

A BIBLIOGRAPHY OF ISLAMIC ASTROLABES⁽¹⁾

BY

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Abbott, Nabia. Indian Astrolabe Makers. *Islamic Culture*,
XI, pp. 144-6. 1937.

Two astrolabes, one made by 'Īsā, son of Ilāhdād in 1013 H.
(1604/5), the other made by Diyā' ad-Dīn Muḥammad son of
Qā'im Muḥammad, son of Mullā 'Īsā, son of Mullā Ilāhdād of
Lahore in 1057 H. (1647).

See Frank, J., and M. Meyerhof.

Amador de los Rios y Villalta, Rodrigo. Toledo. Folio.
Martin y Gamoneda, Madrid, 1905.

Astrolabe made at Toledo, 459 H. (1067) p. 140, with
illustrations. Also illustrated in Calvert's *Toledo*, plate 443.

Anon, Note sur un globe céleste arabe. *Journal Asiatique*,
III^e série, tome I, pp. 191-3. 1836.

Made 463 H. (1070) according to the calculation of Dr.
Schiepati, in whose collection it was. Acquired and brought
to Paris.

Assemani, Simone. Globus cœlestis cufico-arabicus Veliterni
musei Borgiani... illustratus; præmissa ejusdem de Arabum
astronomia dissertatione et adjectis duabus epistolis, Cl. Josephi
Toaldi. 4to., pp. (14) and CCXIX, with 3 folding plates.

Patavii, 1790.

Made 622 H. (1225) for al-Kāmil, fifth Ayyubid Sultan of
Egypt.

(¹) This bibliography forms part of a *Bibliography of the Architecture, Arts and Crafts of Islam*, begun many years ago, which at the present moment runs to 7450 items under AUTHORS and about 9,500 under SUBJECTS.

Beigel, G. W. S. Nachricht von einer arabischen Himmelskugel mit kufischer Schrift, welche im Curfürstl. mathematischen Salon zu Dresden aufbewahrt wird, mitgetheilt. *Bode's Astronomisches Jahrbuch für das Jahr 1808*, pp. 97-110. Berlin, 1805.

. Abbildung einer für Fostat berechneten Horizontal Sonnenuhr. *Fundgruben des Orients*, Band I, pp. 422-7, with 1 figure. 1809.

Bel, Alfred. Trouvailles archéologiques à Tlemcen. *Revue Africaine*, XLIX^e année, pp. 229-36, with 1 figure. 1905.

Includes "Un cadran solaire arabe", pp. 228-31, with 1 fig. Of marble, found in the ruins of Mansūra and now in the Museum of Tlemcen.

Berchem, Max van. Notes d'archéologie arabe. Deuxième article. Toulounides et fatimites. *Journal Asiatique*, VIII^e série, tome XIX, pp. 377-407. 1892.

Sun-dial on wall of Mosque of Emir Qāsūn, dated 785 H. (1383); another on Mausoleum of al-Ashraf Īnāl, dated 871 H. (1466), pp. 387-90. Astrolabes, pp. 390-92.

Brinckmann, Justus. Das Hamburgische Museum für Kunst und Gewerbe. Large 8vo. Hamburg and Leipzig, 1894.

One from the Spitzer Collection, Syrian, XVIth century, p. 774.

Carra de Vaux, Baron. L'Astrolabe linéaire ou bâton d'Et-Tousi. *Journal Asiatique*, IX^e série, tome V, pp. 464-516. 1895.

Casanova, Paul. Une sphère céleste de l'an 684 de l'Hégire. *Mémoires de la Mission Archéologique Française au Caire*, tome VI, pp. 313-330, with folding plate (coloured). 1892.

In the Musée du Louvre.

. La Montre du Sultan Noûr ad Din. (554 de l'Hégire = 1159-1160). *Syria*, IV, pp. 282-99, pl. XLV-XLVII and 4 figs. 1923.

Chiarmi. In the *Revue Encyclopédique*, année 1820, tome VII, p. 609, there is a reference to an Arab astrolabe of copper in the

University of Warsaw, which is supposed to have been brought from Spain by the Piarists in 1642. It adds that M. Chiarmi, Professor of Oriental languages at the University, made it the subject of a dissertation, which he presented to the Royal Institute of Sciences at Warsaw. Published in their Memoirs?

Colin, Georges S. Un juif marocain du XIV^e siècle constructeur d'astrolabe. *Hespéris*, XXII, pp. 183-4. 1936.
Astrolabe made at Fez in 716 H. (1316/17).

Combe, Étienne. Cinq cuivres musulmans des XIII^e, XIV^e et XV^e siècles, de la Collection Benaki. *B.I.F.A.O.*, XXX, pp. 49-58. 1931.
Includes an astrolabe dated 729 H. (1328/9), pp. 54-6.

Cowper, H. Swainson. Through Turkish Arabia. A Journey from the Mediterranean to Bombay by the Euphrates and Tigris Valleys and the Persian Gulf. 8vo., pp. xx and 490, with 26 illustrations and 2 maps. Allen, London, 1894.
Appendix IV: An astrolabe purchased at Baghdād, pp. 469-75, and double-page frontispiece. Made by Hajī 'Alī 1125 H. (1712).

. A Fifteenth Century Planispheric Astrolabe, made at Granada. *Journ. Roy. Asiatic Society*, pp. 53-66, with 3 plates. 1904.
Date, by calculating backwards, about A.D. 1441-2.
Note on above by S. A. Ionides, (on the date calculated by the author), *ibid.*, pp. 542-3.

D'Allemagne, Henri René. Du Khorassan au pays des Backhtiariis, 4to., 4 vols. Hachette, Paris, 1911.
"Astrolabe en cuivre gravé contenant différentes cartes du ciel: face antérieure, XVIII^e siècle. (Collection de l'Auteur)", illustration, tome I, p. 195.

Delphin. L'Astronomie au Maroc. *Journal Asiatique*, VIII^e série, tome XVII, pp. 171-201, with 2 plates. 1891.
Description of a large astrolabe made 1197 H. (1782/3), pp. 178-84, with 2 plates.

Dorn, Dr. Bernhard. Description of the Celestial Globe belonging to Major-General Sir John Malcolm, G.C.B., K.L.S. &c., &c. deposited in the Museum of the Royal Asiatic Society of Great Britain and Ireland. *Transactions of the Royal Asiatic Society*, Vol. II, pp. 371-92, with 1 plate. 1830.

"Made by the most humble in the supreme God, Mohammed ben Helal, the astronomer of Monsul, in the year of the Hejira 674 (A.D. 1275)."

. Kurze Nachricht von zwei Astrolabien mit morgenländischen Inschriften. *Bulletin scientifique de l'Acad. Imp. des Sciences de St. Pétersbourg*, tome V, col. 81-96, with 2 plates. 1839.

. Ueber ein drittes in Russland befindliches Astrolabium mit morgenländischen Inschriften. *Bull. scientifique publié par l'Académie Impériale des Sciences de St. Pétersbourg*. IX, cols. 61-73, with 2 plates. 1842

Dated 1031 H. (1621/2). Made at Lahore by Muhammad Mukim ibn Mullā 'Isa ibn Sheykh al-Haddād. See Sottas (J.), for another astrolabe by the same maker.

. Ueber ein viertes in Russland befindliches Astrolabium mit morgenländischen Inschriften. *Bulletin de la classe historico-philologique de l'Acad. Imp. des Sciences de St. Pétersbourg*, tome, I, col. 353-66. 1844.

. Drei in der Kaiserlichen öffentlichen Bibliothek zu St. Petersburg befindliche astronomische Instrumente mit arabischen Inschriften. 4to., pp. 150, with 2 plates and 6 figures. St. Petersburg, 1865.

Mémoires de l'Académie Impériale des Sciences de St. Pétersbourg, VII^e série, tome IX, No. 1.

Drechsler, Dr. Adolph. Mittheilungen ueber die Sammlung des Königl. mathematisch-physikalischen Salons zu Dresden, nebst cultur-historischen Bemerkungen. *Bulletin de la Soc. Imp. des Naturalistes de Moscou*, tome XLV, pp. 396-425. 1872.

Drechsler, Dr. Adolph. Separat Abdruck, 8vo., pp. 30.

Burdach, Dresden, 1873.

Arabischer Himmelsglobus, pp. 422-4; S.A. pp. 25-7.

. Der arabische Himmels-Globus
angefertigt 1279 zu Maragha von Muhammed bin Muwajid
Elardhi zugehörig dem Königl. mathematisch-physikalischen
Salon zu Dresden. Veröffentlicht in acht lithographischen
Tafeln mit Erläuterungen. 8vo., pp. 14.

Burdach, Dresden, 1873.

Ernst, Alfred. Les instruments de Mathématiques. *La Col-
lection Spitzer*, tome V, pp. 80-122, with 4 plates and many
illustrations.

Quantin, Paris, 1892.

Nos. 25, 26 (with illustration), 27, 133, (plate IV), 136, 137,
and 180. No. 133 is now in the Hamburg Museum. See
Brinckmann (J.).

Evans, Lewis. Some European and Oriental Astrolabes.
The Archaeological Journal, LXVIII, pp. 221-30 and Plates I-XI.

1911

Twenty Oriental astrolabes are listed, ranging in date from
the tenth to the thirteenth century.

Exposition d'Art Musulman. Les Amis de l'Art, Alexan-
drie, mars 1925. Large 4to.

Morancé, Paris, (1925).

See p. 10 and pl. 8. One made for Sultan Bāyezīd II, in 891
H. (1486).

Fiorini, Matteo. Erd- und Himmelsgloben, ihre Geschichte
und Konstruktion. Nach dem Italienischen...frei bearbeitet von
Siegmond Günther. Mit 9 Textfiguren. Large 8vo., pp. vi
and 137.

Teubner, Leipzig, 1895.

Arabische Globen, pp. 13-17.

Floyer, E. A. Les cadrans solaires primitifs dans la Haute-
Égypte. *Bulletin de l'Institut Égyptien*, III^e série, No. 5,
pp. 167-174, with 1 plate and 2 diagrams.

1894.

Fraehn, C. M. Astrolabii Norimbergensis sæc. XIII, p. C.N. inscriptio eufica novis post Tychsenium curis tractata. *Mémoires de l'Acad. Imp. des Sciences de St. Pétersbourg*, tome VIII, pp. 569-71. 1822.

Reprinted in his *Antiquitatis Muhammedanae Monumenta Varia*, Particula II, pp. 73-5. 1822.

Frank, Joseph. Über zwei astronomische arabische Instrumente. *Zeitschrift für Instrumentenkunde*, XLI, pp. 193-200, with 3 figs. 1921.

Frank, Josef, and Max Meyerhof. Ein Astrolab aus dem indischen Mogulreiche. Mit vier Tafeln in Lichtdruck. Large 8vo., pp. 48. Winter, Heidelberg, 1925.

Heidelberger Akten der von-Porthcim-Stiftung, 13. *Arbeiten aus dem Institut für Geschichte der Naturwissenschaft*, III.

In the Kestner Museum, Hanover. Dated 1018 H. (1609); made by the two sons of 'Isā ibn Allāhdād of Lahore.

See Abbott, Nabia.

Gunther, R. T. Early Science in Oxford. Vol. II—Astronomy. 8vo., pp. XV and 408, with many illus.

Printed for the Subscribers, Oxford, 1923.

See Oriental Astrolabes, pp. 188-99, with 4 plates. One dated 374 H. (984), two others of c. A.D. 1224 and 1400, and an Indian astrolabe dated Sambat 1730 = A.D. 1673.

. Historic Instruments for the Advancement of Science. A Handbook to the Oxford Collections prepared for the opening of the Lewis Evans Collection on May 5th, 1925. 12mo., pp. (ii) and 90. Oxford University Press, Oxford, 1925.

See pp. 11-16 for astrolabes and pp. 49-50 for a globe dated 764H. (1362) made by Ja'far ibn 'Umar ibn Dawlātshah al-Kermānī.

. The Astrolabes of the World. Based upon the series of instruments in the Lewis Evans Collection in the Old Ashmolean Museum at Oxford, with notes on Astrolabes in the Collections of the British Museum, Science Museum, Sir J. Findlay, Mr. S. V. Hoffman, the Mensing Collection, and in

other public and private collections. Sm. 4to., 2 vols., pp. xvii, iii and 304, with 69 plates and 91 figs.; pp. viii and 305, with 86 plates and 79 figs.

University Press, Oxford, 1932.

Vol. I—The Eastern Astrolabes, begins with a reduced facsimile of Morley's great work [*g.v.*]. This is followed by a description of 153 Astrolabes, most of which have never been described before; see pp. 109-302, Plates XXII-LXVII and Figs. 59-139.

Hartner, Willy. The Principle and use of the Astrolabe, in Pope (A.U.), *Survey of Persian Art*, III, pp. 2530-54, figs. 844-52 and plates 1397-1404. 1939.

Contents: HISTORY OF THE ASTROLABE. DESCRIPTION OF THE ASTROLABE: 1. The suspensory apparatus. 2. The body of the astrolabe. THE USE OF THE ASTROLABE. Introduction. 1. Determination of the longitude of the sun in the ecliptic. 2. Unequal and equal hours. 3. Ascendant, descendant, 'degree of the middle of the heavens', and 'degree of the point of revolution (that is, of the north line) of the earth'. 4. Day and night arcs. 5. Lengths of the unequal hours expressed in degrees or in equal hours. 6. The *matāli'* (ascendant) in the oblique and right ascension. 7. Azimuth. 8. Longitude of the moon and of the planets in the ecliptic. 9. Ecliptical (geocentric) latitude of the moon and planets. 10. Configurations of the planets.

Hoernle, Dr. (Remarks on an astrolabe made by Hāmad, the son of Muhammad Mugīm, at Lahore, A. H. 1087 (1677).) *Proceedings of the Asiatic Society of Bengal*, pp. 148-9. 1890.

Jomard (Edmé François). Les Monuments de la Géographie, ou Recueil d'anciennes cartes européennes et orientales. Accompagnées de sphères terrestres et célestes, de mappemondes et tables cosmographiques, d'astrolabes et autres instruments d'observation, depuis les temps les plus reculés jusqu'à l'époque d'Ortélius et de Gérard Mercator, publiés en fac-similé de la grandeur des originaux. Atlas folio, pp. (i), with 50 plates (some double). Paris, [1854].

Plates I₁ and I₂ Globe in the Bibliothèque Royale, XVIIIth century; plate II, another, in the Bibliothèque Impériale, made at Mecca in the XVIth century; plate III, astrolabe with Kufic inscription, from Egypt, in the Marcel Collection.

Jourdain. Mémoire sur les Instruments employés à l'Observatoire de Méragah. *Magasin Encyclopédique*, année 1809, tome VI, pp. 43-101. Paris, 1809.

Kaye, G. R. The Astronomical Observatories of Jai Singh. Impl. 4to., pp. viii and 151, with 27 plates.

Supdt. Govt. Printing, Calcutta, 1918.

Archaeological Survey of India, New Imperial Series, Vol. XI.

See pp. 16-30 and plates II-VII for description of astrolabes dated from 1067 H. (1657) to 1091 H. (1680).

. A Guide to the Old Observatories at Delhi ; Jaipur ; Ujjain ; Benares. Sm. 8vo., pp. v and 108, with 15 plates. Supt. Government Printing, Calcutta, 1920.

Based on his larger work (*q.v.*). See Metal instruments, pp. 20-24 and plate II.

. Astronomical Instruments in the Delhi Museum. 4to., pp. 25, with 6 plates.

Suptd. Government Printing, Calcutta, 1921.

Memoirs of the Archaeological Survey of India, No. 12.

One of the latter part of the XIVth century, another c. 1500.

Khanykov. Lettre à M. Dorn. *Bulletin de la classe historico-philologique de l'Acad. Imp. des Sciences de St. Pétersbourg*, tome XII, col. 161-76. 1855.

Reprinted in *Mélanges Asiatiques*, tome II, pp. 437-56. 1856.

Astrolabe made, according to an inscription, for Shāh Sultān Hussein. (XII, col. 169-76 ; II, pp. 447-56).

. Extrait d'une lettre à M. Dorn. *Bulletin de la Classe historico-philologique de l'Acad. Imp. des Sciences de St. Pétersbourg*, tome XIII, col. 177-9. 1856

Reprinted in *Mélanges Asiatiques*, tome II, pp. 508-9. 1856.

Astrolabe made by Muhammed Kerim, 1133H. (1720).

. Un cadran solaire persan. *Bulletin de la classe historico-philologique de l'Acad. Imp. des Sciences de St. Pétersbourg*, tome XIV, col. 233-4, with 1 plate.

Reprinted in *Mélanges Asiatiques*, tome III, pp. 69-70. 1857.

Lane-Poole, Stanley. The Art of the Saracens in Egypt. 8vo. Chapman and Hall, London, 1886.

See p. 177 for an astrolabe in the British Museum made at Cairo by 'Abd al-Kerim in 633 H. (1235/6).

. Saladin and the Fall of the Kingdom of Jerusalem. 8vo. Putnam, New York and London, 1898.

"Astrological Calculator, made by Mohammed ibn Kutlukh of Mosul A. H. 639 (1241); in the British Museum", plate to face p. 44.

Maitrot de la Motte, A. Un Astrolabe Shakaziyi. *Bull. Soc. de Géographie d'Alger*, XLV, pp. 108-32, with 14 figs. 1940.

Marçais, Georges. L'Exposition d'Art musulman d'Alger, avril 1905. Folio. Fontemoing, Paris, 1906.

Astrolabe with Kufic inscription, made at Fez, 1116 H. (1704), plate XX.

Marçais, W., and G. Marçais. Les Monuments arabes de Tlemcen. 8vo. Fontemoing, Paris, 1903.

Sun-dial with Kufic inscription in the Mosque of Sidi'l-Halwi, fig. 70 and p. 292.

Meucci, F. Il Globo celeste arabico del secolo XI esistente nel Gabinetto degli Strumenti antichi di Astronomia, di Fisica e di Matematica del R. Istituto di Studi superiori. 8vo., pp. 19, with 2 plates (1 large folding). Le Monnier, Firenze, 1878.

Dated 473 H. (1080).

Middleton, J. Description of a Persian Astrolabe, submitted to the Asiatic Society by Major Pottinger. *Journ. Asiatic Society of Bengal*, Vol. X, pp. 759-77, with 5 folding plates. 1841.

See Pratt (J. S.).

Millás Vallicrosa, José M^a. Un ejemplar de azafea árabe de Azarquiel. *Al-Andalus*, IX, pp. 111-19 and lám. 3-4. 1944.

Dated 650 H. (1252/3). Preserved in the Real Academia de Ciencias at Barcelona.

Morley, William H. Description of a Planispheric Astrolabe, constructed for Sháh Sultán Husain Safawí, King of Persia, and

now preserved in the British Museum ; comprising an account of the astrolabe generally, with notes illustrative and explanatory : to which are added, concise notices of twelve other astrolabes, Eastern and European, hitherto undescribed. Atlas folio, pp. iii and 50, with 21 plates and illustrations.

Williams and Norgate, London, 1856.

In addition to the large and very beautifully decorated astrolabe, made for Shāh Sulṭān Husain, 1124 H. (1712), the following are described :—

1. With inscriptions partly in Kufic and partly in Dēvanāgarī, dated 669 H. (1270/1). Obtained in Benares.
2. A *thulthi*, or tripartite instrument, constructed for one latitude only. Then in the East India House.
3. Another *thulthi* instrument, with Kufic inscription, but not ancient. This and the preceding were probably made for European use. In the British Museum.
4. A Persian *sudsi*, or sexpartite, astrolabe of Indian workmanship, made by Muhammad Sālih, at Tatta, 1076 H. (1665). Then in the East India House.
5. A *sudsi* instrument, dated 1228 H. (1813). Then the property of W. H. Vaux.
6. Made for al-Malik al-Ashraf, by ‘Abd al-Karīm al-Misrī, *al-Usturlābī*, 633 H. (1235). In the British Museum.
7. Made for a certain Muhammad Bakir, *Isfahānī*, by Muhammad Mahdī al-Khadim. Inscriptions partly in Persian but chiefly in Arabic, dated by *Aḥmad* 1070 H. (1659). Then in the possession of Mr. Williams, Assist. Secy. Roy. Astronomical Socy.

Reprinted in reduced facsimile in Gunther, *Astrolabes of the World* [q.v.], I, pp. iii and 1-50.

. Description of an Arabic Quadrant.
Journ. Roy. Asiatic Society, Vol. XVII, pp. 322-330, with 2 folding plates. 1860.

Dated 735 H. (1334). With several lines of Kufic inscriptions.

Nelthropp. A Catalogue chronologically arranged of the Collection of clocks, watches, chronometers, movements, sun-dials, seals, etc., etc., presented to the Worshipful Company of Clock-makers of the City of London by the Revd. H. L. Nelthropp, Master 1893 and 1894. Second edition, 8vo., pp. (iii) and 85, with 4 illustrations. Blades, East & Blades, London, 1900.

An Indian planispheric astrolabe, suitable for the latitude of Lahore, with Persian inscription:—

"The work of Hâmid, the son of Muhammad Mukim, ... of Lahore, the Royal Astrolabe-maker ..." Dated 1099 H. (1688), pp. 75-8, with 2 illustrations. Not in the first edition published in 1895.

Padmakara Dube. Astrolabes in the State Library, Rampur. *Journal of the United Provinces Historical Socy.*, IV, pp. 1-11, with 7 plates. 1928.

One dated 615H. (1218/19) and another dated 1074H. (1663/4), are described.

Pratt, Rev. J. S. Observations on the Herat Astrolabe, described in No. 118 of the *Journal. Asiatic Society of Bengal*, Vol. XI, pp. 720-22. 1842.

See Middleton (J.).

Prinsep, James. Note on the Nautical Instruments of the Arabs. *Journ. Asiatic Society of Bengal*, Vol. V, pp. 784-94, with 1 plate. 1836.

A description of the primitive instruments used by an Arab navigator of Prinsep's day, in working his way regularly from the Maldivé Islands to Calcutta.

Rehatsek, E. The Labours of the Arab Astronomers, and their Instruments, with the Description of the Astrolabe in the Mulla Firuz Library. *Journ. Bombay Branch, Royal Asiatic Society*, Vol. XI, pp. 311-30, with 5 plates. 1875.

Dated 119 H. no doubt meant for 1119 (1707).

Remondini, Pier Constantino. Intorno all'Astrolabio arabico posseduto dalla Società Ligure di Storia Patria di Genova. *Atti del IV Congresso Internazionale degli Orientalisti*, 1878, Vol. I, pp. 403-31. Le Monnier, Firenze, 1880.

Made between A.D. 1632 and 1637 according to calculation

Rey-Pailhade. Sur un astrolabe arabe de l'an 613 de l'hégire. *Bull. de Géographie historique et descriptive*, année 1890, pp. 217-18. 1890.

Made by Abū Bakr ibn Yūsuf in Morocco 613 H. (1216). In the possession of the Société archéologique du Midi de la France.

Roberts-Austen, Prof. W. Chandler. Alloys. Cantor Lecture IV. *Journal of the Society of Arts*, Vol. XLI, pp. 1016-19 and 1022-30. 1893.

Astrolabe made at Damascus by 'Abd ar-Rahmān son of Yūsuf, 598H. (1202), p. 1009 and fig. 1. In the South Kensington Museum.

Roncière, Charles de la. La découverte de l'Afrique au Moyen Âge. Tome premier: L'Intérieur du Continent. Large 4to., pp. viii and 175, with 19 plates. Le Caire, 1924.

Mémoires de la Société Royale de Géographie d'Égypte, tome V. "Astrolabe arabe construit par Ahmed ibn Khalaf pour Djafar ibn Moktafi Billah (905-987 de J.C.)", p. 21 and pl. III. In the Bibliothèque Nationale.

Rothman, R. W. On the Arabic Globe belonging to the Society. *Memoirs of the Royal Astronomical Society*, Vol. XII, pp. 381-3. 1842.

Saavedra, Eduardo. Astrolabios árabes que se conservan en el Museo Arqueológico Nacional, en la Biblioteca del Real Palacio y en colecciones particulares. *Museo Español de Antigüedades*, tome VI, pp. 395-414, with 1 plate. 1875.

. Note sur un Astrolabe arabe. *Atti del IV Congresso Internazionale degli Orientalisti 1878*, Vol. I, pp. 455-6. Le Monnier, Firenze, 1880.

In the Tribuna Museum of Florence. Made for Pope Sylvester II, at the end of the Xth century, A.D., perhaps in Cairo.

Sauvaire, H. and J. de Rey Pailhade, Sur une mère d'astrolabe arabe du XIII^e siècle (609 de l'hégire) portant un calendrier perpétuel avec correspondance musulmane et chrétienne. Traduction et interprétation. *Journal asiatique*, IX^e série, tome I, pp. 5-76. 1893.

Made in Seville 609 H. (1212).

Schio, Almerico da. Intorno a due strumenti astronomici antichi trovati in Valdagno. *Atti del Reale Istituto Veneto di Scienze, Lettere ed Arti*, serie 5, I, pp. 1399-1402.

1874-1875.

Schio, Almerico da. Di due astrolabj in caratteri cufici occidentali trovati in Valdagno. Comunicazione seconda. *Atti del Reale Istituto Veneto di Scienze, Lettere ed Arti*, Serie 5, VI, pp. 259-68. 1879-80.

Dated 950H. (1543).

... Sur deux Astrolabes arabes. *Atti di IV Congresso Internazionale degli Orientalisti 1878*, Vol. I, pp. 367-9.

Le Monnier, Firenze, 1880.

One dated 950H. (1543), the other 613H. (1216). The property of M. François Cengia.

... Di due astrolabi in caratteri cufici occidentali trovati in Valdagno (Veneto). Con sei tavole. Sm. 4to., pp. 1 and 71.

Ongania, Venezia, 1880.

Schier, Karl. Bericht über den arabischen Himmelsglobus im Königl. sächs. mathematischen Salon zu Dresden. *Zeitschr. für allgemeine Erdkunde*, neue Folge, Band XVI, pp. 494-500.

Berlin, 1864.

Reprinted in his *Globus celestis arabicus*, (q.v.) pp. 65-71.

... Globus cœlestis arabicus qui Dresdæ in Regio Museo Mathematico asservatur. 8vo., pp. viii and 71.

Typis Teubnerianis, Lipsiæ, 1865.

Schuck, A. Der Jakobsstab bei den Arabern. *Die Natur*, Band XL, pp. 352-5, with 1 figure. Halle, 1891.

On the navigation instruments of the Arabs, especially in the Indian Ocean.

... Hat Europa den Kompass über Arabien oder hat ihn Arabien von Europa erhalten. Litterarischsachliche Studie. *Ausland*, Jahrg. LXV, pp. 122-7, 141-3, 153-7. 1892.

... Ein ältes indisches und arabisches Instrument zum Bestimmen der Polhöhe gewisser Orte. *Ausland*, Jahrg. LXV, "Geographische Mitteilungen", p. 814. 1892.

A "Jacob's Staff".

Sedillot, L. Am. Mémoire sur les instruments astronomiques des arabes. *Mémoires présentés par divers savants à l'Académie royale des Inscriptions et Belles-Lettres*, série I, tome I, pp. 1-229, with 36 plates. 1844.

Various kinds used, pp. 35-7.

Sédillot, A. Description d'un astrolabe construit par Abd-ul-Aïma. *Annales de l'Observatoire Impériale de Paris*, IX, pp. 164-71. 1868.

Date suggested: "pas plus haut que le XIII^e siècle".

Siddiqi, A. Construction of Clocks and Islamic Civilization. *Islamic Culture*, I, pp. 245-51. 1927.

To be continued.

Sottas, Jules. Description d'un astrolabe arabe construit à Lahore. *Acad. de Marine, Communications et Mémoires*, IX, pp. 153-85, with 12 figs. 1930.

Made by Mohammad Mukim ibn Mullā 'Īsā ibn Sheykh al-Haddad. See Dorn (B), for another astrolabe by the same maker.

Sulaiman Nadvi. Some Indian Astrolabe-Makers. *Islamic Culture*, IX, pp. 621-31. 1935.

. Indian Astrolabe-Makers. *Islamic Culture*, XI, pp. 537-9. 1937.

Suter, H. Zur Geschichte des Jacobs-Stabs. *Bibliotheca mathematica*, neue Folge, Band IX, pp. 13-18. 1895.

. Nochmals der Jacobsstab. *Bibliotheca mathematica*, neue Folge, Band X, pp. 13-15, with 2 diagrams. 1896.

Wiet, Gaston. L'Exposition persane de 1931. 4to. Institut français, Cairo, 1933.

See pp. 59-60 and 139, for a globe dated 1074 H. (1663 A).

. Une famille de fabricants d'astrolabes. *B.I.F.A.O.*, XXXVI, pp. 97-9. 1936.

Wittstein, Dr. Armin. Ueber das Wasserühr und das Astrolabium des Arzachel. *Zeitscher. f. Mathematik u. Physik, Jahrg. XXXIX, Historisch-lit. Abth.*, pp. 41-55 and 81-94, with 2 diagrams.

1894.

Arzachel was a Spanish Arab who lived in the XIth century.

Woepcke, F. Über ein in der Königlichen Bibliothek zu Berlin befindliches arabisches Astrolabium. *Mathematische Abh. der Kgl. Akad. der Wissenschaften*, pp. 1-31, with 3 plates. 1858.

Made by Muḥammad ibn as-Sāl in Toledo, 420 H. (1029).

. Über ein in der Kaiserlichen Bibliothek zu Paris befindliches arabisches Astrolabium. *Bulletin de l'Acad. Imp. des Sciences de St. Pétersbourg*, tome VII, col. 220-27, with 1 plate.

1864.

Reprinted in *Mélanges Asiatiques*, tome V, pp. 98-108.

Made in Seville, 615 H. (1218).

. Trois traités arabes sur le compas parfait, publiés et traduits. *Notices et extraits des manuscrits de la Bibliothèque Nationale*, tome XXII, pp. 1-175, with figures and diagrams.

Imprimerie Nationale, Paris, 1874.

Description of a compass for drawing conic sections.