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(*fl*. Baghdad, *ca*. 970–1000)

mathematics, astronomy.

Al-Qūhī's names indicate his Persian origin: Al-Qūhī means "from Quh," a village in Tabaristan; and Rustam is the name of a legendary Persian hero. At the peak of his scientific activity he worked in Baghdad under the Buwayhid caliphs ʿḤud al-Dawla and his son and successor Sharaf al-Dawla.

In 969/970 al-Qh̄ assisted at the observations of the winter and summer solstices in Shiraz. These observations, ordered by ʿḤud al-Dawla, were directed by Abū'ḷ usayn ʿAbd al Rahmän ibn ʿUmar aḷ-ūfī; Ḥmad ibn Mụammad ibn ʿAbd al Jal̄al Sijz̄ and other scientists were also present. In 988 Sharaf al-Dawla instructed al-Qūhī to observe the seven planets, and Al-Qūhī constructed a building in the palace garden to house instruments of his own design. The first observation was made in June 988 in the presence of Al-Qūhī, who was director of the observatory; several magistrates *(qudät)*; and the scientists Abu'l Wafä, Ahmad ibn Muhammad al-Säghäni, Abū'l Hasan Muhammad al-Sämarri, Abu'l Hasan al-Maghribi, and Abū Ishäq Ibrähim ibn Hiläl ibn Ibrähim ibn Zahrūn al Ṣäbi. Correspondence between Abū Ishaq and Al-Qūhī still exists. They very accurately observed the entry of the sun into the sign of Cancer and, about three months later, its entry into the sign of Libra. Al-Birūn'i related that activity at al-Qūhi's observatory ceased with the death of Sharaf al-Dawla in 989.

Al-Qūhī, whom al-Khayyämi considered to be an excellent mathematician, worked chiefly in geometry. In the writings known to us he mainly solved geometrical problems that would have led to equations of higher than the second degree. Naṣīr al Dīn al Tūsi adds to his edition of Archimedes' *Sphere and Cylinder* the following note by Al-Qūhī; "To construct a sphere segment equal in volume to a given sphere segment, and equal in surface area to a second sphere segment—a problem similar to but more difficult than related problems solved by Archimedes—Al-Qūhī constructed the two unknown lengths by intersecting an equilateral hyperbola with a parabola and rigorously discussed the conditions under which the problem is solvable."

The same precision is found in *Risäla ft istikhräj dil ʿal-musabbaʿ al-mutasäwil-adläʿfi' d-däira*("Construction of the Regular Heptagon"), a construction more complete than the one attributed to Archimedes. Al-Qūhi's solution is based on finding a triangle with an angle ratio of 1:2:4. He constructed the ratio of the sides by intersecting a parabola and a hyperbola, with all parameters equal. Al-Sijzi, who claimed to follow the method of his contemporary Abū Saʿd al-ʿAlä ibn Sahl, used the same principle. The latter, however, knew al-Qūhi's work, having written a commentary on the treatise *Kitäb Sanʿat al-asturläh* ("On the Astrolabe"). Another method used by Al-Qūhī is found in al-Sijzī's treatise Risala ft qismat atzaiya ("On Trisecting an Angle").

Again, in *Risala ft istikhraj misahat al-mujassam al-mukafi* ("Measuring the Parabolic Body"), Al-Qūhī gave a somewhat simpler and clearer solution than Archimedes had done. He said that he knew only Thabit ibn Qurra's treatise on this subject, and in three propositions showed a shorter and more elegant method. Neither computed the paraboloids originating from the rotation of the parabola around an orDīnate. That was first done by Ibn al-Haytham, who was inspired by Thabifs and al-Quhfs writings. Although he found aJ-Quhi's treatment incomplete, Ibn a]-Haytham was nevertheless influenced by his trend of thought.

Analyzing the equation $x^3 + a = cx^2$, Al-Qūhī concluded that it had a (positive) root if a $a \leq 4c^3/27$. This result, already known to Archimedes, apparently wafl not known to al-Khayyami, whose solution is less accurate. AI-Khayyamf also stated that Al-Qūhī could not solve the equation $x^3 + 13.5x + 5 = 10x^2$ while Abu'l Jud was able to do so. (Abu'I Jud, a contemporary of al-Bfruni, worked on geometric problems leaDīng to cubic equations; his main work is not extant.)

In connection with Archimedean mathematics, Steinschneider stated that Al-Qūhī also wrote a commentary to Archimedes' Lemmata. In I. A. Borelli's seventeenth-century Latin edition of the Lemmata (or *Liber assumptorum*), there is a reference to Al-Qūhī.

Al-Qūhī was the first to describe the so-called conic compass, a compass with one leg of variable length for drawing conic sections. In this clear and rather general work, Risala fi'l birkar al-tamm ("On the Perfect Compass") he first described the method of constructing straight lines, circles, and conic sections with this compass, and then treated the theory. He concluded that one could now easily construct astrolabes, sundials, and similar instruments. Al-Biruni asked his teacher Abu Nasr Mansur ibn 'Iraq for a copy of the work; and in al-Biruni, Ibn al-Husayn found a reference to al-Quhfs treatise. Having tried in vain to obtain a copy, Ibn al-Husayn wrote a somewhat inferior work on the subject (H. Suter, Die Mathe-matiker und Astronomen der Araber und ihre Werke [Leipzig, 1900], p. 139).

Al-Qūhī also produced works on astronomy (Brockelmann lists a few without titles), and the treatise on the astrolabe mentioned above. Abu Nasr Mansur ibn clraq, who highly esteemed Al-Qūhī, gave proofs for constructions of azimuth circles by Al-Qūhī in his *Risala fI dawa ir as-sumut ft al-asturlcib* ("Azimuth Circles on the Astrolabe").

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Yvonne Dold-Samplonius