



ABŪ SAHL KŪHĪ

ABŪ SAHL VĪJAN B. ROSTAM KŪHĪ (also QŪHĪ), mathematician and astronomer. He was born ca. 330/940 at Kūh, which, according to Ebn al-Nadīm (*Fehrest*, pp. 283-84), was in the mountains of Māzandarān. He was well enough known as an astronomer and expert on observational instruments to be chosen, along with Aḥmad b. Moḥammad Seǰzī, Naẓīf b. Yomn the Greek, and Abu'l-Qāsem Ġolām Zoḥal, to assist 'Abd-al-Raḥmān Šūfi: They observed the sun's declinations at the winter solstices (December 16) of 359/969 and 360/970 and at the summer solstice (June 17) of 360/970. The observations were made in Shiraz for the Buyid ruler of Fārs, 'Azod-al-dawla. (See Bīrūnī, *Taḥdīd al-amāken*, ed. P. Bulgakov, Cairo, 1964, pp. 99-100; tr. J. Ali, Beirut, 1967, pp. 69-70; comm. by E. S. Kennedy, Beirut, 1973, pp. 42-43. See also A. Sayili, *The Observatory in Islam*, Ankara, 1960, pp. 104-07.)

In 378/988-89 Šaraf-al-dawla, who had secured his power by expelling his brother Šamšām-al-dawla from Baghdad, asked Kūhī to observe the seven planets for him. The latter built an observatory in the garden of the royal palace in Baghdad; there he observed the summer solstice (June 16) and autumnal equinox (September 18) of 379/988. At the latter observation were present many officials and several prominent astronomers, including Abu'l-Wafā' Būzǰānī and Abū Ḥāmed Aḥmad Šāǧānī (Bīrūnī, *Taḥdīd*, pp. 100-01/69-70/43; Ebn al-Qeṭṭī, *Ta'rik al-ḥokamā'*, ed. J. Lippert, Leipzig, 1903, pp. 351-54; Ebn al-'Ebrī, *Ta'rik moḳtašar al-dawal*, Beirut, 1958, p. 176; Sayili, *Observatory*, pp. 112-17). Apparently the observatory did not survive Šaraf-al-dawla's death (Jomādā II, 379/September-October, 989); and Kūhī could not



have accomplished much of his original program of planetary observations.

Kūhī's greatest fame derives from his highly competent work in geometry, which he based on the writings of Euclid, Apollonius, and Archimedes. Particularly elegant are his solutions utilizing conic sections and the related "conic compass." His works were admired and sought after by Seǰzī, Abū Naṣr Maṣūūr, Bīrūnī, Ebn al-Hayṭam, Ḳayyāmī, and Naṣīr-al-dīn Ṭūsī. Although many of these works survive, they provide no further details on his life.

Ebn al-Nadīm lists nine titles, most of which are repeated by Ebn al-Qeṭṭī: 1. *Ketāb marākez al-okarr* ("Book of the centers of spheres"), unfinished; lost. 2. *Ketāb al-oṣūl 'alā naḥw ketāb Oqlīdos wa'llaḍī ḳaraǰa minho* ("Book of elements in the manner of the book of Euclid and what results from it"), lost. 3. *Ketāb al-barkār al-tāmm* ("Book of the perfect compass"); ed. in F. Woepcke, "Trois traités arabes sur le compas parfait," *Notices et extraits des manuscrits* 22/1, 1874, pp. 145-74; tr., pp. 68-111. 4. *Ketāb ṣaḥ'at al-aṣṭorlāb* ("Book on constructing an astrolabe"); extant with a commentary by Abū Sa'd al-'Alā' b. Sahl; unpublished. 5. *Ketāb eḥdāt al-noqaṭ 'alā al-ḳoṭūṭ* ("Book of producing points on lines"), lost; cited by Abū Naṣr Maṣūūr b. 'Erāq in *Resāla fi'l-ǰawāb 'an ba'z mas'el al-handasa* (text no. 10 in his *Rasā'el*, Hyderabad, 1947, p. 2). 6. *Ketāb 'alā monteǰiyīn fi tawālā al-ḥarakatayn enteṣār ā le Ṭābet b. Qorra* ("Book according to the logicians concerning the continuity of two motions in defense of Ṭābet b. Qorra"), lost. 7. *Ketāb marākez al-dawā'er al-motamāssa 'ala'l-ḳoṭūṭ men ṭarīq al-taḥlīl dūna al-tarkīb* ("Book of the centers of circles situated on lines by the method of analysis without construction"), extant in a ms. copied by Seǰzī; not published. See F. Woepcke, *L'Algèbre d'Omar Alkhayyāmī*, Paris, 1851, p. 55, n. 8. *Ketāb al-zīādāt 'alā Aršemīdes fi'l-maqālat al-tāniya* ("Book of additions to Archimedes in the second treatise"), in Woepcke, *L'Algèbre*, pp. 103-14; cf. Ṭūsī, *Taḥrīr al-kora wa'l-oṣṭowāna*, work no. 5 in his *Rasā'el* II, Hyderabad, 1359/1940, p. 115. 9. *Resāla fi esteḳrāj zeḷ' al-mosabba' fi'l-dā'era* ("Epistle on the derivation of the side of a heptagon in a circle"), addressed to 'Azod-al-dawla. Facsimile of the Cairo ms. with tr. in Y. Samplonius, "Die Konstruktion des regelmässigen Siebenecks nach Abu Sahl al-Qūhī Waigān ibn Rustam," *Janus* 50, 1963, pp. 227-49.

Ebn al-Qeṭṭī adds: 10. *Ketāb eḳrāj al-ḳaṭṭayn 'alā nesba* ("Book of the discovery of two lines in a [given] ratio"), extant, not published. A number of other works are not listed by either bibliographer: 11. *Resāla fi 'amal moḳammas motasāwī al-aḫlā' fi morabba' ma'lūm* ("Epistle on constructing an equilateral pentagon in a given quadrilateral"), unpublished. 12. *Resāla fi esteḳrāj*



mešāḥat al-moḡassam al-mokāfi (“Epistle on the derivation of the area of a paraboloid”), printed as work no. 6 in the *Rasāʿel al-motafarreqa fiʾl-hayʾa*, Hyderabad, 1948; tr. in H. Suter, “Die Abhandlungen Thābit b. Ḳurras und Abū Sahl al-Kūhīs über die Ausmessung der Paraboloide,” *Sitzungsberichte der Physikalisch-medizinischen Sozietät in Erlangen* 48-49, 1916-17, pp. 213-21. 13. *Resāla fi qesmat al-zāwīat al-mostaqīmat al-kaṭṭayn be ṭalāt a aqsām motasāwīa* (“Epistle on the division of an angle into three equal parts”); ed. and tr. in A. Sayili, “Ebū Sahl el Kūhī’nin bir açiyi uç eşit kisma bölme problemi için bulduğu çözümler,” *Bellekten* 26, 1962, pp. 693-700. See also idem, “The Trisection of the Angle by Abu Sahl Wayjan ibn Rustam al Kūhī (fl. 970-988),” *Actes du X^e Congrès International d’Histoire des Sciences*, Paris, 1964, I, pp. 545-46. This epistle is cited by Seǵzī; see Woepcke, *L’Algèbre*, pp. 117-19. 14. *Resāla fi nesbat mā yaqaʾa bayn ṭalāt a koṭūṭ men kaṭṭ wāḥed* (“Epistle on the proportion between three lines from one line”), addressed to Šaraf-al-dawla; unpublished. 15. *Ketāb ekrāǵ al-kaṭṭayn men noqṭa ʾalā al-zāwīat al-maʾlūma be ṭarīq al-taḥlīl* (“Book of discovering two lines from a point at a given angle by means of analysis”); unpublished, but see Woepcke, *L’Algèbre*, pp. 55-56, n. 16. *Resāla fi maʾrefa meqdār al-boʾd men markaz al-arz wa makān al-kawākeb alladī yanqazz beʾl-layl* (“Epistle on knowing the radius of the earth and the place at which a star falls in the night”), unpublished. 17. *Ketāb al-masāʾel al-handasiya* (“Book of geometrical questions”), unpublished. 18. *Maqāla fi anna nesbat al-qoṭr elā al-moḡiṭ nesbat al-wāḥed elā ṭalāta wa sobʾ* (“Treatise on the fact that the ratio of the diameter to the circumference is the ratio of one to $3\frac{1}{7}$ ”), unpublished. 19. *Ketāb taqsīm al-kora be soṭūḥ mostawīya* (“Book of the division of a sphere into equal surfaces”), unpublished. 20. *Ketāb estekrāǵ samt al-qebla* (“Book of the derivation of the azimuth of the qibla”), unpublished. 21. *Resāla fi maʾrefa mā yorā men al-samāʾ waʾl-baḥr* (“Epistle on knowing what is seen of the sky and the sea”), unpublished. 22. *Qawl ʾalā anna fiʾl-zamān al-motanāhī ḡaraka ḡayr motanāhīya* (“Report on the fact that [there can be] an unlimited motion in a limited time”); ed. and tr. A. Sayili, “Kūhī’nin sinirli zamanda sonsuz hareket hakkındaki yazisi,” *Bellekten* 21, 1957, pp. 489-94; cf. idem, “A Short Article of Abū Sahl Waijan ibn Rustam al Qūhī on the Possibility of Infinite Motion in Finite Time,” *Actes du VIII^e Congrès International d’Histoire des Sciences*, Florence and Paris, 1958, I, pp. 248-49.

Abū Sahl also wrote various notes on Euclid (cf. above, no. 2) which survive; they are on the pseudo-Archimedean *Lemmata*. (See H. L. L. Busard, “Der Codex Orientalis 162 der Leidener Universitätsbibliothek,” *Actes du XII^e Congrès International d’Histoire des Sciences*, Paris, 1971, pp. 25-31.) He also



wrote letters to Abū Eshāq Şābe' (314-84/925-94).

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See also Sezgin, *GAS* V, pp. 314-21.

Y. Dold-Samplonius in *Dictionary of Scientific Biography* XI, New York, 1975, pp. 239-41.