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 ’Aud al-Dawla and his son and successor Sharaf al-Dawla.

In 969/970 al-Qūhī assisted at the observations of the winter and summer solstices in Shiraz. These observations, ordered by ’Aud al-Dawla, were directed by Abū’l usayn ’Abd al Rahmān ibn ’Umar al-Ṭīfī; Amad ibn Muḥammad ibn ’Abd al Jafāl Sijzī 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 (qudāt); and the scientists Abū’l Wafā, Ahmad ibn Muhammad al-Ṣāghānī, Abū’l Hasan Muhammad al-Sāmarri, Abū’l Hasan al-Maghribī, and Abū Ishāq Ibrāhīm ibn Ḥilāl ibn Ibrāhīm ibn Zahūrūn al-Ṣāḥī. 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-Bīrūnī related that activity at al-Qūhī’s observatory ceased with the death of Sharaf al-Dawla in 989.

Al-Qūhī, whom al-Khayyāmī 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-Tūsī 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 Risāla fi istikhrāj dil al-masabba’ al-mutasāwil-adlā’ fi d-dāīra (“Construction of the Regular Heptagon”), a construction more complete than the one attributed to Archimedes. Al-Qūhī’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-Sijzī, who claimed to follow the method of his contemporary Abū Sa’d al-‘Alī ibn Sahl, used the same principle. The latter, however, knew al-Qūhī’s work, having written a commentary on the treatise Kitāb San’at al-asturlāh (“On the Astrolabe”). Another method used by Al-Qūhī is found in al-Sijzī’s treatise Risala fi qismat atzaiya (“On Trisecting an Angle”).

Again, in Risala fi istikhrāj 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 ordinate. That was first done by Ibn al-Haytham, who was inspired by Thabit’s and al-Qūhī’s writings. Although he found al-Qūhī’s treatment incomplete, Ibn al-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 \( a < 4c^3/27 \). This result, already known to Archimedes, apparently was not known to al-Khayyāmī, whose solution is less accurate. Al-Khayyāmī 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’l Jud, a contemporary of al-Biruni, worked on geometric problems leading 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-tammi (“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-Qūhī’s treatise. Having tried in vain to
obtain a copy, Ibn al-Husayn wrote a somewhat inferior work on the subject (H. Suter, Die Mathematiker 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 ciraq, who highly esteemed Al-Qūhī, gave proofs for constructions of azimuth circles by Al-Qūhī in his Risāla fi dawa ir as-sumut fi al-asturlcīb (“Azimuth Circles on the Astrolabe”).

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