	1,20	0,42	5,47
13	18	0,38	0,40	0,52	1,03	1,75	2,25	0,75	0,15	7,23
14	19	0,07	0,00	0,03	0,45	1,21	1,29	0,70	0,12	3,87
15	20	0,08	0,10	0,05	0,05	0,20	0,45	0,25	0,25	1,43
16	21	0,15	0,10	0,05	0,57	0,96	1,17	0,75	0,06	3,81
17	22	0,14	0,02	0,15	0,53	1,22	1,43	0,85	0,50	4,84
18	23	0,20	0,13	0,19	1,78	2,05	1,85	0,90	0,15	6,65
19	24	0,05	0,00	0,00	0,80	1,58	1,37	0,95	0,35	5,10
20	25	0,22	0,28	0,36	0,64	0,95	0,92	0,63	0,50	4,50
21	26	0,50	0,30	0,30	0,43	0,07	0,02	0,00	0,00	1,62
22	27	0,13	0,15	0,01	0,39	0,65	0,70	0,45	0,10	2,58
23	28	0,05	0,05	0,05	0,55	0,96	0,76	0,50	0,16	3,08
24	29	0,04	0,08	0,15	0,65	1,50	1,68	1,28	0,59	5,97
25	30	0,25	0,16	0,29	0,75	1,70	1,34	1,01	0,23	5,73
Total du	1–10	3,62	2,70	2,00	4,53	8,25	8,37	5,37	3,11	37,95
	11–20	2,16	1,83	1,70	5,69	9,41	12,10	6,97	2,79	42,65
	21–30	1,73	1,27	1,55	6,49	11,64	11,24	7,32	2,64	43,88
	mois	7,51	5,80	5,25	16,71	29,30	31,71	19,66	8,54	124,48

Maximum en 24h. : 7,23 observé le 18 (mm)

Minimum „ : 1,40 „ le 8 (mm)

} différence ..... 5,83 mm

TABLEAU MÉTÉOROLOGIQUE.—Avril 1875.

Jours de la lune	Jours du mois	Températures extrêmes. Sous l'Abri. Minima	Maxima	Différences	Moyennes	au Soleil. Max. boule noire.	Max. boule blanche.	Différences	Pluie. Jardin Total des 24h.	Toit Total des 24h.	Différences	Température du Puits.
		o	o	o	o	o	o	o	mm	mm	mm	o
25	1	2,0	17,5	15,5	9,75	26,8	22,5	4,3	0,0	0,0	0,0	13,1
26	2	8,6	27,2	18,6	17,90	37,0	31,3	5,7	0,0	0,0	0,0	13,1
27	3	11,8	19,2	7,4	15,50	22,6	22,0	0,6	0,0	0,0	0,0	13,1
28	4	13,4	26,9	13,5	20,15	32,8	29,9	2,9	1,9	1,5	0,4	13,1
29	5	9,6	14,8	5,2	12,20	...	...	...	3,0	2,6	0,4	13,1
1	6	6,4	11,7	5,3	9,05	22,7	17,5	5,2	0,0	0,0	0,0	13,1
2	7	2,6	11,3	8,7	6,95	19,3	15,9	3,4	2,1	2,0	0,1	13,2
3	8	4,8	10,7	5,9	7,75	14,2	12,4	1,8	0,7	0,5	0,2	13,2
4	9	4,8	13,7	8,9	9,25	29,9	23,0	6,9	0,0	0,0	0,0	13,2
5	10	6,8	16,2	9,4	11,50	25,1	20,9	4,2	0,0	0,0	0,0	13,2
6	11	3,8	17,2	13,4	10,50	28,0	22,3	5,7	0,0	0,0	0,0	13,2
7	12	6,7	22,3	15,6	14,50	33,9	27,9	6,0	0,0	0,0	0,0	13,2
8	13	12,2	18,0	5,8	15,10	...	...	...	0,7	0,3	0,4	13,2
9	14	10,4	21,3	10,9	15,85	28,6	25,7	2,9	6,2	5,0	1,2	13,3
10	15	7,5	14,5	7,0	11,00	22,3	18,7	3,6	0,0	0,0	0,0	13,3
11	16	2,8	17,2	14,4	10,00	27,1	22,5	4,6	0,0	0,0	0,0	13,3
12	17	4,8	22,8	18,0	13,80	34,4	28,5	5,9	0,0	0,0	0,0	13,4
13	18	9,0	23,6	14,6	16,30	34,1	28,9	5,2	0,0	0,0	0,0	13,4
14	19	10,4	27,3	16,9	18,85	39,6	33,2	6,4	0,0	0,0	0,0	13,4
15	20	14,8	19,7	4,9	17,25	...	...	...	3,1	2,8	0,3	13,4
16	21	7,2	21,7	14,5	14,45	33,3	27,2	6,1	0,0	0,0	0,0	13,4
17	22	7,6	24,3	16,7	15,95	35,2	29,7	5,5	0,0	0,0	0,0	13,4
18	23	13,3	31,0	17,7	22,15	37,7	34,3	3,4	0,0	0,0	0,0	13,5
19	24	12,0	19,1	7,1	15,55	26,7	23,8	2,9	0,0	0,0	0,0	13,5
20	25	10,1	16,6	6,5	13,35	22,6	19,9	2,7	0,0	0,0	0,0	13,6
21	26	7,0	11,6	4,6	9,30	...	...	...	18,5	13,1	5,4	13,6
22	27	4,8	12,9	8,1	8,85	19,6	16,6	3,0	0,1	0,0	0,1	13,6
23	28	4,1	20,2	16,1	12,15	33,1	26,6	6,5	0,0	0,0	0,0	13,6
24	29	7,2	24,4	17,2	15,80	31,5	28,3	3,2	0,0	0,0	0,0	13,6
25	30	10,3	20,5	10,2	15,40	30,7	25,9	4,8	0,0	0,0	0,0	13,6
Moyennes du	1-10	7,08	16,92	9,84	12,00	...	...	...	7,7	6,6	1,1	...
	11-20	8,24	20,39	12,15	14,32	...	...	...	10,0	8,1	1,9	...
	21-30	8,36	20,23	11,87	14,30	...	...	...	18,6	13,1	5,5	...
	mois	7,89	19,18	11,29	13,54	...	...	...	36,3	27,8	8,5	...

o	o	mm
Maximum: 31,0 observé le 23	Max. boule noire 39,6	Hauteur d'eau tombée 36,3
Minimum: 2,0 „ le 3	„ blanche 34,3	„ „ évaporée 124,48
Différence: 29,0	Différence max. 6,9	Différence 88,18

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Avril 1875.

1. 1h. m.—Ciel très-pur ; vent faible et régulier ; léger dépôt de rosée. 4h. et 7h.—Mêmes remarques. 10h.—Cirro-stratus d'orientation diverse ; 1ere couche d'une délicatesse extrême ; ciel d'un bleu foncé. 1h. s.—Ciel moutonné ; cirro-stratus orientés du N. au S. 4h.—Eclaircie au S. ; ciel très-noir au N. 7h.—Brume à l'horizon ; reste du ciel légèrement voilé. 10h.—Ciel étoilé ; vent fort, pas de rosée.
2. 4h. m.—Brume légère au S.E. et au N E. ; étoiles peu brillantes ; pas de rosée. 7h.—Beau temps, un peu de brume. 10h.—Ciel d'un bleu foncé au zénith ; vent faible et régulier. 1h. s.—Horizon jaunâtre ; ciel légèrement voilé presque partout ; cirrus vaporeux ; calme. 4h.—Même ciel. 7h.—Brume assez épaisse à l'horizon ; vent faible. 10h.—Ciel très-pur ; étoiles brillantes.
3. 1h. m.—Ciel très-pur ; étoiles brillantes ; vent fort. 4h.—Mêmes remarques. 7h.—Ciel pur au zénith ; soleil un peu pâle. 10h.—Ciel couvert uniformément d'une sorte de brouillard chassé rapidement par le vent d'E. 1h. s.—Pluie fine et peu abondante. 4h.—Brume générale et très-épaisse. 10h.—Ciel complétement découvert et très-pur.
4. 1h. m.—Le vent passe au S. et devient plus fort ; étoiles peu brillantes. 4h.—Mêmes remarques. 7h.—Très-faible rosée ; quelques cirro-stratus ; beau ciel. 10h.—Halo peu coloré ; cirro-stratus vaporeux ; éclaircie au S. 1h. s.—Ceinture de brume épaisse très-élevée au-dessus de l'horizon ; cirrus au zénith ; vent fort. 4h.—Ciel pluvieux. 7h.—La pluie continue. 10h.—Id.
5. 1h. m.—Quelques gouttes de pluie ; ciel uniformément couvert ; vent très-régulier. 4h. et 7h.—Mêmes remarques. 10h.—Couche de cumulus diffus couvrant tout le ciel. 1h. s.—Cumulus mieux définis ; couche supérieure sombre, inférieure blanchâtre. 4h.—Nimbus orageux en différents points ; au-dessous cumulus blanchâtres comme à 1h. ; coup de vent subit et violent. 7h.—Ciel uniformément couvert ; vent violent et soufflant par rafales. 10h.—Il commence de pleuvoir ; même ciel qu'à 7h.
6. 1h. m.—Ciel uniformément couvert d'une couche de brume à travers la quelle on aperçoit des étoiles au zénith ; vent fort et soufflant par rafales. 5h.—Ciel comme à 1h. ; le vent est tombé. 7h.—Cirrus nombreux en bandes confuses ; ciel couvert au S. 10h.—Ciel noir au S.E. ; éclaircie à l'W. 1h. s.—Ciel moutonné au zénith ; çà et là quelques éclaircies ; brume à l'horizon. 4h.—Au zénith éclaircie d'un bleu sombre ; l'obscurité est due à une éclipse partielle du Soleil. 7h.—Ciel uniformément couvert de cumulus compactes. 10h.—Long cumulo-stratus au S. ; il est orienté E.-W. ; pas de rosée.
7. 4h. m.—Étoiles et voie lactée très-brillantes ; pas de rosée ; brise faible. 7h.—Beaucoup de cirrus longs et tenus. 10h.—Cumulus compactes au zénith ; quelques éclaircies d'un bleu foncé. Dans les autres directions cumulus grisâtres sous la brume. 1h. s.—

Cumulo-nimbus se détachant sur la brume. 4h. et 7h.—Même ciel. 10h.—Pluie ; brise très-faible.

8. 1h. m.—Le vent a passé subitement de l'E. au N.N.W. à 11h. ½ ; puis calme. Il ne pleut plus. 4h.—Ciel sombre ; le calme continue. 7h.—Vapeurs sur le soleil ; ciel uniformément couvert de cumulo-nimbus ; vent faible. 10h.—Gros nimbus très-noir se détachant sur la brume qui couvre tout le ciel. Il pleut à l'horizon W. 1h. s.—Même ciel ; calme. 4h.—Brume générale ; cumulo-nimbus orageux au S.E. ; cumulus blanchâtres (nuages bas) au-dessous ; vent faible. 7h.—Cumulo-stratus au zénith. Ils sont orientés du N. au S., et séparés par un intervalle légèrement éclairé. 10h.—Ciel très-obscur ; calme.

9. 1h. m.—Ciel sombre et uniformément couvert ; pas de rosée 4h.—Mêmes remarques. 7h.—Cirrus dans toutes les directions ; au-dessous cumulo-nimbus et brume ; très-peu de rosée. 10h.—Éclaircie d'un bleu pâle au zénith ; on y voit des cirrus venant de l'W. Des cumulus diffus arrivent rapidement de l'E. 1h. s.—Des cumulus grisâtres venant du N.W. couvrent presque tout le ciel. 4h.—Épaisse couche de cumulo-nimbus ; il pleut au S.S.E. 7h.—Un léger voile de vapeurs obscurcit tout le ciel ; cirrus mal définis au zénith. 10h.—Étoiles assez brillantes; brume épaisse à l'horizon. Calme ou vent très-faible tout le jour ; il a passé insensiblement du N. au S E., par l'E.

10. 1h. m.—Léger dépôt de rosée ; éclaircie au zénith ; étoiles à peine visibles ; brume épaisse à l'horizon, vent faible. 4h.—Rosée assez abondante ; étoiles peu brillantes. 7h.—Cirro-stratus orientés du N.E. au S W. 10h.—Brume blanchâtre et générale ; cumulus vaporeux venant du N.W. 1h. s.—Brouillard sec formé de sable fin soulevé par le vent et qui nous vient des plaines du Pé-tche-ly ; la tour de la pagode est légèrement voilée ; vent fort et soufflant par rafales ; lumière du Soleil blanchâtre et indécise. 4h.—Horizon jaunâtre, éclaircie d'un bleu pâle au zénith. 7h. —Lune voilée ; çà et là quelques cirrus d'orientation différente ; 7h. ½ halo lunaire incomplet. 10h.—Cirrus dans toutes les directions ; le halo persiste ; pas de rosée.

11. 1h. m.—Étoiles peu brillantes même au zénith ; brume assez épaisse couvrant la moitié du ciel ; vent faible, pas de rosée. 4h. —Rosée abondante ; étoiles brillantes, vent comme à 1h. 7h. —Ciel entièrement dégagé. 10h.—Soleil blanchâtre ; ciel d'un bleu pâle. 1h. s. et 4h.—Mêmes remarques. 7h.—Cirrus diffus au zénith ; brume épaisse surtout à l'W. 10h.—Beau clair de Lune ; étoiles brillantes ; pas de rosée.—Aujourd'hui les hirondelles ont paru pour la première fois ; on a observé aussi une efflorescence de salpêtre à la surface du sol.

12. 1h. m.—Étoiles brillantes ; vent faible et très-régulier ; pas de rosée. 4h.—Etoiles et voie lactée brillantes ; très-peu de rosée ; vent comme à 1h. 7h.—Ciel serein. 10h.—Léger voile de cirrus par tout le ciel ; brume blanchâtre à l'horizon. 1h. s.—Brume générale et transparente ; au-dessus couche de cirrus. 4h.—Très-jolis cirro-stratus au zénith ; horizon brumeux. 7h.—Brume générale : des cumulo-stratus semblent rayonner du point où le soleil vient de se coucher. 9h.—Halo lunaire peu distinct. 10h.

—Vent assez fort, cumulus compactes et mal définis ; Lune à peine visible.

13. 1h. m.—Ciel sombre ; cumulus diffus au zénith ; vent fort, air très-sec. 4h.—Brume générale ; au S. cumulo-stratus orienté de l'E. à l'W. 7h.—Ciel chargé au S. 10h.—Cumulo-nimbus au-dessous de la brume ; quelques gouttes de pluie ; de 9 à 10h. un fort coup de vent. 1h. s.—Quelques gouttes de pluie ; cumulo-nimbus sous un ciel voilé. 4h.—Pluie chassée par le vent ; elle n'est pas accusée par le pluviomètre du toit ; vent violent et soufflant par rafales. Des cumulus blanchâtres arrivent rapidement du S.E. ; ciel très-noir dans cette direction. 7h.—Il ne pleut plus ; ciel diversement couvert ; Lune à peine visible ; vent très-fort et tourbillonnant. 10h.—Averse pendant un ¼ d'heure. A l'E. cumulo-stratus allant du N. au S., vent comme à 7h.

14. 4h. m.—Ciel très-sombre ; il pleut, le vent est tombé. 7h.—Pluie fine, sorte de brouillard ; tour de Long-Hoa invisible ; cumulo-stratus à l'horizon S. 10h.—Cumulo-nimbus noirâtres venant rapidement de l'W., vent de nouveau très-fort. 1h. s.—Vent violent ; vitesse maximum 14.4m par seconde de 1h. à 1h. ½. 4h.—Le ciel présente 3 couches de nuages ; la seconde est formée de gros cumulus d'une extrême blancheur. 7h.—Cirro-cumulus d'orientation diverse. 10h.—Ciel uniformément couvert ; halo Lunaire peu distinct.

15. 1h. m.—Au N. la moitié du ciel est occupée par une brume épaisse ; au S. étoiles voilées ; halo assez distinct ; pas de rosée. Quelques cumulo-stratus orientés du N.E. au S.W. ; léger dépôt de rosée. 7h.—Éclaircies à l'W., ailleurs cumulo-stratus diffus ; rosée assez abondante. 10h.—Brume générale ; au-dessous cumulo-nimbus venant lentement du N.E. 1h. s.—Même ciel qu'à 10h. 4h.—Ciel gris, quelques cirro-cumulus d'orientation diverse. 7h.—Cumulo-stratus rougeâtres à l'W., reste du ciel uniformément couvert ; vent faible. 10h.—Halo bien dessiné ; brume générale et transparente.

16. 1h. m.—Cirro-stratus orientés du N. au S. par tout le ciel ; calme ; pas de rosée. 4h.—Quelques cumulus à l'horizon E. ; reste du ciel très-pur ; étoiles très-brillantes, le calme continue. 7h.—Ciel sans nuage ; un peu de rosée ; calme. 10h.—Ciel splendide ; vent faible. 1h. et 4h. s.—Vent assez fort. 7h.—Vent faible. 10h.—Magnifique clair de Lune ; calme absolu ; très-peu de rosée.

17. 1h. m.—Ciel très-pur, vent faible ; rosée abondante. 4h.—Rosée très-abondante ; le reste comme à 1h. 7h.—Au lever du Soleil des vapeurs blanches s'élèvent à la hauteur des arbres et sont bientôt dissipées. 10h.—Ciel sans nuage et d'un bleu foncé au zénith. 1h. s.—Même ciel. 4h.—Quelques cirro-stratus à l'horizon N. ; reste du ciel comme à 10h. Le vent prend de la force. 7h.—Cumulus noirâtres au N.W. 10h.—Magnifique clair de Lune ; ciel sans nuages ; pas de rosée.

18. 1h. m.—Léger voile de cirro-stratus orientés de l'E. à l'W. ; pas de rosée. 4h.—Les cirro-stratus sont transformés en cumulo-stratus de même orientation ; pas de rosée. 7h.—Couche de cumulus peu distincts et noirâtres ; horizon sombre au S., éclaircie d'un bleu pâle au zénith. 10h.—Brume épaisse ; éclaircie d'un beau bleu au

N.W. 1h. s.—Alto-cumulus au S., reste du ciel blanchâtre ; air très-sec. 4h.—Des cirro-stratus très-déliés arrivent lentement de l'W. 7h.—Brume d'inégale épaisseur ; éclaircie à l'W. 10h.—Ciel serein ; beau clair de Lune ; pas de rosée. Le vent a été très-constant tout le jour et pour la vitesse et pour la direction.

19. 1h. m.—Alto-cumulus vaporeux et blanchâtres au zénith et au S., éclaircie au N., rosée abondante, vent faible. 4h.—Ciel uniformément couvert ; calme absolu. 7h.—Le calme continue ; cirro-stratus peu distincts. 10h.—Brume à l'horizon N. ; ciel d'un bleu pâle. 1h. s.—Halo peu distinct ; cirro-stratus d'orientation différente et léger voile de vapeur par tout le ciel. 4h.—Ciel moutonné au zénith, sombre à l'horizon W. 7h.—Cumulo-stratus diffus et orientés de l'E. à l'W. ; lune entièrement cachée par les nuages. 10h.—Cirro-cumulus venant rapidement de l'W., brume générale et transparente ; çà et là éclaircies blanchâtres ; le baromètre baisse.

20. 1h. m.—Ciel entièrement couvert de cumulus diffus ; pas de rosée. 4h.—Mêmes remarques. 7h.—Brouillard et pluie fine ; tour voilée. 10h.—Ciel uniformément couvert ; la pluie continue. 1h. s.—Pluie fine comme ci-dessus et gros cumulus apparaissant à l'horizon S. 4h.—Cumulo-nimbus sous une couche de brume générale. 7h.—Nuages orageux en différents points du ciel. 10h.—Des cumulus vaporeux et blanchâtres arrivent rapidement du N.N.E., laissant entr'eux de petites éclaircies ; vent fort. Calme ou vent très-faible tout le jour. Des brises folles ont fait faire à la girouette un tour complet sur elle-même.

21. 1h. m.—Cirro-stratus orientés de l'E. à l'W., et venant lentement de l'W. ; brume blanchâtre au N. ; rosée. 4h.—Ciel serein ; rosée abondante. 7h.—Mêmes remarques. 10 h.—Ciel sans nuages et d'un beau bleu. 1h. s.—Même ciel. 4h. et 7h.—Id. 10h.—Magnifique clair de lune. Vent faible de direction variable tout le jour.

22. 1h. m.—Au N., cirro-stratus orientés de l'W., vent froid, rosée abondante. 4h.—Les cirro-stratus persévèrent, ils paraissent converger à l'W. d'où ils viennent lentement. 7h.—Deux couches de cirro-stratus, la 1ère orientée du N.E., du S.W., la 2de du N.W., au S.E., et venant du S.W. ; ils ont la forme d'arcs de cercle. 10h.—Deux couches de cirro-stratus comme ci-dessus, l'orientation générale est de l'E. à l'W. 1h. s.—Bande de cumulo-stratus à l'horizon S.E. 4h. et 7h.—Ciel sans nuages ; bonne brise. 10 h.—Un léger voile de vapeurs obscurcit tout le ciel ; pas de rosée.

23. 1h. m.—Vapeurs blanchâtres obscurcissant tout le ciel ; pas de rosée. 4h. et 7h.—Mêmes remarques. 10h.—Le vent devient fort. 1h. s.—Les vapeurs s'épaississent, cependant elles laissent passer les rayons du soleil ; vent brûlant. 4h.—Éclaircie d'un bleu pâle au zénith. 5¾h.—Coup de vent du N. ; il ne dure qu'une ¼ heure, vitesse 13.3m. par seconde. 7h.—Calme ; ciel sans nuages. 10 h. Étoiles peu brillantes, le calme continue. La girouette a passé insensiblement en 24h., du S. au N. par l'W.

24. 1h. m.—La lune parait à travers un brouillard épais vient du N.E., limite de visibilité 4 à 500m. ; les thermomètres sont mouillés. 4h.—Brouillard plus épais qu'à 1h., il se condense très-abon-

damment sur tous les objets. 7h.—Thermomètres mouillés ; le brouillard s'élève et forme des cumulus diffus qui laissent entre eux des éclaircies. 10h.—Cumulus stratus à l'horizon N., tout le ciel est obscurci par un voile de vapeurs transparentes ; le vent souffle par rafales. 1h. s.—Éclaircie d'un bleu pâle au zénith ; reste du ciel vaporeux. 4h.—Ciel moutonné au zénith ; vers 5h. il s'y forme des cumulo-cirrus d'une délicatesse extrême. 7h.— Brume épaisse à l'horizon N., çà et là quelques cirrus ; calme. 10h.—Id., étoiles assez brillantes ; calme.

25. 1h. m.—Brume générale ; au-dessous, des cumulus noirâtres arrivent rapidement de l'E. ; vent faible ; pas de rosée. 4h.—Les cumulus ont envahi tout le ciel et le couvrent d'une couche très-compacte. 7h —Même remarque. 10h.—Les cumulus paraissent stratifiés à l'horizon. 1h. s.—Même ciel. 4h.—Les cumulus affectent partout le forme de stratus orientés de l'E. à l'W. et semblant converger en ces deux points. 7h.—Les cumulo-stratus conservent leur orientation et paraissent immobiles dans le ciel. 10h.—Ciel très-noir. Le vent a soufflé dans la même direction tout le jour et à peu près avec la même intensité depuis 10h. a.m.

26. 1h. m.—Les cumulo-stratus d'hier persévèrent ; vent fort et soufflant par rafales, pas de rosée. 4h.—Mêmes remarques. 7h.— L'orientation des stratus est du N. au S., excepté de grandes bandes qui à l'horizon S. sont orientées de l'E. à l'W. ; quelques gouttes de pluie. 10h.—Ciel uniformément couvert ; pluie et vent comme ci-dessus. 1h s.—Des cumulo-nimbus arrivent rapidement de l'E.; la pluie continue. 4h.—Même ciel. 7h.—Le vent faiblit ; le reste comme à 1h. p.m. 10h.—Il ne pleut plus ; de gros nimbus très-noirs couvrent presque tout le ciel.

27. 1h. m.—Cirro-stratus vaporeux et orientés du N. au S. ; quelques éclaircies à travers les quelles on aperçoit les étoiles ; vent faible ; pas de rosée. 4h.—Nuages diffus ; éclaircie au S., le reste comme à 1h. 7h.—Ciel sombre au S.W. ; ailleurs couche uniforme de cirro-stratus. 10h.—Brume générale, au-dessous cumulus vaporeux venant du N. 1h. s.—Mêmes remarques. 4h.—Deux couches de cumulus marchant à angle droit. 7h.—Éclaircie d'un bleu pâle au zénith, brume à l'horizon. 10h.—Étoiles plus distinctes ; le calme continue.

28. 1h. m.—Ciel découvert au N. et au zénith, étoiles brillantes ; au S., cumulo-stratus orientés de l'E. au S.W.; calme absolu ; pas de rosée. 4h —Beau clair de lune ; vent faible ; rosée ; quelques cirro-cumulus venant de l'W. 7h.—Jolis cirrus venant de la même direction ; grandes bandes vaporeuses orientées de l'E. à l'W. 10h.—Au zénith alto-cumulus venant lentement de l'W. ; reste du ciel brumeux. 1h. s.—Cirrus arrivent très-rapidement de l'W. ; les alto-cumulus marchent plus lentement. 4h.—Cirro-stratus orientés du N.E. au S.W., venant très-rapidement de l'W. ; de gros cumulo-nimbus se dirigent lentement vers le S. 7h.—Quelques cirrus immobiles ; ciel sombre, à l'horizon N. Mouvement giratoire de la girouette du N. au S. par l'W., pendant les 24h.

29. 1h. m.—A l'horizon S. sorte de banquise de brume orientée de l'E à l'W., reste du ciel étoilé, vent nul, pas de rosée. 4h.—Ciel sans nuages, beau clair de lune ; le calme continue ; rosée assez

abondante. 7h.—Même ciel. 10h.—Quelques cirrus diversement orientés et venant de l'W., ciel d'un beau bleu. 1h. s.—Avant et après midi halo très-distinct ayant 20° à 23° de rayon ; la couleur jaune était dominante. 4h.—Cirrus et éclaircie au S.W., horizon orageux au N.W., 4h. 45m. nimbus très-noir passant à l'W.; pas de pluie; arc-en-ciel incomplet sur Chang-Hai ; coup de vent violent pendant quelques minutes ; atmosphère sablonneuse à l'W. 7h.—Éclaircie à l'W., horizon sombre au N. 10h.—Quelques étoiles à peine visibles au zénith ; reste du ciel uniformément couvert.

30. 1h. m.—Ciel uniformément couvert ; calme; pas de rosée. 4h.—Mêmes remarques. 7h.—Brouillard sec formé d'un sable extrêmement fin ; tour de Long-Hoa à peine visible ; éclaircie au zénith. Même ciel tout le jour ; évaporation extraordinaire. Le brouillard nous est encore venu comme précédemment à la suite d'un coup de vent de N.W. 8.49h.—Quelques étoiles peu visibles au zénith ; lueurs de lumière zodiacale à travers le brouillard. 10h.—Ciel uniformément couvert, vent froid.

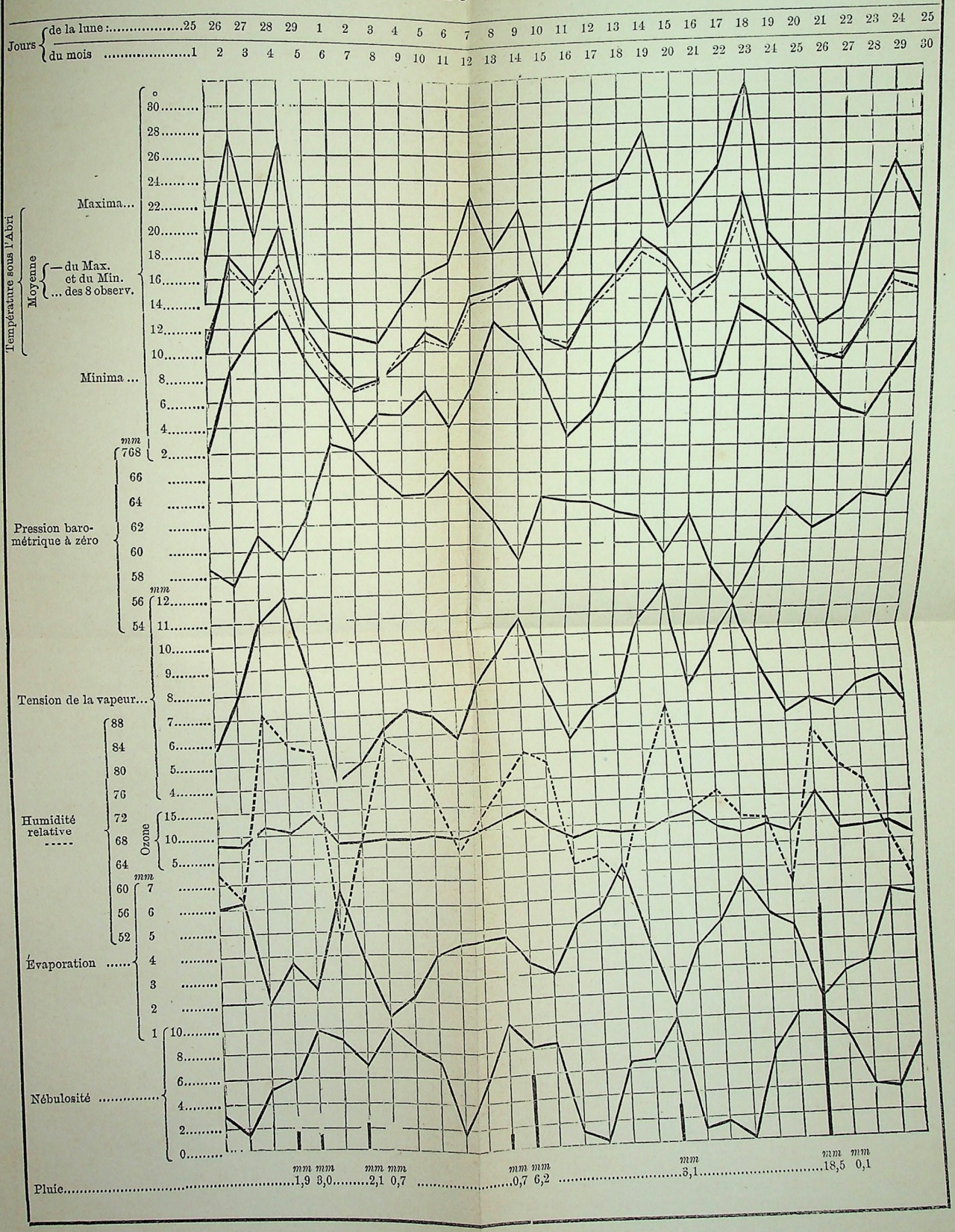
H. Le Lec., s.j.

A. M. D. G.

OBSERVATOIRE DE ZI-KA-WEI

Résumé des Observations Météorologiques d'Avril 1875.

MOYENNES DIURNES.



A. M. D. G.

OBSERVATOIRE

MÉTÉOROLOGIQUE ET MAGNÉTIQUE,

des Pères de la Compagnie de Jésus

à ZI-KA-WEI.

BULLETIN MÉTÉOROLOGIQUE,

MAI 1875.

NOTA.—Pour la position géographique de l'observatoire, les instruments utilisés, les notations employées, etc., voir la note préliminaire placée en tête du Bulletin de Septembre 1874.

TABLEAU MÉTÉOROLOGIQUE.—Mai 1875.

Pression barométrique à zéro.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
26	1	767,29	766,31	766,50	766,96	764,97	763,76	763,93	764,67	765,55
27	2	63,95	63,27	64,23	65,13	64,03	63,81	64,01	65,03	64,18
28	3	64,74	65,17	66,60	67,42	66,32	65,72	66,13	66,96	66,13
29	4	66,15	65,77	66,98	67,14	66,01	64,63	65,20	66,19	66,01
1	5	65,22	64,50	64,72	64,81	62,93	61,76	61,15	61,17	63,28
2	6	59,85	59,05	57,97	56,85	54,95	53,77	54,50	56,04	56,62
3	7	56,34	66,47	58,45	59,90	59,38	59,10	59,97	61,71	58,92
4	8	* 61,31	61,21	62,10	63,03	62,07	60,95	61,27	61,50	61,68
5	9	60,54	60,58	62,36	62,69	61,76	61,16	61,49	62,49	61,63
6	10	62,05	61,75	62,75	62,75	61,85	61,12	61,26	61,73	61,91
7	11	60,59	59,98	60,53	60,06	58,83	57,49	58,03	58,24	59,22
8	12	57,05	56,25	56,62	56,07	54,66	53,33	53,94	54,82	55,34
9	13	53,75	52,75	54,23	55,54	55,87	55,84	57,51	58,78	55,53
10	14	58,85	59,43	60,30	60,37	59,58	58,73	59,07	59,24	59,45
11	15	58,81	58,14	58,74	58,74	57,69	57,60	57,94	58,38	58,26
12	16	57,77	57,43	57,82	58,14	57,31	56,80	57,21	58,44	57,62
13	17	58,02	57,82	58,92	59,61	58,67	58,37	58,61	60,00	58,75
14	18	59,03	59,50	60,12	59,88	59,40	58,55	58,72	59,67	59,36
15	19	58,57	58,17	57,98	58,51	57,08	56,64	57,43	58,64	57,88
16	20	58,16	57,27	58,05	58,45	57,76	56,83	57,39	58,57	57,81
17	21	58,36	58,25	59,19	59,55	58,81	57,43	57,74	59,62	58,62
18	22	57,76	57,49	57,85	57,24	56,40	55,18	55,49	56,01	56,68
19	23	* 54,41	55,26	57,22	56,72	57,44	58,02	59,31	60,67	57,38
20	24	60,39	60,16	60,61	61,32	59,81	58,40	58,45	58,92	59,76
21	25	58,09	57,92	58,58	58,61	57,10	56,25	56,77	57,03	57,46
22	26	56,82	56,44	57,74	57,87	56,79	56,62	57,23	58,02	57,19
23	27	57,54	57,03	57,53	57,28	56,25	54,75	54,64	55,37	56,30
24	28	54,04	53,05	53,35	52,94	52,22	51,72	52,07	54,26	52,95
25	29	55,61	56,44	58,31	59,07	58,75	58,85	59,56	60,40	58,37
26	30	* 59,90	59,40	60,01	60,24	60,25	60,02	59,39	60,01	59,90
27	31	59,35	58,70	59,41	59,41	58,82	58,23	58,93	59,74	59,07
Moyennes du	1–10	762,74	762,41	763,27	763,67	762,43	761,58	761,89	762,75	762,59
	11–20	58,06	57,67	58,33	58,54	57,69	57,02	57,59	58,48	57,92
	21–31	57,48	57,28	58,16	58,20	57,51	56,86	57,23	58,19	57,61
	mois	759,33	759,06	759,86	760,07	759,15	758,43	758,85	759,75	759,32

Maximum : 767,42 observé le 3 à 10 h. A.M.
Minimum : 751,72 „ le 28 à 4 h. P.M.
} différence :.....15,70 mm

TABLEAU MÉTÉOROLOGIQUE.—Mai 1875.

Température sous l'abri.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
26	1	10,1	8,7	12,6	16,0	19,0	18,7	14,0	12,7	13,98
27	2	11,7	13,0	14,5	19,2	22,0	19,3	15,5	14,2	16,18
28	3	13,4	12,9	15,0	18,0	19,6	17,1	14,4	12,0	15,30
29	4	11,0	11,3	14,7	19,7	21,9	20,5	16,3	14,1	16,19
1	5	13,7	13,7	16,7	20,0	23,0	21,2	18,0	17,0	17,91
2	6	17,3	17,2	16,3	17,4	19,2	20,1	19,7	16,0	17,90
3	7	15,3	13,7	13,9	17,6	21,0	21,9	15,0	11,2	16,20
4	8	* 10,0	8,8	14,3	21,5	23,0	21,5	16,2	15,0	16,29
5	9	15,3	15,1	16,6	19,3	21,6	20,0	16,7	15,4	17,50
6	10	14,6	15,0	17,1	19,9	19,5	18,0	16,7	15,2	17,00
7	11	15,4	15,9	16,0	17,3	18,2	18,5	17,4	17,7	17,05
8	12	17,7	17,3	18,0	23,7	25,2	26,4	22,7	20,7	21,46
9	13	20,5	20,4	17,4	18,0	18,7	19,0	16,7	14,3	18,13
10	14	15,0	14,3	15,7	20,3	23,0	23,1	19,0	16,0	18,30
11	15	13,4	14,2	16,8	21,9	24,3	22,3	19,1	15,6	18,45
12	16	16,0	16,5	18,3	23,1	25,2	23,7	20,0	18,7	20,19
13	17	18,0	17,7	20,0	25,1	28,4	25,9	20,9	17,5	21,69
14	18	16,7	16,6	19,8	22,8	27,1	26,3	21,5	20,3	21,39
15	19	19,1	19,0	21,5	27,0	28,0	25,9	21,9	19,0	22,68
16	20	17,6	15,8	17,9	27,8	29,6	27,8	22,3	19,0	22,23
17	21	17,1	16,8	20,0	27,4	29,6	28,0	21,7	19,0	22,45
18	22	18,1	17,7	20,6	26,9	29,0	27,4	23,0	21,0	22,96
19	23	* 20,2	20,0	21,9	25,9	28,5	27,0	21,5	16,0	22,63
20	24	14,0	13,1	18,3	26,0	29,0	28,0	22,0	20,8	21,40
21	25	20,6	19,9	22,8	28,0	30,4	29,2	24,3	22,0	24,65
22	26	21,2	21,0	24,0	29,9	30,5	28,9	24,7	23,1	25,41
23	27	22,8	22,2	25,5	28,8	30,3	30,4	26,1	24,0	26,26
24	28	23,3	22,8	25,4	29,9	28,7	26,0	23,9	24,6	25,58
25	29	19,0	18,0	20,1	22,7	23,1	21,1	19,0	17,9	20,11
26	30	* 17,4	17,0	17,3	19,0	20,7	20,0	18,2	17,4	18,38
27	31	16,7	16,4	17,1	19,0	18,1	18,0	17,7	17,5	17,56
Moyennes du	1–10	13,24	12,94	15,17	18,86	20,98	19,83	16,25	14,28	16,44
	11–20	16,94	16,77	18,14	22,70	24,77	23,89	20,15	17,88	20,15
	21–31	19,10	18,60	21,20	25,80	27,10	25,80	22,00	20,30	22,49
	mois	16,52	16,19	18,26	22,55	24,37	23,26	19,55	17,58	19,79

Maximum : 30,5 observé le 26 à 1 h. P.M.
Minimum : 8,7 „ le 1 à 4 h. A.M.
} différence 21,8

TABLEAU MÉTÉOROLOGIQUE.—Mai 1875.

ACTINOMÈTRE : 1° *thermomètre à boule nue.*

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
26	1	9,6	7,4	15,4	22,6	29,3	24,4	13,3	12,3	16,79
27	2	11,1	12,3	16,8	27,4	31,6	22,0	15,2	13,6	18,75
28	3	13,0	12,0	16,0	23,3	30,3	21,3	14,0	11,3	17,65
29	4	10,4	10,7	18,1	30,3	32,3	27,7	16,0	13,5	19,87
1	5	13,3	13,3	20,3	26,0	34,0	24,3	18,1	16,7	20,75
2	6	17,2	16,6	16,5	19,6	20,3	26,7	19,3	15,3	18,94
3	7	15,3	13,4	21,1	28,3	32,0	30,4	13,4	9,9	20,47
4	8	* 7,2	5,5	19,8	30,0	31,8	24,4	15,8	14,7	18,65
5	9	15,2	15,0	17,8	25,7	27,3	22,3	15,3	15,2	19,22
6	10	15,2	15,2	20,2	29,7	26,1	19,9	16,4	14,9	19,70
7	11	15,3	15,4	16,3	20,5	21,7	20,3	17,3	17,5	18,04
8	12	17,4	17,3	19,3	33,1	32,2	31,3	22,6	20,5	24,21
9	13	20,3	20,3	18,6	20,6	24,0	22,2	16,4	14,3	19,59
10	14	15,1	14,1	18,1	31,3	33,3	31,7	18,1	15,3	22,12
11	15	13,1	14,3	18,3	25,6	3,45	25,0	18,8	14,4	20,50
12	16	15,4	16,2	19,6	32,5	36,3	27,3	19,7	18,3	23,16
13	17	17,7	17,3	21,5	33,3	37,5	30,5	20,3	16,7	24,35
14	18	16,3	16,3	24,0	37,4	37,3	34,3	21,3	20,1	25,87
15	19	18,8	18,3	23,7	35,3	30,6	30,1	20,6	18,4	24,47
16	20	17,3	15,3	20,8	37,5	40,3	33,7	21,8	18,3	25,62
17	21	16,4	15,9	27,0	37,3	39,0	36,3	20,8	18,0	26,34
18	22	17,4	17,0	24,3	36,8	37,7	33,3	22,3	20,5	26,16
19	23	* 19,6	19,5	27,0	36,3	38,8	35,6	20,3	14,1	26,40
20	24	12,3	12,5	25,5	36,4	39,3	36,3	21,6	20,3	25,52
21	25	19,8	18,7	29,8	38,7	41,0	37,4	24,0	21,3	28,84
22	26	20,4	20,3	29,8	40,2	38,3	34,3	24,2	22,5	28,75
23	27	22,3	21,4	31,1	39,8	39,5	35,2	26,0	23,3	29,82
24	28	22,5	22,1	27,5	36,0	30,3	26,3	23,3	19,4	25,92
25	29	18,6	17,3	27,5	33,6	33,5	25,5	18,3	17,3	23,95
26	30	* 16,8	16,4	17,5	23,2	28,9	25,3	18,2	17,3	20,45
27	31	16,3	16,2	17,7	22,3	19,2	18,3	17,3	17,3	18,07
Moyennes du	1–10	12,8	12,1	18,2	26,3	29,5	24,3	15,7	13,7	19,08
	11–20	16,7	16,5	20,0	30,7	32,8	28,6	19,7	17,4	22,79
	21–31	18,4	17,9	25,9	34,6	35,0	31,2	21,5	19,2	25,47
	mois	16,02	15,59	21,51	30,66	32,52	28,18	19,03	16,85	22,55

Moyennes du mois { Therm. à boule noirçie : o 27,25 ; Therm. à boule nue : 22,55 } différence ..... o 4,70

TABLEAU MÉTÉOROLOGIQUE.—Mai 1875.

ACTINOMÈTRE : 2° *thermomètre à boule noirçie.*

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
26	1	9,5	7,3	21,2	32,7	44,5	34,9	13,2	12,2	21,94
27	2	11,1	12,2	21,6	39,2	45,2	26,4	15,1	13,6	23,05
28	3	12,9	11,9	18,6	32,0	46,1	28,3	14,0	11,2	21,87
29	4	10,3	10,6	24,2	45,2	48,2	39,2	16,0	13,4	25,89
1	5	13,2	13,2	27,4	35,2	49,9	29,2	18,1	16,7	25,36
2	6	17,2	16,5	17,2	23,5	22,3	37,0	19,2	15,4	21,04
3	7	15,2	13,3	32,8	43,1	48,1	45,1	13,5	9,4	27,56
4	8	* 7,4	5,4	30,9	42,4	45,2	29,5	15,9	14,7	23,92
5	9	15,3	15,0	20,8	36,1	36,1	28,1	15,2	15,2	22,72
6	10	15,1	15,1	25,6	42,9	35,2	22,9	16,4	14,9	23,51
7	11	15,2	15,4	17,2	26,4	28,0	23,6	17,3	17,5	20,07
8	12	17,4	17,2	21,2	45,2	42,1	39,2	22,6	20,4	28,16
9	13	20,3	20,2	20,4	24,3	31,3	27,2	16,4	14,3	21,80
10	14	15,1	14,1	22,3	45,8	49,1	46,2	18,1	15,2	28,24
11	15	13,1	14,2	21,7	32,2	49,2	29,5	18,9	14,4	24,15
12	16	15,4	16,2	22,9	46,2	52,6	32,8	19,7	17,2	27,87
13	17	17,7	17,3	25,2	47,0	52,4	38,7	20,3	16,7	29,41
14	18	16,3	16,2	31,2	51,2	52,2	48,2	21,3	20,1	32,09
15	19	18,8	18,2	28,1	47,5	35,2	38,3	20,8	18,4	28,16
16	20	17,2	15,2	26,2	52,1	55,7	44,7	21,9	18,2	31,40
17	21	16,4	15,9	38,4	52,1	54,1	51,0	20,9	18,0	33,35
18	22	17,4	17,0	30,9	51,1	50,2	42,4	22,3	20,5	31,47
19	23	* 19,6	19,5	35,9	50,2	54,0	49,5	20,4	14,1	32,90
20	24	12,2	12,5	37,9	51,0	54,7	50,2	21,8	20,2	32,56
21	25	19,7	18,7	41,4	52,8	56,2	51,2	24,1	21,3	35,67
22	26	20,4	20,2	39,1	53,9	47,9	42,2	24,2	22,5	33,80
23	27	22,2	21,4	39,7	54,7	53,0	42,2	26,0	23,2	35,30
24	28	22,5	22,1	31,2	43,9	35,9	29,2	23,3	19,4	28,44
25	29	18,6	17,3	38,9	47,8	49,2	32,2	18,3	17,2	29,94
26	30	* 16,8	16,4	18,2	29,2	40,7	33,1	18,2	17,3	23,74
27	31	16,3	16,2	19,4	28,1	21,3	19,2	17,3	17,3	19,39
Moyennes du	1–10	12,7	12,1	24,0	37,2	42,1	32,1	15,7	13,7	23,69
	11–20	16,7	16,4	23,6	41,8	44,8	36,8	19,7	17,2	27,14
	21–31	18,3	17,9	33,7	46,8	47,0	40,2	21,5	19,1	30,60
	mois	15,99	15,54	27,34	42,10	44,70	36,49	19,05	16,78	27,25

Maximum observé le 25 { Therm. à boule noirçie : o 56,2 ; Therm. à boule nue : 41,0 } différence ..... o 15,2

TABLEAU MÉTÉOROLOGIQUE.—Mai 1875.

Tension de la vapeur.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
26	1	7,35	7,24	7,59	6,02	5,34	5,13	7,83	8,76	6,91
27	2	9,37	9,85	10,53	10,14	7,75	9,53	10,21	10,70	9,76
28	3	10,92	9,91	9,42	8,13	8,92	9,06	9,39	9,71	9,43
29	4	9,52	9,61	10,55	9,00	9,77	9,63	10,51	11,54	10,02
1	5	11,39	11,52	12,51	12,89	13,59	13,72	12,77	12,75	12,64
2	6	13,04	13,26	13,50	14,18	15,11	11,19	10,96	9,47	12,59
3	7	8,85	7,53	7,05	6,06	3,74	4,46	7,37	9,04	6,76
4	8	*8,56	8,09	9,98	7,05	7,56	8,05	7,69	9,55	8,32
5	9	10,75	11,38	12,15	12,58	10,72	12,15	11,53	11,06	11,54
6	10	11,37	11,30	11,29	9,86	10,80	10,74	11,11	11,60	11,01
7	11	12,46	12,86	13,08	14,24	15,05	14,86	14,18	14,29	13,88
8	12	14,60	14,69	15,17	17,38	16,09	17,68	17,99	17,82	16,43
9	13	17,94	17,83	14,63	14,26	13,10	12,46	11,95	12,01	14,27
10	14	11,44	10,77	11,30	12,27	12,94	10,85	13,80	13,22	12,07
11	15	11,44	12,07	13,20	9,94	8,47	10,75	13,14	12,33	11,42
12	16	12,94	12,49	12,43	8,75	6,36	8,53	10,22	14,93	10,83
13	17	13,96	14,45	12,89	11,17	8,06	11,65	13,74	14,27	12,52
14	18	13,71	13,17	15,06	13,87	12,83	13,32	15,50	15,89	14,17
15	19	14,68	14,75	13,70	13,09	11,34	16,03	16,40	16,35	14,54
16	20	14,96	13,34	15,23	13,29	10,36	13,11	13,85	15,23	13,67
17	21	14,51	13,65	15,58	12,65	11,05	11,17	15,17	16,19	13,75
18	22	12,56	13,86	15,54	16,14	15,89	16,33	17,09	16,78	15,52
19	23	*16,55	16,38	16,22	12,28	8,62	6,38	9,45	10,97	12,11
20	24	11,75	11,23	13,78	10,78	6,66	5,35	9,88	9,78	9,90
21	25	8,46	9,59	8,51	7,67	9,36	14,72	16,29	16,68	11,41
22	26	16,82	16,78	17,19	14,97	14,97	15,77	18,18	18,65	16,67
23	27	17,39	17,41	17,36	15,47	16,18	16,32	17,68	18,61	17,05
24	28	18,86	19,02	19,41	18,54	19,88	21,15	21,10	22,22	20,02
25	29	14,56	13,96	12,98	11,84	8,05	7,16	8,87	10,66	11,01
26	30	*11,56	12,47	8,81	11,25	11,27	11,85	12,19	12,68	11,51
27	31	11,66	13,44	13,92	13,80	14,50	14,87	14,45	14,27	13,86
Moyennes du	1–10	10,11	9,97	10,46	9,59	9,33	9,37	9,94	10,42	9,90
	11–20	13,81	13,64	13,67	12,83	11,46	12,92	14,08	14,63	13,38
	21–30	14,06	14,34	14,48	13,22	12,40	12,80	14,58	15,23	13,89
	mois	12,71	12,70	12,91	11,92	11,11	11,74	12,92	13,48	12,44

Maximum : 22,22 observé le 28 à 10 h. P.M.
Minimum : 3,74 „ le 7 à 1 h. P.M.
} différence..... mm 18,48

TABLEAU MÉTÉOROLOGIQUE.—Mai 1875.

Humidité relative.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
26	1	79	86	70	44	32	32	66	80	61,1
27	2	91	88	85	61	39	57	77	89	73,4
28	3	95	89	75	53	52	63	77	93	74,6
29	4	97	96	84	52	50	54	76	96	75,6
1	5	98	99	89	74	65	73	83	89	83,8
2	6	89	91	98	96	91	64	64	70	82,9
3	7	68	64	59	40	20	22	58	92	52,9
4	8	* 94	96	82	37	36	41	56	75	64,6
5	9	83	89	86	76	55	70	81	85	78,1
6	10	92	89	78	57	64	70	79	90	77,4
7	11	96	96	97	97	97	94	96	95	96,0
8	12	97	100	99	80	68	69	88	98	87,3
9	13	100	100	99	93	82	76	83	99	91,5
10	14	90	89	85	69	62	52	84	98	78,6
11	15	100	100	93	50	37	54	80	93	75,9
12	16	96	89	79	42	26	39	58	93	65,3
13	17	91	96	74	47	27	47	75	96	69,1
14	18	97	94	88	67	48	53	81	90	77,3
15	19	89	90	72	49	40	64	84	100	73,5
16	20	100	100	100	47	33	47	69	93	73,6
17	21	100	96	90	46	36	39	78	99	73,0
18	22	81	92	86	61	54	60	82	91	75,9
19	23	* 94	94	88	49	29	24	49	81	62,9
20	24	99	100	88	43	25	18	50	57	60,0
21	25	46	55	41	27	29	49	72	85	50,5
22	26	90	91	78	48	46	54	79	89	71,9
23	27	84	88	71	53	51	51	70	84	69,0
24	28	89	92	80	59	68	85	96	97	83,3
25	29	89	91	74	58	38	39	54	70	64,1
26	30	* 78	87	60	69	61	67	78	86	73,3
27	31	82	97	96	84	94	97	96	96	92,8
Moyennes du	1–10	88,6	88,7	80,6	59,0	50,4	54,6	71,7	85,9	72,43
	11–20	95,6	95,4	88,6	64,1	52,0	59,5	79,8	95,5	78,80
	21–31	84,7	89,3	77,0	54,3	48,2	53,0	73,0	80,0	70,59
	mois	89,5	91,1	81,9	59,0	50,2	55,6	74,8	88,7	73,83

Maximum : 100 observé 11 fois
Minimum : 18 „ le 24 à 4h. P.M. } différence 82

TABLEAU MÉTÉOROLOGIQUE.—Mai 1875.

Ozone.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
26	1	7,5	7	5	8,5	10	5,0	8,5	10	7,7
27	2	20	13	19	8	10	8	10,5	9	12,2
28	3	11	9	10,5	9,5	8,5	1	9	20	9,8
29	4	20	19	11	14	10	4,5	4	18	12,6
1	5	20	9	12	12	10	9	9	11	11,5
2	6	8	20	12	19	20	12,5	10	10	13,9
3	7	8,5	9	8	13,5	7	3	7	8,5	8,1
4	8	?	10	10	10	7	6	8	8	8,4
5	9	19	19	11,5	14	7,5	7,5	11,5	13	12,9
6	10	8	20	5	12	5	13	8	17	11,0
7	11	20	18	20	20	20	19	20	19	19,5
8	12	20	19	12	19	9	8,5	5	8,5	12,6
9	13	8	6,5	11	10	20	12	12	20	12,4
10	14	19	9	9	14	5	6	9	8	9,9
11	15	4	5	6,5	8,5	8,5	7	8	7	6,8
12	16	6	8	6	8,5	5	1	7	4	5,7
13	17	6	5,5	3	5	8	3	8,5	9	6,0
14	18	6,5	9	8	10	7	5,5	9	10	8,1
15	19	11	8,5	8	8,5	8,5	9	6	7	8,3
16	20	8	6	0,0	8,5	4	3,5	7	9	5,8
17	21	9	13	10,5	9	5,5	5	8	9	8,6
18	22	10	9,5	12	8	7,5	6	8	9	8,7
19	23	* 9	6	9,5	9	7	4	5	9	7,3
20	24	9	9	8	9	3,5	2,5	4,0	8	6,6
21	25	8	8	8	6	3	2	5	7	5,9
22	26	10	14	10	7	5	4	4,5	7	7,7
23	27	7	7	6	6	5	6	5	6	6,0
24	28	7	8,5	7	4,5	3	6	6,5	12	6,8
25	29	20	11	12	8	9	5	8	8	10,1
26	30	?	9	10	9	8	8	8	10	8,9
27	31	20	20	16	19	9	20	19	20	17,9
Moyennes du	1–10	13,5	13,5	10,4	12,1	9,5	7,0	8,6	12,5	10,8
	11–20	10,9	19,5	18,4	11,2	9,5	7,5	9,2	10,2	9,5
	21–31	10,9	10,4	9,9	18,6	5,9	6,2	7,3	19,5	8,6
	mois	11,8	11,1	9,6	10,5	8,9	6,9	8,3	10,7	9,6

Maximum : 20 observé 20 fois
Minimum : 0,0 „ le 16

} Différence..... 20,0

TABLEAU MÉTÉOROLOGIQUE.—Mai 1875.

Direction du vent; sa vitesse par seconde.

Date.	Matin.								Soir.								Moyennes des 8 observations.
	1 h.		4 h.		7 h.		10 h.		1 h.		4 h.		7 h.		10 h.		
	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	
		m		m		m		m		m		m		m		m	m
1	ENE	1,5	SE	1,0	S	1,2	SSE	4,5	S	6,9	SSE	6,0	SE	4,4	SSE	3,3	3 6
2	SSE	3,1	S	3,2	S	3,4	S	3,2	SSW	3,6	SSE	3,5	SE	3,0	ESE	2,4	3,2
3	E	0,8	ESE	1,8	SSE	1,7	SSE	3,9	S	6,1	SSE	7,1	SE	5,7	ESE	2,8	3,7
4	SSE	3,1	ESE	2,6	SE	1,5	SE	4,0	SE	6,0	ESE	7,1	E	5,9	ESE	4,0	4,3
5	ESE	3,2	ESE	2,6	E	3,1	ESE	6,6	SE	8,2	SE	8,5	SE	7,9	SE	8,1	6,0
6	SSE	6,1	S	6,7	SE	5,7	S	5,3	WSW	5,0	WNW	6,9	W	6,7	WNW	10,1	6,6
7	WNW	11,1	WNW	12,2	WNW	12,1	NW	14,3	NNW	15,0	NNW	11,4	NNW	6,8	O	0,7	10,5
8	O	0,0	O	0,3	ESE	0,6	S	1,4	S	3,7	SE	4,3	ESE	3,5	ESE	3,2	2,1
9	SE	3,6	ESE	2,8	ESE	2,0	SSW	2,1	SE	3,2	ESE	3,4	ENE	4,1	E	3,2	3,0
10	ESE	2,9	ESE	3,2	ESE	4,6	SE	7,3	SE	9,0	SE	9,8	SE	7,7	SSE	8,2	6,6
11	SE	6,6	ESE	6,9	ESE	8,4	ESE	9,1	ESE	10,7	SE	8,7	SE	7,2	SE	3,5	7,6
12	SE	5,7	ESE	4,4	SE	3,0	S	2,5	SE	2,7	SSE	1,1	SSW	1,3	SSW	1,8	2,8
13	S	1,4	E	1,4	NNE	3,8	NNW	6,1	NNW	6,6	NNW	7,7	NNW	5,3	N	,9	4,7
14	N	3,5	N	2,9	N	2,1	E	4,0	E	4,4	E	4,0	E	2,0	E	1,2	3,0
15	O	0,2	O	0,1	O	0,5	O	0,8	O	1.7	ENE	2,5	ENE	2.6	O	1,2	1.2
16	O	0,1	ENE	0,5	ENE	0,2	NE	3,1	ENE	2,6	ENE	2,9	ENE	2,0	ENE	0,2	1.5
17	O	0,0	O	0,0	O	0,3	WNW	0,1	WSW	0,7	E	3,5	E	3,4	E	1,9	1,2
18	E	1,4	E	1,5	E	0,8	NW	0,6	E	2,6	E	4,1	E	4,1	ESE	2,4	2,2
19	ESE	1,3	S	0,4	SSW	0,7	W	1,6	WNW	2,8	NE	2,3	NE	1,4	ENE	1,6	1,5
20	ENE	1,1	ENE	0,6	ENE	0,4	ESE	1,1	ENE	1,8	SE	4,4	SE	4,4	SE	3,2	2,1
21	SE	1,0	SE	3,5	SE	2,0	SE	3,6	ESE	3 3	SE	4,6	SE	4,2	SE	3,7	3,2
22	SE	3,7	SE	3,9	SSE	4,2	SSE	6,6	SE	5,2	SE	5,0	SE	5,9	SE	2,9	4,7
23	SE	2,3	NNE	0,8	N	2,5	NE	6,7	N	5,5	NNE	6,9	NNE	5,0	NNE	2,2	4,0
24	NNE	0,9	ESE	1,5	SSE	0.5	SSE	2,2	SSE	5,1	SSE	7,8	SE	8,4	SE	7,7	4,3
25	SSE	7,1	SSE	6,7	SSE	6,5	S	6,8	S	8,5	SSE	8,1	SSE	8,0	SSE	5,3	7,1
26	SSE	4,6	SSE	2,4	SSE	3,6	SSW	4,3	SSW	6,3	S	8,7	SSE	8,1	SSE	3,8	5,2
27	SSE	5,5	S	4,5	S	4,3	SSW	7,8	SW	9,4	SSW	7,0	SSE	4,9	SSE	5,2	6,1
28	S	3,2	S	3,3	SSW	2,9	SSW	5,7	W	8,1	W	5,9	W	1,4	NNW	5,8	4,5
29	NNW	5,9	NNW	5.5	NNW	5,3	NNE	5,4	NNE	5,9	NE	8,0	NNE	4,6	NNE	0,8	5,2
30	NNE	0,2	NNE	0,3	NE	3,1	SE	3,4	SSE	3,4	SE	3,4	SE	2.9	SE	2,8	2,4
31	SSE	1,8	ENE	2,5	ENE	2,8	E	5,2	E	5,6	ENE	4,9	ENE	3,6	ENE	4,3	3,8
Moy. du mois		m 3,0		m 2,9		m 3,0		m 4,5		m 5,5		m 5,8		m 4,7		m 3,6	m 4,1

Fréquence relative des 16 vents sur 100

N 2	W..... 2	S 8	E.....11
NNW 5	WSW 1	SSE.....14	ENE 8
NW 1	SW 1	SE 21	NE 2
WNW 2	SSW 4	ESE 12	NNE 6

Calmes, sur 100 observations 4

m

Vitesse moyenne maximum observée le 7 15,0

TABLEAU MÉTÉOROLOGIQUE.—Mai 1875.

ÉTAT DU CIEL.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. m.			4h. m.			7h. m.			10h. m.		
	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.
1	8 Bd	..	..	0	..	..	10 Bd	..	..	10 Bd	..	..
2	5 Br	..	..	10 Br	..	..	10 Bd	..	..	10 Bd	..	..
3	10 Br	..	..	7 Br	..	..	10	..	c S	10	..	ost
4	0	..	..	0	..	..	8	ac ssw	..	7	ac S	..
5	0	..	..	0	..	..	5	k W	..	10	k S	c SE
6	10 Br	..	cn	10	..	n	10	..	n	10 Br	..	cn S
7	7	..	cn	10 Br	..	cn	0	..	..	0	..	..
8	0	..	..	1 Br	..	..	4 Br	kc	..	9	ckstW	..
9	10 Br	..	..	10 Br	..	c	10 Br	..	cn	10 Br	..	c S
10	1	..	c	5	..	c S	9	kc	cst	7	ac S	c S
11	10	..	n	10	..	n	10	..	n SE	10 Br	..	cn SE
12	10 Br	..	..	10 Bd	..	..	10 Bd	..	..	7	..	c S
13	10 Br	..	n	10 Bd	..	n	10	..	n	10 Br	..	c N
14	10 Br	..	c	6	ac N	..	5	k W	..	5	kst	kc E
15	2 Bd	ac SW	..	9 Bd	..	c	10 Bd	..	c	10	..	c
16	10	..	cn	10	..	cn	9	c	cn	9	..	c
17	10	c W	cn	10	c	cn	10	c	..	9	k	ac W
18	8	ac W	..	9	ac	..	6	c	..	1 Br	c N	..
19	10 Br	..	cn	10 Br	..	cn	10	ac W	..	7	kst W	ac W
20	1 Bd	ac W	..	0 Bd	..	..	0 Bd	..	..	1	kst	c E
21	0	..	cst	0	k	..	2	kst	..	0	..	cst
22	10	ac	..	1	k	c	7 Br	..	cst	5	k W	..
23	10	c	cn	8	ac NW	cn	3	ac	..	1	cst	..
24	0	..	..	0	..	..	0	..	..	0	..	..
25	0	..	..	1	..	cst	1	..	cst	2	..	cst
26	2 Br	..	cst	2	..	cst	4	..	cst	4	..	cst
27	8	..	c	6	k	c S	6	c S	..	8	..	c S
28	7 Br	..	cst	5	k	cst	9	..	cst	10 Br	..	c SW
29	10 Br	..	cn N	1	k	cst	3	..	cst	5	k	c
30	10	..	..	10 Br	..	cn	10	c	cn	10 Br	..	..
31	10 Br	..	cn	10	..	n	10	..	n	10 Br	..	cn SE
Moy. du mois	6,4	..	..	5,8	..	..	6,8	..	..	6,7	..	..

NOMBRE DE JOURS DE :

Ciel beau, ou moins de $2\frac{1}{10}$ couvert ..	4	Brouillard	5
,, peu nuageux ou de 2 à $4\frac{1}{10}$,, ..	3	Brume	17
,, nuageux, ou de 4 à $6\frac{1}{10}$,, ..	2	Rosée	8
,, très-nuageux, ou de 6 à $8\frac{1}{10}$,, ..	11	Pluie	8
,, couvert ou plus de $8\frac{1}{10}$,, ..	11	Orage avec tonnere	2
.....		Eclairs sans ,, ...	3

TABLEAU MÉTÉOROLOGIQUE.—Mai 1875.

État du ciel.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. s.			4h. s.			7h. s.			10h. s.			Moyennes des 8 observations.
	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	
1	4 Bd	..	..	10 Bd	..	..	9 Bd	..	cst	0	..	..	6,4
2	10 Bd	..	..	10 Bd	..	..	10 Bd	..	..	10 Bd	..	..	9,4
3	10	ac SE	..	9	ac SE	..	4	ac S	cst	0	..	..	7,5
4	1	ac S	..	1	kst W	..	1	..	cst	0	..	..	3,5
5	5	k SW	c SE	10	k SW	c SE	10 Br	..	cn S	10 Br	..	cn	8,3
6	10 Br	..	cn W	9	ac SW	n	9	ac SW	n	2	..	cst	8,7
7	0	..	..	1	kst	..	1 Br	..	..	0	..	..	2,4
8	10 Br	..	..	10 Br	..	..	10 Br	..	..	10 Br	..	..	6,8
9	10 Br	..	c S	10 Br	kc NW	n	10 Br	..	cn	5	ac	cst	9,4
10	9	k	kst	10 Br	..	..	10	..	cst	10 Br	..	cn	7,6
11	10 Br	..	cn SE	10 Br	..	cn SE	10 Br	..	..	10 Br	..	..	10,0
12	9	c SW	..	9	knc W	cn N	10 Br	cn W	n	10 Br	..	n	9,4
13	10	..	c N	10	k W	c NNW	10 Br	..	c NNW	10 Br	..	c NNW	10,0
14	5	k	ac E	2	kc	c	5	ac	..	1	k	ac	4,9
15	10	..	c	10	..	cst	10	..	cst	7	kc	c	8,5
16	7	k W	..	10	ac W	..	10	ac W	..	10 Br	..	c W	9,4
17	3	ac	..	9	ac W	..	1	..	cst	0	..	..	6,5
18	1	k	c	3	ac	c SE	10 Br	ac W	..	10 Br	..	c	6,0
19	8	k	cn N	9 Br	k W	cn	1	kst	..	2	k	cst	7,1
20	3	kst W	c NE	7	k W	..	0	..	..	0	..	..	1,5
21	1	k W	..	1	k W	..	1	..	cst	1	kst	..	0,7
22	9	k W	c	10	k W	c	9 Br	..	..	10 Br	ac W	..	7,6
23	1	ac	..	0	..	cst	0	..	..	0	..	..	3,0
24	0	..	..	0	..	..	0	..	..	0	..	..	0,0
25	1	..	cst	1	..	cst	2	cst	cn	1	..	cst	1,1
26	5	c	..	10	c	cst	10	..	n	10	..	n	5,9
27	8	..	c S	9	c S	cn SW	7 Br	c W	cn	2	..	cst	6,8
28	10 Br	..	cn W	10 Br	..	n W	10 Br	..	n W	10 Br	..	n	8,9
29	4	k	cst	10	k	c W	10 Br	..	cst W	10 Br	..	cn	6,6
30	10 Br	..	c S	10	ac W	c E	10	ac W	cn E	10 Br	..	cn	10,0
31	10	..	n S	10	..	n	10	..	n	10	..	n	10,0
Moy. du mois	6,2	..	..	7,4	..	..	6,8	..	..	5,5	..	..	6,5

Phénomènes divers observés :

Lumière zodiacale 7 fois 7
Halos solaires, dont l'un avec parhélie le 28 4
Couronnes { solaires 2
Couronnes { lunaires 3
Arc-en-ciel double, le 6 1

TABLEAU MÉTÉOROLOGIQUE.—Mai 1875.

Évaporation sous l'abri.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Total des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
26	1	0,22	0,10	0,20	0,85	1,35	1,70	0,90	0,20	5,52
27	2	0,12	0,08	0,15	0,45	0,98	1,12	0,45	0,15	3,50
28	3	0,08	0,02	0,20	0,70	1,15	0,97	0,66	0,12	3,90
29	4	0,10	0,03	0,07	0,60	1,22	1,26	0,74	0,10	4,12
1	5	0,03	0,00	0,05	0,40	0,80	0,90	0,50	0,30	2,98
2	6	0,20	0,30	0,08	0,05	0,15	0,52	0,55	0,85	2,70
3	7	0,60	0,75	0,75	1,36	2,22	2,72	1,70	0,20	10,30
4	8	0,05	0,05	0,02	0,83	1,40	1,27	0,68	0,40	4,70
5	9	0,30	0,30	0,00	0,15	0,90	0,70	0,35	0,15	2,85
6	10	0,15	0,15	0,20	0,70	1,15	0,98	0,52	0,35	4,20
7	11	0,12	0,03	0,00	0,08	0,12	0,10	0,08	0,05	0,58
8	12	0,07	0,00	0,00	0,28	0,62	0,60	0,35	0,10	2,02
9	13	0,00	0,05	0,00	0,01	0,69	0,15	0,40	0,10	1,40
10	14	0,13	0,17	0,15	0,55	0,70	0,88	0,54	0,20	3,32
11	15	0,10	0,00	0,00	0,40	0,83	0,97	0,55	0,19	3,04
12	16	0,02	0,07	0,09	0,78	2,30	0,48	0,72	0,20	4,66
13	17	0,10	0,05	0,08	0,53	1,18	1,36	1,72	0,13	4,15
14	18	0,05	0,02	0,08	0,96	0,82	1,10	0,62	0,18	3,83
15	19	0,12	0,10	0,20	0,70	1,70	0,30	0,50	0,04	3,66
16	20	0,00	0,00	0,00	0,20	1,30	1,45	0,95	0,17	4,07
17	21	0,01	0,03	0,04	0,70	1,48	1,42	1,10	0,20	4,98
18	22	0,20	0,20	0,15	0,75	1,20	1,10	0,65	0,33	4,58
19	23	0,02	0,04	0,08	1,18	2,10	2,82	1,96	0,57	8,77
20	24	0,20	0,00	0,05	0,65	2,30	2,78	2,22	1,10	9,30
21	25	1,30	1,10	1,15	2,44	2,91	2,50	1,32	0,62	13,34
22	26	0,13	0,25	0,20	1,60	2,00	2,20	0,95	0,35	7,68
23	27	0,30	0,25	0,39	1,47	2,30	1,92	1,18	0,47	8,28
24	28	0,23	0,20	0,20	1,20	1,50	0,45	0,15	0,00	3,93
25	29	0,05	0,27	0,28	1,90	1,50	1,81	1,14	0,43	7,38
26	30	0,08	0,34	0,40	0,54	0,67	0,66	0,53	0,20	3,42
27	31	0,08	0,02	0,05	0,15	0,20	0,10	0,08	0,02	0,70
Total du	1–10	1,85	1,78	1,72	6,09	11,32	12,14	7,05	2,82	44,77
	11–20	0,71	0,49	0,60	4,49	10,26	7,39	5,43	1,36	30,73
	21–31	2,60	2,70	2,99	12,58	18,16	17,76	11,28	4,29	72,36
	mois	5,16	4,97	5,31	23,16	39,74	37,29	23,76	8,47	147,86

mm

Maximum en 24h. : 13,34 observé le 25

Minimum „ : 0,58 „ le 11

} différence ..... mm 12,78

TABLEAU MÉTÉOROLOGIQUE.—Mai 1875.

Jours de la lune	Jours du mois	Températures extrêmes. Sous l'Abri. Minima	Maxima	Différences	Moyennes	au Soleil. Max. boule noire.	Max. boule blanche.	Différences	Pluie. Jardin Total des 24h.	Toit Total des 24h.	Différences	Température du Puits.
		o	o	o	o	o	o	o	mm	mm	mm	o
26	1	7,6	20,3	12,7	13,95	31,1	26,1	5,0	0,0	0,0	0,0	13,6
27	2	11,2	20,1	11,9	17,15	32,6	28,1	4,5	0,0	0,0	0,0	13,6
28	3	12,0	20,5	8,5	16,25	32,2	27,1	5,1	0,0	0,0	0,0	13,6
29	4	10,3	23,2	12,9	16,75	33,7	29,1	4,6	0,0	0,0	0,0	13,6
1	5	13,1	24,4	11,3	18,75	32,6	29,1	3,5	0,0	0,0	0,0	13,6
2	6	16,0	20,1	4,1	18,05	...	...	...	12,6	10,1	2,5	13,6
3	7	11,2	21,9	10,7	16,55	28,8	25,5	3,3	0,0	0,0	0,0	13,6
4	8	8,1	24,4	16,3	16,25	37,4	31,6	5,8	0,0	0,0	0,0	13,7
5	9	14,6	23,0	8,4	18,80	32,8	28,3	4,5	0,0	0,0	0,0	13,7
6	10	14,0	21,7	7,7	17,85	30,2	26,5	3,7	0,0	0,0	0,0	13,8
7	11	15,4	18,8	3,4	17,10	...	...	...	4,3	0,4	3,9	13,8
8	12	16,9	28,2	11,3	22,55	42,2	35,7	6,5	1,0	0,8	0,2	13,8
9	13	14,3	20,5	6,2	17,40	26,9	23,9	3,0	10,4	8,6	1,8	13,9
10	14	13,3	24,2	10,9	18,75	33,6	29,2	4,4	0,0	0,0	0,0	13,9
11	15	12,8	25,6	12,8	19,20	34,6	30,5	4,1	0,0	0,0	0,0	14,0
12	16	15,0	26,9	11,9	20,95	37,5	32,9	4,6	0,0	0,0	0,0	14,0
13	17	17,1	29,8	12,7	23,45	41,0	35,9	5,1	0,0	0,0	0,0	14,0
14	18	16,1	29,6	13,5	22,85	40,7	35,6	5,1	0,0	0,0	0,0	14,0
15	19	18,3	31,0	12,7	24,65	42,4	36,8	5,6	0,0	0,0	0,0	14,1
16	20	15,1	31,5	16,4	23,30	42,6	37,5	5,1	0,0	0,0	0,0	14,1
17	21	15,8	30,8	15,0	23,30	41,0	36,2	4,8	0,0	0,0	0,0	14,1
18	22	17,1	30,4	13,3	23,75	40,7	37,0	3,7	0,0	0,0	0,0	14,2
19	23	16,0	29,3	13,3	22,65	39,6	35,3	4,3	0,0	0,0	0,0	14,2
20	24	11,3	30,2	18,9	20,75	40,6	36,3	4,3	0,0	0,0	0,0	14,2
21	25	19,4	32,7	13,3	26,05	42,1	38,0	4,1	0,0	0,0	0,0	14,2
22	26	20,5	33,0	12,5	26,75	42,2	39,9	2,3	0,0	0,0	0,0	14,2
23	27	21,9	31,9	10,0	26,90	41,5	37,7	2,8	0,2	0,0	0,2	14,2
24	28	22,1	32,0	9,9	27,05	...	...	...	25,8	22,7	3,1	14,3
25	29	17,6	24,0	6,5	20,85	32,5	29,7	3,0	0,0	0,0	0,0	14,3
26	30	16,5	22,4	5,9	19,45	34,7	30,0	4,7	0,0	0,0	0,0	14,3
27	31	16,0	20,5	4,5	18,25	...	...	...	16,8	14,1	2,7	14,4
Moyennes du	1-10	11,81	22,26	10,45	17,04	...	...	...	12,6	10,1	2,5	...
	11-20	15,43	26,61	11,18	21,02	...	...	...	15,7	9,8	5,9	...
	21-31	17,60	28,80	11,20	23,25	...	...	...	42,8	36,8	6,0	...
	mois	15,05	26,00	10,95	20,53	...	...	...	71,1	56,7	14,4	...

Maximum: 33,0 observé le 26	Max. boule noire 42,6	Hauteur d'eau tombée 71,1
Minimum: 7,6 „ le 1	„ blanche 39,9	„ „ évaporée 147,9
Différence: 25,4	Différence max. 6,5	Différence 76,8

JOURNAL MÉTÉOROLOGIQUE.

Mai 1875.

1. 1h. m.—Étoiles à peine visibles ; vent faible ; pas de rosée. 4h. —Léger voile de vapeurs par tout le ciel. 7h. et 10h.—Mêmes remarques. 1h. s.—Brouillard plus épais surtout au S.; halo mal défini. 4h.—Traces de halo. 7h.—Des cumulo-stratus semblent converger à l'W. 10h.—Ciel sans nuage ; étoiles peu brillantes ; vent très-régulier. La sécheresse continue.
2. 1h. m.—Vapeurs épaisses à l'horizon ; vent faible et très-régulier ; pas de rosée. 4h.—Ciel uniformément couvert ; léger dépôt de rosée. 7h.—Mêmes remarques. 10h.—Vapeurs blanchâtres par tout le ciel ; tour un peu voilée. 1h. s.—Mêmes remarques. 4h. —Vapeurs très-épaisses ; on peut fixer le disque du soleil. 7h.— Ciel uniformément couvert. 10h.—Mêmes remarques. Le vent a soufflé avec une grande régularité toute la journée.
3. 1h. m.—Ciel très-sombre ; vent presque nul ; pas de rosée. 4h.— Grande éclaircie au N. s'étendant de l'E. à l'W.; faible rosée. 7h. et 10h.—Cumulus diffus par tout le ciel ; ils viennent lentement du S. 1h. s.—Ciel moutonné et d'un beau bleu dans les éclaircies; vent fort. 4h.—Mêmes remarques. 7h.—Alto-cumulus venant très-lentement du S. E.; longs cumulo-stratus à l'horizon S. W. 8h. 49m.—Lumière zodiacale s'élevant jusqu' aux Gémeaux ; étoiles brillantes. 10h.—Ciel très-étoilé ; vent faible ; pas de rosée. La température atteint son minimum.
4. 1h. m.—Ciel splendide ; voie lactée très-brillante ; vent faible ; rosée abondante. 4h.—Même ciel ; rosée très-abondante. 7h.— Ciel moutonné et d'un bleu foncé dans les éclaircies ; les nuages viennent du S.S.W. 10h.—Mêmes remarques. 1h. s.—Quelques alto-cumulus du N.; reste du ciel découvert. 4h.—Longs cirro-stratus orientés de S.E. à l'W. 7h.—Cumulo-stratus à l'horizon S.; reste du ciel très-pur. 8h. 49m.—Ciel très-étoilé, lumière zodiacale s'élevant jusqu'à la tête de l'Hydre. 10h.—Même ciel ; léger dépôt de rosée.
5. 1h. m.—Ciel étoilé et étincelant ; rosée très-abondante ; quelques cumulus au S.E. 4h.—Léger voile de vapeurs par tout le ciel. 7h. —Au zénith cirro-stratus floconneux ; ils viennent de l'W.; plaques noirâtres au S. 10h.—Cumulus diffus venant rapidement du S.E.; dans les éclaircies cirrus venant de l'W. et ciel d'un bleu foncé. 1h. s.—Halo ou couronne suivant que les cirrus ou les cumulus passent sur le soleil ; tourbillons de poussière. 4h.—Ciel diversement couvert. 7h.—Ciel sombre au S.W., cumulo-nimbus noirâtres au-dessous de la brume. 10h.—Même ciel ; quelques étoiles au zénith ; pas de rosée. Depuis 10h. a.m., le vent est fort et souffle par rafales ; le baromètre a baissé de 4mm. en 24h.
6. 1h. m.—Ciel sombre en différents points ; vent fort et soufflant par rafales. 4h.—Il commence de pleuvoir. 7h.—La pluie continue. 10h.—Pluie moins forte ; des cumulo-nimbus arrivent rapidement du S. 1h. s.—Il ne pleut plus ; les cumulo-nimbus viennent de l'W. 3h. ¼.—Ciel très-noir à l'W. et au N.; coup de vent violent

pendant une ½ heure (13m. par seconde) ; il pleut au S.W. 4h.— Arc-en-ciel double et complet à l'E., il est peu élevé au-dessus de l'horizon et ne dure que quelques instants. 7h.—Grande éclaircie à l'W. et au N.W., ciel sombre au S.E., vent fort et soufflant par rafales. 8h. 49m.—Long cumulo-stratus allant du S.W. au N.E ; lumière zodiacale diffuse. 10h.—Ceinture de cumulo-stratus tout autour de l'horizon ; reste du ciel étoilé et brillant; vent très-fort.

7. 1h. m.—Ciel très-sombre au S., découvert au N.W. ; vent d'une violence extrême par moment (19 à 20m. par seconde). 4h.—Ciel uniformément couvert ; le vent augmente. 7h.—Ciel sans nuages, vent id. 10h.—Quelques cumulus venant du N.W. 1h. s.—Le vent souffle en tempête. 4h.—Cirro-stratus à l'horizon S. vent comme à 1h. 7h.—Brume épaisse au S.W., le vent est tombé. 8h. 49m.—Ciel splendide ; lumière zodiacale brillante ; calme. 10h —Même ciel ; le calme continue ; rosée. Le thermomètre atteint son minimum.

8. 1h. m.—Ciel serein. 4h.—Ciel brumeux au S.E. ; vapeurs par tout le ciel ; calme presqu'absolu depuis hier ; rosé très-abondante. 7h.—Jolis cumulo-cirrus stratifiés ; çà et là cumulus vaporeux ; le calme continue. 10h.—Les cumulo-cirrus persévèrent ; ils sont orientés du N.W. au S.W. et viennent lentement de l'W. 1h. s.— Brume générale et transparente. 4h.—Ciel uniformément couvert ; soleil entièrement voilé. 7h.—Même ciel, vent faible. 10h.—Ciel sombre ; le vent fraichit.

9. 1h. m.—Ciel indistinct ; vent faible ; pas de rosée. 4h.—Quelques cumulus diffus apparaissent sous la brume. 7h.—Même remarque. 10h. et 1h. s.—Cumulus venant lentement du S. 4h.—Ciel sombre au N. et au S.W. 7h.—Éclaircie rougeâtre à l'W. ; çà et là des cumulo-nimbus. 8h. 49m.—Ciel moutonné au zénith ; grande éclaircie au N. 10h.—Alto-cumulus très-délicats autour de la Lune, où ils forment une couronne brillante ; pas de rosée. A trois reprises différentes il s'est tombé quelques gouttes de pluie qui n'ont pas été accusées par les pluviomètres.

10. 1h. m.—Des cumulus compactes ayant l'apparence d'une banquise, occupent tout le S. ; vent faible ; pas de rosée. 4h.—La banquise avance tout d'un bloc vers le N., où le ciel est découvert ; pas de rosée. 7h.—Au zénith et vers de N.W., des cirro-cumulus laissent entr'eux de petites éclaircies ; bandes sombres au S.E. 10h.— Alto-cumulus et cumulus transparents venant du S. au N. ; éclaircie d'un beau bleu. 1h. s.—Eclaircie au N.E. ; le reste du ciel est occupé par des cirrus et des cirro-stratus. 4h.—Ciel uniformément couvert. 7h.—Dans toutes directions cumulo-stratus brumeux et orientés du N. au S. 10h.—Cumulo-nimbus noirâtres sous la brume. Depuis ce matin le vent souffle dans la même direction, et depuis 10 a.m. avec force et par rafales.

11. 1h. m.—Pluie fine peu abondante ; vent moins fort. 4h.—Pluie fine plus dense. 7h.—Le vent augmente ; les cumulo-nimbus arrivent rapidement du S.E. 10h. et 1h. s.—Mêmes remarques ; la pluie continue. 4h.—Pluie moins abondante. 7h.—Il ne pleut plus ; ciel uniformément couvert. 10h.—Ciel moins sombre à l'horizon S.E.

12. 1h. m.—Ciel uniformément couvert. 4h.—Brouillard qui se dépose sur les instruments. 5h.—Limite de visibilité 400m. 10h.—Le brouillard s'est levé et a formé de gros cumulus transparents (balles de coton) qui viennent du S. ; éclaircies d'un bleu foncé au zénith. Le baromètre baisse. 1h. s.—Les cumulus prennent une teinte grisâtre et viennent du S.W. 4h.—Trois couches de nuages dont deux marchant à angle droit ; ciel orageux en différents points ; atmosphère très-transparente. 7h.—Gros cumulo-nimbus orageux à l'W., quelques autres en arrivant au zénith y ont disparu sans donner de pluie. 10h.—Ciel uniformément couvert; pluie.

13. 1h. m.—Pluie fine ; ciel sombre ; vent presque nul. 4h.—Brouillard très-épais qui se résout en pluie. 7h.—Pluie ; thermomètres mouillés. 10h.—Des cumulus vaporeux viennent rapidement du N , sous la brume. 1h. s.—Couche épaisse de cumulus qui cachent complètement le soleil. 4h.—Éclaircie d'un bleu pâle au zénith ; on y aperçoit des cirrus venant de l'W. ; les cumulus viennent du N.N.W. ; vent fort depuis 10h. 7h.—Cumulus grisâtres sous la brume. 10h.—Horizon moins sombre à l'W. ; thermomètres mouillés. Le thermomètre atteint son minimum.

14. 1h. m.—Cumulus diffus sous la brume ; au N.E., éclaircie allant de l'E. à l'W. 4h.—Grande éclaircie au N. ; des alto-cumulus compactes sont chassés en bloc vers le S ; pas de rosée. 7h.—Cirrus nombreux venant de l'W. ; ciel d'un bleu foncé. 10h.—A l'W. longue bande de cirrus orientés du N. au S. ; des cirro-cumulus viennent rapidement de l'E. ; ciel d'un bleu pâle. 1h. s.—Çà et là quelques cirrus ; alto-cumulus plus nombreux au S.W. ; le ciel est redevenu d'un beau bleu. 4h.—Gros cumulus au S.W. ; à l'W. cirro-cumulus très-délicats formant une couronne brillante autour du Soleil. 7h.—Plaque de cumulus compactes à l'W. et au N.E. 8h. 49m.—Au zénith couche d'alto-cumulus très-serrés et d'une grande blancheur ; belle couronne lunaire, rosée abondante. 10h.—Cirrus au zénith.

15. 1h. m.—Brouillard, limite de visibilité 3 à 400m.; alto-cumulus venant lentement du S.W. ; thermomètres mouillés, calme absolu. 4h.—Éclaircie à l'E. ; le reste du ciel est couvert de cumulus compactes ; brouillard et calme comme à 1h. 7h.—Mêmes remarques. 10h.—Couche de cumulus très-denses couvrant tout le ciel. 1h. s.—Ciel uniformément couvert, sauf vers le S. où bandes sombres. 4h.—Nuages diffus formant des bandes qui convergent à l'W. ; calme. 7h.—Mêmes remarques. 8h. 49m.—Ciel couvert de cumulus uniformes et distincts ; horizon un peu sombre. 10h.—Vers le zénith grand espace occupé par de très-petits cirro-cumulus ; couronne lunaire aux couleurs très-vives. On commence à couper l'orge aux environs de Zi-ka-wei.

16. 1h. m.—Ciel noir ; calme. 4h.—Horizon plus sombre à l'W., le reste comme à 1h. 5h. ½.—Quelques gouttes de pluie. 7h.—Çà et là des éclaircies d'un bleu clair. 10h.—Au zénith éclaircies d'un beau bleu. 1h. s.—Des cirrus viennent lentement de l'W., ciel vaporeux au N. et à l'W. 4h.—Couche uniforme de petits cumulus très-compactes. 7h.—Calme absolu ; éclaircie jaunâtre à l'W., verdâtre au N.E. 10h.—Cumulo-nimbus noirâtres venant

lentement de l'W., calme absolu ; pas de rosée. Le coton, semé déjà depuis quelques jours, commence à sortir de terre.

17. 1h. m.—Cumulus vaporeux ; cumulo-nimbus au S.W. ; calme absolu depuis 10h. ; pas de rosée. 4h.—Les cumulo-nimbus avancent en bloc vers le N. et occupent presque tout le ciel. 7h.—Le calme continue ; rosée très-faible. 10h.—Alto-cumulus très-transparents ; ils laissent entr'eux des éclaircies d'un beau bleu. 1h. s.—Alto-cumulus stratifiés au N. et au S. ; reste du ciel bleuâtre. 4h.—Ciel moutonné ; éclaircies verdâtres tout autour de l'horizon. 7h.—Cumulo-stratus très-noirs au N.W., reste du ciel dégagé. 10h.—Ciel serein ; magnifique clair de lune ; rosée abondante. Aujourd'hui le girouette a fait le tour complet du compas.

18. 1h. m.—Alto-cumulus très-transparents, formant une couronne autour de la lune ; vent faible ; rosée abondante. 4h.—Mêmes remarques. 7h.—Alto-cumulus très-petits venant de l'W. ; calme ; rosée faible. 10h.—Des vapeurs blanchâtres très-épaisses viennent de s'élever au N.E. à la suite d'un coup de vent. 1h. s.—Çà et là quelques cirrus ; gros cumulus blanchâtres à l'horizon S.E. ; ciel d'un bleu pâle. 4h.—Des cumulus arrivent en grand nombre du S.E., et se tiennent dans cette partie du ciel sans passer par le zénith ; au N. alto-cumulus détachés. 7h.—Ciel moutonné au zénith, brumeux à l'horizon. 10h.—Cumulus diffus partout le ciel, lune à peine visible ; calme ; pas de rosée. Des brises folles ont encore fait faire à la girouette le tour du compas.

19. 1h. m.—Cumulo-nimbus au-dessous de la brume ; quelques gouttes de pluie ; calme ; pas de rosée. 4h.—Même ciel. 7h.—Ciel couvert de petits cumulus venant de l'W. ; le calme continue ; faible rosée. 10h.—Au zénith alto-cumulus d'un blancheur éblouissante ; couronne solaire. 1h. s.—Éclaircie au S.W. ; nuages orageux à l'W. et au N. 3h —Ils passent au zénith, donnent quelques grosses gouttes de pluie, et disparaissent. 4h.—Éclaircies bleuâtres en différents points ; horizon brumeux et sombre. 7h.—Long cirrus partant de l'W., et atteignant le N. ; vapeurs s'élevant très-haut au-dessus de l'horizon. 10h.—Brouillard léger ; çà et là quelques cirrus ; banquise de cumulus au S. Le vent a varié de l'E.S.E. au l'E.N.E. en passant par l'W.

20. 1h. m.—Brouillard, limite de visibilité 200m. ; gloire brillante autour de la lune ; thermomètres mouillés ; vent faible. 4h.—Le brouillard est devenu plus épais ; ciel pur au zénith. 7h.—Le brouillard permet de fixer le soleil à l'œil nu. 10h.—Cirro-stratus orientés de l'E. à l'W. ; au S. cumulus détachés. 1h. s.—Long cirro-stratus allant du S.W. à l'E. par le S. ; cumulus—*balles de coton*. 4h.—Cirrus diffus venant de l'W ; ciel vaporeux ; le vent fraîchit. 7h.—Ciel sans nuages et très-pur. 10h.—Magnifique clair de lune ; rosée.

21. 1h. m.—Légers cumulo-stratus à l'horizon S. ; reste du ciel très-pur ; vent faible. 4h.— Çà et là quelques cirrus ; rosée abondante. 7h.—Cirro-stratus filamenteux orientés du N.E. au S.W., et venant de cette dernière direction. 10h.—Quelques cumulo-stratus à l'horizon S.E. ; ciel d'un beau bleu. 1h. s.—Cirrus diffus venant de l'W. 4h.—Même remarque ; ciel bleuâtre. 7h.—Cumulo-

stratus à l'horizon N.W. ; reste du ciel très-pur. 10h.—Cirro-stratus orientés de l'E. à l'W. ; rosée assez abondante.

22. 1h. m.—Des alto-cumulus vaporeux couvrent tout le ciel ; vent faible ; pas de rosée. 4h.—Cirrus à l'W., cumulus noirâtres à l'E.; reste du ciel très-pur. 7h.—Ciel parsemé de longs cumulo-stratus un peu diffus et orientés de l'E. à l'W. d'où ils viennent. 10h.—Au zénith cirrus venant de l'W. ; vapeurs blanchâtres partout le ciel ; pas de maximum Barométrique. 1h. s.—Mêmes nuages qu'à 10h. ; éclaircie au S. et au N. 4h.—Ciel d'un bleu pâle ; mêmes nuages. 7h.—Éclaircie jaunâtre allant de l'W. au N. par le N.W. 10h.—Ciel moutonné au zénith, brumeux à l'horizon ; le vent faiblit.

23. 1h. m.—Éclairs en zig-zag très-fréquents au S., pas de tonnerre ; le vent se lève ; cumulo-nimbus noirâtres au S.W. et au N. 4h.—Deux longs cumulo-stratus allant de l'E. à l'W., au N. et au S. ; éclaircie au zénith ; plus d'éclairs. Le ciel change d'aspect à chaque instant ; saute de vent du S.E au N.N.E. 5h.—Coup de tonnere lointain. 7h.—Quelques gouttes de pluie ; le ciel couvert d'un épais brouillard s'éclaircit subitement ; vent fort et soufflant par rafales. 10h.—Quelques cumulo-stratus au N. et au S. ciel d'un bleu pâle. 1h. s.—Cumulus à l'horizon S.E. ; même ciel. 4h.—Ciel sans nuages et très-pur. 9h.—Ciel très-étoilé ; lumière zodiacale un peu diffuse. 10h.—Magnifique clair de lune ; le vent est tombé.

24. 1h. m.—Ciel très-pur ; calme ; rosée très-abondante. 4h.—Vapeurs légères à la surface du sol ; le reste comme à 1h. 7h.—Ciel sans nuages et d'un beau bleu ; vent faible. 10h.—Mêmes remarques. 1h. s.—Le vent fraîchit. 4h.—Vent fort et soufflant par rafales. 7h.—Le vent tombe. 9h.—Ciel étincelant, lumière zodiacale un peu diffuse ; le vent reprend de la force. 10h.—Même ciel ; vent fort.

25. 1h. m.—Ciel sans nuages ; beau clair de lune ; vent fort ; pas de rosée. 4h.—Cumulo-stratus vaporeux et compactes à l'horizon N.E. ; reste du ciel très-pur. 7h.—Même ciel. 10h.—Banquise brumeuse au S. et au N. ; ciel bleuâtre. 1h. s.—La banquise persévère au S., le vent souffle par rafales. 4h.—Mêmes remarques. 7h.—Nuages orageux à l'W. 9h.—Ciel très-étoilé ; lumière zodiacale plus distincte, la pointe s'élève jusqu'à Régulus. Éclairs sans tonnerre à l'W., le vent faiblit. 10h.—L'orage a disparu.

26. 1h. m.—Au S. la banquise de nuages d'hier soir s'étend du S.E. à l'W. Nuages très-légers ; brume à l'horizon N. 4h.—Au N. et au S. cumulo-stratus orientés de l'E. à l'W. ; légères vapeurs partout le ciel ; vent faible ; un peu de rosée. 7h.—Même ciel ; horizon S. plus couvert que le reste du ciel. 10h.—Longues bandes de cumulus orientés de l'E. à l'W. et venant de l'W. 1h. s.—Cumulus éclatants ; quelques autres sont noirs. Ciel dans les intervalles d'un bleu magnifique ; le vent fraîchit. 4h.—Vent violent ; maximum de force 13,7m. par seconde ; au S. nuages allongés et isolés ; le ciel se couvre et se découvre rapidement, surtout au N. 7h.—De temps à autre quelques gouttes de pluie. Ciel chargé ; vent faible. 10h.—Mêmes remarques.

27. 1h. m.—A l'E. ciel plus sombre ; quelques éclaircies au N. à l'W., et au zénith. 4h.—Disque lunaire très-pur ; plaques de cirrus au zénith ; rosée faible, le reste comme à 1h. 7h.—Cumulus nombreux à bords peu définis ; le vent augmente. 10h.—Ciel d'un très-beau bleu au zénith ; vent fort. 1h. s.—Beaucoup de cumulus dans toutes les directions. 4h.—Éclaircie verdâtre au N.E ; gros cumulus orageux paraissant immobiles ; au-dessous cumulo-nimbus très-noirs venant du S.W. 7h.—Ciel changeant d'aspect à vue d'œil ; nuages orageux à l'E. et à l'W. 10h.—Étoiles peu brillantes ; éclairs sans tonnerre.
28. 1h. m.—A l'E. cumulo-stratus rayonnants autour de la Lune ; reste du ciel plus ou moins brumeux ; vent faible ; pas de rosée. 4h.—Cirrus à l'E., ceinture de cumulus tout autour de l'horizon. 6.20h.—Halo de 46° de diamètre avec parhélie ; les deux images du soleil apparaissent sur le diamètre horizontal ; celle du côté du N. est la plus vive. 7h. et 10h.—Ciel d'un aspect variable ; éclaircies d'un bleu sombre. 1h. s.—Il commence de pleuvoir. 4h.—La pluie, qui tombe par averses, est peu abondante. 7h.—Pluie d'orage ; nuages bas ; calme. 10h.—Le vent a passé subitement au N.N.W. Il ne pleut plus ; ciel très-sombre.
29. 1h. m.—Cumulo-nimbus sous la brume ; vent fort. 4h —Légers cirrus au S., au N. ; ciel très-pur : à l'E. cumulo-stratus s'étendant vers le S. ; vent faible ; pas de rosée. 7h.—Au S. grande banquise très-compacte et à bords mal définis; elle est orientée de l'E. à l'W.; au N. quelques petits cumulo-stratus. 10h.—Légers cirrus par tout le ciel; la banquise persévère. 1h. s.—Banquise au N et au S., cumulo-stratus orientés de l'E. à l'W. 4h.—Une couche compacte de cumulus couvre tout le ciel ; petites éclaircies à travers lesquelles on aperçoit des cirrus. 7h.—A l'W. longs cumulo-stratus divergeants dans toutes les directions. 9h.—Ciel très-sombre ; quelques gouttes de pluie. 10h.—Même ciel ; calme.
30. 4h.—Ciel sombre ; quelques gouttes de pluie ; vent faible. 7h.—Pluie comme à 4h. ; cumulus à l'horizon E. ; le reste du ciel est brumeux. 10h.—Même ciel. 1h. s.—Sous la brume cumulus venant du S. 4h. ½.—Ciel moutonné au zénith, orageux à l'horizon S.W. 4h. 49m.—Deux coups de tonnerre lointain. 7h.—Nuages bas et blanchâtres venant de l'E. ; au-dessus alto-cumulus allant en sens contraire. Presque tout l'horizon à un aspect orageux. 10h.—Ciel uniformément couvert ; vent faible et régulier.
31. 1h. m.—Ciel uniformément couvert ; quelques gouttes de pluie ; vent faible. 4h.—Pluie assez forte ; même ciel. 7h.—Pluie plus faible. 10h.—Gros cumulo-nimbus venant du S.E. ; la pluie a cessé. 1h. s.—Pluie forte ; vent très-régulier ; ciel uniformément couvert. 4h.—La pluie diminue ; vent et ciel comme à 1h. 7h. et 10h.—Mêmes remarques.

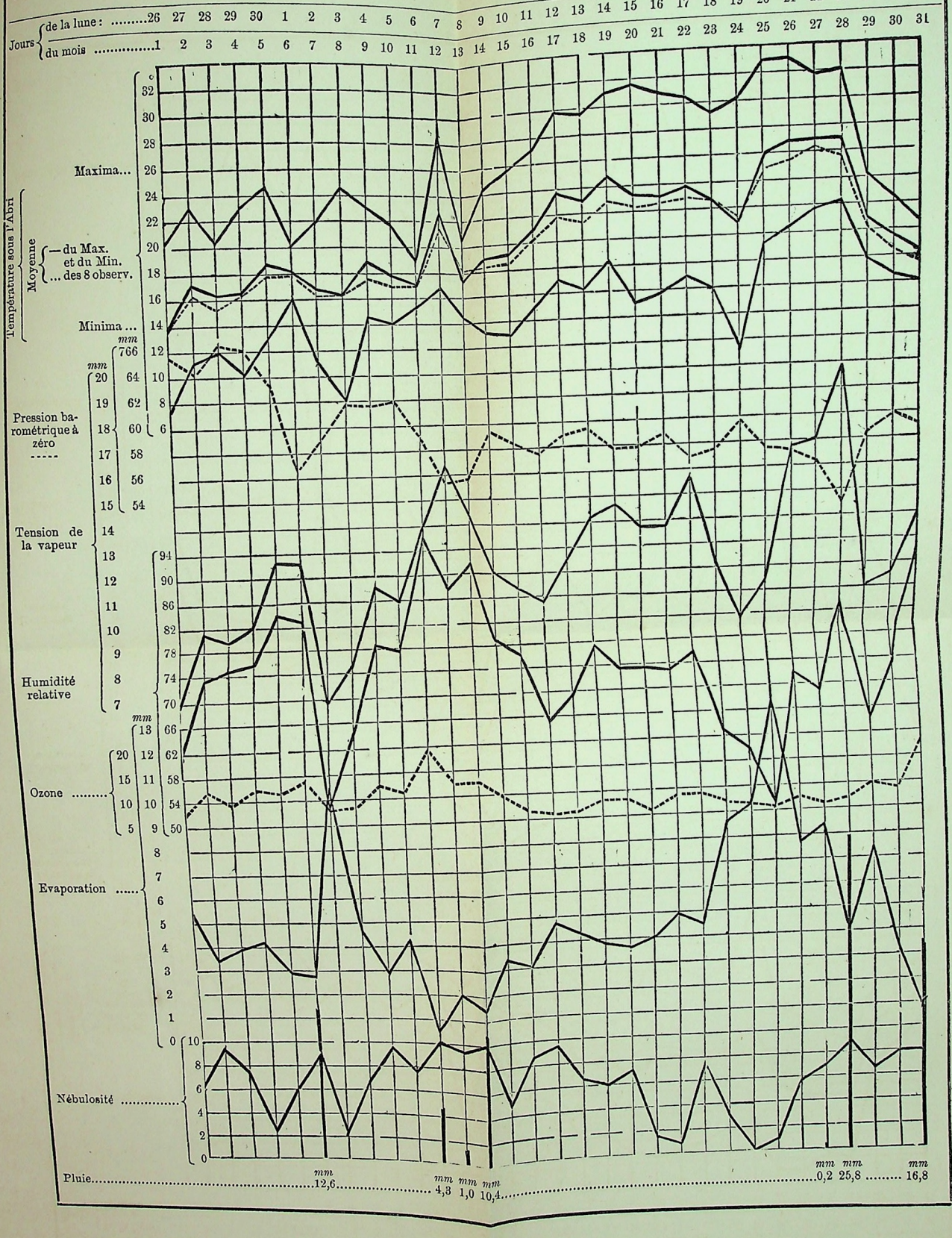
H. Le Lec., s.j.

A. M. D. G.

OBSERVATOIRE DE ZI-KA-WEI

Résumé des Observations Météorologiques de Mai 1875.

MOYENNES DIURNES.



A. M. D. G.

OBSERVATOIRE
MÉTÉOROLOGIQUE ET MAGNÉTIQUE,
des Pères de la Compagnie de Jésus
à ZI-KA-WEI.

BULLETIN MÉTÉOROLOGIQUE,

JUIN 1875.

NOTA.—Pour la position géographique de l'observatoire, les instruments utilisés, les notations employées, etc., voir la note préliminaire placée en tête du Bulletin de Septembre 1874.

TABLEAU MÉTÉOROLOGIQUE.—Juin 1875.

Pression barométrique à zéro.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
28	1	758,53	758,73	758,63	758,73	758,52	757,33	757,45	757,36	758,16
29	2	54,22	53,86	54,41	53,79	53,14	52,65	53,68	54,72	53,81
30	3	54,36	54,60	55,56	56,01	55,33	54,46	54,92	55,69	55,12
1	4	55,20	55,40	55,90	56,15	55,77	55,21	55,86	56,57	55,76
2	5	55,87	55,68	56,44	57,46	56,34	55,83	56,34	56,84	56,23
3	6	55,96	56,66	56,99	57,67	56,78	55,98	55,98	56,00	56,50
4	7	55,14	54,54	54,72	54,53	53,42	52,37	52,49	53,16	53,80
5	8	52,66	52,39	53,28	53,98	54,25	54,59	55,51	56,57	54,15
6	9	56,28	56,70	57,53	58,22	57,99	57,88	58,22	59,23	57,76
7	10	58,83	58,34	59,42	59,14	58,88	58,05	58,37	58,15	58,65
8	11	57,56	57,29	58,48	58,84	57,41	57,31	56,07	56,25	57,40
9	12	56,16	56,33	56,73	57,28	56,23	54,62	54,87	55,62	55,98
10	13	55,29	54,71	53,78	52,75	51,90	50,69	50,79	51,60	52,69
11	14	* 51,12	50,65	51,25	51,14	51,33	51,24	51,76	52,98	51,43
12	15	52,57	52,59	53,40	53,80	52,79	51,50	51,80	52,59	52,63
13	16	51,49	51,19	51,72	52,21	50,00	49,35	49,35	50,12	50,68
14	17	49,64	49,75	51,78	52,26	52,67	52,69	53,44	54,83	52,13
15	18	* 55,66	54,17	54,81	55,43	54,82	54,15	54,74	55,84	54,95
16	19	54,75	54,51	54,85	55,80	55,50	54,99	55,70	56,37	55,31
17	20	* 55,99	55,41	56,18	56,89	56,31	55,61	55,86	56,17	56,05
18	21	55,21	54,66	54,66	54,01	53,28	52,27	52,61	52,40	53,64
19	22	50,79	50,48	52,31	53,11	53,54	53,60	53,93	55,13	52,86
20	23	* 54,60	54,63	55,80	56,24	55,38	54,71	55,82	56,54	55,47
21	24	56,36	56,14	57,18	57,78	57,47	55,84	56,87	56,98	56,83
22	25	55,87	55,32	56,77	57,17	57,44	57,32	57,81	57,98	56,96
23	26	57,30	56,19	56,18	55,64	55,27	54,55	55,14	56,54	55,85
24	27	* 56,62	56,79	57,68	57,92	57,72	57,72	58,18	58,23	57,61
25	28	57,94	57,64	57,76	58,44	57,44	56,76	56,52	57,44	57,49
26	29	56,40	55,61	56,46	56,73	55,81	55,28	55,82	56,42	56,07
27	30	55,56	55,31	55,72	56,02	55,94	55,45	55,79	56,88	55,83
Moyennes du	1–10	755,71	755,69	756,29	756,47	756,04	755,44	755,88	756,43	755,99
	11–20	54,02	53,66	54,30	54,64	53,90	53,22	53,44	54,24	53,93
	21–30	55,67	55,28	56,05	56,31	55,93	55,35	55,85	56,45	55,86
	mois	755,13	754,88	755,55	755,81	755,29	754,67	755,06	755,71	755,26

mm
Maximum : 759,42 observé le 10 à 7 h. A.M.
Minimum : 749,35 „ le 16 à 4 h. P.M.
} différence :.....mm 10,07

TABLEAU MÉTÉOROLOGIQUE.—Juin 1875.

Température sous l'abri.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
28	1	17,9	17,9	18,2	18,4	18,0	17,7	18,0	18,2	18,04
29	2	18,4	18,4	18,8	19,3	18,5	18,1	17,0	17,0	18,19
30	3	17,0	16,9	18,2	22,0	25,0	25,4	21,6	19,0	20,64
1	4	18,9	16,5	20,8	26,2	28,5	29,0	23,8	20,5	22,91
2	5	19,1	17,3	21,0	24,0	27,2	26,0	22,0	21,2	22,23
3	6	21,0	20,3	21,2	22,0	18,0	17,8	17,0	17,7	19,38
4	7	17,9	18,8	19,5	20,7	21,9	21,2	20,5	18,9	19,93
5	8	18,0	18,0	17,0	18,3	18,4	18,0	17,8	16,4	17,74
6	9	15,3	16,0	18,2	22,0	22,0	20,8	18,5	16,6	18,68
7	10	16,2	17,2	19,7	24,0	25,3	25,9	22,3	21,2	21,48
8	11	21,4	21,0	22,2	23,0	25,9	23,4	23,7	22,0	22,83
9	12	22,0	21,4	23,6	27,9	30,1	29,0	25,3	24,3	25,45
10	13	23,1	22,2	22,0	24,0	24,0	24,2	25,5	24,8	23,73
11	14	* 23,9	23,0	24,0	25,7	27,4	27,0	25,1	22,5	24,83
12	15	22,0	22,3	22,7	25,9	25,8	25,2	23,7	23,2	23,85
13	16	24,0	23,2	24,1	23,2	28,9	28,0	26,3	25,5	25,40
14	17	25,0	25,2	21,2	20,5	23,4	25,4	23,1	21,7	23,19
15	18	* 21,6	20,8	22,1	24,6	24,8	25,0	23,3	21,7	22,99
16	19	21,0	20,7	21,1	22,1	24,0	22,5	20,9	21,0	21,66
17	20	20,6	20,2	21,8	21,9	23,0	23,0	21,4	21,0	21,61
18	21	21,8	22,0	23,0	24,7	27,0	27,9	23,7	24,0	24,26
19	22	25,0	24,9	25,2	25,3	22,7	22,5	22,0	21,7	23,66
20	23	* 21,4	21,1	21,8	24,0	24,3	26,6	24,3	23,1	23,33
21	24	22,2	22,0	21,3	21,1	20,6	22,3	21,1	21,0	21,45
22	25	21,0	19,0	20,2	22,0	21,5	21,0	20,0	20,2	20,61
23	26	20,2	21,0	22,4	26,0	29,3	29,7	27,0	23,9	24,94
24	27	* 22,6	22,3	24,0	24,1	25,0	23,9	22,0	21,5	23,18
25	28	21,8	21,8	22,3	23,8	26,0	25,1	24,0	23,3	23,51
26	29	23,0	23,0	24,6	29,0	25,2	24,0	23,7	24,6	24,64
27	30	24,1	24,2	25,3	28,3	29,8	29,8	26,7	25,8	26,75
Moyennes du	1–10	17,88	17,73	19,26	21,69	22,28	21,99	19,85	18,67	19,92
	11–20	22,46	22,00	22,48	23,88	25,73	25,27	23,83	22,77	23,55
	21–30	22,31	22,13	23,01	24,83	25,14	25,28	23,45	22,91	23,63
	mois	20,88	20,62	21,58	23,47	24,38	24,18	22,38	21,45	22,37

Maximum : 29,8 observé le 30 à 1 h. P.M.
Minimum : 15,3 „ le 9 à 1 h. A.M.
} différence ..... o 14,5

TABLEAU MÉTÉOROLOGIQUE.—Juin 1875.

Actinomètre : 1° *thermomètre à boule nue.*

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
28	1	17,3	17,4	19,2	19,4	18,8	17,7	17,5	18,2	18,19
29	2	18,3	18,3	19,2	22,6	22,2	20,6	17,2	17,1	19,44
30	3	17,2	16,3	25,3	33,2	35,7	33,4	21,2	18,2	25,06
1	4	17,3	15,6	26,7	36,3	38,2	36,7	22,6	19,3	26,59
2	5	18,0	16,5	22,6	25,3	35,0	28,3	22,1	21,2	23,62
3	6	20,7	19,7	20,9	23,3	18,6	19,0	16,4	17,3	19,49
4	7	17,4	17,4	20,3	22,6	24,3	22,3	19,3	18,4	20,25
5	8	17,8	17,5	17,6	21,0	20,2	19,0	17,3	16,2	18,33
6	9	15,2	15,5	22,1	30,1	29,6	22,6	18,0	15,7	21,10
7	10	15,4	16,7	24,1	35,6	36,6	34,3	22,3	20,8	25,72
8	11	21,1	20,4	22,3	26,3	31,2	23,5	23,2	21,2	23,65
9	12	21,4	20,6	27,6	38,4	40,3	36,1	25,2	24,3	29,24
10	13	22,8	22,3	21,9	27,3	26,1	24,3	25,3	24,5	24,31
11	14	* 23,5	22,6	26,3	29,3	38,3	31,4	24,7	22,4	27,31
12	15	22,2	22,3	24,6	31,8	33,0	30,2	23,6	23,3	26,37
13	16	23,6	23,2	24,6	23,4	37,9	32,3	25,6	25,1	26,95
14	17	24,5	24,2	23,2	23,5	27,3	32,8	23,3	21,2	25,00
15	18	* 21,0	20,2	23,4	29,6	28,4	29,8	22,7	21,3	24,55
16	19	20,9	20,3	21,9	24,3	30,0	25,1	20,8	21,1	23,05
17	20	* 20,7	20,3	25,2	24,0	27,4	27,3	21,4	20,8	23,39
18	21	21,4	21,7	23,3	28,6	32,7	33,3	24,1	23,8	26,11
19	22	24,4	24,3	26,6	31,3	24,1	23,3	21,4	21,3	24,59
20	23	* 21,2	21,1	22,8	30,1	29,8	34,3	24,1	22,5	25,74
21	24	21,4	21,3	21,9	22,0	21,3	25,6	21,0	20,7	21,90
22	25	21,1	18,3	20,5	25,3	23,0	21,8	19,8	20,2	21,25
23	26	20,3	20,8	25,3	35,3	35,7	35,6	26,6	23,5	27,89
24	27	22,4	22,2	28,1	29,2	30,4	25,0	22,1	21,3	25,09
25	28	21,4	21,4	23,1	26,8	33,0	27,4	23,8	23,3	25,02
26	29	23,2	23,2	26,0	37,3	26,9	26,0	23,3	24,3	26,27
27	30	24,2	24,2	27,5	37,1	40,3	38,4	26,5	25,3	30,44
Moyennes du	1–10	17,46	17,09	21,80	26,94	27,92	25,39	19,39	18,24	21,78
	11–20	22,17	21,64	24,09	27,79	31,99	29,28	23,58	22,52	25,38
	21–30	22,10	21,85	24,51	30,30	29,72	29,07	23,27	22,62	25,43
	mois	20,58	20,19	23,47	28,34	29,88	27,91	22,08	21,13	24,20

Moyennes du mois { Therm. à boule noirçie : 27,39 ; Therm. à boule nue : 24,20 } différence 3,19

TABLEAU MÉTÉOROLOGIQUE.—Juin 1875.

Actinomètre : 2° *thermomètre à boule noirçie.*

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
28	1	17,3	17,4	21,3	21,9	20,4	18,2	17,5	18,2	19,02
29	2	18,2	18,2	20,1	28,7	27,8	23,6	17,2	17,1	21,36
30	3	17,2	16,3	37,4	47,9	53,1	47,6	21,2	18,2	32,36
1	4	17,2	15,6	38,0	50,2	52,1	51,1	23,1	19,3	33,33
2	5	18,0	16,5	26,4	28,2	46,2	31,6	22,2	21,2	26,29
3	6	20,7	19,8	21,9	26,2	20,2	21,6	16,9	17,3	20,57
4	7	17,4	17,4	21,9	26,3	28,7	24,2	19,3	18,4	21,70
5	8	17,9	17,5	19,1	25,2	22,3	20,7	17,5	16,2	19,55
6	9	15,2	15,5	29,4	42,4	40,3	25,5	18,2	15,7	25,27
7	10	15,4	16,7	31,9	51,8	52,5	48,5	22,5	20,9	32,52
8	11	21,1	20,4	22,8	33,2	39,2	24,5	23,2	21,2	25,70
9	12	21,4	20,6	34,2	52,1	54,5	47,3	25,2	24,3	34,95
10	13	23,0	22,2	22,3	32,3	29,6	24,8	25,3	24,5	25,50
11	14	* 23,5	22,6	30,7	85,8	53,2	37,7	25,2	22,4	31,39
12	15	22,2	22,3	27,3	41,2	43,6	38,2	23,7	23,3	30,22
13	16	23,7	23,2	25,6	24,0	50,5	38,9	25,8	25,1	29,60
14	17	24,5	24,2	26,7	29,2	33,5	43,2	24,0	21,2	28,31
15	18	* 21,0	20,2	26,3	36,2	33,9	36,5	23,1	21,3	27,31
16	19	20,9	20,3	24,2	27,9	39,9	29,2	21,1	21,1	25,57
17	20	20,6	20,2	31,0	28,1	34,6	34,1	21,5	21,0	26,39
18	21	21,4	22,1	24,2	34,1	41,9	40,9	24,4	23,8	29,10
19	22	24,4	24,2	29,2	38,4	27,1	25,3	21,7	21,3	26,45
20	23	* 21,2	21,1	25,0	38,3	39,1	46,5	24,4	22,5	29,76
21	24	21,4	21,3	23,2	23,2	23,4	31,3	21,0	21,0	23,22
22	25	21,2	18,3	21,4	31,2	25,4	24,2	20,0	20,2	22,74
23	26	20,3	21,0	29,9	48,2	45,2	44,7	26,8	23,5	32,45
24	27	22,4	22,2	35,2	35,7	38,0	26,3	22,1	21,2	27,89
25	28	21,4	21,4	24,8	31,2	42,2	30,5	24,2	23,3	27,37
26	29	23,2	23,2	28,7	51,2	30,4	30,7	23,9	24,3	29,45
27	30	24,2	24,2	32,0	48,5	56,1	53,0	27,0	25,3	36,29
Moyennes du	1–10	17,45	17,09	26,74	34,88	36,36	31,26	19,56	18,25	25,20
	11–20	22,19	21,62	27,11	34,00	41,25	35,44	23,81	22,54	28,49
	21–30	22,11	21,90	27,36	38,00	36,88	35,34	23,55	22,64	28,47
	mois	20,58	20,20	27,07	35,63	38,16	34,01	22,31	21,14	27,39

Maximum observé le 25 { Therm. à boule noirçie : 56,1 ; Therm. à boule nue : 40,3 } différence 15,8

TABLEAU MÉTÉOROLOGIQUE.—Juin 1875.

Tension de la vapeur.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
28	1	14,47	14,93	14,90	15,11	14,56	14,60	14,87	15,23	14,83
29	2	15,27	15,43	15,99	15,85	15,86	15,11	14,42	14,42	15,29
30	3	14,42	14,04	13,84	13,39	14,21	12,28	14,75	14,56	13,94
1	4	14,72	13,83	15,09	13,93	13,54	13,76	16,95	15,77	14,69
2	5	14,85	14,54	16,66	16,65	12,97	13,51	15,15	15,68	15,00
3	6	16,78	17,21	16,37	13,07	14,56	14,23	13,38	14,14	14,97
4	7	14,78	15,51	16,68	17,48	17,77	17,85	15,43	15,45	16,37
5	8	15,36	14,87	14,13	14,08	14,02	13,81	13,65	13,74	14,21
6	9	12,94	13,54	14,29	13,55	13,55	13,31	12,16	13,17	13,31
7	10	13,41	14,30	15,61	17,19	17,48	17,62	17,88	17,68	16,40
8	11	17,56	17,98	18,30	19,04	19,10	20,64	17,38	17,70	18,46
9	12	17,70	17,28	17,80	18,63	19,83	20,10	20,04	20,66	19,01
10	13	20,62	19,54	19,15	20,27	20,65	21,68	20,11	20,16	20,27
11	14	*20,33	20,50	21,42	21,13	20,89	20,73	20,36	19,71	20,63
12	15	19,66	19,47	19,59	21,01	21,07	21,06	20,45	20,76	20,38
13	16	20,46	20,76	21,55	20,95	21,74	23,10	22,74	23,24	21,82
14	17	22,37	23,43	17,00	16,88	16,33	17,06	18,98	18,61	18,83
15	18	*18,61	17,41	18,54	19,33	18,84	18,35	17,08	17,89	18,26
16	19	16,78	17,13	17,57	17,82	18,43	17,75	16,84	16,78	17,39
17	20	*16,84	16,90	17,14	17,77	17,63	17,45	17,73	18,15	17,45
18	21	19,09	19,51	20,50	21,18	22,72	23,57	21,03	21,61	21,15
19	22	21,97	21,63	22,25	20,81	19,08	18,12	18,61	18,61	20,14
20	23	*18,61	18,62	18,91	18,43	19,15	19,82	20,08	20,43	19,26
21	24	19,03	19,51	18,49	18,26	16,82	17,35	17,92	18,32	18,21
22	25	18,50	15,07	16,58	17,70	16,72	15,12	17,02	17,27	16,75
23	26	17,61	18,50	19,41	19,80	22,94	23,96	23,12	22,06	20,93
24	27	19,83	19,47	18,61	18,91	18,72	18,49	18,06	18,19	18,79
25	28	18,00	18,55	19,47	19,28	20,57	20,93	20,27	20,13	19,65
26	29	20,68	20,89	21,81	24,40	22,05	21,23	21,22	22,22	21,81
27	30	21,93	22,06	22,19	22,72	22,39	22,63	22,50	21,88	22,29
Moyennes du	1–10	14,70	14,82	15,36	15,03	14,85	14,61	14,86	14,98	14,90
	11–20	19,09	19,04	18,81	19,28	19,45	19,79	19,17	19,37	19,25
	21–30	19,53	19,38	19,82	20,15	20,12	20,12	19,98	20,07	19,90
	mois	17,77	17,75	17,99	18,15	18,14	18,17	18,00	18,14	18,02

Maximum : 24,40 observé le 29 à 10 h. A.M.
Minimum : 12,97 „ le 5 à 1 h. P.M.
} différence..... mm 11,43

TABLEAU MÉTÉOROLOGIQUE.—Juin 1875.

Humidité relative.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir.. 1 h.	Soir.. 4 h.	Soir.. 7 h.	Soir.. 10 h.	Moyennes des 8 observations.
28	1	95	98	96	96	95	97	97	98	96,5
29	2	97	98	99	95	100	98	100	100	98,4
30	3	100	98	89	68	60	50	77	89	78,9
1	4	96	99	82	55	47	47	78	88	74,0
2	5	90	99	90	75	48	54	77	83	77,0
3	6	91	97	87	67	95	94	93	94	89,8
4	7	97	96	99	96	91	95	86	95	94,4
5	8	100	97	98	90	89	90	90	99	94,1
6	9	100	100	92	69	69	73	77	94	84,3
7	10	98	98	91	78	73	71	89	94	86,5
8	11	92	97	92	91	77	96	80	90	89,4
9	12	90	91	82	67	63	67	83	91	79,3
10	13	98	98	97	91	93	97	83	87	93,0
11	14	* 92	98	97	86	77	78	86	97	88,9
12	15	100	97	96	85	85	88	94	98	92,9
13	16	92	98	97	99	73	82	89	96	90,8
14	17	95	98	91	94	77	70	90	96	88,9
15	18	* 96	95	93	84	81	78	80	99	87,4
16	19	91	94	94	90	83	88	91	91	90,3
17	20	* 93	96	88	91	84	84	93	98	90,9
18	21	98	99	98	92	86	85	96	97	93,9
19	22	93	92	93	87	93	89	94	96	92,1
20	23	* 98	100	97	83	85	77	89	97	90,8
21	24	95	99	98	98	93	87	96	99	95,6
22	25	100	92	94	90	93	82	98	98	93,4
23	26	100	100	96	79	76	77	87	100	89,4
24	27	97	97	84	85	80	84	92	95	89,3
25	28	92	95	97	88	82	88	91	95	91,0
26	29	99	100	95	82	93	96	97	97	94,9
27	30	98	98	93	79	72	73	86	88	85,9
Moyennes du	1–10	96,4	98,0	92,3	78,9	76,7	76,9	86,4	93,4	87,37
	11–20	93,9	96,2	92,7	87,8	79,3	82,8	86,9	93,6	89,15
	21–30	97,0	97,2	94,5	86,3	85,3	83,8	92,6	96,2	91,61
	mois	95,8	97,1	93,2	84,3	80,4	81,2	88,6	94,4	89,38

Maximum : 100 observé 14 fois
Minimum : 47 „ le 4 à 4h. P.M.
} différence 53

TABLEAU MÉTÉOROLOGIQUE.—Juin 1875.

Ozone.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
28	1	20	20	19	20	20	20	20	20	19,9
29	2	20	20	18	20	19	18	20	19	19,3
30	3	20	20	11	10	8	8	8	8	11,6
1	4	9	9	8,5	9	8,5	5	8	10	8,4
2	5	12	14	9	8	8	7	8	8	9,3
3	6	10	12	11	11	13	20	20	20	14,6
4	7	20	20	20	14	11	12,5	16	17	16,3
5	8	10,5	19	19	13	9,5	12	14	10	13,4
6	9	7	7	7	4	7	5	9	9	6,9
7	10	8	9	11	9	3	8,5	8	12	8,6
8	11	20	12	11	11	7,5	7	8	5	10,2
9	12	6	7	9	4	3	2	2	6	4,9
10	13	8	5	9	10	10	9	8,5	7	8,3
11	14	?	9	7	7	7	4	3	8	6,4
12	15	7,5	6,5	8,5	8,5	8,5	4	8,5	8,5	7,6
13	16	8	8	6	8	8	5	6	7	7,0
14	17	7	8	10	14	12	9	9	9	9,8
15	18	8	12	10	9	8,5	4	10	10	8,9
16	19	12	10	11	13	9	9,5	3	20	11,6
17	20	?	20	18	19	9	8	11	20	15,0
18	21	10	20	12	11	8	5,5	8	7,5	10,3
19	22	8	7	6,5	10	13	11	19	9	10,4
20	23	?	16	6	10	6	8,5	10	8	9,2
21	24	10	11	16,5	19	19	20	10,5	13	14,9
22	25	14	9	18	18	8,5	9,5	15	12	13,0
23	26	17	20	4	11	3	5	7	8	9,4
24	27	?	11	9	8	8	9	13,5	13	10,2
25	28	15	13	11	10	8	8	8	8,5	10,2
26	29	9	7,5	6	7	9	8,5	7	6	7,5
27	30	6	7	8,5	7,5	5	3	5	8	6,3
Moyennes du	1–10	13,7	15,0	13,4	11,8	10,7	11,6	13,1	13,3	12,8
	11–20	9,6	9,8	10,0	10,4	8,3	6,2	7,4	10,1	9,0
	21–30	11,1	12,2	9,8	11,2	8,8	8,8	10,3	9,3	10,1
	mois	11,6	12,3	11,0	11,1	9,2	8,8	10,3	10,9	10,6

Maximum : 20 observé 26 fois
Minimum : 2 „ 2 fois

} Différence..... 18,0

TABLEAU MÉTÉOROLOGIQUE.—Juin 1875.

Direction du vent; sa vitesse par seconde.

Date.	Matin. 1 h. Dir.	Vit.	4 h. Dir.	Vit.	7 h. Dir.	Vit.	10 h. Dir.	Vit.	Soir. 1 h. Dir.	Vit.	4 h. Dir.	Vit.	7 h. Dir.	Vit.	10 h. Dir.	Vit.	Moyennes des 8 observations.
		m		m		m		m		m		m		m		m	m
1	ENE	4,3	ENE	3,4	ENE	4,6	E	5,6	E	7,0	ENE	7,7	ENE	6,9	E	7,0	5 8
2	E	10,0	ENE	7,9	NE	5,6	NE	8,4	NNE	7,3	NNW	5,8	NNW	5,8	NNW	4,8	6,9
3	NNW	3,5	NNW	2,9	NNW	2,0	NW	4,3	W	4,2	WNW	4,3	SW	4,5	SW	2,9	3,6
4	SW	2,1	SW	1,8	WNW	1,3	NW	3,9	N	3,1	NE	1,6	ESE	1,7	ESE	1,7	2,1
5	SE	2,6	..	0,2	SE	0,8	SE	1,1	SE	2,4	ESE	3,0	ENE	2,5	ESE	4,4	2,1
6	SE	5,4	SSE	3,4	ESE	1,7	ENE	3,9	ENE	6,2	ENE	9,4	ENE	11,4	ENE	10,1	6,4
7	ENE	8,0	ENE	5,3	ENE	4,9	ENE	4,2	ENE	3,1	NNE	1,2	N	1,3	NNW	3,1	3,9
8	NW	2,7	WNW	3,4	NNW	4,4	NNW	4,5	NW	4,8	N	4,3	N	3,1	NNW	0,8	3,5
9	NW	0,3	W	0,2	NNE	0,1	NNE	0,9	NE	2,0	ENE	3,4	ENE	3,6	ENE	1,2	1,5
10	ENE	1,4	E	1,8	E	3,8	E	4,3	SE	4,9	ESE	5,0	SE	5,8	ESE	4,5	3,9
11	SE	4,7	SE	4,1	SE	4,9	SSW	5,3	SE	6,0	S	4,8	S	6,0	SSE	4,8	5,1
12	SSE	3,8	SSE	4,4	S	2,1	S	3,9	S	5,2	SE	5,0	SE	4,3	SE	2,6	3,9
13	SSW	2,2	SSW	0,3	ESE	4,7	SSE	7,9	S	7,8	SW	5,9	SSW	5,7	SSW	4,4	4,9
14	SW	4,5	SSW	4,5	SSW	3,1	WSW	4,7	NNW	4,6	N	2,7	NNE	1,0	E	2,7	3,5
15	E	2,4	E	2,4	E	3,3	ENE	4,3	E	5,6	E	5,9	ESE	5,6	ESE	4,9	4,3
16	SE	2,9	SSW	4,2	SE	2,5	SSE	3,2	SSE	5,2	SE	4,8	SSE	5,1	SSW	3,4	3,9
17	SSW	4,0	W	5,7	WNW	5,7	NNW	5,1	NW	3,1	NNW	2,5	W	1,4	W	1,9	3,7
18	SSW	0,6	S	0,6	S	1,5	S	3,4	S	3,3	S	3,1	SSE	2,3	SE	2,7	2,2
19	E	3,1	E	2,2	E	3,4	E	5,0	E	3,9	ESE	5,6	E	4,4	ENE	3,4	3,9
20	ENE	3,1	NE	3,1	ENE	3,1	NE	4,2	ENE	4,9	ENE	5,8	E	4,9	E	4,6	4,2
21	ESE	3,7	ESE	3,1	SE	2,9	S	4,4	SSE	4,9	S	3,9	S	3,1	SE	2,0	3,5
22	SSE	4,1	SSE	4,0	W	3,1	NW	2,8	NNW	3,4	NW	2,5	NW	1,5	NW	0,4	2,7
23	WNW	0,6	WNW	0,0	WNW	0,5	S	1,8	S	3,1	SSW	3,9	S	3,1	S	1,3	1,8
24	SSE	2,0	SE	2,1	SE	2,9	SE	5,1	E	4,8	E	4,9	ENE	3,5	ENE	2,2	3,4
25	NE	3,6	NE	5,4	NE	8,1	NE	8,1	NE	7,9	NE	6,0	NE	2,9	NE	2,5	5,6
26	ENE	3,1	E	5,4	ESE	5,1	SSE	4,9	S	4,0	SSE	3,6	SSE	4,2	S	2,2	4,1
27	W	1,6	W	3,4	W	3,4	NW	3,7	NNW	2,0	NNE	2,6	NNE	2,9	E	1,7	2,7
28	N	1,5	NE	1,8	NE	1,6	NE	2,1	NE	2,1	NE	3,4	NE	3,1	ENE	2,7	2,3
29	E	2,3	NE	0,9	NE	1,5	E	1,6	NE	3,0	ENE	4,0	NE	2,1	ESE	2,7	2,3
30	SE	3,3	SE	3,6	SE	3,6	ESE	6,4	SE	7,6	SE	7,3	SE	7,6	SE	5,7	5,6
		m		m		m		m		m		m		m		m	m
Moy. du mois		3,2		3,1		3,2		4,3		4,6		4,5		4,0		3,3	3,8

Fréquence relative des 16 vents sur 100

N 3	W..... 3	S 9	E.....12
NNW 6	WSW 1	SSE..... 8	ENE 13
NW 5	SW 3	SE 12	NE 11
WNW 3	SSW 3	ESE 6	NNE 2

Calmes, sur 100 observations 2

Vitesse moyenne maximum observée le 6 ..... m 11,4

TABLEAU MÉTÉOROLOGIQUE.—Juin 1875.

État du ciel.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. m.			4h. m.			7h. m.			10h. m.		
	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.
1	10	..	n	10	..	n	10	..	n	10 Br	..	n E
2	10	..	n	10	..	n	10	..	n	10	..	n
3	10 Br	..	cn	9	..	c NNW	7	..	c NW	5	..	c N
4	0	..	..	0	..	..	2	ac	..	1	ac	..
5	0	..	..	4	k W	cn	5	k	c NW	10	ac	..
6	10 Br	..	cn	10 Br	..	n	10	..	n	10 Br	..	cn
7	10 Bd	..	..	10 Bd	..	..	10 Bd	..	..	10 Br	..	c E
8	10 Br	..	cn	10 Br	..	cnNW	10 Br	..	n	10 Br	..	cn N
9	10 Br	..	..	6	k	cn	7 Br	..	c SW	9	ac SW	c E
10	0	..	..	1	cst	..	9 Br	..	c S	9	..	c S
11	0	..	..	5	k	cst	10	..	n	10 Br	c SW	n
12	9	ac	cn SW	5	k	c	5	cst	c	1	..	c
13	10	..	n	10	..	n	10	..	n	10 Br	c S	cn
14	..	..	..	10 Br	..	cn W	10 Br	..	cn	10	ac W	cn W
15	9	c	..	10 Br	..	..	10 Br	..	..	10	..	c E
16	8	k	c SE	10	..	n	10	..	n	10	..	n SW
17	10 Br	..	cn	10	..	n	10	..	cn N	10 Br	..	cn N
18	..	..	..	9 Br	ac	..	10 Br	ac	cn	10 Br	..	cn SW
19	10	..	c	10	..	c	10	..	n	10	..	cn E
20	..	..	..	10 Br	..	cn E	10	..	cn E	10	..	cn E
21	10	..	n	10	..	c	10	..	n	10 Br	ac SW	c SW
22	10 Br	..	c W	4	k	cn	10	..	n	10	k	cn NW
23	..	..	..	10 Br	..	..	10 Br	..	cn	10 Br	..	cn SW
24	10	kc SW	cn	9 Br	cst	c	10	..	n	10	..	n
25	10	..	n	10 Br	cst	cn	10	..	n	10 Br	..	cn NE
26	10	cn	n	60 Br	..	..	10 Bd	c SE	..	9	kc SW	c SSE
27	..	..	..	10	cst	c SW	5	k	ac wsw	10 Br	..	c NW
28	10 Br	..	..	10 Br	..	..	10 Br	..	c E	10 Br	..	c E
29	10 Br	..	..	10 Bd	..	..	10 Bd	ac	..	9	ac	cn SE
30	9	c	..	9	cst	c	8	ck	ac SW	7	ck	c S
Moy. du mois	8,2	..	..	8,4	..	..	8,9	..	..	9,0	..	..

Nombre de jours de :

Ciel beau, ou moins de $2_{1/10}$ couvert	.. 1	Brouillard	3
,, peu nuageux ou de 2 à $4_{1/10}$,,	.. 1	Brume	7
,, nuageux, ou de 4 à $6_{1/10}$,,	.. 1	Rosée	6
,, très-nuageux, ou de 6 à $8_{1/10}$,,	.. 5	Pluie	21
,, couvert ou plus de $8_{1/10}$,,	..22	Éclairs sans tonnere	3

TABLEAU MÉTÉOROLOGIQUE.—Juin 1875.

État du ciel.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. s.			4h. s.			7h. s.			10h. s.			Moyennes des 8 observations.
	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	
1	10	..	n	10	..	n	10	..	n	10	..	n	10,0
2	10 Bd	..	cn NE	10 Bd	..	cn NE	10 Bd	..	cn NE	10 Bd	..	cn	10,0
3	5	k W	c N	1	..	c N	0	..	..	0	..	..	4,6
4	1	k W	c	0	..	..	0	..	..	0	..	..	0,5
5	10	c SW	cn	10	..	c	10	..	c	10 Br	..	cn	7,4
6	10	..	n	10	..	n NE	10	..	n NE	10	..	cn	10,0
7	10 Br	..	c E	10 Bd	..	..	10 Bd	c N	..	10 Br	..	cn	10,0
8	10 Br	..	cn NW	10 Br	..	cn N	10	..	cn N	8	acst	..	9,7
9	10	..	c SW	9	c	cn N	1	c	..	0	..	..	6,5
10	8	..	c SE	2	..	c S	1	k	c	0	..	..	3,7
11	10 Br	..	c S	10	..	n	7	k	cn	5	ac	..	7,1
12	5	kst W	c S	7	kst W	c	10 Br	c	cn	10	cn	..	6,5
13	10	..	n	10	..	n	10	ac SW	c	10	c	..	10,0
14	9	ac NW	c NW	7	k W	c W	3	kst W	cn	10	c	c SW	8,4
15	10	..	cn E	7	kst S	c SE	10 Br	..	c SE	10 Br	..	..	9,5
16	10	k SW	cn	10	k	c W	10 Br	..	cn SE	10 Br	..	cn	9,8
17	10 Br	..	cn NW	9	k SW	cn N	8	kst W	ac NW	4	acst W	..	8,9
18	10	..	cn SW	9	k W	cn SE	9	ac S	cn	9	acst W	..	9,4
19	10	kc W	c E	10	kc W	cn E	10	kc	cn E	10 Br	..	cn E	10,0
20	10	..	cn E	10	kc	cn E	10	..	cn SE	10	..	n	10,0
21	9	ac SW	c SW	7	ac SW	c SW	10	ac	cn N	8	kest	cn	9,2
22	10	ac	cn SW	10	c W	cn N	10 Br	c SW	cn	10 Br	..	cn	9,3
23	9 Br	..	c W	7	kc W	cn SW	9	kc	c SW	9 Br	..	cn	9,1
24	10 Br	..	n	10 Br	cst	c E	10 Br	..	cn E	10	..	n	9,9
25	10	..	cn ENE	9	cst	c E	10 Br	..	cn E	10	..	n	9,9
26	8	k SW	c SW	8	k	cn SW	9	acst	cn SE	5	cn	..	8,6
27	10 Br	..	cn NE	10 Br	..	cn N	10 Br	c	cn SE	9	..	cn W	9,1
28	10	..	cn NE	9	cn SW	c NE	8	k	acon E	10 Br	..	..	9,6
29	10	cn	n	10	cst	cn SW	10	cst	cn NE	10	cst	cn	9,9
30	5	ck	c S	5	k	c S	9	k	cn S	1	..	c	6,6
Moy. du mois	9,0	..	..	8,2	..	..	8,1	..	..	7,6	..	..	8,4

Phénomènes divers observés :

Lumière zodiacale 2 fois 2
Halos solaires 4, dont l'un avec parhélie le 20 4
Couronnes { solaire ..... 1 ; lunaires 3
Arc-en-ciel double, le 6 1

TABLEAU MÉTÉOROLOGIQUE.—Juin 1875.

Évaporation sous l'abri.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Total des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
28	1	0,00	0,05	0,03	0,07	0,05	0,00	0,00	0,02	0,22
29	2	0,03	0,05	0,00	0,08	0,07	0,00	0,00	0,00	0,23
30	3	0,00	0,00	0,08	0,40	0,78	0,90	0,80	0,20	3,16
1	4	0,10	0,00	0,05	0,69	1,26	1,23	0,67	0,60	4,60
2	5	0,00	0,01	0,06	0,33	0,80	1,08	0,44	0,30	3,02
3	6	0,18	0,13	0,10	0,27	0,30	0,10	0,22	0,10	1,40
4	7	0,02	0,03	0,05	0,00	0,10	0,10	0,00	0,10	0,40
5	8	0,00	0,00	0,00	0,19	0,30	0,25	0,20	0,05	0,99
6	9	0,00	0,00	0,01	0,34	0,47	0,57	0,37	0,07	1,83
7	10	0,07	0,00	0,02	0,29	0,59	0,66	0,45	0,10	2,18
8	11	0,19	0,08	0,13	0,21	0,48	0,44	0,26	0,40	2,19
9	12	0,20	0,24	1,19	0,69	1,16	1,02	0,54	0,22	5,26
10	13	0,16	0,00	0,05	0,07	0,28	0,11	0,32	0,32	1,31
11	14	0,09	0,09	0,08	0,19	0,38	0,54	0,38	0,10	1,85
12	15	0,00	0,02	0,08	0,15	0,25	0,30	0,10	0,05	0,95
13	16	0,05	0,10	0,05	0,00	0,27	0,65	0,32	0,15	1,59
14	17	0,10	0,00	0,00	0,05	0,27	0,53	0,32	0,08	1,35
15	18	0,05	0,05	0,10	0,25	0,52	0,47	0,43	0,18	2,05
16	19	0,10	0,10	0,07	0,13	0,25	0,35	0,16	0,14	1,30
17	20	0,00	0,05	0,10	0,11	0,21	0,33	0,18	0,07	1,05
18	21	0,00	0,00	0,05	0,03	0,26	0,44	0,03	0,03	0,84
19	22	0,06	0,05	0,15	0,25	0,25	0,11	0,09	0,02	0,98
20	23	0,00	0,01	0,06	0,16	0,35	0,41	0,45	0,06	1,50
21	24	0,08	0,10	0,07	0,05	0,17	0,17	0,16	0,04	0,84
22	25	0,00	0,00	0,11	0,14	0,35	0,23	0,12	0,01	0,96
23	26	0,00	0,00	0,09	0,16	0,49	0,66	0,40	0,02	1,82
24	27	0,04	0,05	0,15	0,31	0,33	0,34	0,14	0,02	1,38
25	28	0,02	0,08	0,00	0,10	0,22	0,31	0,21	0,06	1,00
26	29	0,02	0,00	0,03	0,15	0,30	0,02	0,08	0,00	0,60
27	30	0,02	0,08	0,10	0,42	0,76	0,80	0,52	0,20	2,90
Total du	1–10	0,40	0,27	0,40	2,66	4,72	4,89	3,15	1,54	18,03
	11–20	0,94	0,73	1,85	1,85	4,07	4,74	3,01	1,71	18,90
	21–30	0,24	0,37	0,81	1,77	3,48	3,49	2,20	0,46	12,82
	mois	1,58	1,37	6,28	3,06	12,27	13,12	8,36	3,71	49,75

Maximum en 24h. : 4,60 observé le 4

Minimum „ : 0,22 „ le 1

différence 4,38

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TABLEAU MÉTÉOROLOGIQUE.—Juin 1875.

Jours de la lune	Jours du mois	Températures extrêmes. Sous l'Abri. Minima	Maxima	Différences	Moyennes	au Soleil. Max. boule noire.	Max. boule blanche.	Différences	Pluie. Jardin. Total des 24h.	Toit. Total des 24h.	Différences	Température du Puits.
		o	o	o	o	o	o	o	mm	mm	mm	o
									104,6	78,8	25,8	14,4
28	1	17,1	18,6	1,5	17,85	...	...	...	24,7	26,0	−1,3	14,4
29	2	16,9	20,2	3,3	18,55	...	...	...	0,0	0,0	0,0	14,5
30	3	15,8	26,0	10,2	20,90	35,7	31,8	3,9	0,0	0,0	0,0	14,5
1	4	15,8	29,4	13,6	22,60	42,1	37,3	4,8	0,0	0,0	0,0	14,5
2	5	17,0	29,2	12,2	23,10	43,7	38,5	5,2	15,2	10,8	4,4	14,5
3	6	17,0	22,2	5,2	19,60	...	...	...	4,7	1,4	3,3	15,0
4	7	17,6	22,2	4,6	19,90	...	...	...	0,3	0,0	0,3	15,0
5	8	16,4	19,9	3,5	18,15	...	...	...	0,0	0,0	0,0	15,0
6	9	14,7	23,9	9,2	19,30	33,8	30,7	3,1	0,0	0,0	0,0	15,0
7	10	15,8	26,6	10,8	21,20	39,6	32,4	7,2				
									10,8	9,5	1,3	15,0
8	11	20,6	27,1	6,5	23,85	...	...	...	0,0	0,0	0,0	15,0
9	12	21,0	31,2	10,2	26,10	43,3	36,4	6,9	36,5	31,1	5,4	15,0
10	13	21,6	26,2	4,6	23,90	...	...	...	11,8	9,9	1,9	15,0
11	14	22,5	28,5	6,0	25,50	40,1	33,8	6,3	0,0	0,0	0,0	15,0
12	15	21,4	26,7	5,3	24,05	33,6	29,7	3,9	55,2	52,4	2,8	15,0
13	16	22,9	29,5	6,6	26,20	39,5	34,2	5,3	54,2	47,7	6,5	15,1
14	17	20,5	27,0	6,5	23,75	...	...	...	0,0	0,0	0,0	15,1
15	18	20,3	26,4	6,1	23,35	...	...	...	0,2	0,1	0,1	15,1
16	19	20,3	24,9	4,6	22,60	...	...	...	0,8	0,2	0,6	15,2
17	20	19,6	24,5	4,9	22,05	...	...	...				
									32,2	26,9	5,3	15,2
18	21	20,6	28,1	7,5	24,35	...	...	...	8,7	7,8	0,9	15,4
19	22	21,7	25,3	3,6	23,50	...	...	...	1,3	1,2	0,1	15,3
20	23	20,8	27,2	6,4	24,00	38,1	32,6	5,5	20,5	17,7	2,8	15,3
21	24	19,1	22,9	3,8	21,00	...	...	...	40,2	36,6	3,6	15,4
22	25	17,6	23,1	5,5	20,35	...	...	...	30,9	28,6	2,3	15,5
23	26	19,8	31,4	11,6	25,60	44,6	37,5	7,1	1,8	1,7	0,1	15,6
24	27	21,5	25,4	3,9	23,45	31,7	28,9	2,8	0,7	0,5	0,2	15,7
25	28	20,8	27,1	6,3	23,95	34,7	30,8	3,9	36,6	33,8	2,8	15,7
26	29	22,8	31,8	9,0	27,30	...	...	...	...	...	...	15,9
27	30	22,8	30,4	7,6	26,60	42,2	36,5	5,7				
Moyennes du	1-10	16,4	23,8	7,4	20,11	...	...	...	149,5	117,0	32,5	...
	11-20	21,1	27,2	6,1	24,14	...	...	...	169,5	150,9	18,6	...
	21-30	20,7	27,3	6,5	24,01	...	...	...	172,9	154,8	18,1	...
	mois	19,4	26,1	6,7	22,75	...	...	...	491,9	422,7	69,2	...

Maximum: 31,8 observé le 29	Max. boule noire 44,6	Hauteur d'eau tombée	491,8
Minimum: 14,7 „ le 9	„ blanche 38,5	„ „ évaporée	49,75
Différence: 17,1	Différence max. 7,2	Différence	442,05

JOURNAL MÉTÉOROLOGIQUE.

Juin 1875.

1. 1h. m.—Ciel uniformément couvert ; pluie assez abondante ; vent très-régulier. 4h. et 7h.—Mêmes remarques. 10h.—Pluie forte ; nimbus venant rapidement de l'E. 1h. s.—Vent fort ; la pluie continue. 4h.—De 4 à 5h. il est tombé 12.9mm. de pluie ; vent très-fort. 7h.—Mêmes remarques. 10h.—La pluie tombe de nouveau avec abondance ; ciel uniformément couvert.
2. 1h. m.—Pluie assez forte de minuit ½ à 1h. ; pendant une ½h. seulement, le vent a atteint une vitesse de 16m. par seconde. 4h.—Pluie ; vent fort ; ciel uniformément couvert. 7h.—Mêmes remarques. 10h.—Pluie fine ; ciel et vent comme à 4h. 1h. s.—Il bruine ; la tour de Long-Hoa apparaît dans le brouillard ; des cumulo-nimbus vaporeux viennent rapidement du N.E. 4h. 47m. Mêmes remarques ; les thermomètres sont mouillés. 10h.—Ciel sombre et uniformément couvert ; il bruine toujours ; vent modéré et soufflant d'une manière régulière. Le thermomètre atteint son minimum à 8h. 49m. Rotation de la girouette de l'E. au N.N.W. par le N.
3. 1h. m.—Il ne pleut plus ; thermomètres mouillés. 4h.—Cumulus vaporeux venant rapidement du N.N.W. ; vent faible. 7h.—Cumulus légers et transparents ; ciel d'un bleu pâle. 10h. et 1h. s.—Mêmes remarques. 4h.—Cumulus au S. seulement, ciel d'un beau bleu. 7h.—A l'W. légers cumulo-stratus orientés du N. au S. ; ciel très-pur. 8h. 49m.—Lumière zodiacale diffuse ; ciel très-étoilé. 10h.—Même ciel ; vent très-régulier. La girouette continue sa rotation inverse.
4. 1h. m.—Ciel splendide ; vent faible ; rosée abondante. 4h.—Quelques cumulus à l'E. ; le reste comme à 1h. 7h.—A l'horizon W. quelques cumulus ; au zénith long filet allant du N.W. au S.E. 10h.—Quelques cumulus à l'horizon S. ; ciel d'un beau bleu. 1h. s.—Halo incomplet ; ciel d'un bleu pâle. 4h.—Ciel sans nuages ; calme absolu. 7h.—Même ciel ; vent faible. 8h. 49m.—Ciel très-étoilé, lumière zodiacale comme les jours précédents. 10h.—Scintillation extraordinaire des étoiles ; vent faible, rosée. La girouette est revenue sur ses pas par une rotation directe.
5. 1h. m.—Ciel très-pur ; scintillation des étoiles comme à 10h. ; vent faible ; rosée. 4h.—Ciel noir au N.E ; au zénith légers cirrus venant de l'W. ; vent presque nul ; rosée très-abondante. 7h.—Nuages de toutes formes ; cirrus et alto-cumulus venant de l'W. ; cumulus du N.W., calme. 10h.—Au zénith couche épaisse de cumulus compactes. 1h. s.—Mêmes nuages au zénith ; cumulo-nimbus au S. 4h.—Même ciel. 7h.—Ciel uniformément couvert. 10h.—Ciel très-sombre ; des cumulo-nimbus se détachent sur la brume ; quelques grosses gouttes de pluie ; le vent fraîchit. Un télégramme nous apprend qu'un typhon a sévit à Macao le 31 Mai.
6. 1h. m.—Ciel sombre ; quelques gouttes de pluie. 4h.—Ciel uniformément couvert ; vent faible, pluie peu abondante. 7h.—Même ciel ; quelques gouttes de pluie. 10h.—Ciel gris ; bandes noirâtres

allant de l'W. au N. 1h. s.—Ciel uniformément couvert ; pluie abondante, vent fort. 4h.—Mêmes remarques. Vent violent et soufflant par rafales ; le maximum de vitesse, a été de 15m. par seconde. 7h.—Mêmes remarques. Le thermomètre atteint son minimum à 7h. 10h.—Ciel très-sombre ; vent toujours fort ; pluie fine.

7. 1h. m.—Il bruine ; ciel sombre et uniformément couvert ; le vent faiblit. 4h.—Mêmes remarques. 7h.—Il bruine toujours ; tour de Long-Hoa dans le brouillard. 10h.—Cumulus vaporeux et mal définis venant de l'E. 1h. s.—Ciel uniformément couvert ; calme. 4h.—Brouillard épais ; tour à peine visible. 7h.—Cumulus comme à 10h. venant rapidement du N. ; il bruine légèrement. 8h. 49m. —Il commence de pleuvoir ; ciel sombre, calme. 10h.—Il ne pleut plus ; ciel et vent comme à 8h. 49m.

8. 1h. m.—Ciel plus sombre à l'W. ; il bruine légèrement ; vent faible. 4h.—Gros cumulo-nimbus vaporeux chassés rapidement par le vent du N.W. ; il bruine encore un peu. 7h.—Pluie fine. 10h.—Cumulo-nimbus très-noir venant du N. 1h. s.—Pluie fine pendant quelques minutes ; petites averses semblables dans l'après-midi ; les nuages viennent du N.W. 4h.—Horizon très-noir de l'W. au S. ; les nuages viennent du N. 7h.—Beaucoup de cumulo-nimbus assez bien définis. 10h.—Ciel moutonné à l'W. ; au zénith éclaircies où les étoiles paraissent à peine ; calme absolu ; rosée.

9. 1h. m.—Brume générale à travers laquelle on aperçoit les étoiles les plus brillantes ; vent presque nul ; rosée très-abondante. 4h.—Au zénith légers cirrus dans les éclaircies ; horizon très-noir du N. au S. par l'E. ; calme absolu. 7h.—Cumulus nombreux et transparents ; ciel d'un bleu pâle. 10h.—Gros cumulus vaporeux venant de l'E., alto-cumulus du S.W. 1h. s.—Cumulus venant lentement du S.W., petites éclaircies d'un bleu sombre. 4h.—Au zénith couche épaisse de cumulo-nimbus venant du N. ; à 5h. elle avait entièrement disparu. 7h.—Ceinture des nuages allant du S.E. à l'W. par le S. ; vent faible. 10h.—Ciel sans nuages et très-pur ; beau clair de lune.

10. 1h. m.—Ciel très-étoilé ; voie lactée brillante ; vent faible ; rosée très-abondante. 4h.—Cumulo-stratus en différents points de l'horizon ; vent et rosée comme à 1h. 7h.—Cumulus venant du S. ; ils sont diaphanes au zénith, noirâtres partout ailleurs. 10h.—Gros cumulus transparents et à bords diffus ; ciel d'un bleu foncé. 1h. s.—Même ciel ; les nuages viennent rapidement du S.E. 4h.—Les cumulus ne passent plus au zénith, mais longent l'horizon où ils finissent par disparaître. 7h.—Cirrus jaunâtres à l'horizon N.W., quelques cumulus à l'E. 10h.—Ciel splendide ; vent faible.

11. 1h. m.—Ciel brillant ; vent assez fort et régulier ; pas de rosée. 4h.—Cirrus diffus épars dans le ciel ; banquise au S. ; rosée peu abondante. 9h. ½.—Forte averse. 10h.—Ciel très-noir au N. ; il ne pleut plus. Midi ½.—Coup de vent qui ne dure qu'une ½h. ; vitesse, 11m. par seconde. 1h. s.—Vent fort et soufflant par rafales ; au-dessous de la brume quelques cumulus venant du S. 4h.—Averse de grosse pluie ; ciel à peu près uniformément couvert. 7h.—Horizon chargé du N. au S. par l'E. ; à l'W. cirrus

colorés en rouge très-vif par le soleil couchant. 10h.—Alto-cumulus transparents et compactes ; couronne lunaire ; ciel dégagé à l'E.

12. 1h. m.—Alto-cumulus stratifiés semblant converger vers le S. ; au-dessous cumulo-nimbus venant du S.W. ; vent très-régulier ; pas de rosée. 4h. 45m.—Légers cirrus épars dans le ciel ; ceinture presque complète de cumulus blancs à l'horizon ; rosée presque nulle. 7h.—Alto-cumulus stratifiés et très-fins ; ils paraissent tourmentés ; grandes bandes orientées du S.S.W. au N.N.E. ; çà et là quelques cumulus sans mouvement sensible. 10h.—Cumulus compactes à l'horizon S. ; reste du ciel découvert et d'un bleu pâle. 1h. s.—Halo presque complet à couleurs tranchées et de 22 à 23° de rayon ; cirro-stratus orientés du N. au S. ; gros cumulus orageux au N. surtout. 7h.—Au zénith et au-dessous de la brume cumulus très-déliés ; ciel noir en différents points de l'horizon. 8h.—Éclairs sans tonnerre. 10h.—Cumulo-nimbus partout le ciel ; quelques gouttes de pluie ; calme.

13. 1h. m.—Ciel uniformément couvert ; pluie assez forte ; vent presque nul. 4h.—Pluie forte ; ciel comme à 4h., calme absolu. 7h.—Le vent se lève ; la pluie continue. 10h.—Quelques gouttes de pluie ; nuages bas et grisâtres venant très-rapidement du S. ; ciel chargé au S.W. ; vent soufflant par rafales. 1h. s.—Ciel uniformément couvert ; de 1h. à 2h. il est tombé 6,1mm. de pluie dans le jardin ; vent comme à 10h. 4h.—Averse au moment où le vent a passé subitement au S.W. 7h.—Il ne pleut plus ; 2 couches de nuages ; la plus basse vient très-rapidement de l'W. 9h.—Couronne lunaire. 10h.—Couche épaisse de cumulus qui cache complètement la lune.

14. 4h. m.—Il bruine un peu ; cumulo-nimbus venant de l'W. sous la brume. 7h.—Mêmes nuages et même direction. 10h.—Deux couches de nuages venant l'une et l'autre de l'W., la plus basse très-rapidement ; quelques éclaircies bleuâtres. 1h. s. et 4h.—Mêmes remarques. 7h.—Cirro-stratus orientés de l'W. au N., où ils semblent converger ; cumulus orageux à l'horizon S. 10h.—Cumulus vaporeux venant rapidement du S.E. La girouette a passé en 24h. du S.W. à l'E. par W.

15. 1h. m.—Ciel uniformément couvert ; vent faible ; peu de rosée. 4h.—Mêmes remarques. 7h.—Ciel brumeux ; rosée abondante. 10h.—Cumulus diffus et bas venant de l'E. 1h. s.—Même ciel. 4h.—Cirro-stratus orientés de l'E. à l'W. et très-brillants ; au-dessus cumulus venant rapidement du S.E. 7h.—Cumulus comme à 4h. 10h.—Brume générale ; vent très-régulier.

16. 1h. m.—Couche très-légère de cirrus dans tout le ciel : couronne lunaire ; au-dessous cirro-cumulus diffus et par plaques. 4h.—Ciel uniformément couvert ; pluie forte ; vent presque nul. 7h.—Mêmes remarques. 10h.—Pluie très-forte. 1h. s.—Halo complet de 22 à 23° degrés de rayon et à couleurs pâles ; cirrus venant du S.W. ; cumulo-nimbus épars dans le ciel. 5h.—Halo comme à 1h. ; cirrus diffus par tout le ciel. 7h.—Petite averse ; ciel chargé en différents points de l'horizon. 10h.—Coup de vent de S.W. et averse qui ne dure qu'un $\frac{1}{4}$ d'heure.

17. 1h. m.—Pluie fine. 4h.—Pluie très-abondante ; vent fort. 7h.—Il ne pleut plus ; cumulo-nimbus venant rapidement du N. 10h.—Pluie fine ; nuages comme à 7h. 1h. s.—Il ne pleut plus ; les nuages viennent du N.W. 4h.—Cirrus venant du S.W.; au-dessous cumulo-nimbus venant rapidement du N.; au-zénith éclaircie d'un beau bleu. 7h.—Cirro-stratus à l'W. d'orientation diverse et très-brillants ; à l'E. gros cumulus noirâtres. 10h.—Alto-cumulus venant de l'W. et orientés de l'E. à l'W.; couronne lunaire complète et pâle ; vent faible ; rosée. Depuis le commencement du mois il est tombée 163mm de pluie ; c'est déja 6mm de plus que la moyenne de Juin pendant 10 années à Chang-Hai.
18. 3h. m.—Brume légère ; au-dessous alto-cumulus compactes ; vent faible ; rosée abondante. 4h.—A l'E. éclaircie bleuâtre ; le reste comme à 3h. 7h.—Nuages indistincts ; éclaircies à travers lesquelles on aperçoit des alto-cumulus. 10h.—Nuages bas venant du S.W.; ciel chargé à l'W. et au S, 1h. s.—Mêmes nuages venant de la même direction. 4h.—Éclaircie d'un bleu foncé ; ciel sombre au S.E. et au N. 7h.—Alto-cumulus brillants à l'W.; seconde couche de nuages noirâtres et sans mouvement apparent. 10h.—Ciel moutonné, nuages orientés de l'E. à l'W., et couronne lunaire ; vent faible, pas de rosée.
19. 1h. m.—Couche épaisse de cumulus vaporeux et compactes ; vent faible et régulier ; pas de rosée. 4h.—Mêmes remarques. 7h.—Petite pluie qui ne dure que quelques instants. 10h.—Quelques gouttes de pluie ; nuages comme à 1h.; ils viennent de l'E. 1h. s.—Petites éclaircies à l'W.; on y aperçoit une couche supérieure de cirro-cumulus venant de l'W. 4h. et 7h.—Même ciel. 10h.—Lune complètement invisible ; le vent tourne au N.
20. 4h. m.—Brume générale ; au-dessous cumulo-nimbus vaporeux comme hier ; papier ozonomètrique surchargé. 6½h.—Halo complet et pâle de 23° de rayon, avec parhélie ; l'image du soleil n'était visible que du côté S. 7h.—Gros cumulo-nimbus venant rapidement de l'E. 10h. et 1h. s.—Même ciel. 4h.—Une seconde couche de nuages apparaît à travers une éclaircie. 7h.—Il bruine un peu ; les nuages viennent du S.E. 10h.—Pluie fine moins forte.
21. 1h. m.—Pluie fine abondante. 4h.—Il ne pleut plus ; ciel uniformément couvert. 7h.—Pluie ; ciel extrêmement sombre. 10h.—Il ne pleut plus ; nuages bas venant très-rapidement du S.W.; ciel chargé au S. 1h. s.—Trois couches de nuages ; les deux inférieures marchent très-rapidement. 4h.—Deux couches de nuages toujours très-rapides ; éclaircie d'un beau bleu, nuages orageux au N. et à l'W. 6h. ¼—Orage presque zénithal ; il éclate subitement et ne dure qu'un ¼ d'heure ; il passe au N.E.; 4 ou 5 secondes d'intervalle entre l'éclair et le tonnerre ; vitesse du vent 15m. par seconde ; pluie, 16mm. en un ½h. 7h.—Ciel chargé au N.E. et à l'E. 10h.—Dans les éclaircies cirro-cumulus orientés de l'E. à l'W.; cumulo-nimbus très-noirs en différents points du ciel.
22. 1h. m.—Brume générale ; au-dessous quelques cumulus venant de l'W. 4h.—Léger voile de cirrus dans les éclaircies ; gros cumulo-nimbus au N. et à l'E.; rosée faible. 7h.—Ciel chargé ; nuages venant de l'W.S.W. 10h.—Ciel très-noir au S.W.; couche inférieure de nuages basse et blanchâtre. 1h. s.—Le vent et les

nuages inférieurs marchent en sens opposé. 2h.—Coup de tonnerre lointain. 4h.—Les deux couches de nuages marchent dans deux directions perpendiculaires. 7h.—Ciel très-sombre ; quelques cumulo-nimbus se détachent sur la brume ; calme absolu. 10h.—Éclairs peu brillants ; vent faible. Petites averses toute l'après-midi ; pendant les intervalles il tombe toujours quelques gouttes de pluie. Temps orageux toute la journée ; courbe du barographe très-sinueuse.

23. 4h. m.—Ciel uniformément couvert ; calme absolu. 7h.—Mêmes remarques. 10h.—Horizon orageux dans presque toutes les directions ; cumulo-nimbus bas et blanchâtres venant du S.W. 1h. s.—Brume générale ; au-dessous nuages bas comme à 10h. éclaircie au N.W. ; ciel sombre au S.W. 4h.—Éclaircie au N.W. ; cumulo-nimbus noirâtres occupant tout l'horizon de l'E. au S.W. ; à l'W. cumulo-cirrus d'un blancheur et d'un délicatesse extrême ; il s'y forme une couronne solaire. 7h.—Arc-en-ciel au S.E. ; coucher de soleil brillant ; ciel sombre au zénith ; éclaircie verdâtre au N. 10h.—Éclaircie au N.W. ; cumulo-nimbus se détachant sur la brume. Vent presque nul ; rosée.

24. 1h. m.—Ciel pommelé ; couronne lunaire ; cumulo-nimbus très-noir au S.W. ; vent faible, rosée abondante. 4h.—Éclaircie à l'horizon N. et N.E., reste du ciel d'un aspect très-varié ; cumulo-stratus orientés E. et W., cumulus compactes, etc. 7h. et 10h.—Pluie. 1h. s.—Id. ; au N.W., couche de cumulo-stratus orientés E. et W. 4h.—Il ne pleut plus ; cumulo-stratus comme à 1h. ; la température atteint son maximum. 7h.—De gros cumulo-nimbus vaporeux et blanchâtres venant de l'E. occupent tout le ciel. 8h. 49m.—Ciel très-noir ; pluie abondante. 10h.—Mêmes remarques. Le total de la pluie tombée depuis le commencement du mois est de 381,6mm. ; il dépasse de 122,3m. le maximum de pluie tombée à Chang-Hai en Juin, depuis plus de 10 ans.

25. 1h. m.—Pluie ; vent faible. 4h.—Il ne pleut plus ; long cumulo-stratus allant du S.E. au N.E. ; cumulo-nimbus vaporeux et noirs. 7h.—Pluie. 10h.—Les nuages viennent rapidement du N.E. 1h. s.—Il ne pleut plus ; vent fort ; nuages comme à 10h. 4h.—Au S. éclaircie et cumulo-stratus orientés E.-W. ; cumulus bas venant rapidement de l'E. ; quelques gouttes de pluie ; ciel sombre du N. 10h.—Pluie forte ; vent presque nul.

26. 1h. m.—Pluie ; le vent fraîchit ; ciel très-sombre au N. ; ailleurs gros cumulo-nimbus vaporeux. 4h.—Il ne pleut plus ; ciel uniformément couvert. 7h.—Léger brouillard ; tour voilée ; cumulus diffus venant rapidement de l'E. 10h.—Cirro-cumulus immobiles ; cumulus comme à 7h. ; ils paraissant tiraillés ; éclaircies d'un beau bleu. 1h. s.—Çà et là cirrus panachés ; couronne ; ciel bleuâtre. 4h.—Gros nimbus orageux au S.W. et au N. ciel d'un bleu foncé. 6h. ½.—Eclairs sans tonnerre à l'W. ; 6h. ¾ tonnerre lointain. 7h. ¼.—Pluie abondante ; le vent passe à l'W. Éclairs sans tonnerre presque continus jusqu'à 10h. L'orage a marché du N. au S. par l'E. 10h.—Le ciel se découvre rapidement ; étoiles peu brillantes ; vent faible ; rosée.

27. 4h. m.—A l'E. cumulo-stratus et éclaircie s'étendant du N. au S. ; cumulus diffus venant rapidement du S.W. ; rosée. 7h.—Cirrus

et alto-cumulus paraissant immobiles ; cumulus venant de l'W.S.W. ; ciel d'un bleu pâle au zénith, verdâtre à l'horizon. 10h.—Cumulus vaporeux. 1h. s.—Mêmes nuages ; ils viennent du N. ; ciel chargé en différents points ; petite averse. 7h.—Pluie d'orage ; gros nimbus orageux sous la brume au S. et à l'W. 10h.—Éclairs sans tonnerre presque continus ; calme. Le thermomètre atteint son minimum.

28. 1h. m.—Une couche de brume épaisse et uniforme couvre tout le ciel. 4h.—Même ciel. 7h.—Au-dessous de la brume des cumulus vaporeux viennent lentement de l'E. 10h.—Même remarque. 1h. s.—Cumulo-nimbus noirâtres et diffus par tout le ciel. 4h.—Trois couches de nuages ; les deux inférieures marchent en sens inverse ; ciel orageux du S.W. ; éclaircie verdâtre au N.E. 7h.—Nuages orageux à l'horizon ; cumulus bas et blanchâtres au-dessous des cumulo-nimbus. 9h.—Ciel découvert et très-étoilé au N., orageux de l'E. à l'W. ; éclairs sans tonnerre ; ils sont rares et peu brillants : lueurs de lumière zodiacale. 10h.—Ciel uniformément couvert.

29. 1h. m.—Ciel uniformément couvert ; calme ; pas de rosée. 4h.—Brouillard qui se dépose sur les thermomètres. 7h.—Au-dessous du brouillard, alto-cumulus compactes ; tour voilée ; pas de rosée ; 7h. $\frac{3}{4}$ le brouillard se résout en pluie. 10h.—Alto-cumulus d'une blancheur éblouissante ; au-dessous cumulo-nimbus vaporeux et noirâtres. 1h. s.—Averse ; 1h. $\frac{1}{2}$ pluie torrentielle. 4h.—Quelques gouttes de pluie ; 2 couches de nuages allant en sens inverse. 7h.—Pluie peu abondante ; ciel plus sombre à l'W. 10h.—Ciel diversement couvert, moins sombre à l'E.

30. 1h. m.—Le ciel se découvre au S.E., çà et là quelques étoiles ; vent régulier et faible ; pas de rosée. 4h.—Cumulo-stratus et éclaircie verdâtre à l'E. ; orientation du N. au S. ; vent faible ; pas de rosée. 7h.—Ciel d'un beau bleu au zénith ; soleil blanchâtre. 10h.—Cumulo-cirrus par plaques immobiles, cumulus épars et venant rapidement du S. ; vent fort. 1h. s.—Ciel pommelé en quelques endroits ; ailleurs cumulo-cirrus par plaques ; cumulus *balles-de-coton* dans toutes les directions ; éclaircies d'un bleu foncé au zénith. 4h.—Cirrus panachés ou stratifiés diversement. 7h.—Cirrus diffus ; cumulo-nimbus et ciel orageux en différents points. 10h.—Quelques cumulus épars ; reste du ciel étoilé ; pas de rosée.

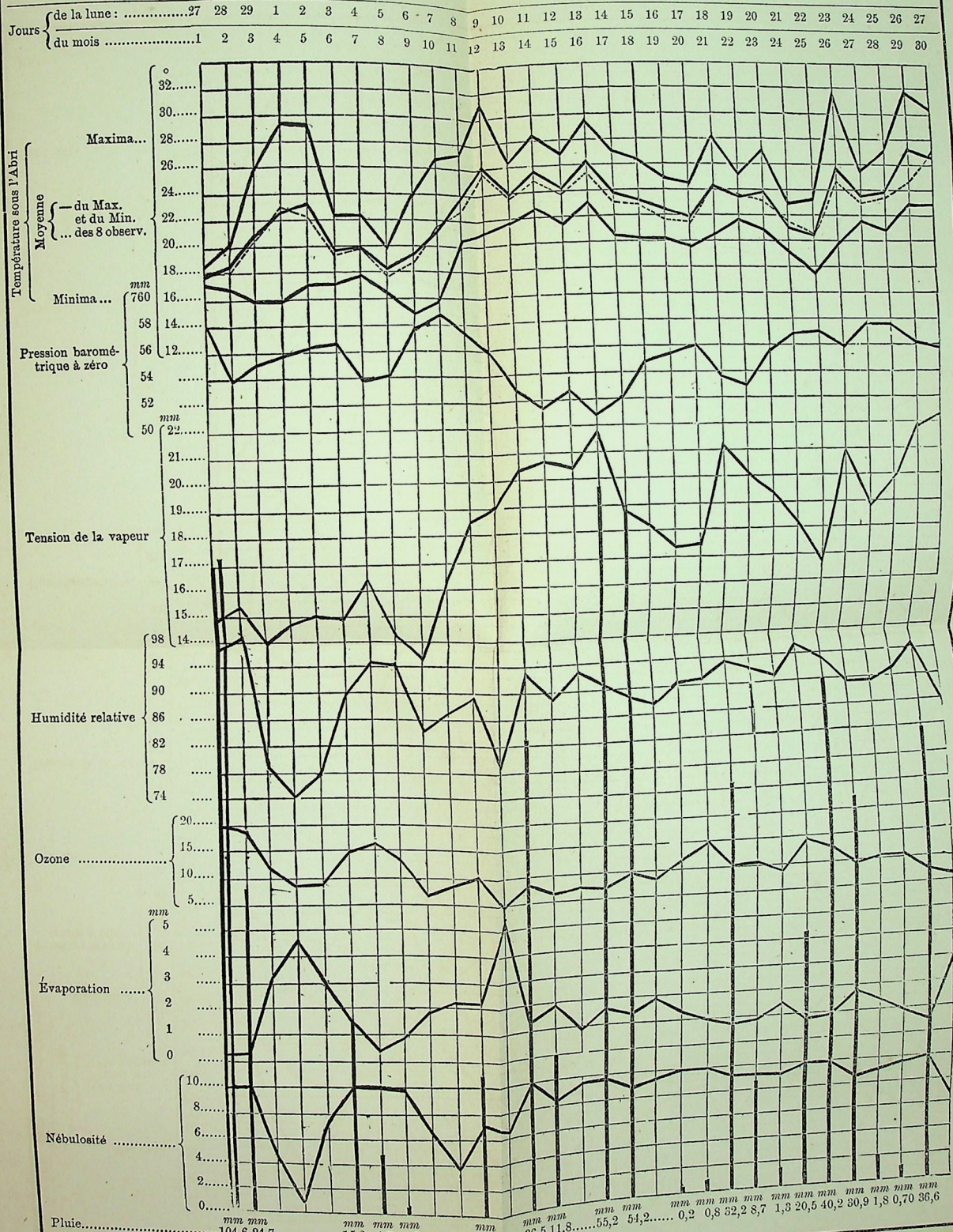
H. Le Lec, s.j.

A. M. D. G.

OBSERVATOIRE DE ZI-KA-WEI

Résumé des Observations Météorologiques de Juin 1875.

MOYENNES DIURNES.



A. M. D. G.

OBSERVATOIRE

MÉTÉOROLOGIQUE ET MAGNÉTIQUE,

des Pères de la Compagnie de Jésus

à ZI-KA-WEI.

BULLETIN MÉTÉOROLOGIQUE,

JUILLET 1875.

NOTA.—Pour la position géographique de l'observatoire, les instruments utilisés, les notations employées, etc., voir la note préliminaire placée en tête du Bulletin de Septembre 1874.

TABLEAU METÉOROLOGIQUE.—Juillet 1875.

Pression barométrique à zéro.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
28	1	756,00	755,56	756,46	756,45	755,40	754,67	754,99	755,45	755,62
29	2	55,10	54,90	55,36	55,65	55,03	54,28	54,56	55,39	55,03
1	3	54,88	54,33	54,57	55,24	54,53	53,54	53,21	53,89	54,27
2	4	53,88	53,81	54,53	54,72	54,29	53,32	53,95	54,09	54,07
3	5	53,36	52,41	53,05	53,31	52,64	51,26	50,95	51,44	52,30
4	6	51,27	50,68	51,18	51,51	50,78	50,00	50,24	50,96	50,83
5	7	50,61	50,38	51,18	52,00	51,18	51,37	51,38	51,79	51,24
6	8	51,70	51,11	50,93	51,06	50,29	50,05	49,99	50,49	50,70
7	9	* 50,35	50,22	51,00	51,06	50,30	49,68	50,40	51,87	50,61
8	10	51,33	50,89	52,06	52,15	52,23	51,96	52,65	53,16	52,05
9	11	52,58	52,00	52,71	52,93	52,23	51,42	51,47	52,21	52,19
10	12	* 50,88	50,50	50,55	50,36	49,55	48,43	48,26	48,67	49,65
11	13	47,47	47,27	48,36	49,04	48,67	48,82	49,85	50,84	48,79
12	14	50,77	50,79	52,35	52,72	52,44	51,45	52,05	53,34	51,99
13	15	52,96	52,76	53,38	53,98	52,66	52,22	52,24	52,83	52,88
14	16	* 52,50	51,69	52,14	51,78	50,99	49,94	50,16	50,72	51,24
15	17	50,15	50,21	51,31	52,10	52,10	52,03	52,61	53,41	51,74
16	18	* 53,42	53,44	54,34	54,92	55,31	54,67	54,63	55,73	54,56
17	19	55,45	55,26	55,61	55,97	55,12	54,16	54,14	54,85	55,07
18	20	53,91	52,88	53,18	53,84	53,09	51,65	51,51	52,50	52,82
19	21	51,59	51,53	52,17	52,12	53,26	52,24	52,34	53,24	52,31
20	22	52,96	52,99	53,69	54,12	53,82	52,87	53,59	54,62	53,58
21	23	54,40	54,74	55,54	56,26	55,23	54,56	54,90	55,43	55,13
22	24	55,37	55,09	55,83	56,52	56,03	55,34	55,47	56,45	55,76
23	25	55,98	56,06	56,66	57,21	56,26	55,67	55,71	56,56	56,26
24	26	55,70	55,24	55,70	55,59	54,79	53,85	53,88	54,50	54,91
25	27	* 53,90	54,01	54,58	54,66	53,58	52,76	53,35	54,51	53,92
26	28	54,01	53,17	53,86	54,16	53,31	52,32	52,77	53,54	53,39
27	29	52,51	52,34	52,74	52,97	52,44	52,06	52,48	52,96	52,56
28	30	52,87	52,86	53,49	53,83	52,92	52,57	53,31	54,65	53,31
29	31	* 54,10	54,01	54,85	55,30	54,86	54,59	55,19	56,48	54,92
Moyennes du	1–10	752,85	752,43	753,03	753,32	752,67	752,01	752,23	752,85	752,67
	11–20	52,01	51,68	52,39	52,76	52,22	51,48	51,69	52,51	52,09
	21–31	53,94	53,80	54,46	54,79	54,22	53,53	53,90	54,80	54,18
	mois	752,97	752,68	753,33	753,66	753,07	752,38	753,65	753,44	753,02

Maximum : 757,21 observé le 25 à 10 h. A.M.
Minimum : 747,27 „ le 13 à 4 h. A.M.
} différence : ..... 9,94 mm

TABLEAU MÉTÉOROLOGIQUE.—Juillet 1875.

Température sous l'abri.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
28	1	25,1	25,0	27,0	28,9	31,0	30,3	27,5	26,0	27,60
29	2	24,9	25,0	28,0	32,2	35,3	36,0	30,0	27,9	29,91
1	3	27,0	26,9	29,8	34,0	35,0	35,8	31,7	29,2	31,17
2	4	26,0	25,5	28,5	32,8	33,1	32,7	30,1	28,2	29,61
3	5	27,2	26,9	28,3	32,3	34,0	33,0	30,5	28,0	30,03
4	6	27,7	27,7	28,3	32,0	35,0	34,9	31,0	29,9	30,81
5	7	28,3	28,0	26,3	28,3	31,0	30,5	28,6	26,9	28,49
6	8	26,0	25,0	27,5	24,7	27,0	29,5	27,4	26,1	26,65
7	9	* 25,6	25,2	27,2	30,0	31,8	30,0	27,0	25,7	27,81
8	10	25,1	24,8	24,0	25,3	26,7	26,0	24,0	22,6	24,81
9	11	22,6	22,1	25,6	26,3	27,2	26,9	24,5	24,0	24,90
10	12	* 23,6	23,3	23,3	23,2	23,0	24,0	23,3	24,1	23,47
11	13	24,6	24,5	25,0	26,5	27,8	26,1	24,0	23,1	25,20
12	14	22,8	22,8	23,1	26,0	28,3	28,8	25,1	23,9	25,10
13	15	23,8	22,0	26,1	30,5	31,0	29,3	26,0	24,9	26,70
14	16	* 24,4	24,0	25,7	28,0	28,5	29,0	27,0	26,9	26,69
15	17	26,1	26,0	27,3	28,1	29,2	29,0	27,0	26,5	27,40
16	18	* 26,2	26,0	27,9	28,9	29,5	29,9	27,0	26,7	27,76
17	19	26,3	26,0	27,7	30,4	31,1	32,0	28,9	27,9	28,79
18	20	26,9	26,9	28,2	31,4	33,5	33,6	30,2	28,6	29,80
19	21	28,2	27,6	27,6	31,6	24,2	26,9	24,0	24,2	26,79
20	22	24,8	25,0	26,0	30,1	31,0	31,0	27,7	26,2	27,72
21	23	26,5	26,0	27,3	30,0	30,6	30,7	27,2	26,4	28,09
22	24	26,3	26,0	27,3	30,1	31,7	30,2	27,4	27,2	28,28
23	25	26,8	26,0	27,5	30,5	32,9	31,4	28,3	27,0	28,80
24	26	26,6	26,3	28,2	31,5	34,2	32,9	29,0	26,8	29,44
25	27	* 26,0	26,0	28,0	32,4	35,8	34,0	29,0	26,7	29,74
26	28	25,9	25,2	27,6	31,9	37,0	29,8	28,7	27,0	29,14
27	29	26,2	26,0	28,8	34,0	37,4	35,2	31,1	29,0	30,96
28	30	28,0	27,0	29,0	33,1	37,0	32,6	29,9	28,5	30,64
29	31	* 27,3	26,4	29,0	34,7	36,2	31,9	30,0	27,9	30,42
Moyennes du	1–10	26,29	26,00	27,49	30,05	31,99	31,87	28,78	27,05	28,69
	11–20	24,73	24,27	25,99	27,93	28,91	28,86	26,30	25,66	26,58
	21–31	26,60	26,14	27,84	31,81	33,45	31,51	28,39	26,99	29,09
	mois	25,90	25,49	27,33	30,00	31,52	30,77	27,84	26,58	28,15

Maximum : o 37,4 observé le 29 à 1 h. P.M.
Minimum : 22,0 „ le 15 à 4 h. A.M.
} différence ..... o 15,4

TABLEAU MÉTÉOROLOGIQUE.—Juillet 1875.

Actinomètre : 1° *thermomètre à boule nue.*

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
28	1	24,5	24,4	32,8	37,4	41,3	38,5	27,6	25,4	31,49
29	2	24,2	24,3	35,3	42,3	44,2	43,0	30,6	27,3	33,82
1	3	26,6	26,2	36,9	43,3	44,5	43,3	31,3	30,0	35,26
2	4	26,1	25,3	35,0	39,4	39,0	35,4	29,8	27,6	32,20
3	5	26,8	26,3	29,9	38,6	42,2	39,5	29,9	27,5	32,59
4	6	27,3	27,3	31,3	38,8	45,0	42,3	30,3	27,3	33,70
5	7	28,0	28,1	26,3	30,1	39,2	36,3	28,4	26,3	30,34
6	8	25,4	24,3	33,2	27,4	30,3	37,3	27,3	25,4	28,82
7	9	* 25,4	25,3	32,5	38,3	42,5	38,4	27,2	25,5	31,89
8	10	25,2	24,3	24,3	30,0	31,3	29,3	23,5	22,2	26,26
9	11	22,2	21,4	32,0	32,3	34,9	33,4	24,3	23,8	28,04
10	12	* 23,5	23,4	23,9	24,3	24,2	24,6	23,2	24,3	23,92
11	13	24,4	24,3	26,2	35,3	36,0	30,6	23,8	23,3	27,99
12	14	22,3	22,5	24,4	31,9	35,9	37,3	24,5	23,3	27,76
13	15	23,3	22,6	32,3	42,6	39,3	38,6	26,0	24,3	31,12
14	16	* 23,8	23,3	26,9	36,3	33,8	34,5	26,9	26,3	28,97
15	17	26,0	26,0	30,1	34,3	34,5	36,6	27,3	26,3	30,14
16	18	* 25,9	25,6	31,3	37,2	36,3	38,3	27,2	26,3	31,01
17	19	26,2	26,1	34,8	40,7	39,7	41,3	28,3	27,3	33,05
18	20	26,3	25,3	35,9	41,3	43,5	41,5	29,9	28,4	34,01
19	21	27,9	27,3	28,3	40,7	25,3	29,5	23,4	24,2	28,32
20	22	24,3	24,3	29,5	40,3	37,3	39,6	27,3	26,1	31,09
21	23	26,0	25,3	34,3	41,0	41,5	39,3	27,3	26,3	32,62
22	24	26,2	25,7	34,9	40,3	41,0	38,5	27,3	27,0	32,61
23	25	26,3	25,3	34,6	40,9	42,4	36,4	28,3	26,5	32,59
24	26	26,3	26,1	25,2	42,3	45,4	41,3	28,6	26,3	32,69
25	27	* 25,5	25,5	34,6	43,1	44,3	42,3	29,1	26,3	33,84
26	28	25,3	25,2	33,8	42,4	47,5	30,9	28,3	26,8	32,52
27	29	26,1	25,7	34,9	44,0	46,5	38,4	31,1	28,3	34,37
28	30	27,3	26,3	35,4	43,4	45,4	36,2	29,3	27,8	33,89
29	31	* 26,4	26,2	35,4	44,0	45,8	40,2	29,6	27,3	34,36
Moyennes du	1–10	25,95	25,58	31,75	36,56	39,95	38,33	28,53	26,45	31,64
	11–20	24,39	24,05	29,78	35,62	35,81	35,67	26,14	25,36	29,60
	21–31	26,14	25,72	32,81	42,04	42,04	37,51	28,14	26,63	32,63
	mois	25,52	25,13	31,49	38,20	39,35	37,18	27,62	26,16	31,33

Moyennes du mois { Therm. à boule noirçie : 36,48 ; Therm. à boule nue : 31,33 } différence ..... o 5,15

TABLEAU MÉTÉOROLOGIQUE.—Juillet 1875.

Actinomètre : 2° *thermomètre à boule noirçie.*

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
28	1	24,5	24,4	41,5	49,1	56,2	51,9	28,0	25,4	37,62
29	2	24,2	24,3	46,0	55,2	57,9	55,8	30,2	27,3	40,11
1	3	26,6	26,2	47,1	56,4	58,2	56,6	31,3	30,0	41,55
2	4	26,1	25,2	44,7	49,1	48,1	40,8	30,1	27,6	36,46
3	5	26,7	26,2	32,6	48,7	53,8	51,0	30,2	27,5	37,09
4	6	27,2	27,2	35,3	49,6	55,9	54,8	30,3	27,2	38,94
5	7	28,0	28,1	27,5	33,1	51,2	45,5	28,5	26,2	33,51
6	8	25,4	24,3	42,7	33,5	34,6	51,3	27,9	25,4	33,14
7	9	* 25,4	25,3	42,1	49,8	59,6	53,0	27,2	25,4	38,47
8	10	25,2	24,3	25,2	37,9	39,0	36,4	23,2	22,2	29,17
9	11	22,2	21,4	42,1	40,9	45,7	44,5	24,5	24,0	33,16
10	12	* 23,5	23,4	25,1	26,4	26,2	26,5	23,2	24,2	24,81
11	13	24,4	24,3	28,1	46,6	47,2	37,8	24,2	23,3	31,99
12	14	22,3	22,5	26,3	40,5	47,3	51,1	25,2	23,3	32,31
13	15	23,3	22,5	42,7	59,7	53,4	54,5	26,2	24,2	38,31
14	16	* 23,7	23,2	29,2	49,2	42,2	43,3	27,2	26,3	33,04
15	17	26,2	26,0	35,2	42,5	43,0	49,3	27,4	26,2	34,47
16	18	* 25,9	25,6	36,4	49,1	46,2	51,2	27,2	26,2	35,97
17	19	26,2	26,0	45,5	54,2	51,2	56,2	28,4	27,3	39,37
18	20	26,2	25,2	46,7	54,2	58,3	55,2	30,2	28,3	40,54
19	21	27,9	27,3	29,7	53,2	27,1	34,5	23,5	24,2	30,92
20	22	24,2	24,3	35,7	55,0	47,1	53,4	27,4	26,1	36,65
21	23	26,0	25,3	45,2	55,9	58,2	53,5	27,3	26,2	39,70
22	24	26,2	25,8	46,3	53,3	54,5	52,2	27,5	27,1	39,11
23	25	26,2	25,3	45,2	54,2	57,1	44,5	28,2	26,5	38,40
24	26	26,2	26,1	45,5	55,7	61,0	55,2	29,1	26,3	40,64
25	27	* 25,5	25,5	45,2	56,0	57,2	56,2	29,2	26,3	40,14
26	28	25,3	25,2	43,7	55,3	63,4	32,2	28,3	26,8	37,52
27	29	26,1	25,7	44,7	56,4	61,2	43,0	31,2	28,2	39,56
28	30	27,2	26,2	45,2	56,2	59,6	39,0	29,3	27,8	38,81
29	31	* 26,4	26,2	45,2	54,2	55,6	52,2	29,6	27,2	39,57
Moyennes du	1–10	25,93	25,55	38,47	46,24	51,85	49,71	28,69	26,42	36,61
	11–20	24,39	24,01	35,73	46,33	46,07	46,96	26,37	25,33	34,40
	21–31	26,19	25,71	42,87	55,04	54,73	46,90	28,24	26,61	38,27
	mois	25,49	25,11	39,15	49,39	51,01	47,82	27,78	26,14	36,48

Maximum observé le 28 { Therm. à boule noirçie : 63,4 ; Therm. à boule nue : 47,5 } différence ..... o 15,9

TABLEAU MÉTÉOROLOGIQUE.—Juillet 1875.

Tension de la vapeur.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
28	1	21,91	21,97	22,92	22,95	24,91	23,80	23,62	23,33	23,18
29	2	22,64	22,98	23,75	25,48	25,86	21,92	26,86	24,44	24,24
1	3	25,43	24,43	25,21	24,36	23,74	22,38	27,89	26,69	25,02
2	4	22,93	23,24	25,13	25,11	24,27	24,52	27,03	26,20	24,80
3	5	24,67	24,19	25,92	26,35	23,63	24,99	25,44	25,02	25,03
4	6	24,75	24,35	25,69	25,39	23,31	23,80	26,70	26,48	25,04
5	7	26,14	25,88	24,16	24,41	24,68	22,62	24,86	24,43	24,65
6	8	22,93	23,18	24,05	21,37	22,31	23,03	24,97	23,67	23,19
7	9	*23,65	23,63	24,24	22,50	22,87	23,78	22,72	21,74	23,14
8	10	21,50	21,69	21,80	19,47	19,37	19,61	18,97	19,14	20,19
9	11	19,14	18,36	20,24	19,04	19,25	18,67	18,66	18,61	19,00
10	12	*18,82	19,04	19,22	20,55	20,50	20,27	20,70	21,55	20,08
11	13	22,01	22,28	23,55	20,84	21,45	20,70	19,70	19,53	21,26
12	14	19,17	19,35	18,98	19,23	19,93	20,83	20,93	21,10	19,94
13	15	20,78	19,66	22,87	23,68	23,37	22,94	21,55	21,44	22,04
14	16	*21,04	20,65	22,75	23,31	23,43	24,61	23,93	23,79	22,94
15	17	23,27	23,33	23,34	23,68	23,00	23,13	22,51	21,24	22,94
16	18	*21,09	20,95	22,16	21,94	23,24	22,99	22,14	22,50	22,13
17	19	22,18	21,55	22,68	22,26	22,46	23,84	23,40	22,56	22,62
18	20	22,37	22,76	22,78	22,69	24,24	23,46	25,62	25,95	23,73
19	21	25,76	24,20	23,56	23,64	21,68	21,80	21,65	21,87	22,90
20	22	22,29	22,98	23,13	26,58	26,23	25,79	23,09	22,81	24,11
21	23	22,62	22,93	23,14	23,14	24,04	24,20	24,24	23,29	23,45
22	24	22,74	22,56	21,56	22,44	23,58	23,44	22,67	22,59	22,70
23	25	20,86	21,35	22,00	21,36	21,31	23,33	23,98	23,52	22,21
24	26	23,57	24,36	24,68	23,48	24,24	23,72	23,97	24,25	24,03
25	27	*23,33	23,53	24,80	25,36	25,79	26,66	25,26	23,51	24,78
26	28	23,19	23,43	24,42	25,67	24,50	21,79	24,58	24,58	24,02
27	29	24,86	24,99	25,39	26,66	25,26	24,06	28,26	25,26	25,59
28	30	25,44	24,37	25,26	24,71	24,50	26,16	22,78	25,57	24,85
29	31	*26,99	25,16	27,48	26,02	25,00	25,67	25,08	24,02	25,68
Moyennes du	1–10	23,64	23,55	24,29	23,74	23,50	23,04	24,91	24,11	23,85
	11–20	20,99	20,79	21,86	21,72	22,09	22,14	21,91	21,83	21,67
	21–31	23,79	23,62	24,31	24,46	24,19	24,24	24,05	23,75	24,03
	mois	22,83	22,69	23,51	23,34	23,29	23,18	23,64	23,25	23,21

Maximum 28,26 mm observé le 29 à 7 h. P.M.

Minimum : 18,36 mm „ le 11 à 4 h. A.M.

différence..... 9,90 mm

TABLEAU MÉTÉOROLOGIQUE.—Juillet 1875.

Humidité relative.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
28	1	93	93	87	78	74	74	86	93	84,7
29	2	97	97	85	71	61	50	85	87	79,1
1	3	96	92	81	62	57	51	80	88	75,9
2	4	92	96	87	68	65	67	85	92	81,5
3	5	92	92	91	73	60	67	78	89	80,3
4	6	89	88	90	71	56	57	80	84	76,8
5	7	92	92	95	86	74	70	85	92	85,8
6	8	92	98	88	92	84	75	92	94	89,4
7	9	* 96	99	90	71	65	76	86	88	83,9
8	10	90	93	98	81	74	78	86	94	86,7
9	11	94	92	82	75	71	71	82	84	81,4
10	12	* 87	90	91	97	98	91	97	97	93,5
11	13	96	98	100	81	77	82	89	93	89,5
12	14	93	94	90	77	70	71	88	96	84,9
13	15	95	100	91	73	70	76	86	92	85,4
14	16	92	93	92	83	81	82	90	90	87,9
15	17	93	93	86	84	77	78	85	82	84,8
16	18	* 83	84	80	74	76	74	83	86	80,0
17	19	87	86	82	69	67	67	79	81	77,3
18	20	85	91	80	66	63	61	80	89	76,9
19	21	91	88	86	68	97	83	93	97	87,9
20	22	96	97	93	84	79	77	84	90	87,5
21	23	88	92	86	74	73	73	90	91	83,4
22	24	89	90	80	70	67	73	84	84	79,6
23	25	79	85	80	66	57	68	84	89	76,0
24	26	91	96	87	68	61	64	80	92	79,9
25	27	* 93	94	88	70	59	67	85	90	80,7
26	28	93	98	89	73	51	70	84	93	81,4
27	29	98	100	86	67	62	57	84	95	79,9
28	30	91	92	85	66	51	71	73	83	77,1
29	31	*100	98	92	63	55	73	79	86	80,7
Moyennes du	1–10	92,9	94,0	89,2	75,3	67,0	66,5	84,3	90,1	82,4
	11–20	90,5	92,1	87,4	77,9	75,0	75,3	85,9	89,0	84,1
	21–31	91,7	93,6	86,5	69,9	64,7	70,5	83,6	89,5	81,3
	mois	91,6	93,2	87,7	74,2	68,8	70,8	84,6	89,5	82,57

Maximum : 100 observé 4 fois
Minimum : 50 „ le 2 à 4h. P.M.
} différence..... 50

TABLEAU MÉTÉOROLOGIQUE.—Juillet 1875.

Ozone.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
28	1	8	8	8	4	4	4	5	6,5	5,9
29	2	8	6	6,5	4,0	5,0	3	7	8	5,9
1	3	7	6	7	5	3	3	3	6	5,0
2	4	8	9	7	6	4	4	4	6	6,0
3	5	6,5	8,5	7	7	3	2,5	4	7	5,7
4	6	9	8,5	5,5	4	3	2	2	3	4,6
5	7	3	7	8,5	6	9	3	3	6	5,7
6	8	6	2,5	4	9	6	2	3	8,5	5,1
7	9	...	6	3	7	3	3	4	9	5,0
8	10	9	11	9	9	5,5	5	5	8	7,7
9	11	8,5	7	6,5	5	4	3	4	8	5,7
10	12	10	7	10	9	9	10	11	11	9,6
11	13	10	7	2	10	4,5	4	9	11	7,2
12	14	11	9	8	6,5	2	2	3	4	5,7
13	15	8	6	3	5	3	2	5	9	5,1
14	16	...	9	6	7	2	5	6	8,5	6,2
15	17	7,5	8,5	9,5	2	2	2	3	5	4,9
16	18	...	9	1	2	2	2	2	7,5	3,6
17	19	7	6	7	2,5	1	2	2,5	3	3,9
18	20	4	6	6	2	2	1	1	0,5	2,8
19	21	6	6	0,5	0,5	4	8	8	9	5,2
20	22	8	8	4	8	2	2	2	4,5	4,8
21	23	6,5	4	3	2	2	2	2	7	3,6
22	24	6	5	1	2	2	2	2	6	3,3
23	25	3	3	0	2	2,5	2	2	5	2,4
24	26	8	7	6	2	4,5	3	2,5	6	4,9
25	27	* 8	7	7	3	1,5	3,5	2,5	6	4,8
26	28	6,5	4,5	3,5	5	2,5	2,5	3	5	4,1
27	29	6	4	3,5	4	4	3	3	8,5	4,5
28	30	7,5	8	7,5	4	4	3	3	5	5,2
29	31	* 4	6	4	8	4	4	3,5	7	5,1
Moyennes du	1–10	7,2	7,2	6,6	6,1	4,5	3,2	4,0	6,3	5,7
	11–20	8,2	7,5	5,9	5,1	3,1	3,3	4,7	6,7	5,5
	21–31	6,3	5,7	3,6	3,7	3,0	3,2	3,0	6,3	4,3
	mois	7,1	6,8	5,3	4,9	3,5	3,2	3,9	6,6	5,1

Maximum : 11 observé 4 fois

Minimum : 0,0 „ le 25 à 7h. A.M.

} Différence..... 18,0

TABLEAU MÉTÉOROLOGIQUE.—Juillet 1875.

Direction du vent; sa vitesse par seconde.

Date.	Matin.								Soir.								Moyennes des 8 observations.
	1 h.		4 h.		7 h.		10 h.		1 h.		4 h.		7 h.		10 h.		
	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	
		m		m		m		m		m		m		m		m	m
1	SE	5,6	SE	4,8	SE	4,8	SSE	6,9	SSE	6,3	SE	6,2	ESE	6,1	SE	4,0	5 6
2	SSE	3,0	SSE	2,4	S	3,0	S	4,2	SW	4,0	WSW	3,2	SE	2,4	SSE	2,9	3,1
3	SSE	2,6	SSE	2,7	S	3,2	SW	4,4	WSW	5,3	WSW	5,0	SSW	2,8	SSE	2.7	3,6
4	E	4,2	S-E	2,8	N	0,8	SW	2,1	WSW	4,4	WSW	3,2	O	0,7	SE	0,2	2,3
5	SE	2,2	SSE	2,0	SSE	0,9	SW	1,2	SW	3,0	S	2,3	SSE	3,2	SSE	2,1	2,1
6	SSE	2,8	SSE	2,7	SSW	2,6	SSW	3,6	SW	6,5	WSW	6,6	SW	3,0	S	2,2	3,7
7	WSW	2,7	WSW	2,5	W	3,1	W	4,8	W	6,7	WNW	7,1	W	5,0	W	2,2	4,3
8	SW	2,7	N	0,6	E	1,6	WNW	3,7	SW	1,2	W	4,4	WSW	3,0	S	1,5	2,3
9	O	0,4	O	0,4	E	0,7	NNE	1,4	NE	2,2	E	3,7	E	4,2	E	3,6	2,1
10	ENE	3,3	E	2,9	NE	3,1	E	3,8	NE	4,2	NE	4,3	NE	4,8	NE	1,5	3,4
11	NE	1,3	NNE	1,1	NNE	1,4	E	4,4	ENE	5,2	E	6,1	ENE	5,7	ESE	2,5	3,5
12	E	3,6	E	3,6	ENE	3,9	E	6,4	ENE	6,5	ENE	6,9	E	6,6	E	7,0	5,6
13	E	5,3	E	1,7	O	0,6	NW	3,5	NW	3,7	NW	5,6	NW	4,0	WNW	3,8	3,5
14	NW	3,9	WNW	3,0	WNW	1,7	NW	3,2	NW	3,3	NW	3,6	N	2,3	ENE	0,5	2,7
15	ENE	1,6	ENE	0,5	E	0,4	ESE	1,3	E	2.0	ENE	4,7	ENE	5.5	ENE	2,7	2,3
16	NE	0,9	NE	2,1	NNE	0,4	NE	5,3	NE	5,6	NE	7,1	ENE	6,5	E	7,1	4,4
17	E	7,4	E	6,4	ESE	7,9	ESE	10,1	ESE	11,7	ESE	11,4	ESE	10,4	ESE	9,3	9,3
18	ESE	9,4	ESE	8,9	SE	8,0	SE	10,8	SE	10,0	SE	8,3	SE	9,2	SE	8,2	9,1
19	SE	7,8	SE	7,3	SE	6,8	SSE	8,1	SSE	8,4	SSE	7,8	SSE	5,6	SSE	5,1	7,1
20	SSE	6,5	SSE	4,3	SSE	3,7	S	6,2	SSW	6,2	SSW	5,5	S	3,6	SSE	3,0	4,9
21	S	3,9	SSW	3,1	SSW	2,3	SSW	1,2	WSW	6,0	WNW	3,1	SW	2,2	SE	2,1	3,0
22	SSE	1,2	SE	1,8	SE	3,4	SSE	3,7	SE	3,7	SE	5,1	SE	4,6	SE	4,4	3,5
23	SE	4,6	SSE	6,3	SE	4,8	SE	7,0	SE	7,8	ESE	6,9	ESE	6,1	ESE	5,6	6,1
24	SE	4,7	SE	7,0	SE	6.1	SSE	7,7	SE	7,5	SE	8,5	SE	8,5	SE	5,6	7,0
25	SE	6,7	SE	6,8	SE	5,6	SSE	7,0	S	6,6	SSE	5,3	SE	4,6	SE	3,9	5,8
26	SE	4,2	SSE	4,0	SSE	3,5	SSE	4,0	S	3,5	SE	3,2	SE	4,8	ESE	3,6	3,8
27	SE	3,9	SE	4,0	SE	4,3	S	2,8	WSW	1,3	SE	3,1	ESE	4,1	ESE	3,9	3,4
28	ESE	3,2	ESE	2,5	ESE	2,8	SSE	2,6	SSE	2,0	ENE	3,0	ESE	3,2	E	2,6	2,7
29	E	3,1	E	1.5	SE	2,0	SW	2,7	W	3,2	WNW	1,9	E	1,0	SE	2,2	2,2
30	SSE	2,0	SSE	3,8	SSE	2,3	S	3,6	WSW	2,9	W	2,0	E	2.0	SSE	2,7	2,6
31	SSE	0,8	SE	0,7	SE	1,4	SSW	2,0	W	2,0	E	2,4	E	3,3	ESE	2,6	1,9
Moy. du mois		m 3,7		m 3,3		m 3,1		m 4,5		m 4,9		m 5,1		m 4,5		m 3,6	m 4,1

Fréquence relative des 16 vents sur 100

N 1	W..... 2	S 7	E.....11
NNW 0	WSW 4	SSE.....15	ENE 7
NW 3	SW 5	SE 20	NE 5
WNW 4	SSW 4	ESE 10	NNE 2

Calmes, sur 100 observations 2

m

Vitesse moyenne maximum observée le 17..... 11,7

TABLEAU MÉTÉOROLOGIQUE.—Juillet 1875.

État du ciel.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. m.			4h. m.			7h. m.			10h. m.		
	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.
1	2	c	..	6	k	cst	7	k	cst	7	k	kcst
2	5	..	c	1	k	..	1	k	c	1	k	cst
3	0	..	..	7	k	cst	5 Br	kst	..	5	kst W	c
4	10 Br	..	n	9	..	cn	9	kc	c	9 Br	ac	c
5	1	cst	..	9 Br	cst	..	9 Br	kst	c	10 Br	..	..
6	3 Br	..	c	10	..	c	10 Br	ac	..	10 Br	ac N	c SW
7	2 Br	..	cn	10 Br	c	cn	9	ac	n W	9	ac	c NW
8	10	c	..	3 Br	cst	o	4	ac	cn	10 Br	..	cn
9	?	..	..	10 Bd	..	c	5	c E	..	5	ac	c N
10	10 Br	..	cst	10	c	n	10	c E	..	10	ac	cn NE
11	3	c	..	8 Br	cst	..	6	kst	c NE	9	kc	c N
12	..	..	..	10 Br	..	..	10 Br	cst	..	10 Br	..	n NE
13	10 Br	..	c	9 Br	..	c	10 Bd	..	..	10	..	c W
14	10	..	cn	10 Br	..	c	10	c NW	..	10	ac	c NW
15	1	cst	..	0	cst	..	0	kst	..	8	kst	ac SE
16	..	..	..	3	cst	..	10 Bd	..	c NE	9	kc E	c NE
17	8	kc E	..	8 Br	..	cn	8	k	c SE	9	k S	c SE
18	?	..	..	5	kc	..	8	..	cn	9	k	c S
19	2	ac SW	..	8	ac	cst	3	ac	cst	3	ac	cst
20	0	..	..	2	kst	..	4	cst	..	3	kcst	cst
21	10	..	c	10	..	c	10	..	cn	8	..	c
22	10	n	c	7	ac W	cst	7 Br	ac	n S	8	ac SW	..
23	5	k	..	1	k	cst	3	..	cst	7	kst	c S
24	8	kst	..	7	kst	..	3	kst	..	2	kst	..
25	7	k	..	2	kst	..	1	kst	..	3 Br	kst	cst
26	0	..	..	1 Br	..	..	1	kst	..	3	kst	..
27	0	..	..	0	..	..	2	c	..	0	..	..
28	0	..	..	0	..	..	1 Br	..	c	2	cst	c NW
29	0	..	..	0	..	..	1	..	c	0	..	..
30	0	..	..	0	..	..	1	..	c	0	..	..
31	0	..	..	0	..	..	1 Br	..	c S	0	..	..
Moy. du mois	4,3	..	..	5,3	..	..	5,5	..	..	9,0	..	..

Nombre de jours de :

Ciel beau, ou moins de $2_{1}/_{0}$ couvert	.. 4	Brouillard	3
,, peu nuageux ou de 2 à $4_{1}/_{0}$,,	.. 7	Brume	18
,, nuageux, ou de 4 à $6_{1}/_{0}$,,	.. 7	Rosée	14
,, très-nuageux, ou de 6 à $8_{1}/_{0}$,,	.. 8	Pluie	8
,, couvert ou plus de $8_{1}/_{0}$,,	.. 5	Orages avec tonnerre	3
.....		Éclairs sans tonnerre	13

TABLEAU MÉTÉOROLOGIQUE.—Juillet 1875.

État du ciel.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. s.			4h. s.			7h. s.			10h. s.			Moyennes des 8 observations.
	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	
1	5	k	ac SW	7	k	ac S	5	kst	cn	0	..	..	4,9
2	1	k	cst	2	k	c	7	ac	cn	0	..	..	2,2
3	5	k	c	5	k	c W	9	ac	n	10	n	cst	5,8
4	10 Br	..	c	10 Br	..	c	5 Br	cst	ac	0	..	..	7,7
5	10 Br	..	c	7	k S	c	6 Br	kst	c	3	cst	..	6,9
6	9	ac N	c SW	7	kst	c SW	10 Br	cst	c NW	10 Br	..	..	8,6
7	9	ac	c W	7	ac	c W	5	ac	cnNW	9	..	cn	7,5
8	9	ac	c W	5	ac	c N	3	kc NW	cst	2	ac NW	c	5,7
9	3	ac N	c E	3	ac	c S	9	ac	c SE	10	cn	..	6,4
10	10 Br	c NE	..	9	ac	c E	5	k NW	cst	8	k	cst	9,0
11	10	ac	c E	7	ac	c E	5	kst	c E	9	cn	..	7,1
12	10 Br	..	n E	10	..	cn E	10	..	cn	10	..	cn	10,0
13	9	..	c W	10	..	c N	9	cst	c N	10	c N	..	9,6
14	7	ac W	..	6	kst	c SW	1	kst	c	1	kst	c	6,9
15	8	c SE	..	7	k W	c E	3	c N	..	2	ac E	..	3,6
16	9	ac E	c NE	9	c E	cn E	8	kc	c E	2	kst E	c SE	7,1
17	8	k S	c SE	7	k S	c SE	9	k	acst S	1	kcst	..	7,3
18	10 Br	..	c S	7	ac S	c S	2	ac	c S	1	cst	..	6,0
19	8	ac S	c SW	5	ac SW	c SW	7	ac	cst	1	ac SW	..	4,6
20	3	kcst	c W	1	..	c	6	k	cst	10	c	..	3,6
21	10	..	n	10	..	n	9	cst	cn SW	10 Br	..	cn	9,6
22	9	ac S	c S	3	cst	cn	9	acst	n	6 Br	cn	..	7,4
23	7	..	c SE	7	ac	c SE	5	ac	c S	1	kst	..	4,5
24	6	kst	c SW	4	kst	c	5	k	..	0	..	..	4,4
25	5 Br	kst	c SW	8	k	c SW	2	kst	..	0	..	..	3,5
26	5	kst	c SW	4	kst	..	5	kst	..	0	..	..	2,4
27	5	c SW	..	3	cnNW	..	1	cn	..	0	..	..	1,4
28	7	c NW	..	8	ac	n N	5	k	cn	0	..	..	2,9
29	2	ac SW	n	5	ac	c SW	2	kst	cn	0	..	..	1,2
30	5	ac W	..	4	cn SW	..	3	ac	cn	0	..	..	1,6
31	3	ac SW	..	3	ac	..	1	kst	c	0	..	..	1,0
Moy. du mois	7,0	..	..	6,1	..	..	5,5	..	..	3,7	..	..	5,5

Phénomènes divers observés :

Lumière zodiacale	1 fois	.....	1
Halos { solaires	4 ,,	.....	4
Halos { lunaires	3 ,,	.....	3
Couronnes { solaire	0 ,,	.....	0
Couronnes { lunaires	5 ,,	.....	5
Arc-en-ciel double, le 21		.....	1

TABLEAU MÉTÉOROLOGIQUE.—Juillet 1875.

Évaporation sous l'abri.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Total des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
28	1	0,10	0,10	0,16	0,47	0,80	0,78	0,52	0,16	3,09
29	2	0,13	0,01	0,12	0,68	0,91	1,09	0,75	0,25	3,94
1	3	0,10	0,10	0,16	0,74	1,10	1,20	0,70	0,42	4,52
2	4	0,23	0,14	0,08	0,44	0,99	0,70	0,40	0,10	3,08
3	5	0,10	0,20	0,10	0,26	0,79	0,95	0,94	0,26	3,60
4	6	0,20	0,13	0,27	0,60	0,78	1,82	0,60	0,30	4,70
5	7	0,30	0,10	0,10	0,34	0,46	0,78	0,43	0,29	2,80
6	8	0,10	0,10	0,02	0,00	0,10	0,40	0,35	0,05	1,12
7	9	0,01	0,01	0,05	0,38	0,65	0,60	0,40	0,20	2,30
8	10	0,01	0,10	0,10	0,11	0,39	0,40	0,40	0,10	1,70
9	11	0,05	0,05	0,16	0,34	0,68	0,62	0,55	0,15	2,60
10	12	0,20	0,10	0,10	0,20	0,05	0,09	0,06	0,05	0,85
11	13	0,06	0,04	0,01	0,13	0,49	0,58	0,34	0,10	1,75
12	14	0,10	0,10	0,10	0,40	0,48	0,70	0,61	0,01	2,50
13	15	0,02	0,01	0,06	0,31	0,58	0,54	0,40	0,16	2,08
14	16	0,03	0,01	0,10	0,20	0,50	0,50	0,20	0,20	1,74
15	17	0,10	0,20	0,20	0,60	0,80	0,92	0,63	0,45	3,90
16	18	0,40	0,40	0,40	0,80	0,89	0,81	0,70	0,39	4,79
17	19	0,31	0,31	0,39	0,80	1,28	1,29	0,88	0,43	5,69
18	20	0,38	0,22	0,30	0,90	1,13	1,27	0,95	0,33	5,48
19	21	0,22	0,30	0,23	0,40	0,62	0,15	0,10	0,10	2,12
20	22	0,10	0,00	0,08	0,23	0,64	0,74	0,51	0,20	2,50
21	23	0,22	0,38	0,20	0,65	0,90	0,75	0,42	0,18	3,70
22	24	0,20	0,40	0,35	0,81	1,12	1,07	0,78	0,32	5,05
23	25	0,50	0,40	0,40	0,90	1,45	1,35	0,62	0,28	5,90
24	26	0,29	0,01	0,13	0,67	1,00	1,07	0,75	0,25	4,17
25	27	0,10	0,10	0,11	0,49	0,85	1,04	0,62	0,19	3,50
26	28	0,10	0,01	0,10	0,44	0,75	1,01	0,34	0,05	2,80
27	29	0,10	0,05	0,10	1,35	0,20	1,20	0,80	0,20	4,00
28	30	0,20	0,19	0,11	0,80	1,00	0,90	0,71	0,29	4,20
29	31	0,10	0,00	0,08	0,47	0,86	0,84	0,59	0,16	3,10
Total du	1–10	1,37	0,99	1,16	4,02	6,97	8,72	5,49	2,13	30,85
	11–20	1,65	1,44	1,82	4,68	6,88	7,32	5,32	2,27	31,38
	21–31	2,13	1,84	1,89	7,21	9,39	10,12	6,24	2,22	41,04
	mois	5,15	4,27	4,87	15,91	23,24	26,16	17,05	6,62	103,27

Maximum en 24h. : 5,90 observé le 25 mm
Minimum „ : 0,85 „ le 12 mm
différence 5,05

TABLEAU MÉTÉOROLOGIQUE.—Juillet 1875.

Jours de la lune	Jours du mois	Températures extrêmes. Sous l'Abri. Minima	Maxima	Différences	Moyennes	au Soleil. Max. boule noire.	Max. boule blanche.	Différences	Pluie. Jardin Total des 24h.	Toit Total des 24h.	Différences	Température du Puits.
		o	o	o	o	o	o	o	mm	mm	mm	o
28	1	24,4	31,2	6,8	27,80	43,6	37,8	5,8	0,0	0,0	0,0	15,9
29	2	24,4	36,3	11,9	30,35	45,2	40,6	4,6	0,0	0,0	0,0	15,9
1	3	26,2	36,2	10,0	31,20	43,8	40,5	3,3	0,0	0,0	0,0	15,8
2	4	25,1	34,6	9,5	29,85	43,7	39,2	4,5	0,0	0,0	0,0	15,8
3	5	26,4	34,5	8,1	30,45	43,1	38,7	4,4	0,0	0,0	0,0	15,9
4	6	27,1	35,9	8,8	31,50	44,6	40,8	3,8	0,0	0,0	0,0	15,9
5	7	25,8	31,7	5,9	28,75	...	...	...	1,0	0,7	0,3	15,9
6	8	24,6	29,5	4,9	27,05	...	...	...	21,9	19,7	2,2	15,9
7	9	24,7	34,1	9,4	29,40	45,7	39,6	6,1	0,0	0,0	0,0	15,5
8	10	23,7	28,2	4,5	25,95	...	...	...	10,5	9,7	0,8	15,7
9	11	21,7	30,1	8,4	25,90	39,3	34,7	4,6	0,0	0,0	0,0	15,7
10	12	22,3	24,5	2,2	23,40	...	...	...	35,6	22,6	13,0	15,6
11	13	23,1	29,2	6,1	26,15	...	...	...	3,0	2,9	0,1	15,4
12	14	22,3	30,1	7,8	26,20	40,2	35,2	5,0	0,0	0,0	0,0	15,7
13	15	22,0	33,3	11,3	27,65	46,6	39,5	7,1	0,0	0,0	0,0	15,7
14	16	23,6	30,9	7,3	27,25	38,7	35,2	3,5	0,9	0,2	0,7	15,7
15	17	25,7	31,1	5,4	28,40	38,7	35,1	3,6	0,0	0,0	0,0	15,5
16	18	25,6	31,3	5,7	28,45	41,1	36,3	4,8	0,0	0,0	0,0	15,5
17	19	25,7	33,2	7,5	29,45	43,8	39,2	4,6	0,0	0,0	0,0	15,5
18	20	25,5	34,7	9,2	30,10	45,6	43,5	2,1	0,0	0,0	0,0	15,4
19	21	24,0	31,7	7,7	27,85	...	...	...				15,4
20	22	23,7	33,0	9,3	28,35	44,6	38,7	5,9	7,2	6,2	1,0	15,4
21	23	25,3	32,1	6,8	28,70	42,6	37,8	4,8	2,3	2,1	0,2	15,3
22	24	25,2	32,4	7,2	28,80	43,7	38,0	5,7	0,0	0,0	0,0	15,4
23	25	25,8	33,6	7,8	29,70	43,6	38.6	5,0	0,0	0,0	0,0	15,4
24	26	26,0	34,9	8,9	30,45	48,8	42,8	6,0	0,0	0,0	0,0	15,4
25	27	25,7	38,1	12,4	31,90	52,9	45,1	7,8	0,0	0,0	0,0	15,5
26	28	25,2	37,7	12,5	31,45	52,1	44,5	7,6	0,0	0,0	0,0	15,5
27	29	25,8	38,9	13,1	32,35	49,6	43,8	5,8	0,0	0,0	0,0	15,4
28	30	26,3	38,2	11,9	32,25	51,1	42,3	8,8	0,0	0,0	0,0	15,5
29	31	25,8	37,4	11,6	31,60	49,6	43,2	6,4	0,0	0,0	0,0	15,6
Moyennes du	1-10	25,24	33,22	8,0	29,23	...	...	...	33,4	30,1	3,3	...
	11-20	23,75	30,84	7,1	27,29	...	...	...	39,5	25,7	13,8	...
	21-31	25,35	35,27	9,9	30,31	...	...	...	9,5	8,3	1,2	...
	mois	24,80	33,18	8,28	28,99	...	...	...	82,4	64,1	18,3	...

Maximum: 38,9 observé le 29	Max. boule noire 52,9	Hauteur d'eau tombée	82,4
Minimum: 21,7 „ le 9	„ blanche 45,1	„ „ évaporée	103.27
Différence: 17,2	Différence max. 8,8	Différence	20,87

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Juillet 1875.

1. 1h. m.—Quelques cumulus diffus en différents points du ciel ; vent assez fort ; pas de rosée. 4h.—Voile de cirrus au S. ; au N. cumulo-stratus allant de l'E. à l'W. 7h.—Banc de nuage au N.W., orienté comme ci-dessus ; à l'W. des cumulus viennent rapidement du S. ; éclaircies d'un beau bleu. 10h.—Cirrus par plaques et immobiles ; il s'y forme un halo complet vers midi. 1h. s.—Les cirrus persévèrent ; nuage orageux au S. ; ciel verdâtre à l'horizon. 4h.—Même ciel. 7h.—Rayon lumineux semblant diverger à l'W., et converger vers l'E. en un point symétrique. 8h. 49m.—Le nuage orageux à monté à l'W. ; il en sort des éclairs rares, peu brillants et sans tonnerre. 10h.—Plus d'éclairs ; ciel splendide.
2. 1h. m.—Ciel légèrement brumeux au N. ; rosée très-faible. 4h.—Çà et là quelques cirrus ; rosée abondante. 7h.—Vapeurs blanchâtres à l'horizon W. ; ciel d'un beau bleu. 10h.—Cumulo-stratus au S.W. ; ciel splendide. 1h. s.—Mêmes remarques. 4h.—Ciel orageux du N. au S., par l'W. 7h.—Même ciel ; les nuages orageux prennent une teinte très-noire au coucher du soleil. 8h. 40m.—Au S. long cumulo-stratus allant de l'E. à l'W. Au N. éclairs rares, brillants et sans tonnerre. 10h.—Plus d'éclairs ; ciel pur, voie lactée et étoiles très-brillantes.
3. 1h. m.—Ciel splendide ; calme ; pas de rosée. 4h.—Cirrus diffus épars dans le ciel ; au N. banc de cumulo-stratus ; rosée très-abondante. 7h.—Brume blanchâtre à l'horizon ; ciel d'un bleu pâle. 10h.—Cirro-stratus s'étendant de l'W. vers le N. et l'E. ; cumulus brumeux à l'horizon S.W. ; le vent fraîchit subitement. 1h. s.—Cirrus panachés ; quelques cumulus longent l'horizon. 4h.—Cirrus diffus et par plaques ; gros cumulus *balles-de-coton* venant de l'W. 6h. ½.—Éclairs sans tonnerre au N. 7h.—Gros nimbus très-noirs occupant tout le ciel de l'E. à l'W. par le N. ; éclaircie verdâtre au S. ; éclairs successivement au N. et à l'E. 8h. 49m.—L'horizon est en feu ; éclairs continus et très-brillants ; de temps en temps ils s'élancent en zig-zag vers le zénith ; tonnerre lointain. 10h.—Éclairs comme ci-dessus ; plus de tonnerre.
4. 1h. m.—L'orage baisse et les éclairs longent l'horizon de l'E. à l'W. par le N. ; ils sont aussi vifs et aussi continus qu'à 10h. 4h.—Au N. banc de cumulo-stratus orientés de l'E. à l'W. ; au-dessous éclaircie verdâtre de même orientation. Ciel sombre au S. ; éclairs à l'E. seulement. 7h.—Brouillard léger à l'horizon ; tour voilée ; calme ; rosée. 10h.—Ciel pommelé ; brume blanchâtre à l'horizon ; éclaircie verdâtre au S. 1h. s.—Ciel uniformément couvert ; quelques cumulus près de l'horizon. 4h.—Même ciel. 7h.—A l'horizon cumulo-stratus orientés de l'E. à l'W. occupant toute la partie N. du ciel ; alto-cumulus et éclaircie au zénith. 8h. 49m.—Cumulo-stratus partant de l'W. et s'étendant au N.E. et au S.E. ; scintillation extraordinaire des étoiles ; lumière zodiacale diffuse s'élevant peu au-dessus de l'horizon. 10h.—Ciel splendide. Les cigales se font entendre pour la 1ère fois aujourd'hui ; c'est 10 jours plus tard que l'an dernier.

5. 1h. m.—Long cumulo-stratus s'étendant du S.W. à l'E ; ciel splendide ; calme ; pas de rosée. 4h.—Cumulo-stratus vaporeux partant du N.E., et rayonnant dans toutes les directions ; légère brume sur le ciel ; pas de rosée. 7h.—Au N. brume uniforme, au S. éclaircies et cirro-stratus ; un peu de rosée sur le gazon. 10h.—Ciel uniformément couvert. 1h. s.—Brume générale, au N. seulement quelques cumulus se détachent sur la brume. 4h.—Longs cirro-stratus panachés ; ils sont orientés du S.W. au N., et du N.W. au S.E. ; çà et là alto-cumulus par plaques. Les premiers forment un halo pâle, et les seconds une couronne solaire brillante ; nuages orageux, au N. à l'horizon. 7h.—Ciel pommelé au zénith ; brumeux à l'E. ; cirro-stratus orientés de l'W. au N. 8h. 49m.—Cumulo-stratus partant de l'W. et s'étendant jusqu'au S.E. at au N.E. Au N. éclairs sans tonnerre rares et peu brillants. 10h.—Mêmes nuages ; les étoiles sont légèrement voilées.
6. 1h. m.—Étoiles légèrement voilées ; brume à l'horizon S. ; vent fort ; pas de rosée. 4h.—Gros cumulus vaporeux et grisâtres sur tout le ciel ; petite éclaircie à l'E. ; pas de rosée. 7h.—Brume générale, au-dessous petits cumulus très-serrés ; rosée sur le gazon. 10h.—Brume à l'horizon ; au zénith ciel pommelé ; au-dessous des alto-cumulus des cumulus viennent rapidement du S.W. ; le vent se lève subitement, et souffle par rafales. 1h. s.—Ciel pommelé au zénith, orageux au N.W. ; les cumulus marchent toujours rapidement. 4h.—Éclaircie et cirro-stratus au zénith ; à l'W. plaque blanchâtre de cirro-cumulus ; il s'y forme un halo de 23° de rayon incomplet et pâle. 7h.—De l'E. à l'W. par le N. horizon orageux ; au coucher du soleil un rayon rouge de 4 ou 5° de large partant de l'W. traverse le ciel et se rend à l'E. en un point symétrique du premier. Ce phénomène est très-fréquent en été. 8h. ½., quelques éclairs sans tonnerre. 10h.—Ciel brumeux, plus sombre au N. ; quelques étoiles au S. et au zénith ; pas d'éclairs.
7. 1h. m.—Voile de vapeurs sur tout le ciel, étoiles à peine visibles ; à l'horizon N. et N.E. nuage orageux, éclairs vifs, fréquents et sans tonnerre. 4h.—Les nuages orageux persévèrent, plus d'éclairs ; reste du ciel couvert de cumulus diffus ; vent régulier ; pas de rosée. 6h. ½ un coup de tonnerre lointain ; averse. 7h.—Nuages orageux dans toutes les directions. 10h.—De l'E. à l'W. par le S. horizon couleur-ardoise ; au-dessous nuages bas ; ils convergent de tous les côtés vers l'E. 1h. s.—Alto-cumulus d'une délicatesse et d'un blancheur extrême ; cumulus venant rapidement de l'W. ; éclaircies d'un bleu sombre. 4h.—Çà et là alto-cumulus comme à 1h. ; gros cumulus *balles-de-coton* très-nombreux ; ciel blanchâtre. 7h.—Ciel orageux du S. au N.W. par l'W. ; éclaircie blanchâtre. 10h.—Éclaircie au zénith, reste du ciel brumeux et sombre.
8. 1h. m.—Gros cumulus vaporeux ; quelques éclaircies où on voit des étoiles ; vent faible ; pas de rosée. 4h.—Brume à l'horizon ; au N.E. banc de cumulo-stratus ; çà et là quelques cumulus ; dans les éclaircies étoiles voilées ; rosée extraordinaire. 7h.—Nuages orageux de l'W. au N. ; éclaircie au zénith et au S. ; ciel blanchâtre. 7h. ½.—Éclairs et tonnerre lointain ; le nimbus orageux s'étend de l'W. au N. et s'avance en bloc vers l'E. ; au-dessous nuages très-bas ; 8h. 5m. un coup d'tonnerre sec. 4 secondes après

l'éclair ; le vent est devenu fort et a passé subitement de l'E.S.E. au N.N.W. ; 19,5mm. de pluie de 8h. à 9h. Quatre personnes ont été frappées de la foudre à quelques kilomètres au S.E. de Chang-Hai. 10h.—Calme, ciel plus sombre au N.E. et au S.E. ; nuages orageux au S.W. 1h. s.—Nuages orageux au S. et à l'W. ; éclaircie verdâtre au N.W. 4h.—Banc d'alto-cumulus au S. ; nuage orageux tout autour de l'horizon ; ciel bleuâtre. 7h.—Cirro-cumulus panachés ; nuages orageux de l'E. à l'W. par le N. 10h.—Les nuages orageux persévèrent au N. ; ciel pur, vent régulier, rosée abondante.

9. 4h. m.—Brouillard qui se lève et forme des cumulus diffus ; calme absolu, rosée abondante. 7h.—Cumulus diffus venant rapidement de l'E. 10h.—Ciel pommelé et d'un bleu pâle au zénith ; cumulus *balles-de-coton* venant du N. 1h. s.—Les cumulus viennent de l'E ; banc d'alto-cumulus au N.W. 4h.—Ceinture de gros cumulus à l'horizon du N.W. au S.W. ; alto-cumulus par plaques en différents points. 7h.—Ciel sombre au N.W. ; gros cumulus vaporeux venant du S.E. 10h.—Éclairs rares, peu brillants et sans tonuerre au N.W. ; cumulo-nimbus sur tout le ciel.

10. 1h. m.—Brume générale, à travers laquelle on distingue les étoiles; quelques cumulus au-dessous ; pas de rosée. 4h.—Ciel très-sombre au S. ; quelques gouttes de pluie ; 5h. ½ éclairs sans tonnerre au N.E. 7h.—Pluie ; nuages bas au-dessous des nimbus. 10h.—Il ne pleut plus ; au S. ciel couleur-ardoise de l'E. à l'W. ; nuages bas et blanchâtres comme à 7h. 1h. s.—Il pleut à l'horizon N.E. ; cumulus grisâtres sur tout le ciel venant du N.E. 4h.—Les nuages viennent de l'E., éclaircie d'un beau bleu. 7h.—Trois couches de nuages ; banc de cumulo-stratus au S., ceinture de gros-cumulus vaporeux tout autour de l'horizon ; à l'W. éclaircie verdâtre et stratus orientés du N. au S. 10h.—Au N. banc nuageux ; cirrus diffus sur tout le ciel ; halo lunaire incomplet et pâle; il a 22 à 23° de rayon.

11. 1h. m.—Çà et là de gros cumulo-nimbus noirâtres ; vent faible ; peu de rosée. 4h.—Ciel uniformément couvert, éclaircie au N.W.; ceinture de gros cumulus vaporeux autour de l'horizon ; rosée. 7h.—Banc de cumulo-stratus au S. ; ceinture de nuage comme à 4h., cirro-stratus orientés de l'E. à l'W. 10h.—Trois couches de nuages ; les cumulus inférieurs sont très-rapides. 1h. s.—Ciel d'un beau bleu ; 2 couches de nuages seulement ; la seconde se meut toujours rapidement. 4h.—Alto-cumulus d'une grande délicatesse ; les cumulus prennent une teinte noire à l'W. 7h.—Cirro-stratus d'orientation diverse ; au N. banc de cumulo-stratus. 8h.—Ciel pommelé près du zénith ; couronne lunaire ; étoiles brillantes dans les éclaircies. 10h.—Des cumulus compactes ont envahi tout le ciel.

12. 3h. m.—Ciel uniformément couvert de cumulo-nimbus compactes. 4h.—Brume générale ; 5h. ½ pluie. 7h.—Il ne pleut plus ; cumulo-nimbus orientés de l'E. à l'W. 10h.—Pluie forte ; ciel uniformément couvert ; vent fort. 1h. s.—Mêmes remarques. 4h.—La pluie a cessé ; cumulus compactes venant de l'E. 7h.—Il ne pleut plus ; le vent augmente ; thermomètre monte ainsi que le baromètre.

13. 1h. m.—Brume générale à travers laquelle on aperçoit quelques étoiles au zénith, au-dessous cumulus vaporeux ; le vent tombe insensiblement. 4h.—Même ciel à part une éclaircie à l'E.; elle est orientée N.-S. ; calme, rosée faible. 5h. ½.—Averse. 7h.—Brouillard épais qui se forme subitement au moment où le vent passe de N.E. au N.W. ; limite de visibilité 3 ou 400m. ; le calme continue. 10h.—Gros cumulus vaporeux venant de l'W. ; petites éclaircies d'un bleu foncé ; le vent se lève. 1h. s.—Même ciel. 4h.—Couche épaisse de cumulus compactes. 7h.—Banc de cumulo-stratus et éclaircie verdâtre au S. ; au N. ; ciel très-sombre. 16h.—Ciel uniformément couvert de cumulus comme à 4h., vent très-régulier. Le vent a passé de l'E. à l'W. par le N.
14. 1h. m.—Une couche épaisse de cumulus couvre tout le ciel ; quelques gouttes de pluie ; vent très-régulier. 4h.—Brume générale, au-dessous quelques cumulus ; pas de rosée. 7h.—Cumulus compactes. 10h.—Mêmes nuages ; on en aperçoit des alto-cumulus à travers les éclaircies. 1h. s.—Cumulus *balles-de-coton* dans toutes directions ; éclaircie d'un beau bleu. 4h.—Au S. quelques cirro-stratus ; au N.E. gros cumulus près de l'horizon. 7h.—Cirro-stratus comme à 4h. ; ils sont orientés du N. au S., cirrus épars au zénith ; les cumulus du N.E. persévèrent. 10h.—Cirro-stratus orientés de l'E. à l'W. ; rosée abondante ; beau clair de lune.
15. 1h. m.—Cumulo-stratus s'étendant de l'E. à l'W. ; reste du ciel pur ; calme, rosée. 4h.—Quelques stratus à l'horizon E. ; le calme continue, rosée très-abondante. 7h.—Léger brouillard tout autour de l'horizon ; tour voilée ; ciel bleuâtre. 10h.—Quelques cirro-stratus orientés de l'E. à l'W. ; de plus deux couches de cumulus ; les plus bas marchent rapidement. 1h. s.—Une seule couche de nuages ; éclaircies d'un bleu pâle. 4h.—Deux couches de nuages marchant en sens inverses ; ceux de la couche inférieure se meuvent rapidement. 7h.—Banc de gros cumulus vaporeux et noirâtres à l'horizon N. ; au S., quelques cirrus rougeâtres. 10h.—Les cumulus persévèrent au N. ; beau clair de lune.
16. 4h. m.—Gros cumulo-stratus partant de l'E.N.E., et rayonnant dans toutes les directions ; calme, rosée. 7h.—Brouillard épais et élevé, tour voilée. 10h.—Deuxième couche de cumulus diffus et venant très-rapidement du N.E. ; éclaircies bleuâtres. 1h. s.—Alto-cumulus mal définis ; deuxième couche comme à 1h.; petites averses de temps en temps. 4h.—Cumulo-nimbus très-bas ; quelques gouttes de pluie ; vent fort et soufflant par rafales. 7h.—3 couches de nuages ; gros cumulus orageux à l'E. et à l'W. 10h.—Alto-cumulus vaporeux sur tout le ciel ; quelques cumulus venant toujours très-rapidement du S.E.
17. 2h. m.—Cirro-cumulus diffus couvrant tout le ciel ; couronne lunaire. 4h.—Ciel sombre au S.E.; quelques gouttes de pluie fine; éclaircies où l'on aperçoit les étoiles. 7h.—Vent assez violent; cumulus vaporeux venant rapidement du S.E. 10h.—Cumulus marchant très-rapidement ; éclaircies d'un bleu foncé. 1h. s.—Mêmes remarques. 4h.—Cirro-stratus orientés du N. au S. ; le reste comme à 10h. 7h.—Ciel moutonné au zénith ; les cumulus ont disparu ; éclaircies verdâtres à l'horizon. 8h. 49m.—Des cumulus noirâtres ont de nouveau envahi tout le ciel ; ils viennent rapidement du

alto-cumulus rougeâtres ; ciel très-noir et orageux au N. 10h.— A l'E. stratus orientés du N. au S. il s'y forme une couronne lunaire ; au N. ciel toujours brumeux ; les signes d'orage ont disparu.

23. 1h. m.—Cirrus panachés au zénith, diffus au N. ; au S. ciel découvert. 4h.—Légers cirrus épars dans le ciel ; stratus à l'horizon ; vent faible ; pas de rosée. 7h.—Cirrus comme à 4h. ; à l'E. ils sont orientés du N. au S. 10h.—Le cirrus persévèrent ; cumulus *balles-de-coton* venant rapidement du S. ; ciel d'un bleu foncé au zénith verdâtre à l'horizon. 1h. s.—Les cirrus ont disparu, cumulus etc. comme à 10h. 4h.—Au N. et au S. plaque d'alto-cumulus. 7h.—Les cumulus longent l'horizon à l'E. et à l'W. et convergent vers le N.W. ; gros nuage orageux au S.W. 10h.—Cirro-stratus à l'E. seulement.

24. 1h. m.—Cirro-stratus vaporeux partout le ciel. 4h.—De longs cirro-stratus partent du S. et semblent converger au N. ; halo lunaire de 22 à 23° de rayon ; vent fort, pas de rosée. 7h.—Mêmes nuages. 10h.—Les cirro-stratus sont orientés du N.E. au S.W. 1h. s.—Cirro-stratus comme à 1h. ; des cumulus viennent rapidement du S.W. ; ciel verdâtre à l'horizon, d'un beau bleu au zénith. 4h.—Cirro-stratus comme ci-dessus ; les cumulus ont disparu ; nuages orageux à l'horizon N.W. 7h.—Légers cirrus au zénith ; horizon brumeux. 10h.—Ciel splendide, étoiles brillantes.

25. 1h. $\frac{3}{4}$ m.—Cirrus diffus au S., et halo de 22 à 23° ; éclaircie au N. 4h.—Banc de cirro-stratus à l'horizon S. ; pas de rosée. 7h.—Quelques stratus autour de l'horizon ; ciel d'un bleu pâle. 10h.—Un long cirro-stratus s'étend du S.W. au N.E. ; vapeurs blanchâtres à l'horizon N. ; banc au S. comme à 4h. il occupe tout l'horizon jusqu'à l'E. 1h. s.—Cirro-stratus semblant converger au N.E. ; çà et là quelques cumulus venant rapidement du S.W. ; léger voile de cirrus partout le ciel. 4h.—Trace d'un halo de 22 à 23° de rayon ; cirrus et cumulus comme à 1h. ; éclaircie au S.E. 7h.—Cirro-stratus orientés du N. au S. ; ciel voilé au zénith, à l'W. nuages d'une teinte jaune orange. 10h.—Ciel sans nuages ; étoiles brillantes.

26. 1h. 20m. m.—Ciel serein ; magnifique clair de lune ; vent faible ; pas de rosée. 4h.—Léger voile de vapeurs au N. ; reste du ciel pur ; un peu de rosée. 7h.—Quelques longs cirro-stratus orientés du N. au S. ; ciel d'un bleu pâle. 10h.—Cirro-stratus comme à 7h. ; ciel d'un beau bleu. 1h. s.—Les cirro-stratus persévèrent, leur orientation est N.E.-S.W. Cumulus *balles-de-coton ;* ciel d'un bleu foncé. 4h.—Les cumulus ont disparu ; nuages orageux au S. et au N. ; éclaircie au zénith. 7h.—Mêmes nuages ; horizon brumeux. 10h.—Banc de cumulo-stratus s'étendant de l'W. au N. ; ciel très-brillant ; éclairs rares, peu visibles et sans tonnerre.

27. 2h. m.—Ciel sans nuages ; vent faible ; pas de rosée. 4h.—Mêmes remarques. 7h.—Quelques cumulus au N. et à l'E. ; vent faible, rosée. 10h.—Ciel très-pur ; quelques cumulus longent l'horizon. 1h. s.—Cumulus noirâtres au N. ; horizon orageux du S.E. au N.E. par l'E. 3h.—Il pleut au N.W. de Chang-hai. 2 couches de nuages allant en sens inverse ; la couche supérieure vient du S.W. ; ciel pur au S. 4h.—Les nimbus orageux s'étendent du

N.E. jusqu'à l'W. par le N.; reste du ciel au S. comme à 1h. 7h.—Nuages orageux au N. seulement ; rayon brumeux partant de l'W. et l'N. et s'étendant jusqu'à l'E. 10h.—Ciel étincelant ; vent faible ; au N.W. quelques éclairs rares, peu brillants et sans tonnerre.

28. 1h. m.—Ciel très-pur ; vent faible, un peu de rosée. 4h.—Rosée très-abondante, le reste comme à 1h. 7h.—Quelques cumulus vers le S. 10h.—Bandes de stratus orientés du S. à l'W.; quelques cumulus venant du N. 1h. s.—Ciel d'un bleu foncé au zénith ; horizon sombre du N. au S. par l'E. 3h. ½.—Tonnerre lointain au N.E. 3h. ½.—L'orage a passé au S.E. ; quelques coups de tonnerre à peine perceptibles. 4h.—Quelques gouttes de pluie d'orage ; éclaircie au S.E. et au N. 5h. ½.—Petite averse qui n'est pas accusée par le pluviomètre. 7h.—Cirrus diffus et rougeâtres à l'horizon S. ; nuages orageux à l'W. 10h.—A l'W. éclairs vifs, assez rares et sans tonnerre ; ciel très-étoilé ; vent faible ; rosée. De 1h. à 4h. la girouette a fait insensiblement le tour entier du compas ; partie de l'E.S.E. elle y est revenue en passant par l'W.

29. 1h. ¾ m.—Ciel serein ; vent faible, un peu de rosée. 4h.—Rosée très-abondante. 7h.—Quelques cumulus à l'horizon E., ciel d'un bleu clair. 10h.—Ciel sans nuages et d'un beau bleu. 1h. s.—Banc brumeux à l'horizon S.W.; on y voit quelques nuages orageux. 4h.—Deux couches de nuages ; la première paraît immobile, la seconde vient du S.W. et a un aspect grisâtre. 7h.—A l'W. cirro-stratus orientés de l'W. au N. et brillants. 10h.—Ciel très-étoilé et sans nuages, vent faible.

30. 1h. m.—Ciel très-étoilé ; vent faible et régulier, pas de rosée. 4h.—Un peu de rosée, le reste comme à 1h. 7h.—Quelques cumulus au N. ; rosée peu abondante. 10h.—Ciel sans nuages et d'un bleu pâle. 1h. s.—Cumulus *balles-de-coton* venant de l'W. 4h.—Quelques gouttes de pluie, ciel orageux à l'E. 6h. ½.—Arc-en-ciel partiel au S.E. 7h.—Nuages orageux en différents points de l'horizon; banc noirâtre à l'W.; éclaircie au zénith. 8h.—Au S.W. éclairs très-vifs et se succédant rapidement. 10h.—Plus d'éclairs ; ciel très-pur, vent faible.

31. 2h. m.—Rosée extraordinaire ; calme absolu, ciel sans nuages. 4h.—Vent faible, ciel serein ; la rosée a disparu en partie. 7h.—Quelques cumulus ; rosée abondante. 10h.—Cumulus à l'horizon E. ; le ciel y est vaporeux et blanchâtre. 1h. s.—Cumulus *balles-de-coton* venant de l'W. 1h. ½.—Nuages orageux du N. à l'E. comme les jours précédents. 4h.—L'orage a disparu ; ciel découvert à l'E. ; alto-cumulus du N. au S. par l'W. ; le vent a passé brusquement de l'W. à l'E. par le N. 7h.—Cirro-stratus brumeux au S.W. 10h.—Ciel serein ; vent faible.

H. Le Lec., s.j.

S. ; couronne lunaire pâle. 10h.—Les cumulus ont disparu pour la seconde fois ; au S.E., cirro-stratus orientés comme ci-dessus.

18. 4h. m.—Léger voile de cirrus couvrant presque tout le ciel ; éclaircie verdâtre au N.E., vent toujours fort et soufflant par rafales. 7h.—Le ciel se couvre de cumulus ; vent id. 10h.—Cirrus diffus ; il s'y forme un halo de 23° de rayon et à couleurs pâles ; les cumulus viennent rapidement du S. 1h. s.—Brume générale au-dessous de laquelle on aperçoit çà est là quelques cumulus. 4h.—Alto-cumulus d'une grande blancheur et par plaques, cumulo-stratus d'orientation diverse. 7h.—Alto-cumulus et stratus comme à 4h. ; ciel pur au zénith. 10h.—Banc de cumulo-stratus au S. ; clair de lune splendide.

19. 1h. m.—Alto-cumulus très-transparents ; il s'y forme une belle couronne lunaire ; vent fort et soufflant par rafales. 4h.—Ciel pommelé au zénith ; cumulo-stratus à l'horizon E., vent comme à 1h., pas de rosée. 7h.—Quelques alto-cumulus diffus et sans mouvement sensible. 10h.—Alto-cumulus par plaques ; stratus à l'horizon N. et S. ; ciel d'un beau bleu au zénith. 1h. s —Ciel pommelé au zénith ; quelques cumulus venant du S.W. 4h.—Mêmes remarques. 7h.—Alto-cumulus compactes occupant tout le ciel au N.E ; stratus à l'horizon N.W. et S. ; ils prennent une teinte rouge très-vive au coucher du soleil. 10h.—Ciel pommelé à l'E. ; couronne lunaire brillante.

20. 1h. m.—Ciel splendide. Vent faible. 4h.—Dépôt de rosée ; le vent tombe. 7h.—Cumulo-stratus, les uns au zénith en désordre, les autres vers l'horizon alignés N.E.-S.W. 10h.—Çà et là des cumulo-cirrus orientés N.-S. banc de cumulo-stratus au N. 1h. s.—Cumulo-cirrus stratifiés et orientés E.W., cumulus *balles-de-coton*. Le vent vient de l'W. ; ciel d'un beau bleu. 4h.—Quelques petits cumulus épars. 7h.—Tout l'horizon un peu noir, surtout au N. et au N.E ; vent faible. 8h. 49m.—Ciel chargé ; quelques éclairs sans tonnerre au N. 10h.—Même ciel ; les éclairs ont cessé.

21. 1h. m.—Ciel couvert ; vent très-faible. 4h.—Mêmes remarques. 7h.—Ciel chargé ; vent faible. 10h.—Couche de cumulus compactes sans mouvement sensible. Vent faible et régulier. Midi 40m. grain subit et violent ; pluie. 1h. s.—Pluie faible. 4h.—Il pleut au S.E. ; vent faible ; 4h. 30m. grosse averse ; 5h. 30m. éclairs et tonnerre. 5h.—Fragments d'arc-en-ciel double, éclaircie à l'W. et cumulo-stratus brillants. 8h. 49m.—Quelques éclairs sans tonnerre au S E. ; ciel sombre en différents points. 10h.—Brume générale au-dessous de laquelle se détachent quelques cumulus.

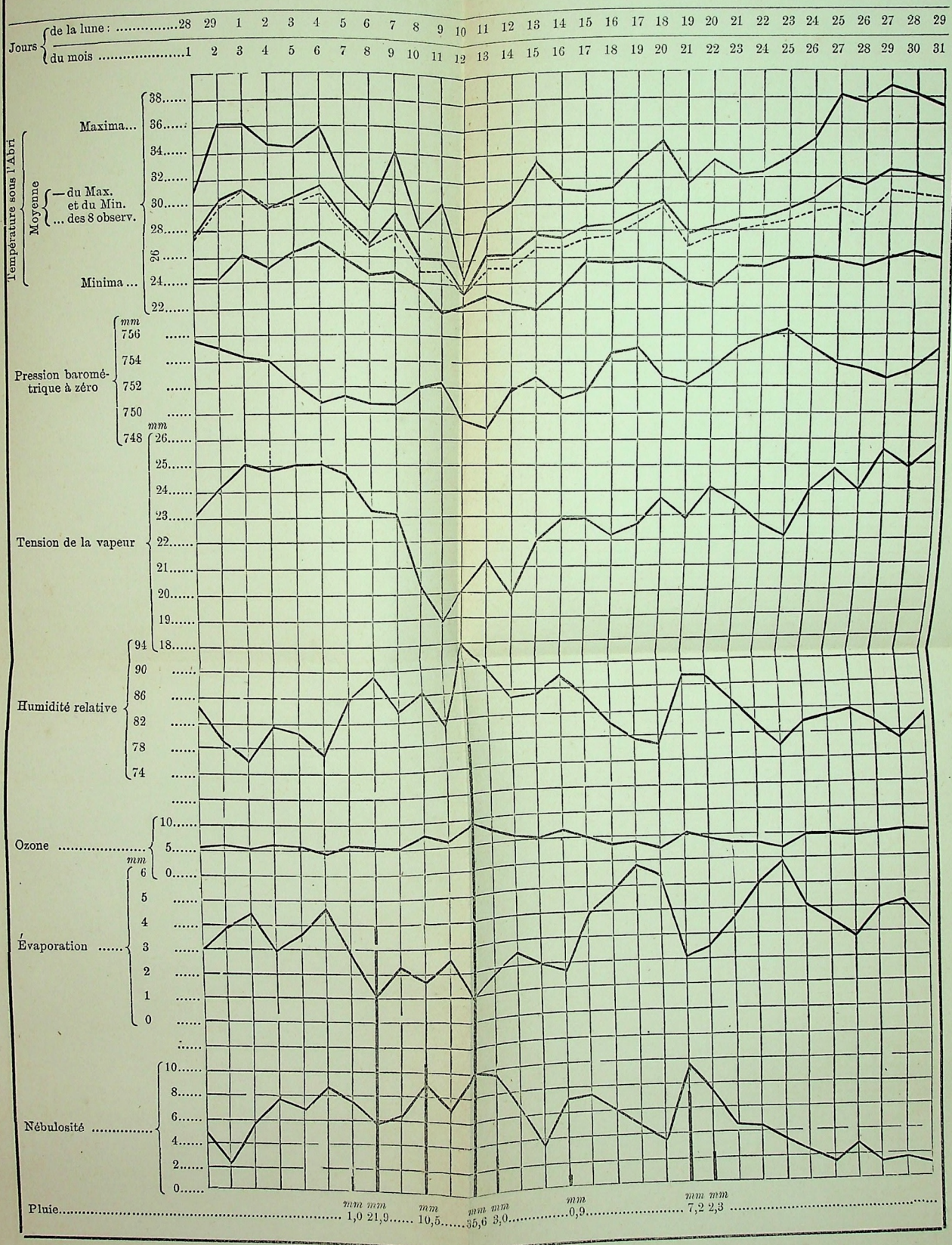
22. 1h. m.—Pluie, un gros nimbus très-noir passe au zénith ; au-dessous cumulus blanchâtres. 4h.—La pluie a cessé ; au zénith alto-cumulus compactes ; il s'y forme une couronne lunaire ; au N.E., cumulo-stratus orientés de l'E. à l'W. 7h.—Cumulo-nimbus venant du S. avec rapidité ; les alto-cumulus n'ont pas de mouvement sensible au S. 10h.—Éclaircie d'un bleu foncé au N. ; alto-cumulus d'une grande blancheur. 1h. s.—Les deux couches de nuages viennent lentement du S. 4h.—Banc de cumulo-stratus au N.W. et nuages orageux au S. stratus orientés du S.W. à l'E. 7h.—Au S.

A. M. D. G.

OBSERVATOIRE DE ZI-KA-WEI

Résumé des Observations Météorologiques de Juillet 1875.

MOYENNES DIURNES.



A. M. D. G.

OBSERVATOIRE

MÉTÉOROLOGIQUE ET MAGNÉTIQUE,

des Pères de la Compagnie de Jésus

à ZI-KA-WEI.

BULLETIN MÉTÉOROLOGIQUE,

AOÛT 1875.

NOTA.—Pour la position géographique de l'observatoire, les instruments utilisés, les notations employées, etc., voir la note préliminaire placée en tête du Bulletin de Septembre 1874.

TABLEAU MÉTÉOROLOGIQUE.—Août 1875.

Pression barométrique à zéro.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
1	1	755,98	755,52	756,34	756,91	756,20	755,67	756,29	757,80	756,34
2	2	* 57,58	57,27	57,95	58,33	57,89	57,30	57,69	58,26	57,78
3	3	57,87	57,91	58,48	58,95	58,10	57,36	57,13	57,88	57,96
4	4	57,16	57,19	57,63	57,83	57,19	56,45	55,93	56,45	56,98
5	5	56,06	55,68	56,94	56,90	56,55	55,49	55,81	55,84	56,16
6	6	55,95	56,08	57,00	57,15	56,46	55,74	55,66	56,44	56,31
7	7	55,91	55,55	56,17	56,31	55,34	54,38	54,15	54,72	55,32
8	8	54,23	54,13	54,64	55,26	54,60	54,11	54,60	55,34	54,61
9	9	55,13	54,74	55,61	55,89	55,34	54,28	54,58	55,53	55,14
10	10	55,44	54,95	56,27	56,18	55,49	54,58	54,60	56,34	55,48
11	11	54,60	54,54	55,15	55,49	54,52	53,55	54,16	54,92	54,62
12	12	55,04	54,34	54,65	54,71	54,03	53,31	53,86	54,47	54,30
13	13	54,44	53,97	54,67	55,23	54,57	53,84	53,85	55,23	54,48
14	14	55,04	54,74	55,30	55,52	54,73	53,95	54,07	55,09	54,80
15	15	* 55,09	54,09	54,64	54,92	54,44	54,08	54,21	55,13	54,57
16	16	* 54,97	54,24	54,24	54,27	53,36	52,75	52,72	53,45	53,75
17	17	* 53,88	51,65	51,01	49,93	48,33	46,48	47,52	48,26	49,57
18	18	46,06	44,23	43,01	42,84	42,35	42,37	42,73	45,08	43,58
19	19	45,62	46,65	48,42	49,94	50,47	51,21	52,00	53,19	49,69
20	20	53,75	54,14	55,55	56,49	56,42	56,07	56,73	57,65	55,85
21	21	* 57,89	57,13	57,58	57,92	57,05	56,30	56,80	57,03	57,15
22	22	56,15	55,82	56,47	56,42	55,25	54,39	54,59	54,97	55,51
23	23	53,82	53,78	54,35	54,92	54,80	54,17	54,56	55,30	54,46
24	24	55,22	55,56	56,80	57,85	57,88	57,97	58,23	59,05	57,32
25	25	59,05	58,87	59,28	59,70	58,73	58,39	58,28	57,94	58,78
26	26	56,25	55,54	56,25	57,19	57,03	56,76	57,11	58,17	56,79
27	27	57,03	56,75	57,47	58,23	57,71	57,30	57,38	58,19	57,51
28	28	57,41	56,64	57,09	57,79	56,89	56,39	56,69	57,13	57,00
29	29	56,42	56,02	56,71	56,97	56,31	55,93	56,57	57,36	56,54
30	30	56,99	56,60	57,70	58,06	57,35	57,05	57,62	59,07	57,56
1	31	58,88	57,97	58,58	59,44	58,45	57,96	58,79	59,83	58,74
Moyennes du	1–10	756,13	755,90	756,70	756,97	756,32	755,54	755,64	756,46	756,21
	11–20	52,80	52,26	52,66	52,93	52,32	51,76	52,19	53,25	52,52
	21–31	56,78	56,43	57,12	57,68	57,04	56,60	56,96	57,64	57,03
	mois	755,28	754,91	755,55	755,92	755,28	754,70	755,00	755,84	755,31

Maximum : 759,83 observé le 31 à 10 h. P.M.
Minimum : 742,35 „ le 18 à 1 h. P.M.
} différence : ..... mm 17,48

TABLEAU MÉTÉOROLOGIQUE.—Août 1875.

Température sous l'abri.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
1	1	26,1	25,5	28,3	33,2	34,3	33,2	28,3	26,3	29,40
2	2	* 25,6	25,0	26,8	31,5	33,1	32,2	26,4	24,9	28,19
3	3	24,3	24,0	26,2	30,8	32,7	31,4	27,4	26,0	27,85
4	4	24,9	24,0	28,0	31,9	32,8	32,0	27,0	25,3	28,24
5	5	24,0	23,1	26,3	30,9	32,5	32,0	27,0	25,9	27,71
6	6	25,0	25,0	28,0	32,2	33,0	31,2	27,9	26,1	28,55
7	7	25,3	25,0	28,0	29,2	30,4	30,6	27,2	25,6	27,66
8	8	25,2	25,9	27,8	31,7	32,9	31,0	27,1	25,0	28,32
9	9	24,4	24,4	26,1	31,0	32,0	32,0	28,0	26,0	27,99
10	10	25,0	24,3	28,7	32,0	32,0	29,2	28,0	26,1	28,16
11	11	25,2	25,0	28,1	32,6	34,1	32,1	27,9	26,1	28,89
12	12	25,0	24,3	27,4	30,9	33,0	32,0	27,8	26,1	28,31
13	13	25,1	25,0	28,0	31,9	33,3	32,0	27,9	26,6	28,73
14	14	25,5	23,9	27,3	31,9	33,7	32,3	27,7	27,0	28,66
15	15	* 27,0	26,9	28,8	32,0	33,7	30,8	28,0	26,0	29,15
16	16	* 25,8	25,6	28,8	31,6	32,1	31,6	28,0	27,0	28,81
17	17	* 26,8	26,9	28,6	27,0	29,3	27,0	25,2	24,0	26,85
18	18	26,2	26,0	25,6	25,4	27,9	27,0	25,2	24,0	25,91
19	19	22,3	21,1	21,1	22,0	22,5	23,7	23,8	22,9	22,42
20	20	21,9	21,9	22,3	23,3	24,8	25,8	24,0	22,0	23,14
21	21	20,2	20,3	23,2	27,0	29,0	28,0	24,0	22,1	24,23
22	22	* 21,2	20,9	21,8	24,8	26,3	25,2	22,7	20,6	22,94
23	23	21,0	20,0	21,0	24,0	24,6	24,0	21,2	19,0	21,85
24	24	18,5	19,0	21,2	25,1	27,3	27,0	22,7	20,0	22,60
25	25	19,0	17,7	22,2	25,5	26,0	24,7	22,0	20,7	22,22
26	26	22,0	21,5	21,5	23,9	25,3	25,9	22,6	21,7	23,05
27	27	20,9	20,8	21,4	24,3	25,8	24,3	23,0	23,0	22,94
28	28	23,1	23,2	25,1	25,6	26,1	24,9	23,8	23,8	24,45
29	29	24,4	24,2	25,0	29,4	30,2	26,5	24,9	24,7	26,16
30	30	24,1	24,0	25,6	29,0	29,8	26,4	26,0	25,7	26,33
1	31	25,3	24,8	25,9	28,0	26,8	23,7	22,8	23,0	25,04
Moyennes du	1–10	24,98	24,62	27,42	31,44	32,57	31,48	27,43	25,72	28,21
	11–20	25,08	24,57	26,60	28,86	30,44	29,43	26,55	25,17	27,09
	21–31	21,79	21,49	23,08	26,05	27,02	25,51	23,24	22,21	23,80
	mois	23,88	23,49	25,61	28,70	29,91	28,70	25,66	24,30	26,28

Maximum : o 34,3 observé le 1er à 1 h. P.M.
Minimum : 17,7 „ le 25 à 4 h. A.M.
} différence ..... o 16,6

TABLEAU MÉTÉOROLOGIQUE.—Août 1875.

Actinomètre : 1° *thermomètre à boule nue.*

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
1	1	25,3	25,2	34,1	4,29	44,3	41,3	28,1	26,3	33,44
2	2	* 25,9	24,5	32,9	41,3	42,5	40,3	26,1	25,3	32,22
3	3	24,1	23,6	32,5	40,3	43,4	39,6	27,3	25,5	32,04
4	4	23,3	22,8	33,3	41,2	40,9	40,2	26,3	24,4	31,55
5	5	23,3	22,4	32,8	43,3	42,3	41,2	26,4	24,8	32,06
6	6	24,2	24,4	34,6	42,3	43,1	40,1	27,3	25,6	32,70
7	7	24,7	24,3	33,3	40,3	40,3	37,3	27,2	24,5	31,49
8	8	24,7	25,5	34,1	43,0	42,7	38,5	26,4	24,3	32,40
9	9	24,0	24,3	28,0	44,0	43,9	40,4	27,3	25,2	32,14
10	10	24,4	24,1	34,3	43,3	40,3	30,3	27,2	25,3	31,15
11	11	24,8	23,8	33,8	41,8	43,6	40,3	27,3	25,6	32,62
12	12	24,3	23,6	33,5	41,6	41,4	40,3	27,2	25,6	32,19
13	13	24,5	24,3	34,1	42,1	42,6	39,8	27,3	26,1	32,60
14	14	24,7	22,9	33,2	41,5	43,3	40,5	27,1	25,5	32,34
15	15	* 25,9	26,3	33,3	40,3	42,4	36,3	27,4	25,4	32,16
16	16	* 25,3	25,3	32,8	39,8	41,0	40,6	27,8	26,3	32,36
17	17	* 25,8	26,1	31,2	33,1	35,4	28,5	25,2	24,2	28,69
18	18	25,3	25,4	26,2	26,4	34,0	29,3	25,3	24,3	27,02
19	19	22,2	21,3	21,3	23,3	24,6	24,9	23,3	22,3	22,90
20	20	21,4	21,0	23,3	25,3	29,3	29,3	23,4	21,3	24,29
21	21	* 20,7	20,2	28,3	38,0	39,7	35,3	23,8	21,4	28,42
22	22	20,5	20,2	22,7	32,3	36,9	29,5	21,7	20,2	25,50
23	23	20,6	19,5	21,4	32,3	36,1	31,4	20,8	18,3	25,05
24	24	17,7	18,3	27,5	35,9	37,5	35,6	21,3	19,0	26,60
25	25	17,9	16,8	27,7	32,5	35,3	29,5	20,6	20,2	25,06
26	26	21,4	21,3	24,6	31,3	34,3	30,4	22,2	21,5	25,87
27	27	20,3	20,2	21,9	27,3	29,0	24,5	22,6	22,5	23,54
28	28	23,1	23,2	26,6	27,5	30,8	25,7	23,3	23,3	25,44
29	29	24,3	24,3	26,1	40,6	40,3	33,3	24,4	24,4	29,71
30	30	23,8	24,0	27,8	39,5	37,1	27,1	26,1	25,3	28,84
1	31	25,3	24.3	27,3	32,2	28,3	24,5	22,7	23,2	25,97
Moyennes du	1–10	24,39	24,11	32,99	42,19	42,37	38,92	26,96	25,02	32,12
	11–20	21,42	24,00	30,27	35,52	37,76	34,98	26,13	24,66	29,72
	21–31	21,42	21,12	25,63	33,58	35,03	29,71	22,68	21,75	26,36
	mois	23,34	23,01	29,50	36,98	38,28	34,38	25,17	23,75	29,30

Moyennes du mois { Therm. à boule noirçie : o 34,23 ; Therm. à boule nue : 29,30 } différence ..... o 4,93

TABLEAU MÉTÉOROLOGIQUE.—Août 1875.

ACTINOMÈTRE : 2° *thermomètre à boule noirçie.*

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		o	o	o	o	o	o	o	o	o
1	1	25,3	25,2	43,6	52,2	58,2	54,2	28,2	26,2	39,14
2	2	* 25,9	24,5	43,2	54,4	57,0	54,2	26,4	24,2	38,72
3	3	24,1	23,6	43,0	53,3	59,1	53,3	27,3	25,5	38,65
4	4	23,3	23,0	43,3	55,1	51,7	53,4	26,3	24,4	37,56
5	5	23,3	23,2	42,7	52,2	56,9	54,2	27,1	24,8	38,05
6	6	24,2	24,4	44,1	56,2	54,2	54,3	27,3	25,6	38,79
7	7	24,7	24,3	42,7	53,2	51,4	46,3	27,2	24,5	36,79
8	8	24,7	25,5	43,9	57,5	58,1	51,0	26,5	24,3	38,94
9	9	24,2	24,3	31,3	59,1	59,2	54,5	27,2	25,2	38,12
10	10	24,5	24,1	44,1	57,2	50,4	33,2	27,2	25,3	35,75
11	11	24,9	24,1	44,0	55,1	57,7	53,5	27,3	25,6	39,02
12	12	24,3	23,7	43,7	55,0	55,2	54,3	27,2	25,9	38,66
13	13	24,7	24,3	44,2	55,2	56,7	53,4	27,2	26,2	38,99
14	14	24,7	22,9	43,6	54,9	58,2	54,5	27,2	25,4	38,92
15	15	* 25,9	26,3	41,4	53,1	57,0	46,0	27,5	25,4	37,82
16	16	* 25,2	25,2	39,4	52,8	52,7	55,0	28,0	26,4	38,06
17	17	* 26,0	26,2	34,7	40,3	45,2	31,4	25,2	25,2	31,77
18	18	25,3	25,5	26,8	28,2	42,1	34,0	25,3	24,2	28,92
19	19	22,2	21,2	22,1	26,2	28,4	27,0	23,3	22,3	24,09
20	20	21,4	21,2	25,2	31,2	37,2	35,5	23,5	21,2	27,05
21	21	* 20,7	20,2	37,2	50,4	55,9	47,1	23,9	21,4	34,60
22	22	20,5	20,2	25,7	42,0	51,1	36,5	22,2	20,2	29,80
23	23	21,2	20,2	24,2	43,9	51,5	44,2	21,1	18,4	30,46
24	24	18,1	18,3	37,9	49,2	52,2	49,5	21,3	19,1	33,20
25	25	18,2	17,1	38,3	43,2	47,3	38,9	21,0	20,2	30,52
26	26	21,5	21,4	22,4	42,2	46,1	38,7	22,2	21,9	29,55
27	27	20,3	20,2	23,9	31,2	33,7	25,4	23,1	22,7	25,06
28	28	23,2	23,2	29,3	31,2	38,7	28,3	23,3	23,4	27,57
29	29	24,3	24,2	28,4	57,4	55,2	45,4	24,5	24,5	35,49
30	30	24,1	24,2	32,2	54,2	50,6	28,7	26,2	25,4	33,20
1	31	25,2	24,3	30,8	39,4	31,2	26,6	23,0	23,2	27,96
Moyennes du	1–10	24,42	24,21	42,19	55,04	55,62	50,86	27,07	25,00	38,05
	11–20	24,46	24,06	36,51	45,20	49,02	44,46	26,17	24,78	34,33
	21–31	21,57	21,23	29,94	44,03	46,68	37,21	22,89	21,85	30,67
	mois	23,42	23,10	36,01	47,96	50,32	43,95	25,30	23,81	34,23

Maximum observé le 9 { Therm. à boule noirçie : 59,2 ; Therm. à boule nue : 43,9 } différence ..... o 15,3

TABLEAU MÉTÉOROLOGIQUE.—Août 1875.

Tension de la vapeur.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
1	1	24,08	24,05	25,69	25,33	26,47	22,65	22,92	24,56	24,47
2	2	*23,37	22,17	23,04	23,70	24,04	19,90	22,32	21,63	22,52
3	3	22,00	21,99	22,81	19,96	20,83	21,40	23,88	23,13	22,00
4	4	22,01	21,80	23,75	22,81	20,97	21,03	20,73	23,20	22,04
5	5	21,99	20,82	22,74	20,30	18,75	17,84	20,93	19,67	20,38
6	6	21,77	22,17	22,70	21,34	20,64	20,92	22,16	22,87	21,82
7	7	23,36	23,18	23,31	23,00	21,42	22,13	22,19	23,18	22,72
8	8	22,45	21,41	22,22	21,45	20,48	21,25	25,79	22,17	22,15
9	9	21,94	22,34	23,88	22,09	22,96	23,17	22,30	23,33	22,75
10	10	23,55	22,60	23,31	21,90	21,90	22,77	23,51	23,67	22,90
11	11	23,43	21,77	23,24	20,46	19,12	19,76	21,75	21,69	21,40
12	12	21,77	21,62	22,87	20,91	21,25	19,82	21,82	22,87	21,62
13	13	22,51	22,17	23,75	21,54	21,87	19,62	22,76	22,76	22,12
14	14	21,07	20,91	22,12	19,28	19,37	17,86	21,51	21,34	20,43
15	15	*22,54	23,38	24,73	23,40	20,20	22,01	22,30	21,96	22,56
16	16	*22,58	23,01	25,16	23,86	24,00	21,93	23,75	24,37	23,58
17	17	*24,25	23,79	24,22	25,22	25,07	24,13	23,43	22,18	24,04
18	18	23,41	23,94	24,39	24,11	24,23	24,37	23,83	22,18	23,81
19	19	19,47	18,62	16,89	17,36	18,12	18,11	18,55	16,47	17,95
20	20	15,77	16,32	17,35	15,88	17,61	17,86	19,88	19,66	17,54
21	21	*18,69	17,72	18,92	18,61	18,91	17,99	18,43	18,18	18,43
22	22	16,65	17,52	17,14	16,16	14,72	14,20	18,17	17,02	16,45
23	23	16,78	15,58	16,95	14,48	15,60	15,45	15,00	15,39	15,65
24	24	15,21	16,19	17,34	15,80	12,06	11,60	15,73	16,22	15,02
25	25	15,39	15,05	16,90	15,73	15,42	16,22	16,16	16,96	15,98
26	26	18,24	19,10	18,73	17,26	16,58	17,44	18,42	18,06	17,98
27	27	18,38	17,76	18,25	18,24	18,95	19,88	20,68	20,31	19,06
28	28	20,82	21,15	22,31	22,81	21,69	21,63	20,97	20,97	21,54
29	29	21,94	22,06	22,57	23,30	23,01	24,44	21,83	21,75	22,61
30	30	22,12	22,18	23,18	24,61	25,21	24,09	23,33	24,53	23,64
1	31	23,36	23,30	23,39	23,51	24,05	20,45	20,62	20,89	22,45
Moyennes du	1–10	22,65	22,25	23,35	22,19	21,85	21,31	22,67	22,74	22,37
	11–20	21,68	21,55	22,47	21,20	21,08	20,55	21,96	21,55	21,51
	21–31	18,87	18,87	19,61	19,14	18,74	18,49	19,03	19,12	18,98
	mois	20,99	20,83	21,74	20,79	20,50	20,06	21,15	21,07	20,89

Maximum mm 26,47 observé le 1 à 1 h. P.M.
Minimum : 11,60 „ le 24 à 4 h. P.M.
} différence..... mm 14,87

TABLEAU MÉTÉOROLOGIQUE.—Août 1875.

Humidité relative.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations.
1	1	96	99	90	67	65	60	80	97	81,7
2	2	*95	94	88	69	64	55	87	92	80,5
3	3	97	99	90	60	56	62	88	93	80,6
4	4	97	98	85	65	57	59	78	97	79,5
5	5	99	99	89	61	52	50	79	79	76,0
6	6	93	94	81	60	55	62	79	91	76,9
7	7	97	98	83	77	67	68	83	95	83,5
8	8	94	86	80	61	55	63	97	94	78,8
9	9	97	98	95	66	65	65	80	93	82,4
10	10	100	100	79	62	62	76	83	94	82,0
11	11	98	93	82	56	48	55	78	86	74,5
12	12	93	96	84	63	57	56	79	91	77,4
13	13	95	94	85	61	58	55	81	88	77,1
14	14	87	95	82	54	50	50	78	80	72,0
15	15	*82	89	84	66	51	67	80	88	75,9
16	16	*91	94	85	69	67	63	85	92	80,7
17	17	*92	90	83	95	82	91	98	100	91,4
18	18	93	96	100	100	87	92	100	100	96,0
19	19	97	100	91	88	89	83	85	79	89,0
20	20	81	88	87	74	76	72	90	100	83,5
21	21	*100	100	90	70	63	64	83	92	82,7
22	22	89	95	88	69	58	60	89	94	80,3
23	23	91	90	92	65	68	70	80	94	81,3
24	24	96	99	92	67	45	43	76	93	76,4
25	25	94	100	85	64	62	70	82	93	81,2
26	26	92	100	98	78	69	70	90	93	86,2
27	27	100	97	96	81	77	88	99	97	91,9
28	28	99	100	94	94	86	92	96	96	94,6
29	29	97	98	96	77	72	95	93	94	90,3
30	30	99	100	95	82	81	94	93	100	93,0
1	31	97	100	94	84	92	94	100	100	95,1
Moyennes du	1–10	96,5	96,5	86,0	64,8	59,8	62,0	83,4	92,5	80,2
	11–20	90,9	93,5	86,3	72,6	66,5	68,4	85,4	90,4	81,7
	21–31	95,8	98,1	92,7	75,5	70,3	76,4	89,2	95,1	86,6
	mois	94,4	96,1	88,5	71,1	65,7	69,2	86,1	92,7	83,0

Maximum : 100 observé 20 fois
Minimum : 43 „ le 24 à 4h. P.M.
} différence..... 57

TABLEAU MÉTÉOROLOGIQUE.—Août 1875.

Ozone.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Moyennes des 8 observations
1	1	8	6	2	5	3	4	3	6	4,6
2	2	?	9	6	5	4	3	3	6	5,1
3	3	6	7,5	4	3	3	2,5	4	7	4,6
4	4	5,5	5	4	3	3	3	3	7	4,2
5	5	5	4	3,5	3	3	3,5	2,5	3	3,4
6	6	3	3	3	3	2,5	3	2,5	5	3,1
7	7	5	3,5	1	2	2	1,5	2	3,5	2,6
8	8	6	8	3	3	3,5	3	3	3,5	4,1
9	9	4	4	0	7,5	2	2,5	3	3	3,3
10	10	3	3	0	5	4	3,5	4	4	3,3
11	11	4	6	4	3	2	2,5	3	3	3,4
12	12	6	7	5	3	2	2	2	4	3,9
13	13	7,5	6,5	5	4	2,5	4	2,5	7	4,9
14	14	8	8	6	6	5	?	4	6	6,1
15	15	* 7	8	8	4	4	3	3,5	6	5,4
16	16	*8,5	5	8	2	2	2	3,5	5	4,5
17	17	* 6	5	7	6	6	8	8,5	9	6,9
18	18	9	9	8	?	9	10	8	9	8,9
19	19	17	17	11	9,5	12	8,5	5	7	10,9
20	20	7	4	9	7	4	6	6	6	6,1
21	21	* 3	3	2	8	5	7	6	7	5,1
22	22	14	9	11	7	5	5	8,5	12	8,9
23	23	12	14	11	9	3	4,5	7	9	8,7
24	24	8,5	8,5	9	9	7,5	7	2	6	7,2
25	25	6	5	5	7	6,5	6	6	9	6,3
26	26	10	18	11	9	6	5	8	8,5	9,4
27	27	8	8	6	12	5	6	8,5	8,5	7,7
28	28	8,5	7	2	6	6	5	7	6	5,9
29	29	5	6,5	3	8	4	7	7	9	6,2
31	30	8,5	4	0	5	3,5	3,5	7	6	4,7
1	31	6	6	5	6	6	6,5	8	4	5,9
Moyennes du	1–10	5,2	5,3	2,6	4,0	3,0	3,0	3,0	4,8	3,8
	11–20	8,0	7,5	7,1	4,5	4,9	5,1	4,6	6,2	6,1
	21–31	8,1	8,1	5,9	7,8	5,2	5,7	6,8	7,7	6,9
	mois	7,2	7,0	5,2	5,7	4,4	4,6	4,9	6,3	5,7

Maximum : 17 observé le 19 2 fois
Minimum : 0,0 „ 3 fois

} Différence..... 17,0

TABLEAU MÉTEOROLOGIQUE.—Août 1875.

Direction du vent; sa vitesse par seconde.

Date.	Matin.								Soir.								Moyennes des 8 observations.
	1 h.		4 h.		7 h.		10 h.		1 h.		4 h.		7 h.		10 h.		
	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	Dir.	Vit.	
		m		m		m		m		m		m		m		m	m
1	E	1,4	E	0,5	E	0,8	ESE	2,1	ENE	2,6	ENE	3,7	ENE	3,3	E	3,3	2,2
2	E	3,5	ESE	3,6	ENE	1,3	ENE	3,1	NE	3,1	ENE	3,6	E	4,4	E	3,9	3,3
3	E	2,8	E	2,8	E	3,0	E	2,3	E	5,4	ENE	4,0	ENE	3,7	ENE	1,7	3,2
4	ENE	1,0	ENE	0,1	ENE	0,0	NE	1,3	NE	2,1	NNE	2,6	E	2,4	E	1,0	1,3
5	SSE	0,2	NE	0,2	NNE	0,4	NNE	1,0	NNE	2,3	N	1,8	ENE	2,5	E	0,8	1,1
6	E	0,0	E	0,0	NNE	0,0	ESE	0,6	ESE	3,1	E	5,2	E	4,1	ESE	2,4	1,9
7	ESE	1,7	ESE	1,0	ESE	0,8	NE	2,6	E	3,9	E	4,4	E	3,1	E	1,1	2,3
8	ESE	1,6	SE	2,3	ESE	2,0	E	2,8	E	2,5	E	4,4	E	4,6	E	0,5	2,6
9	ENE	0,5	ENE	0,5	N	0,7	N	2,2	NE	3,4	ENE	4,4	ENE	3,3	ENE	0,5	1,9
10	ENE	0,0	ENE	0,0	ENE	0,2	W	0,5	N	1,8	SE	3,7	SE	2,0	SE	0,6	1,1
11	SE	0,7	SE	0,8	SE	0,7	ESE	2,4	S	1,9	ESE	3,1	ESE	3,8	SE	2,5	2,0
12	SSE	2,2	SE	2,0	SE	1,6	SSE	3,5	SSE	3,7	SE	4,2	ESE	4,9	SE	2,4	3,1
13	SE	2,0	ESE	1,8	ESE	2,5	S	4,2	E	3,2	ESE	5,3	ESE	4,5	SE	1,7	3,2
14	SSE	3,1	SE	1,4	E	0,7	SE	3,0	ESE	3,3	ESE	2,9	E	2,7	E	1,9	2,4
15	E	0,9	ESE	1,6	ESE	2,5	ESE	3,9	E	5,0	E	5,6	ESE	5,7	ESE	3,9	3,6
16	ESE	1,1	E	2,0	E	1,8	ESE	6,1	ESE	7,9	ESE	7,3	E	5,1	E	2,0	4,2
17	ENE	2,8	NE	0,7	NE	2,9	ENE	7,9	ENE	9,2	ENE	9,5	ENE	8,5	ENE	5,3	5,9
18	ENE	4,4	NNE	6,2	NNE	4,5	NE	5,3	NNE	4,6	NNW	5,6	NNW	8,3	NW	8,2	5,9
19	NW	10,6	WNW	12,1	WNW	12,5	WNW	11,7	WNW	11,2	WNW	9,6	W	5,7	WSW	5,2	9,8
20	WSW	4,6	W	4,2	WNW	3,1	WNW	5,0	WNW	5,4	WNW	4,7	NW	1,5	NW	0,9	3,7
21	SSW	0,6	SSW	1,4	W	1,5	NNE	1,9	NNE	2,4	NNE	2,8	ENE	2,8	NNE	2,2	1,9
22	NNE	1,7	N	1,0	N	1,8	NNE	3,0	NNE	5,1	NNE	4,9	NNE	3,6	ENE	3,8	3,1
23	NNE	3,8	N	4,2	NNE	3,4	NE	5,8	NNE	8,2	NNE	8,4	NNE	5,8	NNW	1,8	5,2
24	NNW	1,8	NW	2,2	NW	1,9	NW	3,4	N	1,7	N	3,0	E	1,1	E	0,7	2,0
25	E	0,0	ENE	0,0	ENE	0,1	ENE	0,3	ENE	3,7	ENE	5,1	ENE	3,4	NNE	1,4	1,8
26	NNE	2,3	N	2,8	N	4,5	NNE	5,6	NNE	3,9	NNE	5,3	N	1,8	N	0,9	3,4
27	NNE	0,6	N	0,5	N	0,3	N	2,0	NE	2,5	NNE	1,9	NNE	0,5	NNE	0,7	1,1
28	NNE	0,9	NNE	0,7	NE	0,8	ENE	4,2	E	5,6	NE	4,2	E	4,8	ESE	5,5	3,2
29	ESE	3,7	E	2,8	ESE	3,3	SE	3,8	E	3,4	ENE	5,7	ENE	5,0	E	4,5	4,0
30	E	3,4	ENE	1,2	E	1,9	SE	3,0	SE	4,2	ESE	5,1	ESE	4,2	ESE	3,1	3,3
31	ESE	3,2	ESE	2,2	ESE	2,0	SE	3,9	NNE	3,1	ENE	9,0	ENE	8,5	ENE	8,4	5,9
Moy. du mois		m 2,2		m 2,0		m 2,0		m 3,5		m 4,2		m 4,9		m 4,1		m 2,7	m 3,2

Fréquence relative des 16 vents sur 100

N 8	W..... 2	S 1	E 19
NNW 2	WSW 1	SSE..... 2	ENE 18
NW 3	SW 0	SE 9	NE 5
WNW 3	SSW 1	ESE 14	NNE 12

Calmes, sur 100 observations 5

m

Vitesse moyenne maximum observée le 19..... 12,4

TABLEAU MÉTÉOROLOGIQUE.—Août 1875.

ÉTAT DU CIEL.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. m.			4h. m.			7h. m.			10h. m.		
	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.
1	0	..	..	0	..	..	0 Br	..	..	0	..	..
2	..	..	..	10 Br	..	..	2	..	c	2	kst	c S
3	0	..	..	0	..	..	1	c	..	2	c SE	..
4	0	..	..	0	..	..	0	..	..	8	ac NE	..
5	0	..	..	1	c	..	0 Bd	..	..	7	c NE	..
6	1	cst	..	7 Br	c	..	3 Br	c	..	7	k	c E
7	0	..	..	1	..	c	2	..	c	8	ac N	cn E
8	0	..	..	9 Br	..	..	1	c	..	7	c E	..
9	1	c	..	8	..	cn	6 Br	..	cn	8	ac N	c N
10	0	..	..	1	c	..	3	ac	c	7	acst	c W
11	0	..	..	0	..	..	1	..	c	1	ac	c W
12	0	..	..	0	..	..	0	..	..	2	ac SE	..
13	0	..	..	0	..	..	2	cst	c	2	kst	c SE
14	0	..	..	0	..	..	0	..	..	1	c SE	..
15	..	..	..	9 Br	..	..	2	k	c	8	..	c E
16	..	..	..	3	..	cn	5 Br	..	c E	8	ac E	c E
17	..	..	..	8	cn	n	4	..	cn NE	9	kc	cn E
18	10 Br	..	c E	10	ac	cn NE	10	..	cn NE	10 Br	..	cn NE
19	10 Br	..	c	10 Br	..	c	10 Br	..	n NW	10 Br	..	c W
20	10	ac	c SW	10	ac	c NW	10	ac	..	10 Br	..	c W
21	1	..	..	1 Bd	..	..	0 Bd	..	..	1 Br	..	c N
22	1	kst	c	4	acst	..	10	acst	..	8	acst	c NE
23	10 Br	cst	..	10 Br	..	n	10 Br	cst	cn	10 Br	..	cn W
24	0	..	..	0	..	..	1	..	c NW	1	..	c N
25	0	..	..	0	..	..	3 Bd	..	cst	8	k W	kc E
26	10 Br	..	c N	10 Bd	..	..	10	n	..	10 Br	..	c N
27	0	..	..	1	cst	..	8 Br	cst	..	10	ac	cn N
28	10 Br	..	cn	9	ac	cn	10	ac SW	c E	10 Br	..	n E
29	10	c	..	10	c	..	10	cst	n	9	kc W	c SE
30	7	..	c	7	..	c	5	cst NW	c E	8	kc	n E
31	10	..	n	10	c	n	10	ac SW	..	10	n	c S
Moy. du mois	3,4	..	..	4,8	..	..	4,5	..	..	6,5	...	..

NOMBRE DE JOURS DE :

Ciel beau, ou moins de $2_{1/0}$ couvert	.. 8	Brouillard	4
,, peu nuageux ou de 2 à $4_{1/0}$,,	.. 6	Brume	19
,, nuageux, ou de 4 à $6_{1/0}$,,	.. 5	Rosée	20
,, très-nuageux, ou de 6 à $8_{1/0}$,,	.. 4	Pluie	11
,, couvert ou plus de $8_{1/0}$,,	.. 8	Orages avec tonnerre	 0
.....		Éclairs sans tonnerre	 2

TABLEAU MÉTÉOROLOGIQUE.—Août 1875.

État du ciel.—*Nébulosité, Forme et Direction des Nuages.*

Date.	1h. s.			4h. s.			7h. s.			10h. s.			Moyennes des 8 observations.
	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	Nébulos.	Nuages sup.	Nuages inf.	
1	2	ac S	..	1	acst	..	1	cst	cn	8 Br	..	..	1,5
2	1	kst	c S	1	c	..	0	..	..	0	..	..	2,3
3	5	c SE	..	3	ac	c S	2	ac E	c E	0	..	..	1,6
4	7	ac N	..	1	c	..	1	c	..	0	..	..	2,1
5	3	c NE	..	3	kst	c NE	1	kst	c	0	..	..	1,9
6	7	kst	c E	5	kst	c E	2	kst	c	0	..	..	4.0
7	8	ac N	cn E	8	ac N	cn E	3	kst	c E	0	..	..	3.8
8	6	..	c E	3	kst	c E	3	kst	c	1	kst	..	3,7
9	8	ac N	c NE	5	ac	cn NE	2	kst	c	0	..	..	4,7
10	7	ac	c N	8	ac	cn NE	2	..	c	0	..	..	3,5
11	3	ac NE	..	1	kst	ac	1	kst	ac	0	..	..	0,9
12	3	ac SE	..	1	ac SE	..	3	cst	c	0	..	..	1,1
13	5	..	c SW	2	..	c	2	kst	c	1	..	c	1,7
14	2	c E	..	1	c	..	2 Br	..	c	2 Br	..	ac-t	1,0
15	6	..	c SE	6	..	c E	1	ac	c	0	..	..	4,6
16	8	ac E	c E	5	ac E	c E	2	kc	c	1	..	c	4,4
17	10 Br	..	cn E	10 Br	..	cn E	10 Br	..	n NE	10 Br	..	n	8,7
18	10 Br	..	cn NE	10 Br	..	cnNW	10 Br	..	cnNW	10 Br	..	cn	10,0
19	10 Br	..	c NW	10 Br	..	..	10 Br	..	..	9 Br	..	c W	9,9
20	10 Br	..	c W	10	ac	c W	10	..	c	2	acst	..	9,0
21	7	acst	c N	5	kac N	c N	10	ac	cn N	5	kst	..	3,8
22	8	acst	c N	9	kst	c N	10 Br	..	cn	10 Br	..	cst	7,5
23	9	k W	c N	3	acst	c NE	3	acst	c N	0	..	..	6,9
24	1	k	c	1	kc	c N	2	cst	..	0	..	..	0,7
25	8	kc W	..	9	kc W	c NE	8	kst	c NE	5 Br	..	c	5,1
26	8	k W	c NE	8	k W	c NE	7	cst	c	0	..	..	7,9
27	10	ac	cn N	10 Br	..	cn N	10 Br	..	cn	10 Br	..	cn	7,4
28	10 Br	n	c E	10 Br	..	cn NE	10	..	n	10 Br	..	cn	9,9
29	9	kac sw	c E	10	ac	n E	10	ac	c E	10 Br	..	..	9,9
30	8	cst	c E	10	..	n	10 Br	..	cn E	10 Br	..	cn	8,1
31	10 Br	..	cn E	10 Br	..	cn NE	10	n	..	10	n	..	10,0
Moy. du mois	6,7	..	..	5,8	..	..	5,1	..	..	3,7	..	..	5,1

Phénomènes divers observés :

Lumière zodiacale	8 fois	8
Couronnes	solaire 1 ,,	1
	lunaires 3 ,,	3
Arcs-en-ciel solaires	2 ,,	2
Étoiles filantes	Le 9, 10 et 11 la moyenne a été de 32 pour 1 observateur pendant 1h.	

TABLEAU MÉTÉOROLOGIQUE.—Août 1875.

Évaporation sous l'abri.

Jours de la lune	Jours du mois	Matin. 1 h.	Matin. 4 h.	Matin. 7 h.	Matin. 10 h.	Soir. 1 h.	Soir. 4 h.	Soir. 7 h.	Soir. 10 h.	Total des 8 observations.
		mm	mm	mm	mm	mm	mm	mm	mm	mm
1	1	0,10	0,10	0,02	0,48	0,80	0,90	0,68	0,14	3,22
2	2	* 0,09	0,09	0,08	0,42	0,71	0,89	0,55	0,10	2,93
3	3	0,05	0,00	0,09	0,51	1,35	0,44	0,51	0,10	3,05
4	4	0,10	0,00	0,07	0,43	0,81	0,99	0,72	0,08	3,20
5	5	0,00	0,00	0,08	0,51	1,15	1,18	0,77	0,20	3,89
6	6	0,10	0,10	0,10	0,45	0,87	1,04	0,63	0,11	3,40
7	7	0,10	0,00	0,10	0,50	0,80	0,70	0,51	0,10	2,81
8	8	0,09	0,10	0,20	0,60	1,07	0,94	0,69	0,10	3,79
9	9	0,08	0,02	0,00	0,48	1,08	0,94	0,70	0,10	3,40
10	10	0,02	0,01	0,09	0,53	0,97	0,88	0,35	0,06	2,91
11	11	0,08	0,01	0,10	0,60	1,20	1,10	0,70	0,20	3,99
12	12	0,20	0,10	0,08	0,57	1,05	1,10	0,70	0,20	4,00
13	13	0,10	0,00	0,10	0,58	0,90	1,07	0,65	0,19	3,59
14	14	0,21	0,09	0,02	0,61	1,18	0,10	0,95	0,07	3,23
15	15	* 0,14	0,14	0,16	0,54	1,00	0,98	0,62	0,20	3,78
16	16	* 0,10	0,10	0,15	0,55	0,98	1,22	0,60	0,18	3,88
17	17	* 0,15	0,17	0,20	0,19	0,32	0,24	0,00	0,00	1,27
18	18	0,08	0,00	0,00	0,00	0,04	0,06	0,00	0,00	0,18
19	19	0,00	0,00	0,13	0,35	0,14	0,26	0,42	0,35	1,65
20	20	0,35	0,30	0,12	0,38	0,50	0,50	0,25	0,07	2,47
21	21	* 0,03	0,04	0,01	0,44	0,88	1,08	0,50	0,20	3,18
22	22	0,10	0,10	0,17	0,53	1,20	1,26	0,59	0,10	4,05
23	23	0,25	0,25	0,20	0,54	1,11	1,25	0,76	0,14	4,50
24	24	0,10	0,00	0,00	0,49	1,11	1,50	0,75	0,10	4,05
25	25	0,03	0,07	0,00	0,35	0,76	0,79	0,40	0,13	2,53
26	26	0,15	0,00	0,00	0,62	0,67	1,07	0,41	0,10	3,02
27	27	0,00	0,00	0,06	0,24	0,48	0,30	0,04	0,08	1,20
28	28	0,00	0,00	0,08	0,15	0,22	0,13	0,00	0,05	0,63
29	29	0,03	0,02	0,05	0,20	0,50	0,31	0,13	0,01	1,25
30	30	0,05	0,00	0,05	0,20	0,36	0,34	0,10	0,00	1,10
1	31	0,02	0,00	0,07	0,21	0,18	0,07	0,00	0,00	0,55
Total du	1–10	0,73	0,42	0,83	4,91	9,61	8,90	6,11	1,09	32,60
	11–20	1,41	0,91	1,06	4,37	7,31	6,63	4,89	1,46	28,04
	21–31	0,76	0,48	0,69	3,97	7,47	8,10	3,68	0,91	26,06
	mois	2,90	1,81	2,58	13,25	24,39	23,63	14,68	3,46	86,70

	mm		mm
Maximum en 24h. :	4,50 observé le 25	différence	4,32
Minimum „ :	0,18 „ le 12		

TABLEAU MÉTÉOROLOGIQUE.—Août 1875.

Jours de la lune	Jours du mois	Températures extrêmes. Sous l'Abri. Minima	Maxima	Différences	Moyennes	au Soleil. Max. boule noire.	Max. boule blanche.	Différences	Pluie. Jardin. Total des 24h.	Toit. Total des 24h.	Différences	Température du Puits.
		o	o	o	o	o	o	o	mm	mm	mm	o
1	1	25,0	36,4	11,4	30,70	48,4	41,9	6,5	0,0	0,0	0,0	15,5
2	2	24,0	35,0	11,0	29,50	44,4	39,1	5,3	0,0	0,0	0,0	15,5
3	3	23,7	34,1	10,4	28,90	46,7	43,5	3,2	0,0	0,0	0,0	15,6
4	4	22,9	34,3	11,4	28,60	47,1	40,7	6,4	0,0	0,0	0,0	15,5
5	5	22,8	34,2	11,4	28,50	47,1	41,0	6,1	0,0	0,0	0,0	15,5
6	6	24,5	34,4	9,9	29,45	46,7	40,1	6,6	0,0	0,0	0,0	15,5
7	7	24,6	33,2	8,6	28,90	45,6	39,3	6,3	0,0	0,0	0,0	15,5
8	8	24,8	34,4	9,6	29,60	46,5	40,1	6,4	0,0	0,0	0,0	15,5
9	9	23,8	34,2	10,4	29,00	47,0	41,0	6,0	0,0	0,0	0,0	15,5
10	10	23,9	35,2	11,3	29,55	49,1	42,6	6,5	0,0	0,0	0,0	15,5
11	11	24,1	35,3	11,2	29,70	46,8	41,8	5,0	0,0	0,0	0,0	15,5
12	12	23,6	34,4	10,8	29,00	46,8	41,0	5,8	0,0	0,0	0,0	15,6
13	13	24,4	35,3	10,9	29,85	...	...	...	0,0	0,0	0,0	15,6
14	14	22,5	35,2	12,3	29,05	47,3	41,2	6,1	0,0	0,0	0,0	15,7
15	15	25,8	34,7	8,9	30,25	43,1	39,0	4,1	0,0	0,0	0,0	15,8
16	16	25,1	34,3	9,2	29,70	42,6	38,7	3,9	0,0	0,0	0,0	15,8
17	17	24,0	31,2	7,2	27,60	...	...	...	52,4	43,1	9,3	15,8
18	18	23,8	29,0	5,2	26,40	...	...	...	70,3	60,9	9,4	15,8
19	19	20,3	24,8	4,5	22,55	...	...	...	15,0	12,9	2,1	15,9
20	20	20,8	26,2	5,4	23,50	...	...	...	0,0	0,0	0,0	15,9
21	21	19,7	30,2	10,5	24,95	43,1	37,6	5,5	0,0	0,0	0,0	15,9
22	22	20,4	28,2	7,8	24,30	40,1	35,1	5,0	1,0	0,3	0,7	16,0
23	23	19,8	26,1	6,3	22,95	36,1	30,2	5,9	0,4	0,1	0,3	16,0
24	24	17,9	28,0	10,1	22,95	39,1	34,1	5,0	0,0	0,0	0,0	16,0
25	25	16,8	28,2	11,4	22,50	39,7	34,7	5,0	0,0	0,0	0,0	16,0
26	26	19,9	28,1	8,2	24,00	41,1	35,1	6,0	2,1	0,6	1,5	16,0
27	27	19,7	26,4	6,7	23,05	...	...	...	0,4	0,3	0,1	16,0
28	28	22,8	27,5	4,7	25,15	...	...	...	26,8	22,7	4,1	16,0
29	29	23,1	32,2	9,1	27,65	42,5	35,3	7,2	5,1	4,1	1,0	16,0
30	30	23,8	31,8	8,0	27,80	...	...	...	1,3	1,2	0,1	16,0
1	31	22,8	28,7	5,9	25,75	...	...	...	77,6	66,4	11,2	16,7
												(1)
Moyennes du	1-10	24,00	34,54	10,54	29,27	...	...	...	0,0	0,0	0,0	...
	11-20	23,48	32,04	8,56	27,76	...	...	...	137,7	116,9	20,8	...
	21-31	20,61	28,67	8,06	24,64	...	...	...	114,7	95,7	19,0	...
	mois	22,63	31,65	9,02	27,14	...	...	...	252,4	212,6	39,8	...

	o	o	mm
Maximum:	36,4 observé le 1	Max. boule noire	49,1 — Hauteur d'eau tombée 252,4
Minimum:	16,8 „ le 25	„ blanche	43,5 — „ „ évaporée 86,70
Différence:	19,6	Différence max.	6,6 — Différence 165,7

JOURNAL MÉTÉOROLOGIQUE.

Août 1875.

1. 1h. m.—Ciel serein, étoiles brillantes ; vent faible ; un peu de rosée. 4h.—Rosée abondante ; le reste comme à 1h. 7h.—Brume à l'horizon. 10h.— Quelques cumulus à l'horizon E. ; ciel d'un bleu pâle. 1h. s.—Cumulus *balles-de-coton* du côté W. ; ciel découvert à l'E. 3h.—Nimbus orageux à l'W. ; avant d'atteindre le zénith il est chassé par le vent. 4h.—Cumulo-stratus vaporeux à l'horizon W. ; reste du ciel pur ; le vent fraîchit 7h.—Stratus et nuages orageux à l'horizon ; il en part des rayons lumineux qui traversent tout le ciel et semblent converger à l'E. en un point symétrique de celui où se trouve le Soleil. 8h. 49m.—Éclairs sans tonnerre du S.W. ; ils sont assez vifs et assez fréquents. 10h.—Le ciel se couvre subitement d'une brume épaisse.
2. 4h. m.—Ciel uniformément couvert ; vent très-faible. 5h.— Brouillard assez dense et élevé venant du N.E. 7h.—Quelques cumulus tout autour de l'horizon ; çà et là des cirrus ; horizon brumeux. 10h.—Cumulus épars ; cirro-stratus au N.E. 1h. s.— Banc de cumulus compactes du S. à l'W. ; ciel d'un bleu pâle. 4h.—Cumulus orageux du S. à l'W. ; ciel très-pur. 7h.—Rayons lumineux moins distincts qu'hier ; quelques cumulus longent l'horizon. 10h.—Ciel splendide ; vent régulier ; rosée.
3. 1h. m.—Ciel très-pur ; vent faible, rosée extraordinaire. 4h.— Mêmes remarques. 7h.—Quelques cumulus à l'horizon E. 10h.— Cumulus venant du S E. et longeant l'horizon ; ciel d'un bleu pâle. 1h. s.—Cumulus *balles-de-coton* venant du S.E. et dispersés partout le ciel. 4h.—Ceinture de cumulus tout autour de l'horizon. 7h.— Deux couches de nuages venant de l'E. ; la 2ème très-rapidement. 10h.—Ciel très-étoilé ; vent faible.
4. 2h. m.—Ciel sans nuages et très-pur ; calme, rosée. 4h.—Même ciel ; lumière zodiacale peu distincte ; étoiles filantes nombreuses ; le calme continue, rosée très-abondante. 7h.—Ciel et calme comme ci-dessus. 10h.—Des cumulus viennent lentement du N.E. ; ciel d'un bleu pâle. 1h. s.—Les cumulus viennent du N. ; ciel comme à 10h. 4h.—Banc de cumulus compactes du S. à l'W. ; ciel d'un beau bleu. 7h.—Cumulus noirâtres à l'horizon W. et N.E. ; reste du ciel serein. 10h.—Brume à l'horizon N.W. ; calme absolu, rosée.
5. 1h. m.—Ciel très-pur, calme absolu, rosée abondante. 4h.— Mêmes remarques ; de plus, lumière zodiacale comme hier. 7h.— Brouillard peu élevé ; le calme continue. 10h.—Cumulus grisâtres venant du N.E. ; éclaircies d'un beau bleu. 1h. s.—Cumulus compactes au S. ; éclaircie au zénith. 4h.—Au N. cirro-stratus orientés du N. à l'E. 7h.—Cirro-stratus épars dans le ciel ; cumulus orageux à l'W. 10h.—Ciel sans nuages et très-étoilé ; vent faible.
6. 1h. m.—Au N.E., cumulo-stratus s'étendant du N. au S. ; calme, léger dépôt de rosée. 4h.—Tout le N. et l'E. est occupé par des cumulus diffus ; le calme continue ; pas de rosée. 7h.—Couronne de cumulus tout autour de l'horizon ; calme. 10h.—Quelques

cirrus épars ; cumulus *balles-de-coton* venant lentement de l'E. ; ciel d'un beau bleu. 1h. s.—Cirro-stratus d'orientation diverse ; cumulus comme à 10h. ; ciel d'un bleu pâle au zénith, sombre à l'W. ; le vent fraîchit. 4h.—Au N. cirro-stratus orientés E.W. ; cumulus comme ci-dessus. 7h.—Cirro-stratus et cumulus tout autour de l'horizon ; reste du ciel découvert. 10h.—Ciel très-pur, vent faible et régulier ; pas de rosée.

7. 1h. m.—Étoiles peu brillantes ; vent faible et régulier, rosée. 4h.—Lumière zodiacale s'élevant jusqu'à la constellation du Taureau ; gros cumulus vaporeux au N. ; calme. 7h.—Cumulus au N. et au N.E. 10h.—Ciel sombre en plusieurs points, saute de vent du S.E. au N.E. 1h. s.—Montagnes de nuages au N. et à l'E. ; ciel orageux et très-noir de l'E. à l'W. par le S. 4h.—Gros nimbus orageux à l'W. ; il est chassé comme les autres par le vent d'E. 7h.—Cirro-stratus brillants à l'W. ; cumulus tout autour de l'horizon, ciel pur au zénith. 8h. 49m.—Les cumulus persévèrent au N.E. et à l'W. ; beau clair de lune. 10h.—Quelques cumulus au N. ; reste du ciel très-pur ; vent faible, rosee. Les étoiles filantes apparaissent chaque jour plus nombreuses et plus brillantes ; nous entrons évidemment dans l'essaim qui a son maximum dans la nuit du 10 Août.

8. 1h. m.—Ciel étincelant ; étoiles filantes avec traînées ; brume au N.E. ; vent faible, rosée. 4h.—Ciel uniformément couvert ; bande découverte tout autour de l'horizon ; le vent fraîchit, plus de rosée. 7h.—Quelques cumulus à l'horizon ; vent faible. 10h.—Cumulus légèrement grisâtres venant de l'E. ; ciel d'un bleu pâle au zénith, verdâtre à l'horizon. 1h. s.—Mêmes remarques. 4h.—Cirro-stratus au S. et au S.W. ; ciel d'un beau bleu. 7h.—Cirrus d'un rouge vif à l'W. ; cumulus tout autour de l'horizon ; ciel pur au zénith. 10h.—A l'W. des cirrus divergent dans toutes les directions ; calme, rosée.

9. 1h. m.—Cumulus vaporeux au N.E., étoiles peu brillantes ; vent faible, rosée. 4h.—Gros cumulus très-noirs ; il a un peu plu ; éclaircie à l'E. ; les étoiles y scintillent d'une manière extraordinaire, on y voit aussi la lumière zodiacale. 5h. ½.—Brouillard peu élevé. 7h.—Pluie fine ; vent très-faible. 10h.—Deux couches de cumulus venant du N. ; la couche inférieure marche rapidement ; elle a une teinte grisâtre comme hier. 1h. s.—Nimbus orageux en différents points. 4h.—Alto-cumulus par plaques ; nimbus à l'W. et au S. ; éclaircie d'un bleu foncé à l'E. 7h.—Cirro-stratus vaporeux au zénith et au N. ; ils sont orientés de l'E. à l'W. ; gros cumulus à l'horizon de l'W. au N. et au S. ; des rayons lumineux partent de l'W. en divergeant. 10h.—Ciel splendide ; calme.

10. 1h. m.—Ciel étincelant ; calme absolu depuis 10h. ; rosée. 4h.—Cumulus très-noirs du N.W. à l'E., par le N. ; le calme continue, rosée abondant. La lumière zodiacale était à 3h. ½ trois fois plus brillante que la voie lactée ; elle s'élevait jusqu'à Aldébaran. 7h.—Calme. 10h.—Cumulus grisâtres partout le ciel ; éclaircies d'un beau bleu. 1h. s.—Montagne de nuages à l'horizon N. ; ciel sombre au S.E. 4h.—Il pleut au N.W. ; arc-en-ciel double et partiel à l'E. 7h.—Ceinture de gros cumulus à l'horizon de l'E. à l'W. par le N., rayons lumineux divergeants à l W. et convergeants

à l'E. en un point symètrique. 10h.—Ciel serein; vent faible. De 2h. à 4h. a.m. 44 étoiles filantes, dont 10 avec traînées, ont été observées; l'observateur regardait le N. et le zénith.

11. 1h. m.—Ciel très-étoilé ; vent faible, rosée. 4h.—Lumère zodiacale comme hier; gros cumulus à l'horizon E. ; rosée abondante. 7h.—Cumulus à l'horizon N. et N.E.; vent toujours faible. 10h.—Les cumulus persévèrent à l'horizon ; d'autres viennent lentement de l'W. 1h. s.—Des cumulus légèrement grisâtres viennent du N.E. ; éclaircies d'un bleu pâle ; nuages orageux au S.W. et au N. 4h.—Quelques cirrus épars dans le ciel ; nuages orageux comme à 1h. 7h.—Mêmes nuages ; vent faible et régulier. 10h.—Ciel serein ; beau clair de lune ; vent comme à 7h. Deux observateurs orientés comme hier ont enrégistré 144 étoiles filantes, dont 22 avec traînées, depuis 1h. jusqu'à 4h. du matin.

12. 1h. m.—Ciel serein ; vent faible et régulier, rosée. 4h.—Lumière zodiacale comme les jours précédents ; bande de cumulus noirâtres au N.E. 7h.—Ciel sans nuages. 10h.—Des alto-cumulus viennent du S.E. sans passer au zénith ; ciel d'un bau bleu en ce point, verdâtre à l'horizon. 1h. s.—Alto-cumulus partout le ciel ; ils prennent une teinte grisâtre ; le reste comme à 10h. 4h.—Quelques stratus à l'horizon S.W. 7h.—Banc noirâtre au S.W.; vent faible et très-régulier. 10h.—Le banc persévère; reste du ciel pur.(1)

13. 1h. 25m. m.—Ciel splendide ; vent faible et régulier, rosée. 4h.—Lumière zodiacale diffuse, le reste comme ci-dessus. 7h.—Cumulus à l'horizon N. et cumulo-stratus à l'horizon S. 10h.—Quelques cirro-stratus au S.W. ; ciel d'un beau bleu. 1h. s.—Beaucoup de beaux cumulus isolés et éclatants. 4h.—Cumulus tout autour de l'horizon. 7h.—Gros cumulus à l'horizon du N. à l'E. ; cumulo-stratus de l'W. au S., à peu près comme à 7h. a.m. 10h.—Magnifique clair de lune, encore quelques cumulus à l'horizon E. ; vent faible et régulier ; pas de rosée.

14. 1h. m.—Ciel pur et très-étoilé; le vent fraîchit, pas de rosée. 4h.—Ciel id. ; calme ; rosée très-abondante ; baisse rapide du thermomètre. 7h.—Ciel sans nuages ; le calme continue. 10h.—Des cumulus venant du S.E., longent l'horizon ; ciel d'un beau bleu au zénith, blanchâtre dans les autres points. 1h. s.—Cumulus par tout le ciel. 4h. -Quelques cumulus à l'horizon N. et E. d'autres en petit nombre épars dans le ciel, excepté au zénith. 7h.—A l'horizon N.E. et S. de gros cumulus blanchâtre se détachent sur un fond brumeux. 10h.—Mêmes nuages ; magnifique clair de lune ; vent faible et régulier ; pas de rosée.

15. 2h. 20m. m.—Pluie tiède pendant quelques minutes ; ciel chargé du N. à l'E. ; de gros cumulus blancs se détachent sur un fond noir. 4h.—Brume uniforme qui laisse apercevoir les étoiles au zénith ; éclaircie à l'E. ; vent faible, pas de rosée. 7h.—Cumulus à l'horizon ; cumulo-cirrus au zénith. 10h.—Cumulus grisâtres venant rapidement de l'E. ; ciel d'un bleu pâle. 1h. s.—Les cumulus viennent du S.E. ; le reste comme à 10h. 4h.—Même

(1). Aujourd'hui de 3h. ½ à 4h. un observateur, orienté comme les jours précédents, a enrégistré 20 étoiles filantes, dont 2 avec traînée. Pendant ces 3 jours la moyenne des étoiles observées par *un observateur en 1h.* a été de 32. Sur 132, dont on a pu déterminer la trajectoire, ½ appartient à Cassiopée.

ciel, vent fort. 7h.—Quelques cumulus *balles-de-coton* à l'horizon N.E. ; alto-cumulus au S.W. ; des rayons lumineux peu distincts partent de l'W. en divergeant. 10h.—Ciel sans nuages ; vent très-régulier ; magnifique clair de lune.

16. 2h. 45m. m.—Quelques cirro-stratus épars dans le ciel ; au N. gros cumulus ; calme, pas de rosée. 4h.—Cumulo-nimbus au N.W., éclaircie au S.E. ; le calme continue, pas de rosée. 7h.—Un voile de vapeurs obscurcit le soleil ; çà et là quelques cumulus ; le vent se lève. 10h.—Deux couches de nuages venant de l'E. la 2de très-rapidement ; ciel d'un bleu pâle. 1h. s.—Trois couches de nuages, la 1ère de cirrus ; ciel d'un bleu foncé. 4h.—Mêmes nuages qu'à 1h. ; ciel d'un beau bleu au zénith, verdâtre à l'horizon. 7h.—Banc noirâtre au N.W. ; cumulo-cirrus à l'W. et au S.W. gros cumulus à l'horizon E. 8h. 49m.—D'énormes cumulus vaporeux sont épars dans le ciel ; il s'y forme une couronne lorsqu'ils passent devant la lune. 10h.—Mêmes nuages, ciel très-pur au zénith ; vent faible et régulier. Le vent a soufflé avec force et par rafales depuis 7 heures du matin jusqu'à 7 heures du soir.

17. 2h. m.—Il a plu vers 1h. Une sorte de chaîne de montagnes nuageuses s'étend à l'horizon du N.E. au S.W. par l'W. ; reste du ciel très-pur ; vent faible et régulier. 4h.—D'énormes cumulus ont envahi tout le ciel ; nimbus en plusieurs points de l'horizon. 6h. ½.—Portion d'arc-en-ciel aux couleurs très-vives sans pluie visible. 7h.—Alto-cumulus presqu'immobiles ; au-dessous cumulo-nimbus venant rapidement du N.E. Vers 9h. quelques coups de tonnerre lointain. 10h.—Trois couches de nuages ; la première est formée de cumulo-cirrus ; la troisième marche très-rapidement ; éclaircies d'un bleu foncé. 1h. s.—Ciel très-sombre au S.E. 4h.—Averses depuis ce matin ; dans les intervalles on a aperçu le soleil. 7h.—Pluie ; le vent tombe ; thermomètres mouillés. 8h. 49m.—Averse ; pluie tiède ; coup de vent violent. 10h.—Pluie faible et continue ; le vent est tombé. Baisse du Baromètre de 6,9mm. dans la journée. Le vent à soufflé par rafales pendant 10h. ; sa vitesse moyenne maximum a été de 13m. par seconde.

18. 1h. m.—Cumulus vaporeux venant très-rapidement de l'E ; on aperçoit la lune à travers la brume et les nuages. 4h.—Couronne lunaire ; ciel très-noir au N.E. 7h.—Pluie très-abondante. 10h.—Gros cumulus vaporeux venant du N.E. ; papier ozonométrique et thermomètres mouillés. 1h. s.—Forte averse. 4h.—Des nuages bas et blanchâtres se détachent sur des nimbus très-noirs en différents points du ciel. 7h.—Coup de vent très-violent pendant quelques minutes. 10h.—Pluie fine ; le vent augmente de force. Le vent a soufflé par rafales tout le jour ; mouvement giratoire inverse de la girouette. L'oscillation du baromètre a été de 11mm. 03 depuis hier 1h. a.m., jusqu'à aujourd'hui 1h. p.m. ; il est rarement descendu aussi bas à Chang-Hai.

19. 1h. m.—Ciel uniformément couvert de cumulus vaporeux et chassés rapidement par le vent ; pluie fine. 4h.—Mêmes remarques. 7h.—Ciel très-chargé ; vent toujours fort. 10h.—Ciel uniformément couvert ; des cumulus se détachent sur la brume et viennent rapidement de l'W. ; il bruine. 1h. s.—Même ciel.

4h.—Le thermomètre monte ; le vent faiblit. 7h.—Petite pluie ; la brume est légèrement stratifiée à l'horizon N.W. et S. ; le vent souffle d'une manière très-régulière. 10h.—Éclaircies au zénith ; les étoiles que l'on y aperçoit sont peu brillantes. Le vent a continué son mouvement giratoire inverse ; parti de l'E.S.E. le 16 il s'est arrêté à l'W.S.W. aujourd'hui à 10h. p.m.; sa vitesse moyenne maximum a été à 7h. a.m. de 15,7m. par seconde.

20. 1h. m.—Une couche d'alto-cumulus compactes couvre tout le ciel ; couronne lunaire ; vent régulier, pas de rosée. 4h.—Ciel moutonné au zénith ; alto-cumulus par plaques en différents points ; quelques cumulus viennent du N.W. 7h.—Brume générale légèrement ondulée en certains endroits. 10h.—Gros cumulus diffus et grisâtres venant de l'W. 1h. s.—Même ciel. 4h.—Au N. trois couches de nuages ; la 3ème est formée de cumulus blanchâtres qui se détachent sur un fond brumeux et noirâtre ; au zénith ciel moutonné. 7h.—Couche épaisse de cumulus très-serrés ; petite éclaircie à l'W. 10h.—Plaque d'alto-cumulus à l'W. ; elle est orientée du N. au S. ; calme ; rosée abondante.

21. 4h. 35m. m.—Brouillard peu élevé ; rosée extraordinaire ; vent très-faible ; long stratus à l'E. 7h.—Brouillard comme ci-dessus ; calme. 10h.—Ciel brumeux à l'horizon S.E. ; quelques cumulus viennent du N. en longeant l'horizon. 1h. s.—Un alto-cumulus stratifié s'étend du N.E. au S.W. ; cumulus dans toutes les directions ; au zénith ils laissent entre'eux des éclaircies d'un bleu foncé. 4h.—Trois couches de nuages ; la 1ère est formée de cirrus d'une délicatesse extrême ; la 3ème marche très-rapidement. 7h.—Cumulo-nimbus vaporeux et noirâtres par tout le ciel ; l'horizon au N.E. est très-sombre. 8h. 49m.—A l'E. et à l'W. stratus orientés du N. au S. ; éclairs peu brillants et sans tonnerre au S.E. ; les cumulo-nimbus ont disparu. 10h.—Les stratus persévèrent ; éclaircie au N. ; vent faible, léger dépôt de rosée.

22. 1h. 15m. m.—Une traînée d'alto-cumulus s'étend en éventail du N.E. jusqu'au zénith ; banc brumeux au S.E. ; vent faible, rosée. 4h.—Magnifiques bandes d'alto-cumulus allant du N.E. au S.W. à travers tout le ciel ; éclaircie au zénith ; vent faible et régulier, rosée abondante. 7h.—Nuages de toutes sortes ; calme. 10h.—Cumulus venant du N. sans passer par le zénith. 1h. s —Ciel moutonné au zénith. 4h.—Trois couches de nuages ; la 1ère est formée de cirrus panachés ; la 3ème de gros cumulus qui viennent du N. en longeant l'horizon E. et W. 6h. ½.—Petite averse. 7h.—Ciel chargé à l'E. ; à l'horizon W. éclaircie jaunâtre. 8h. 49m.—Pluie fine ; ciel uniformément couvert et très-sombre. 10h.—Il ne pleut plus ; des bandes noirâtres orientées N. et S. se détachent sur la brume. Les alto-cumulus stratifiés ont persévéré et conservé leur orientation depuis 4h. a.m., jusqu'au soir.

23. 1h. m.—Brume générale ; couronne lunaire ; à l'E. énorme cumulo-stratus noirâtre s'étendant du N. au S. ; vent faible et régulier, pas de rosée. 4h.—Un nimbus passe au zénith et donne quelques gouttes de pluie. 7h.—Quelques gouttes de pluie ; ciel chargé, stratus à l'W. 10h.—Des cumulus viennent rapidement du N. ; le vent se lève subitement et souffle par rafales. 1h. s.—Les cumulus longent l'horizon sans passer au zénith, banc de cumulus compactes au S.E. 4h.—A l'E. banc de stratus orientés N. et S. ;

éclaircie au zénith. 7h.—Le banc de stratus persévère ; des cumulus vaporeux arrivent rapidement du N. 10h.—Ciel très-étoilé ; vent faible ; rosée abondante.

24. 1h. m.—A l'E. long stratus orienté N. et S. ; vent faible, rosée très-abondante. 4h.—Mêmes remarques. 7h.—Vent extrêmement régulier ; quelques cumulus viennent du N.W. 10h.—Les cumulus viennent du N. ; ciel d'un bleu clair. 1h. s.—Cirrus et cumulus à l'W. seulement ; reste du ciel très-pur. 4h.—Plaque de cirro-cumulus au S.W. ; les cumulus longent l'horizon sans passer au zénith. 7h.—Banc de cumulo-stratus s'étendant de l'E. au S.W. 10h.—Ciel sans nuages ; étoiles brillantes ; vent très-faible ; rosée abondante.

25. 1h. m.—Ciel splendide ; calme absolu depuis 10h. ; rosée très-abondante. 4h.—Quelques cumulus viennent du N. ; le calme continue. 5h. ½ —Brouillard peu dense et peu élevé. 7h.—Mêmes remarques. 10h.—Au zénith cirro-cumulus par plaques ; ciel verdâtre à l'horizon, ailleurs d'un beau bleu. Les deux couches de nuages marchent en sens inverse. 1h. s.—Les cumulus ont disparu ; le reste comme à 10h. 4h.—Des cumulus viennent rapidement du N.E. ; cirro-stratus de toutes formes. 7h.—Cirro-stratus orientés S.E. et N.W. ; éclaircies brumeuses ; banc noirâtre à l'W. ; vent faible. 10h.—Étoiles voilées ; vent faible ; rosée abondante.

26. 1h. m.—Cumulus vaporeux et très-bas venant rapidement du N. ; au-dessus couche d'alto-cumulus ; vent faible, pas de rosée. 4h.—Ciel uniformément couvert ; il bruine, thermomètres mouillés ; le vent souffle par rafales. 7h.—Pluie faible, thermomètres mouillés ; vent assez fort. 10h.—Brume générale ; il ne pleut plus ; les cumulus marchent très-rapidement. 1h. s.—Les cumulus viennent du N.E., toujours avec une grande vitesse. 4h.—Deux couches de nuages comme à 1h. ; ciel d'un bleu clair. 7h.—Banc noirâtre à l'horizon W. ; il s'étend du N. au S. ; le côté E. est occupé par des cumulus compactes jusqu'au zénith. 10h.—Ciel sans nuages et très-brillant ; calme, rosée.

27. 1h. m.—Ciel splendide ; calme, rosée abondante. 4h.—A l'E. long stratus s'étendant du N. au S. ; le reste comme à 1h. 7h.—Banc de stratus orienté comme ci-dessus ; éclaircies d'un beau bleu au S.W. et à l'W. ; le calme continue. 10h.—Quelques gouttes de pluie ; couche d'alto-cumulus compactes ; au-dessous cumulo-nimbus venant du N. 1h. s.—Mêmes nuages qu'à 10h. 4h.—Quelques gouttes de pluie ; nuages bas longeant l'horizon à l'E. et à l'W. 6h. ½.—Deux arcs-en-ciel partiels à l'horizon N.E. et S.E. ; ils se réunissent bientôt presque complètement à la partie supérieure qui est peu brillante. 7h.—Il ne pleut plus ; nuages comme à 4h. ; éclaircie jaunâtre à l'W. 10h.—La pluie a cessé ; ciel très-sombre.

28. 1h. m.—Quelques gouttes de pluie fine ; ciel presque uniformément couvert ; vent faible. 5h.—Ceinture de gros cumulus tout autour de l'horizon ; à l'E. éclaircie d'um bleu pâle. 7h.—Cumulus vaporeux, très-rapides et très-bas, venant de l'E. ; au-dessus on aperçoit une couche d'alto-cumulus venant du S.W. 10h.—Averse abondante. 1h. s.—Ciel chargé en différents points ; au-dessous des nimbus nuages blanchâtres et bas ; temps lourd. 4h.—Averses très-fortes depuis 1h. ; le papier ozonométrique et les

thermomètres sont mouillés. 7h.—Ciel uniformément couvert ; pluie, vent faible. 10h.—Il ne pleut plus ; quelques cumulus se détachent sur la brume ; vent faible et soufflant par rafales.

29. 1h. m.—Des cumulus vaporeux et compactes occupent tout le ciel ; on aperçoit les étoiles au zénith ; le thermomètre monte. 4h.—Le ciel s'assombrit. 7h.—Trois couches de nuages ; la 1ère est formée de cirro-stratus immobiles ; la 2ème de cumulus grisâtres venant lentement de l'E. ; enfin la 3ème de brume marchant très-rapidement vers l'W. 10h.—Cirro-cumulus d'une délicatesse extrême ; il s'y forme une couronne solaire brillante ; cumulus très-rapides ; ciel d'un bleu pâle. 1h. s.—Ciel très-noir à l'E. et au N.W., d'un bleu foncé au zénith. 3h. $\frac{1}{2}$.—Forte averse. 4h.—Alto-cumulus immobiles, nimbus venant de l'E. ; quelques gouttes de pluie. 7h.—La couche d'alto-cumulus persévère, cumulus très-rapides. 10h.—Ciel uniformément couvert.

30. 1h. m.—Cumulus vaporeux ; éclaircie au zénith, étoiles voilées ; vent très-faible ; léger dépôt de rosée. 4h.—Même ciel, rosée abondante. 7h.—Alto-cumulus venant du N.W. ; au-dessous cumulus vaporeux et blanchâtres venant de l'E. 10h.—Cirro-cumulus d'une grande délicatesse, alto-cumulus d'une blancheur éblouissante et très-rapides ; ciel chargé à l'E. et au N. 1h. s.—Gros cumulus venant de l'E. ; de temps en temps petites averses. 4h.—Pluie ; ciel très-chargé dans toutes les directions excepté à l'W., où l'on distingue des cumulus. 7h.—Cumulus diffus sous la brume ; vent faible et régulier. 8h. 49m.—Ciel uniformément couvert et sombre ; éclairs à l'W. ; ils sont rares, peu brillants et sans tonnerre. 10h.—Quelques grosses gouttes de pluie d'orage depuis 8h. 49m. ; on n'aperçoit plus d'éclairs.

31. 1h. m.—Pluie abondante ; vent faible. 4h.—Ciel chargé au N. et à l'E., quelques gouttes de pluie ; au zénith éclaircie où l'on aperçoit des étoiles. 7h.—Ciel moutonné ; les nuages viennent lentement du S.W. 10h.—La moitié du ciel du côté du S. est de couleur-ardoise ; au-dessous nuages bas et blanchâtres ; quelques gouttes de pluie. 1h. s.—Cumulo-nimbus très-rapides ; petite averse. 4h.—Pluie fine ; vent fort et soufflant par rafales. 7h.—Pluie torrentielle ; vent comme à 4h. 10h.—Pluie moins forte, le vent tombe ; papier ozonométrique et thermomètres mouillés.

H. Le Lec, s.j.

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(1). Le thermomètre Jansen ayant été comparé à l'étalon a été trouvé de ° 0,4 trop bas. De plus, la pluie en s'infiltrant a fait monter la température du puits ; de là la différence de 0 °,7 entre la température du 30 et du 31.

A. M. D. G.

OBSERVATOIRE DE ZI-KA-WEI

Résumé des Observations Météorologiques d'Aout 1875.

MOYENNES DIURNES.



ERRATA.

1874.

		au lieu de	*lisez*
p. 7,	Humidité relative ; moyenne du mois.....	33,29	83,29
p. 8,	Ciel très-nuageux	$8\frac{1}{10}$	$8\frac{1}{10}$
p. 11,	Pluie	32,1	42,1
	id. total {	42,5	44,6
	id. total {	272,0	274,1
	Hauteur d'eau évaporée.....	80,0	80,8
	Différence etc.....	192,0	194,3
	Température minimum du mois	32.7	12,7
p. 47,	Pluie, le 11 7h. s.	0,0	1,9
	id. le 12 7h. m.	0,0	1,8
	Ajouter ces deux valeurs au total du mois.		

1875.

p. 2,	Pression barométrique	68,58	64,58
	Corriger les moyennes correspondantes.		
p. 9,	Température du puits.....	11,5	...
p. 50,	Actinomètre (boule nue)	15,47	15,65
	id, différence des moyennes	4,74	4,56
p. 56,	Nombre de jours de ciel beau etc. :		
	au lieu de 7, 10, 9, 4, 10,		
	lisez 7, 3, 3, 7, 10.		

N.B.—De nouvelles séries d'observations faites simultanément avec notre Actinomètre et les Actinomètres No. 5251-5252 et 5256-5253, qui ont été comparés avec celui de Montsouris, nous ont donné pour facteur moyen 5,74 au lieu de 6,09 trouvé précédemment.—(Voir p. 46.)

Les planches qui suivent ainsi que celles qui accompagnent le Bulletin Magnétique ont été gravées à l'Orphelinat de la Mission Catholique à Tou-sai-vai, près Zi-ka-wei.

A. M. D. G.

OBSERVATOIRE

MÉTÉOROLOGIQUE ET MAGNÉTIQUE

des Pères de la Compagnie de Jésus

à

ZI-KA-WEI.

MAGNÉTISME

1875.

A. M. D. G.

OBSERVATIONS MAGNÉTIQUES

faites à l'Observatoire de Zi-ka-wei *(Chine), en 1875.*

Longitude Orientale	Altitude	Latitude
7h. 56m. 24s. (de Paris).	6 mètres.	Nord 31° 12′ 30″

Les instruments employés pour ces observations sont décrits dans les "*Instructions for magnetic surveys by land and sea*" du Major-Général Sabine ; les méthodes d'observation sont aussi celles qu'on y trouve recommandées ; toutefois j'ai cru devoir adopter, pour la recherche de l'Inclinaison, l'observation directe dans deux azimuts rectangulaires : le calcul donne ensuite l'Inclinaison vraie par la formule

$$\text{cotg.}^2 I = \text{cotg}^2 i' + \text{cotg.}^2 i''.$$

Le bulletin de 1874 renferme déjà quelques observations de la déclinaison pour les trois premiers mois de 1875 ; j'ai cru utile de les reporter dans le bulletin de 1875, afin que cette année soit complète ; en outre, pour ne point sortir du cadre que je m'étais fixé dans la discussion des observations de 1874, j'avais dû laisser de côté la moitié environ des observations horaires faites pendant ces trois mois et je m'étais aussi contenté de les donner d'heure en heure. Mais comme ces mois sont plus irréguliers sous le rapport de la marche diurne de l'aimant, je crois bon de les publier ici, comme je les ai faites, c'est-à-dire de $\frac{1}{2}$ heure en $\frac{1}{2}$ heure, depuis 6h. A.M. jusqu'à 6h. P.M.

Ces observations semi-horaires ont été continuées jusqu'à la fin de Juin ; à partir du mois de Juillet de nouvelles occupations m'ont forcé à les interrompre et à me contenter d'une dizaine d'observations isolées par mois : je me suis astreint cependant à les faire toujours à 11h. du matin (temps moyen) ; c'est, en effet, d'après mes observations de 1874, le moment où l'aimant atteint sensiblement sa position moyenne de la journée. Enfin, depuis le 15 Octobre, j'ai pu relever la position de l'aimant trois fois par jour : à 7h. et à 11h. du matin et à 4h. du soir, la moyenne des observations de 7h. A.M. et de 4h. P.M. ne s'écarte que très-peu de la moyenne diurne.

Pour les 6 premiers mois de l'année, les observations de la déclinaison sont rapportées au Temps vrai, tandis que pour les 6 derniers, elles le sont au Temps moyen de Zi-ka-wei.

La Déclinaison magnétique à Zi-ka-wei est Occidentale.

La Planche, jointe à ce bulletin, présente en valeurs absolues la variation diurne moyenne de la déclinaison magnétique pendant les six premiers mois de l'année 1875, et le déplacement de l'aimant d'un mois à l'autre. Ces courbes ont été tracées avec les valeurs horaires moyennes de chaque mois.

M. Dechevrens, S J.

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

Janvier 1875.

Temps vrai.	1 Janvier	8 Janvier	15 Janvier	22 Janvier	29 Janvier	Moyennes horaires.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Matin						
6h.	2 0 42	1 59 13	2 0 21	2 0 6	1 59 20	1 59 56,3
,, 30	0 42	59 25	0 16	0 6	59 3	59 54,4
7h.	0 36	59 44	1 59 40	59 53	58 51	59 44,6
,, 30	1 59 42	59 30	58 50	59 8	58 47	59 11,4
8h.	58 30	58 37	58 38	58 13	58 34	58 30,5
,, 30	58 4	58 11	58 38	58 2	58 15	58 13,8
9h.	57 37	57 32	58 52	57 49	57 53	57 54,4
,, 30	57 15	57 53	59 18	57 42	57 29	57 55,4
10h.	57 46	57 46	2 0 14	58 17	58 6	58 25,6
,, 30	58 12	58 15	1 10	58 26	58 30	58 54,4
11h.	58 38	59 17	1 37	58 58	59 4	59 30,9
,, 30	59 15	2 0 7	2 18	58 50	59 40	2 0 2
Midi	2 0 17	0 35	2 35	58 58	2 0 20	0 33
Soir						
0h. 30	2 0 53	2 0 29	2 2 16	1 58 40	2 0 27	2 0 33
1h.	1 14	0 16	2 16	58 51	1 59 52	0 29,8
,, 30	0 58	1 59 55	2 16	58 40	59 38	0 17,6
2h.	0 52	59 48	1 28	58 37	59 11	1 59 59,4
,, 30	0 20	59 34	0 50	58 40	59 4	59 41,6
3h.	1 59 25	59 3	0 25	58 8	58 37	59 13,5
,, 30	58 50	58 50	1 59 54	58 37	58 20	58 54
4h.	58 50	58 22	59 24	58 53	58 10	58 43,8
,, 30	58 35	58 0	59 31	59 5	58 7	58 39,6
5h.	58 20	58 0	59 50	59 18	58 10	58 43,8
,, 30	58 25	58 22	59 54	59 18	58 27	58 53,1
6h.	58 39	58 19	59 54	59 18	58 37	58 57,4
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes	1 59 18	1 59 0	2 0 25	1 58 50	1 58 49	1 59 16,5

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	
Max. sec.	2 0 42	1 59 48	2 0 21	2 0 6	1 59 20	
Min. prin.	1 57 15	57 28	1 58 31	1 57 40	57 27	
Max. prin.	2 1 15	2 0 35	2 2 38	....	2 0 38	
Min. sec.	1 58 20	1 57 57	1 59 24	....	1 57 2	
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moy. des Min. et Max.	1 59 15	1 59 2	2 0 35	1 58 53	1 59 3	1 59 21,5
	′	′	′	′	′	′
Amplitude	4,0	3,11	4,11	2,43	3,18	3,60

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

FÉVRIER 1875.

Temps vrai.	3 Février	6 Février	10 Février	13 Février	17 Février
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Matin					
6h.	1 59 10	1 59 28	1 59 23	1 59 25	2 0 20
,, 30	59 0	59 41	59 28	59 25	0 23
7h.	59 4	59 54	59 28	58 47	0 23
,, 30	58 49	59 54	59 14	58 32	0 10
8h.	58 33	59 44	58 20	58 28	1 59 40
,, 30	58 12	59 28	58 12	58 32	59 20
9h.	57 49	59 0	57 52	58 28	59 2
,, 30	57 41	58 45	57 39	58 8	59 2
10h.	57 41	58 45	57 39	58 19	58 55
,, 30	57 55	59 7	58 5	58 32	59 2
11h.	57 49	59 21	58 33	58 54	59 8
,, 30	57 42	59 28	59 9	59 29	59 27
Midi	57 51	59 45	59 38	59 55	59 41
Soir					
0h. 30	1 57 55	2 0 0	1 59 57	2 0 15	1 59 46
1h.	57 48	1 59 41	2 0 0	0 0	59 41
,, 30	57 44	59 21	1 59 54	1 59 40	59 36
2h.	57 40	58 47	59 47	59 28	59 22
,, 30	57 44	58 30	59 28	59 14	59 8
3h.	57 51	58 20	59 0	59 0	59 2
,, 30	58 18	58 13	58 33	59 6	58 55
4h.	58 30	58 20	58 12	59 0	59 2
,, 30	58 35	58 47	57 59	58 40	59 8
5h.	58 35	58 53	57 59	58 31	59 22
,, 30	58 28	59 0	58 19	58 35	59 41
6h.	58 24	59 0	58 47	58 50	59 41
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes	1 58 11	1 59 10	1 58 49	1 59 1	1 59 28

MINIMA ET MAXIMA.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Max. secon.	1 59 12	2 0 2	1 59 30	1 59 27	2 0 25
Min. princ.	....	1 58 40	57 35	58 2	1 58 57
Max. princ.	....	2 0 0	2 0 0	2 0 15	59 45
Min. secon.	1 57 40	1 58 10	1 57 58	1 58 30	58 57
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes des Min. et Max.	1 58 26	1 59 20	1 58 48	1 59 9	1 59 21
	′	′	′	′	′
Amplitude	1,53	1,86	2,41	2,21	1,46

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

FÉVRIER 1875.

Temps vrai.	20 Février	24 Février	28 Février	Moyennes horaires.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Matin				
6h.	1 58 20	1 58 20	1 58 46	1 59 8,9
,, 30	58 35	58 34	58 34	59 12,5
7h.	58 42	58 20	58 17	59 6,7
,, 30	58 35	58 5	58 0	58 55
8h.	58 24	58 0	57 39	58 36,2
,, 30	58 24	57 43	57 35	58 25,8
9h.	58 1	57 31	57 35	58 10
,, 30	58 1	57 11	57 15	57 57,2
10h.	58 14	57 5	57 42	58 2,7
,, 30	58 1	57 11	57 49	58 12,7
11h.	57 47	57 31	58 17	58 24,7
,, 30	57 50	58 3	58 17	58 40,7
Midi	58 13	58 47	58 37	59 3,2
Soir				
0h. 30	1 58 33	1 59 29	1 59 1	1 59 22
1h.	58 42	59 43	59 8	59 20,2
,, 30	58 46	59 33	59 16	59 13,8
2h.	58 42	59 15	58 58	58 59,5
,, 30	58 28	58 33	58 37	58 42,4
3h.	58 8	58 2	58 47	58 31,1
,, 30	57 47	57 30	58 43	58 23,1
4h.	57 37	57 4	58 28	58 16,5
,, 30	57 33	56 50	58 8	58 12,5
5h.	57 41	57 4	57 52	58 14,5
,, 30	57 54	57 24	58 8	58 25,9
6h.	57 54	57 48	58 24	58 35,8
	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes	1 58 11	1 58 1	1 58 17	1 58 38,9

MINIMA ET MAXIMA.

	° ′ ″	° ′ ″	° ′ ″	
Max. secon.	1 58 44	1 58 32	1 58 59	
Min. princ.	57 47	56 58	57 11	
Max. princ.	58 44	59 42	59 19	
Min. secon.	57 33	56 48	57 51	
Moyennes des Min. et Max.	° ′ ″ 1 58 16	° ′ ″ 1 58 20	° ′ ″ 1 58 15	° ′ ″ 1 58 44,4
Amplitude	′ 1,18	′ 2,73	′ 2,13	′ 1,94

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

Mars 1875.

Temps vrai.	3 Mars	8 Mars	11 Mars	14 Mars	18 Mars
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Matin					
6h.	1 59 10	1 57 24	1 58 13	1 57 42	1 57 55
,, 30	58 30	57 38	57 50	57 35	57 55
7h.	58 16	57 38	57 6	57 6	57 35
,, 30	57 36	56 59	55 57	56 4	56 55
8h.	57 8	56 40	55 3	55 31	56 10
,, 30	57 14	56 18	54 10	54 54	55 30
9h.	57 8	55 14	53 48	54 28	54 58
,, 30	56 34	55 14	53 40	53 54	54 44
10h.	57 21	55 34	53 53	54 12	54 58
,, 30	57 21	56 10	54 17	54 34	55 45
11h.	57 42	56 31	55 10	55 31	56 54
,, 30	58 5	57 30	56 10	56 52	58 0
Midi	58 20	58 13	57 22	57 50	59 0
Soir					
0h. 30	1 58 58	1 59 6	1 58 21	1 58 30	1 59 50
1h.	59 35	2 0 5	59 35	59 9	2 0 5
,, 30	59 20	1 59 47	59 56	59 28	0 5
2h.	59 4	2 0 0	2 0 3	59 9	0 11
,, 30	58 30	1 59 30	1 59 50	58 48	1 59 54
3h.	57 56	59 13	59 18	58 30	59 20
,, 30	57 35	58 45	58 23	57 50	58 38
4h.	57 22	57 44	57 47	57 33	57 50
,, 30	57 0	56 23	57 33	57 3	57 17
5h.	56 40	56 50	57 6	56 39	57 1
,, 30	56 27	57 38	57 6	56 50	57 17
6h.	56 27	58 4	57 26	57 19	57 48
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes	1 57 48	1 57 37	1 57 0	1 56 55	1 57 39

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Max. secon.	....	1 57 47	....	....	1 57 55
Min. princ.	1 56 32	55 0	1 53 40	1 53 54	54 37
Max. princ.	59 35	2 0 8	2 0 6	59 29	2 0 18
Min. secon.	56 2	1 56 23	1 57 6	56 39	1 57 0
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes des Min. et Max.	1 58 4	1 57 34	1 56 53	1 56 41	1 57 28
	′	′	′	′	′
Amplitude	3,05	5,12	6,43	5,57	5,68

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

Mars 1875.

Temps vrai.	22 Mars	26 Mars	30 Mars.	Moyennes horaires.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Matin				
6h.	1 58 9	1 58 12	1 58 40	1 58 10,6
,, 30	58 2	58 2	58 8	57 57,4
7h.	57 28	57 40	57 24	57 31,3
,, 30	56 47	57 2	56 42	56 57,8
8h.	56 6	56 21	56 16	56 9,2
,, 30	55 32	55 21	55 41	55 35
9h.	55 18	54 45	55 16	55 6,8
,, 30	55 18	54 26	54 45	54 48,2
10h.	55 35	54 30	55 8	55 9
,, 30	56 6	55 13	56 0	55 40,6
11h.	57 28	56 4	57 3	56 32,7
,, 30	58 56	56 32	58 32	57 34,6
Midi	2 0 18	57 11	59 32	58 28,2
Soir				
0h. 30	2 1 20	1 58 4	2 0 36	1 59 20,5
1h.	2 0	58 52	0 55	2 0 2
,, 30	2 21	59 30	1 22	0 13,6
2h.	2 21	2 0 17	1 46	0 21,2
,, 30	1 46	0 17	1 33	0 1,1
3h.	0 38	1 59 51	0 55	1 59 27,3
,, 30	0 7	59 15	0 20	58 51,7
4h.	1 59 3	58 30	1 59 35	58 10,4
,, 30	58 29	57 56	58 38	57 32,3
5h.	57 54	57 30	58 8	57 13
,, 30	57 41	57 25	58 0	57 18
6h.	57 50	57 37	58 0	57 34
	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes	1 58 30	1 57 27	1 58 21	1 57 40

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	
Max. secon.	....	1 58 12	....	
Min. princ.	1 55 18	54 20	1 54 43	
Max. princ.	2 2 25	2 0 23	2 1 48	
Min. secon.	1 57 40	1 57 22	1 58 0	
	° ′ ″	° ′ ″	° ′ °	° ′ ″
Moyennes des Min. et Max.	1 58 52	1 57 22	1 58 15	1 57 38,6
	′	′	′	′
Amplitude	7,12	6,05	7,08	5,76

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

Avril 1875.

Temps vrai.	3 Avril	6 Avril	9 Avril	13 Avril	17 Avril
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Matin					
6h.	1 58 0	1 57 30	1 56 52	1 58 9	1 58 22
,, 30	57 27	56 50	56 25	58 0	57 52
7h.	57 0	56 9	55 40	57 41	57 28
,, 30	56 16	55 29	55 21	57 14	56 53
8h.	55 4	54 30	54 30	56 32	55 12
,, 30	53 59	53 50	54 2	55 31	55 39
9h.	53 18	53 12	53 53	55 4	55 18
,, 30	52 53	52 58	53 59	54 37	55 0
10h.	53 11	53 1	54 14	54 58	55 30
,, 30	54 12	53 36	54 34	55 31	56 0
11h.	55 48	54 6	55 40	56 32	....
,, 30	57 10	54 47	56 27	57 28	....
Midi	58 25	55 34	57 10	58 33	....
Soir					
0h. 30	1 59 18	1 56 20	1 58 2	1 59 25	....
1h.	2 0 3	57 3	58 39	59 45	....
,, 30	0 35	57 38	58 39	59 41	....
2h.	0 55	57 58	59 0	59 37	....
,, 30	0 44	57 51	59 25	59 4	....
3h.	0 22	57 36	59 19	58 54	....
,, 30	1 59 34	57 7	58 35	58 44	....
4h.	58 50	56 46	58 18	58 35	....
,, 30	58 16	56 26	58 4	58 22	....
5h.	57 43	56 6	58 44	58 2	....
,, 30	57 30	56 2	57 30	57 27	....
6h.	57 51	56 22	57 3	57 27	....
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes	1 56 53	1 55 47	1 56 46	2 57 38	....

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Max. secon.	....	....	....	....	....
Min. princ.	1 52 53	1 52 58	1 53 52	1 54 37	1 55 0
Max. princ.	2 1 2	57 58	59 27	59 45	....
Min. secon.	1 57 30	55 55	....	57 27	....
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes des Min. et Max.	1 56 57	1 55 28	1 56 40	1 57 11	....
	′	′	′	′	′
Amplitude	8,15	5,0	5,58	5,13	....

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

Avril 1875.

Temps vrai.	20 Avril	24 Avril	29 Avril	Moyennes horaires.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Matin				
6h.	1 57 0	1 58 20	1 56 18	1 57 26,9
,, 30	56 48	57 32	55 42	56 57,7
7h.	56 37	57 8	55 17	56 30,3
,, 30	56 10	56 52	54 56	56 2,4
8h.	55 35	56 3	54 52	55 18,1
,, 30	55 2	55 0	55 3	54 38
9h.	54 54	54 55	55 30	54 24
,, 30	55 2	55 15	56 40	54 29
10h.	55 42	55 28	57 15	54 49,7
,, 30	56 6	55 52	58 30	55 28,7
11h.	56 37	56 27	59 20	56 21,5
,, 30	57 14	57 20	59 45	57 10
Midi	58 0	58 30	2 0 30	58 5,7
Soir				
0h. 30	1 58 40	1 59 43	2 1 13	1 58 57,2
1h.	59 40	2 0 14	1 35	59 34,1
,, 30	2 0 22	0 22	2 4	59 54,7
2h.	0 15	0 49	2 10	2 0 6,3
,, 30	1 59 55	0 58	1 53	1 59 58,2
3h.	59 34	0 45	1 32	59 43,1
,, 30	59 20	0 30	1 13	59 17,7
4h.	58 53	0 16	0 54	58 56
,, 30	58 26	0 12	0 18	58 34,7
5h.	57 32	1 59 30	1 59 30	58 0,7
,, 30	57 18	58 10	59 22	57 37
6h.	57 11	58 46	58 50	57 38,7
	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes	1 57 30	1 58 12	1 58 48	1 57 26

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	
Max. secon.	....	....	....	
Min. princ.	1 54 51	1 54 55	1 54 50	
Max. princ.	2 0 22	2 1 3	2 2 12	
Min. secon.	1 57 11	1 58 5	....	
	° ′ °	° ′ ″	° ′ ″	° ′ ″
Moyennes des Min. et Max.	1 57 37	1 57 59	1 58 31	1 57 11,8
	′	′	′	′
Amplitude	5,51	6,15	7,37	6,13

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

Mai 1875.

Temps vrai.	2 Mai	5 Mai	8 Mai	12 Mai	16 Mai
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Matin					
6h.	1 58 32	1 58 11	1 58 51	1 59 51	1 58 35
,, 30	58 3	57 30	58 3	58 45	58 25
7h.	57 46	56 35	57 18	58 10	57 15
,, 30	57 25	56 35	57 2	57 47	57 5
8h.	57 18	56 0	56 45	57 30	57 34
,, 30	57 18	55 56	56 59	57 47	57 50
9h.	57 35	56 41	57 30	57 30	58 39
,, 30	57 59	57 15	58 28	58 30	59 10
10h.	58 26	58 51	59 37	59 5	59 46
,, 30	58 52	59 40	2 0 40	2 0 0	2 0 37
11h.	59 14	2 0 47	1 38	0 25	1 3
,, 30	59 48	1 21	2 14	1 26	1 50
Midi	59 13	2 44	3 1	1 58	2 20
Soir					
0h. 30	2 0 45	2 3 32	2 3 1	2 1 58	2 2 30
1h.	1 7	3 53	3 1	1 50	2 5
,, 30	1 30	3 26	3 10	1 50	2 0
2h.	2 4	3 22	2 56	1 37	1 40
,, 30	2 4	2 44	2 22	1 50	1 45
3h.	2 18	2 16	1 56	1 54	1 53
,, 30	1 51	2 2	1 22	1 26	2 0
4h.	1 38	1 49	1 10	1 0	2 0
,, 30	1 34	1 8	0 58	0 45	1 57
5h.	1 17	1 0	0 28	0 33	1 35
,, 30	1 17	1 8	0 0	0 20	1 25
6h.	0 51	0 40	0 0	0 30	1 12
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes	1 59 21	2 0 12	2 0 20	2 0 10	2 0 29

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Max. secon.	....	....	....	....	....
Min. princ.	1 56 51	1 55 54	1 56 45	1 57 20	1 57 4
Max. princ.	2 2 19	2 3 55	2 3 10	2 2 0	2 2 30
Min. secon.	....	....	....	....	....
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes des Min. et Max.	1 59 35	1 59 55	1 59 58	1 59 40	1 59 47
	′	′	′	′	′
Amplitude	5,46	8,02	6,41	4,66	5,43

DECLINAISON MAGNÉTIQUE A ZI-KA-WEI.

Mai 1875.

Temps vrai.	20 Mai	24 Mai	28 Mai	31 Mai	Moyannes horaires.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Matin					
6h.	1 58 2	1 57 22	1 56 16	1 55 18	1 57 53,1
,, 30	57 20	56 43	55 34	54 18	57 11,2
7h.	56 50	55 58	54 59	53 20	56 27,9
,, 30	56 50	55 20	54 42	52 59	56 11,6
8h.	56 58	55 11	54 38	53 15	56 7,6
,, 30	57 27	55 17	54 34	54 0	56 20,9
9h.	58 0	55 24	54 42	54 22	56 42,5
,, 30	58 45	55 52	54 59	54 34	57 17
10h.	59 36	56 24	55 35	54 48	58 0,9
,, 30	2 0 13	57 20	56 27	55 28	58 48,5
11h.	0 40	58 42	57 29	56 23	59 36,8
,, 30	1 22	59 52	57 49	57 18	2 0 20
Midi	2 20	2 1 11	58 30	58 0	1 1,9
Soir					
0h. 30	2 1 54	2 1 52	1 58 58	1 58 38	2 1 27,5
1h.	2 48	2 28	59 10	59 30	1 46
,, 30	3 0	2 28	59 22	59 58	1 51,8
2h.	3 14	2 32	59 18	2 0 8	1 52,4
,, 30	3 14	2 23	59 14	0 15	1 45,5
3h.	3 0	2 12	59 10	0 8	1 38,4
,, 30	2 35	2 3	59 6	0 2	1 23,1
4h.	2 2	1 24	58 44	1 59 30	1 1,9
,, 30	1 20	0 56	58 20	58 58	0 39,5
5h.	0 35	0 23	58 3	58 40	0 17,1
,, 30	0 25	0 1	57 49	58 26	0 5,6
6h.	0 21	1 59 48	57 22	58 19	1 59 53,6
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes	2 0 21	1 59 10	1 57 21	1 57 4	1 59 25

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	° ′ ″	
Max. secon.	....	....	....	....	
Min. princ.	1 56 45	1 55 6	1 54 34	1 52 58	
Max. princ.	2 3 22	2 2 32	59 25	2 0 15	
Min. secon.	....	....	....	....	
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes des Min. et Max.	2 0 4	1 58 49	1 57 0	1 56 37	1 59 3
	′	′	′	′	′
Amplitude	6,61	7,43	4,85	7,28	6,24

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

Juin 1875.

Temps vrai.	4 Juin	7 Juin	11 Juin	15 Juin
	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Matin				
6h.	1 56 6	1 57 34	1 58 47	1 59 14
,, 30	55 20	56 40	58 25	58 55
7h.	54 44	55 45	57 59	58 39
,, 30	54 44	55 11	57 59	58 33
8h.	54 50	54 50	57 59	58 19
,, 30	55 30	55 18	57 53	58 19
9h.	56 32	55 59	57 25	58 12
,, 30	57 14	56 12	57 12	58 46
10h.	58 1	56 53	57 39	59 14
,, 30	58 49	58 1	57 59	59 48
11h.	59 44	59 36	58 40	2 0 22
,, 30	2 0 18	59 57	59 55	0 49
Midi	1 0	2 1 20	2 0 29	1 18
Soir				
0h. 30	2 1 38	2 2 22	2 1 10	2 1 38
1h.	2 5	2 22	1 44	2 11
,, 30	2 5	2 14	1 58	2 45
2h.	1 47	2 14	2 29	3 2
,, 30	1 47	2 22	2 25	3 12
3h.	1 53	3 8	2 32	3 12
,, 30	1 53	2 47	2 25	3 19
4h.	1 40	2 7	2 5	3 12
,, 30	1 5	1 39	1 44	3 5
5h.	0 52	1 32	1 24	2 45
,, 30	0 31	1 12	1 5	2 18
6h.	0 11	1 5	0 50	1 57
	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes	1 59 13	1 59 36	2 0 0	2 0 7

Minima et Maxima.

	° ′ ″	° ′ ″	° ′ ″	.... ° ′ ″
Max. secon.	....	....	....	
Min. princ.	1 54 44	1 54 50	1 57 10	1 58 12
Max. princ.	2 2 10	2 3 8	2 2 33	2 3 19
Min. secon.	....	....	....	....
	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes des Min. et Max.	1 58 27	1 58 59	1 59 51	2 0 46
	′	′	′	′
Amplitude	7,43	8,30	5,38	5,11

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

JUIN 1875.

Temps vrai.	19 Juin	22 Juin	25 Juin	Moyennes horaires.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Matin				
6h.	1 59 14	1 56 46	1 57 47	1 57 55,4
,, 30	58 30	56 3	57 12	57 17,8
7h.	57 52	55 58	56 35	56 47,4
,, 30	58 5	55 51	55 58	56 37,3
8h.	58 33	56 26	55 51	56 41,1
,, 30	58 46	56 53	55 31	56 52,8
9h.	59 27	57 47	55 38	57 17,1
,, 30	59 55	58 21	55 51	57 38,8
10h.	2 1 3	59 50	56 12	58 24,6
,, 30	2 4	2 0 24	57 0	59 10,7
11h.	2 38	1 39	57 30	2 0 1,3
,, 30	3 19	2 27	58 0	0 40,7
Midi	3 5	2 40	58 30	1 11,7
Soir				
0h. 30	2 3 5	2 2 44	1 59 9	2 1 40,8
1h.	3 12	2 30	59 36	1 57,1
,, 30	3 19	1 53	59 50	2 0,6
2h.	3 46	1 19	59 50	2 4
,, 30	3 19	0 17	2 0 4	1 55,1
3h.	2 59	1 59 36	0 17	1 56,7
,, 30	2 29	59 9	0 17	1 45,6
4h.	2 4	58 56	0 17	1 28,7
,, 30	1 47	58 56	0 17	1 33,3
5h.	1 19	58 56	0 17	1 0,7
,, 30	1 19	58 56	1 59 50	0 44,4
6h.	1 3	58 56	59 16	0 28,3
	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes	2 1 17	1 59 20	1 58 14	1 59 45

MINIMA ET MAXIMA.

	° ′ ″	° ′ ″	° ′ ″	
Max. secon.	....	....	....	
Min. princ.	1 57 50	1 55 51	1 55 31	
Max. princ.	2 3 46	2 2 44	2 0 17	
Min. secon.	....	....	....	
	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Moyennes des Min. et Max.	2 0 48	1 59 17	1 57 54	1 59 26
	′	′	′	′
Amplitude	5,93	6,86	4,76	6,25

DÉCLINAISON MAGNÉTIQUE A ZI KA-WEI.

Jours du mois.	Juillet 1875.
1	2° 1′ 10″
3	2 1 38
6	2 1 36
10	2 1 57
15	2 1 0
18	2 0 52
21	2 1 52
25	2 1 59
28	2 1 50
31	2 2 0
Moyenne	2° 1′ 36″

Jours du mois.	Août 1875.
2	2° 0′ 10″
6	2 2 30
9	2 0 15
12	2 4 55
15	2 4 0
18	2 3 30
21	2 3 0
24	2 2 57
27	2 2 45
30	2 3 30
Moyenne	2° 2′ 45″

Jours du mois.	Septembre 1875.
3	2° 1′ 30″
6	2 2 0
10	2 0 10
13	2 2 10
16	2 2 10
19	2 2 13
21	2 0 10
23	2 0 10
26	1 58 30
29	2 0 25
Moyenne	2° 0′ 57″

Jours du mois.	Octobre 1875.
1	2° 2′ 0″
4	1 58 50
8	2 0 15
12	2 1 0
15	2 2 0
19	1 58 11
22	2 0 41
25	2 0 30
28	2 0 30
31	2 0 55
Moyenne	2° 0′ 29″

DECLINAISON MAGNÉTIQUE A ZI-KA-WEI.

Novembre 1875.

Jours du mois.	Jours de la lune.	7h. matin.			11h. matin.			4h. soir.			Moyennes diurnes.		
		°	′	″	°	′	″	°	′	″	°	′	″
1	4	1	59	6	2	1	0	2	0	30	2	0	12
2	5	1	59	33,5	2	1	22,5	2	0	20	2	0	25,3
3	6	2	0	28	2	1	40	1	59	40	2	0	36
4	7	2	0	0,5	2	1	50	2	0	30	2	0	46,8
5	8	1	59	53,5	1	59	47	2	0	41,5	2	0	7,3
6	9	2	0	35	2	0	28	2	1	22,5	2	0	48,5
7	10	2	0	55,5	1	58	50	2	0	5	1	59	56,8
8	11	2	1	6	1	59	37,5	1	59	51	2	0	11,5
9	12	2	0	45,5	1	59	23,5	1	59	51	2	0	0
10	13	2	0	5	2	0	12	2	0	5	2	0	7,3
11	14	2	0	12	2	0	5	1	59	58	2	0	5
12	15	1	59	58	1	59	58	1	59	51	1	59	55,7
13	16	1	59	51	1	59	37,5	1	59	51	1	59	46,5
14	17	1	59	37,5	2	0	31	1	58	45	1	59	37,8
15	18	1	58	42	2	0	38	1	58	49	1	59	23
16	19	1	58	8	1	59	16	1	59	45	1	59	3
17	20	1	58	21,5	1	59	29,5	1	59	43	1	59	11,3
18	21	1	59	16	1	58	45	1	59	56,5	1	59	19,2
19	22	1	59	29	1	59	36	1	59	22	1	59	29
20	23	1	59	56,5	1	59	43	1	59	9	1	59	36,2
21	24	2	0	10	1	59	32	2	0	6	2	0	1
22	25	2	0	6	2	0	6	2	1	0,5	2	0	24,2
23	26	2	1	0,5	1	59	52,5	2	0	20	2	0	24,3
24	27	2	0	0	2	0	6	2	0	0	2	0	2
25	28	2	0	13	1	59	46	2	0	19,5	2	0	6,2
26	29	2	0	6	1	59	32	2	0	19,5	1	59	59,2
27	30	2	0	0	1	59	25	1	59	39	1	59	41,3
28	1	2	0	13	2	0	1,5	2	0	1,5	2	0	5,3
29	2	1	59	41	1	59	48	1	59	34	1	59	41
30	3	2	0	29	1	59	13,5	1	59	54,5	1	59	52,3
Moyennes mensuelles		1°	59′	56″	1°	59	58″,5	1°	59′	58″,5	1°	59′	57″,8

DÉCLINAISON MAGNÉTIQUE A ZI-KA-WEI.

Décembre 1875.

Jours du mois.	Jours de la lune.	7h. matin.			11h. matin.			4h. soir.			Moyennes diurnes.		
		°	′	″	°	′	″	°	′	″	°	′	″
1	4	2	0	15	1	59	34	1	59	54,5	1	59	54,5
2	5	2	0	8,5	1	58	46,5	1	59	0	1	59	18,3
3	6	2	0	0	1	59	6,5	1	59	34	1	59	33,5
4	7	1	59	48	1	59	34	1	59	34	1	59	38,7
5	8	2	0	8,5	1	59	27	2	0	14,5	I	59	56,7
6	9	2	0	28	1	59	6,5	1	59	47,5	1	59	47,3
7	10	2	1	23	1	58	52,5	1	59	34	1	59	56,5
8	11	2	1	9	1	59	20,5	2	0	28	2	0	19,2
9	12	2	1	9	1	59	20,5	2	0	48	2	0	25,8
10	13	2	0	48	1	59	20,5	2	1	22	2	0	30,2
11	14	2	1	16	1	59	34	2	0	28	2	0	26
12	15	2	1	9	2	0	9	2	0	0	2	0	26
13	16	2	0	13	1	59	46,5	2	0	0	1	59	59,8
14	17	2	0	6,5	2	0	41	2	0	13	2	0	20
15	18	2	0	20	1	59	39,5	2	0	0	1	59	59,8
16	19	2	0	33	1	59	32	1	59	32	1	59	52,3
17	20	2	1	1,5	1	59	46,5	1	59	25	2	0	4,3
18	21	2	2	15	2	0	40	1	59	52,5	2	0	55,8
19	22	2	1	30	1	59	2	1	59	56,5	2	0	9,5
20	23	2	0	30,5	1	59	15,5	2	0	16,5	2	0	0,8
21	24	2	0	9,5	1	58	28	2	0	9,5	1	59	35,7
22	25	2	0	9,5	1	59	2	1	59	15,5	1	59	28
23	26	2	0	9,5	1	59	15,5	1	59	29	1	59	38
24	27	1	59	56,5	1	59	22,5	1	59	22,5	1	59	33,8
25	28	1	59	56,5	1	58	14	1	59	42	1	59	17,5
26	29	2	0	30,5	1	59	15,5	1	59	51,5	1	59	52,5
27	30	2	0	51	2	0	10	1	59	56,5	2	0	19,2
28	1	2	0	30,5	1	58	28	2	0	16,5	1	59	45
29	2	2	0	51	1	58	7,5	2	0	16,5	1	59	45
30	3	2	0	37,5	1	58	34,5	2	0	3	1	59	45
31	4	2	0	37,5	1	59	2	1	58	48	1	59	29,2
Moyennes mensuelles		2°	0′	35″,8	1°	59′	18″,5	1°	59′	54″,5	1°	59′	57″

INCLINAISON MAGNÉTIQUE A ZI-KA-WEI, EN 1875.

Mois.	Dates.	Temps moyen.	Inclinaison dans un 1er azimut.	Inclinaison dans l'azimut rectang.	Inclinaison vraie.	Inclinaison moyenne.
		h. m.				
Avril	11	11 0 m.	54° 15′ 26″	57° 45′ 15″	46° 15′ 26″	46° 16′ 47″
	20	3 10 s.	55 28 56	56 21 49	46 15 44	
	30	3 30 s.	55 33 52	56 23 11	46 19 10	
		h. m.				
Mai	4	7 35 m.	55° 8′ 26″	56° 40′ 0″	46° 13′ 43″	46° 14′ 25″
	13	8 45 m.	55 30 11	56 28 37	46 19 58	
	21	9 40 m.	55 38 11	56 3 15	46 11 1	
	30	8 0 m.	55 37 41	56 7 26	46 12 58	
		h. m.				
Juin	3	9 30 m.	55° 38′ 26″	56° 13′ 45″	46° 16′ 43″	46° 15′ 7″
	12	9 25 m.	55 33 8	56 13 33	46 13 42	
	20	8 0 m.	55 52 34	56 56 0	46 14 56	
		h. m.				
Juillet	11	9 45 m.	55° 38′ 0″	56° 9′ 30″	46° 14′ 14″	46° 17′ 11″
	16	9 40 m.	55 12 38	56 45 15	46 18 46	
	21	7 45 m.	55 37 52	56 17 53	46 18 35	
		h. m.				
Août	8	8 10 m.	55° 41′ 30″	56° 1′ 30″	46° 11′ 53″	46° 12′ 29″
	1	7 50 m.	55 47 0	55 57 41	46 12 49	
	29	8 45 m.	55 49 4	55 55 30	46 12 46	
		h. m.				
Septembre	8	9 0 m.	55° 57′ 11″	55° 59′ 26″	46° 19′ 16″	46° 19′ 39″
	14	8 20 m.	55 49 56	56 10 56	46 21 30	
	19	8 30 m.	55 40 45	56 15 26	46 18 52	
	26	8 40 m.	55 17 45	56 40 4	46 18 58	
		h. m.				
Octobre	3	8 40 m.	55° 43′ 4″	56° 27′ 0″	46° 26′ 15″	46° 18′ 58″
	10	8 30 m.	55 24 15	56 38 22	46 21 45	
	17	8 40 m.	55 48 56	56 4 30	46 17 31	
	24	8 40 m.	55 48 11	56 2 15	46 15 55	
	31	8 45 m.	55 44 30	56 1 15	46 13 23	
		h. m.				
Novembre	1	8 30 m.	55° 43′ 22″	55° 59′ 41″	46° 11′ 56″	46° 12′ 43″
	7	8 30 m.	55 42 49	56 1 7	46 12 22	
	14	8 30 m.	55 40 11	56 11 7	46 16 17	
	21	8 35 m.	55 41 4	55 57 41	46 9 38	
	28	8 30 m.	55 47 15	55 58 30	46 13 24	
		h. m.				
Décembre	5	8 30 m.	55° 43′ 34″	56° 4′ 0″	46° 14′ 20″	46° 14′ 33″
	12	8 30 m.	55 44 19	56 4 49	46 15 10	
	19	8 30 m.	55 42 30	56 5 4	46 14 20	
	26	8 20 m.	55 42 38	56 5 4	46 14 24	

INTENSITÉ DE LA FORCE MAGNÉTIQUE DE LA TERRE, A ZI-KA-WEI.

Détermination de la Composante horizontale.

Mois.	Dates.	Temps moyen de l'observation.	Durée corrigée de l'oscillation de l'aimant.		Moment magnétique de l'aimant.		Composante horizontale.
1875		h. m.	s.				
Janvier	3	8 55 m.	2 7813	s. 2 7838	0. 83317	0. 83166	6. 95006
	11	9 10 m.	7824		83107		96240
	20	9 45 m.	7894		83042		93301
	30	9 50 m.	7823		83197		95527
		h. m.	s.				
Février	5	9 40 m.	2 7804	s. 2 7847	0. 83197	0. 83129	6. 96473
	14	9 40 m.	7857		83073		94862
	21	9 10 m.	7860		83047		94912
	27	9 35 m.	7867		83202		93278
		h. m.	s.				
Mars	4	9 45 m.	2 7847	s. 2 7832	0. 83092	0. 83215	6. 95179
	10	10 00 m.	7838		83266		94196
	17	9 25 m.	7839		83212		94600
	28	8 50 m.	7805		83290		95626
		h. m.	s.				
Avril	3	8 15 m.	2 7828	s. 2 7839	0. 83199	0. 83182	6. 95248
	11	8 35 m.	7825		83232		95122
	18	8 30 m.	7860		83197		93653
	30	10 25 m.	7841		83099		95419
		h. m.	s.				
Mai	3	2 30 s.	2 7849	s. 2 7866	0. 83091	0. 83084	6. 95104
	9	8 15 m.	7866		83126		94218
	17	8 15 m.	7870		83116		94183
	29	9 15 m.	7878		83002		94390
		h. m.	s.				
Juin	5	9 25 m.	2 7900	s. 2 7877	0. 82920	0. 82987	6. 94368
	14	9 15 m,	7848		83049		95483
	21	8 00 m.	7882		82993		94308

INTENSITÉ DE LA FORCE MAGNÉTIQUE DE LA TERRE, A ZI-KA-WEI.

Détermination de la Composante horizontale.

Mois.	Dates.	Temps moyen de l'observation.	Durée corrigée de l'oscillation de l'aimant.		Moment magnétique de l'aimant.		Composante horizontale.
1875		h. m.	s.				
Juillet	11	5 05 s.	2 7884	s.	0. 83012		6. 94001
	17	8 10 m.	7875	2 7876	83050	0. 83011	94200
	23	8 50 m.	7870		82973		95040
		h. m.	s.				
Août	8	9 25 m.	2 7890	s.	0. 82925		6. 94454
	22	8 30 m.	7895	2 7889	82887	0. 82922	94915
	29	9 50 m.	7883		82952		95020
		h. m.	s.				
Septembre	8	10 40 m.	2 7902		0. 82853		6. 94925
	15	8 30 m.	7897	s.	82873	0. 82897	94863
	19	9 30 m.	7899	2 7897	82940		94246
	26	10 00 m.	7889		82921		94957
		h. m.	s.				
Octobre	3	9 40 m.	2 7890		0. 82918		6. 94856
	10	9 45 m.	7888	s.	82913		95014
	17	9 40 m.	7890	2 7888	82923	0. 82896	94806
	24	9 40 m.	7882		82884		95517
	31	9 55 m.	7890		82842		95423
		h. m.	s.				
Novembre	1	9 50 m.	2 7881		0. 82850		6. 95810
	7	9 45 m.	7860	s.	82911		96343
	14	9 55 m.	7901	2 7877	82861	0. 82880	94654
	21	9 50 m.	7865		82871		96265
	28	9 50 m.	7878		82908		95352
		h. m.	s.				
Décembre	5	9 50 m.	2 7881		0. 82797		6. 96025
	12	10 00 m.	7889	s.	82820		95472
	19	9 45 m.	7880	2 7888	82844	0. 82797	95645
	26	9 25 m.	7900		82726		95820

RÉSUMÉ GENÉRAL POUR L'ANNÉE 1875.

Mois.	Déclinaison occidentale.	Inclinaison.	Unités anglaises.			Unités métriques.		
			Intens. horiz.	Intens. vertic.	Intens. totale	Intens. horiz.	Intens. vertic.	Intens. totale
Janvier	1° 59′ 16″	....	6. 95018	....	....	3. 20459	....	....
Février	1 58 38	....	6. 94881	....	....	3. 20396	....	....
Mars	1 57 40	....	6. 94900	....	....	3. 20405	....	....
Avril	1 57 26	46° 16′ 47″	6. 94860	7. 26614	10. 05386	3. 20386	3. 35027	4. 63563
Mai	1 59 25	46 14 25	6. 94473	7. 25210	10. 04102	3. 20208	3. 34372	4. 62971
Juin	1 59 45	46 15 7	6. 94720	7. 25763	10. 04673	3. 20321	3. 34635	4. 63235
Juillet	2 1 36	46 17 11	6. 94413	7. 26316	10. 04860	3. 20180	3. 34890	4. 63321
Août	2 2 45	46 12 29	6. 94796	7. 24730	10. 03980	3. 20357	3. 34151	4. 62915
Septembre	2 0 57	46 19 39	6. 94748	7. 27711	10. 06100	3. 20334	3. 35533	4. 63893
Octobre	2 0 29	46 18 58	6. 95123	7. 27814	10. 06434	3. 20507	3. 35581	4. 64047
Novembre	1 59 58	46 12 43	6. 95685	7. 25756	10. 05336	3. 20766	3. 34632	4. 63540
Décembre	1 59 57	46 14 33	6. 95740	7. 26589	10. 05975	3. 20792	3. 35016	4. 63835
Moyennes annuelles	1° 59′,82	(46° 15′,8)	6. 94946	(7. 26278)	(10. 05205)	3. 20426	(3. 34871)	(4. 63480)

M. Dechevrens, s.j.

TABLEAU I. VARIATION HORAIRE DE LA DÉCLINAISON MAGNÉTIQUE (OCCIDENTALE.)

Observée à Zi-ka-wei le 23 *Mars* 1874 (————) *et le* 22 *Mars* 1875 (— · — · — · —)

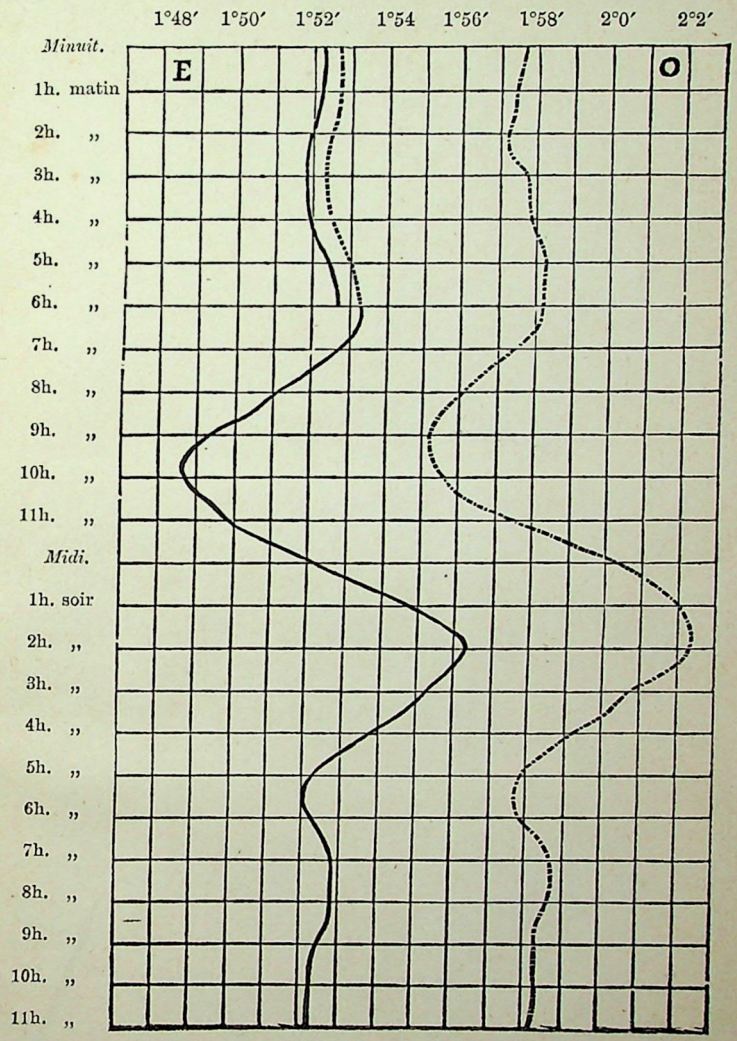


TABLEAU II. VARIATION DIURNE MOYENNE DE LA DÉCLINAISON (OCCIDENTALE) A ZI-KA-WEI, EN 1874-75.

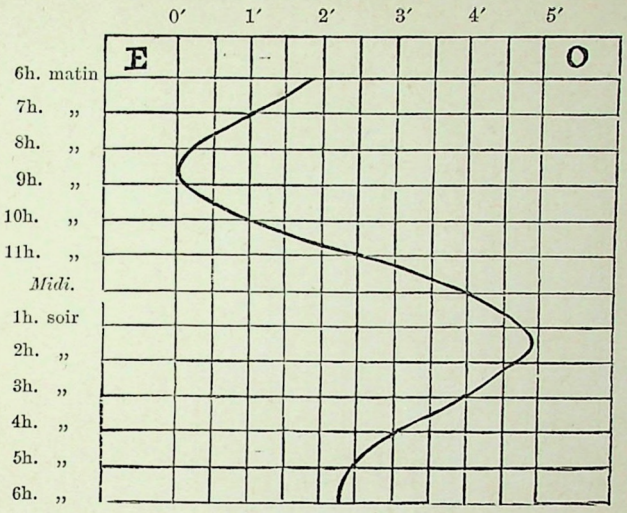


TABLEAU IV. COURBES DIURNES MAXIMA (1 JUIN 1874 ET MINIMA 20 FÉVRIER 1875) DE LA DÉCLINAISON, A ZI-KA-WEI.

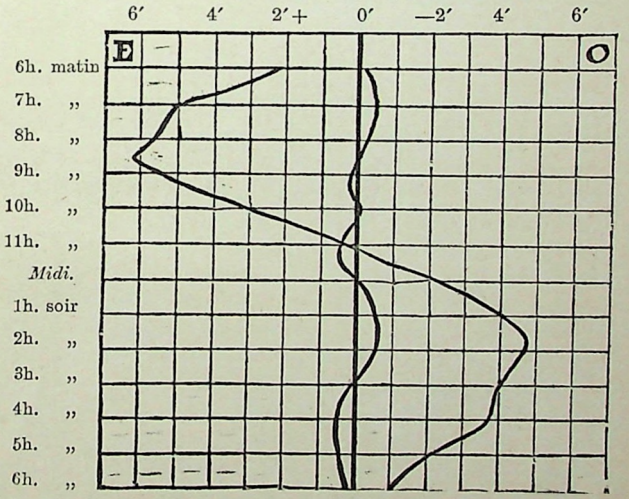


TABLEAU V. DÉCLINAISON (OCCIDENTALE) MOYENNE EN ÉTÉ (———) ET EN HIVER (------), EN 1874-75.

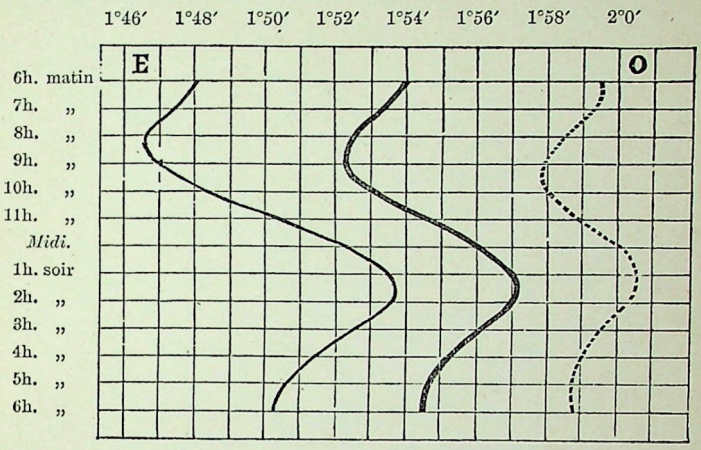


TABLEAU VI. VARIATION HORAIRE DE LA DÉCLINAISON EN ÉTÉ (———) ET EN HIVER (-----), EN 1874-75.

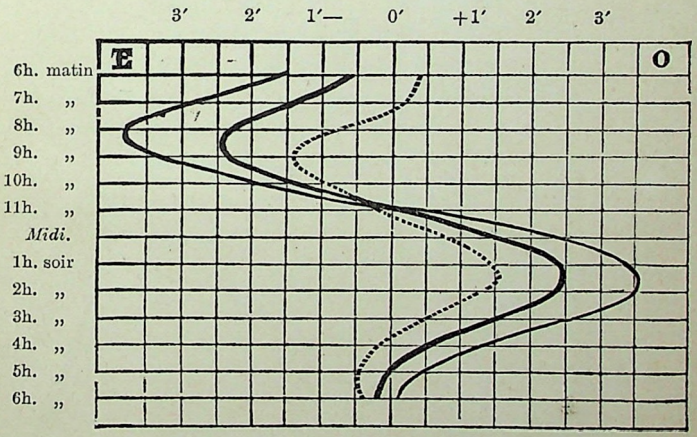


TABLEAU VII. PERTURBATIONS APPORTÉES DANS LA VARIATION HORAIRE MOYENNE PAR LA VARIATION DE LA DÉCLINAISON DU SOLEIL.

☞ *Printemps* (————) - *Eté* (------) - *Automne* (---------) - *Hiver* (- - - - - - -)

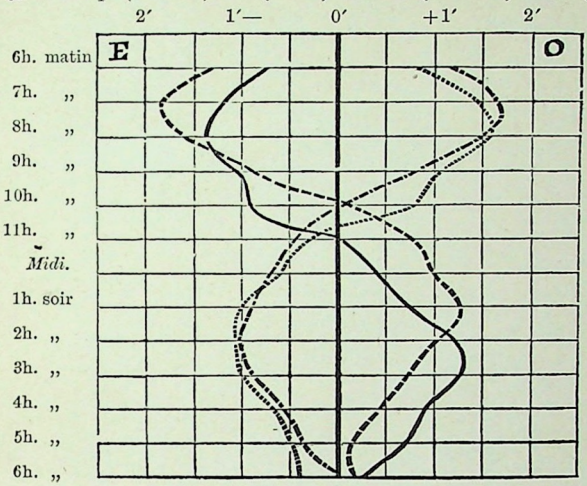


TABLEAU VIII. VARIATION DIURNE DE LA VITESSE DE L'AIGUILLE DE DÉCLINAISON, 1874-75.

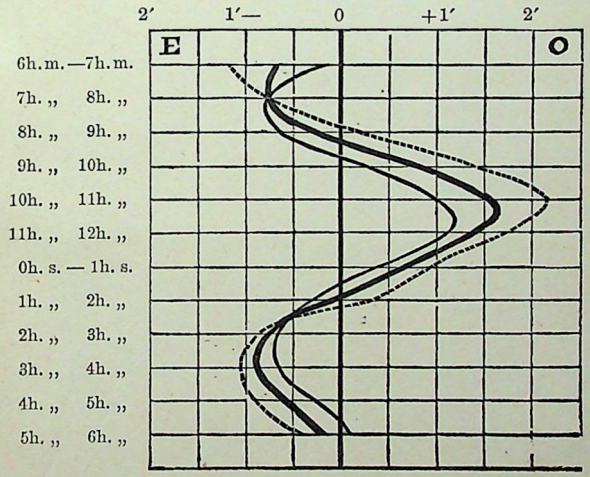
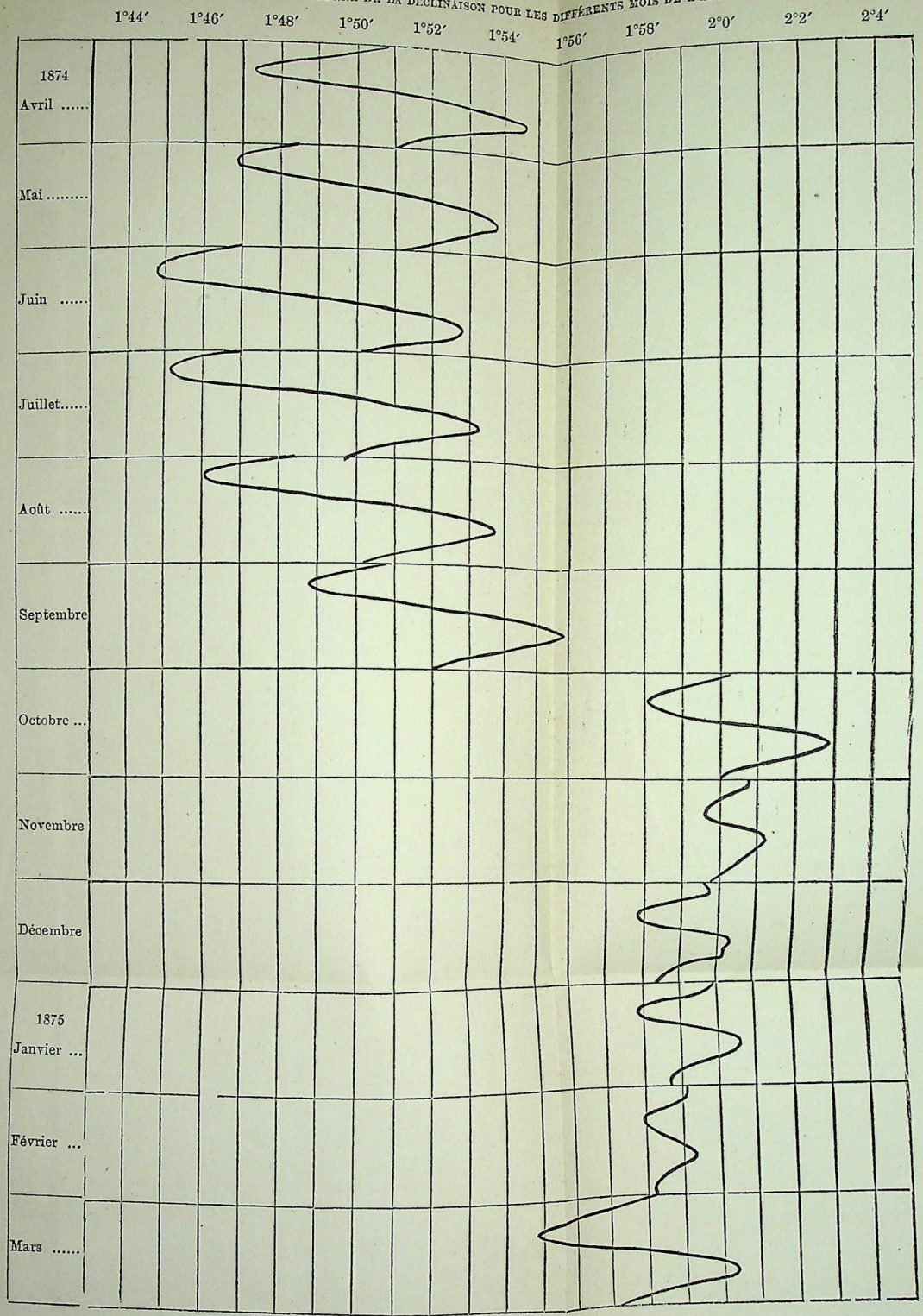


TABLEAU III. VARIATION DIURNE MOYENNE DE LA DÉCLINAISON POUR LES DIFFÉRENTS MOIS DE L'ANNÉE 1874, A ZI-KA-WEI.



VARIATION DIURNE MOYENNE DE LA DÉCLINAISON PENDANT LE 1ER SEMESTRE DE 1875, A ZI-KA-WEI.

