

# The Geometrical Works of Abū Saʿīd al-Ḍarīr al-Jurjānī

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## I Abū Saʿīd al-Ḍarīr al-Jurjānī

Almost nothing is known about the life of the geometer Abū Saʿīd al-Ḍarīr (“the blind”) al-Jurjānī. His name indicates that he originated from the town of Jurjān, that is present-day Gorgān near the Caspian Sea in Iran. The most complete form of his name appears in one version of al-Bīrūnī’s *Extraction of Chords* [20, p. 13]<sup>1</sup> as Abū Saʿīd Muḥammad ibn ʿAlī al-Ḍarīr al-Jurjānī. In [19, p. 27], Suter confused the geometer, Abū Saʿīd al-Ḍarīr al-Jurjānī, with the philologist, Abū Saʿīd al-Ḍarīr Aḥmad ibn Khālīd, who died in 895 CE.<sup>2</sup> Consequently, al-Jurjānī is listed as a ninth-century mathematician by Sezgin [17, vol. 5, pp. 263–264, vol. 6, p. 159] and by Matvievskaia and Rozenfeld [13, vol. 2, p. 76, no. 48]. In the *Geometrical Problems*, published below, al-Jurjānī mentions Abū ʿAbdallāh al-Shannī,<sup>3</sup> who lived in the second half of the 10th century CE. This reference confirms that the geometer Muḥammad ibn ʿAlī al-Jurjānī is not identical to the philologist Aḥmad ibn Khālīd. We will see below that al-Jurjānī must have flourished around 1000 CE.<sup>4</sup>

Two treatises by al-Jurjānī have come down to us, both of considerable historical interest.

1. His *Geometrical Problems* begin with a construction of a *neusis* by means of a parabola and hyperbola. This construction is a variation of a construction in Book IV of the *Mathematical Collection* of Pappus of Alexandria. Then follow solutions of two problems related to the trisection of the angle, and a theorem about the altitude of a triangle. The *Geometrical Problems* is addressed to an anonymous mathematician, who will be identified below as al-Bīrūnī. One of

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<sup>1</sup>On al-Bīrūnī (973–1048) see for example [17, vol. 6, pp. 261–276].

<sup>2</sup>On Abū Saʿīd al-Ḍarīr Aḥmad ibn Khālīd see [17, vol. 8, pp. 167–168].

<sup>3</sup>On al-Shannī see [17, vol. 5, p. 352]. Around 970 CE he quarreled with Abū’l-Jūd in connection with the regular heptagon, see [7, pp. 243–244].

<sup>4</sup> In [5, p. 331] Hermelink stated that al-Jurjānī lived in the second half of the 10th century CE.