



## FAẒL NAYRĪZĪ

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**FAẒL NAYRĪZĪ, ABU'L 'ABBĀS b. Ḥātem**, mathematician and astronomer (fl. 900 C.E.). His family originated from Nayrīz/Nīrīz, a small town near Shiraz. Almost nothing is known of his personal life. The fact that he dedicated several works to the caliphs al-Mo'tāzēd (279-89/892-902) and al-Moktafī (289-95/902-8) and also the dedication notice to a vizier in his *Resāla fī aḥdāt al-jaww*, suggest that he, already a mature scholar, spent some time at the caliphal court in Baghdad around the turn of the 10th century (Sezgin, *GAS* VII, p. 330).

Nayrīzī's most important work on mathematics is his *Šarḥ ketāb Oqlīdes fī'l-oṣūl*, a commentary on Euclid's *Elements* (Sezgin, *GAS* V, p. 284), in which he quotes extensively from Simplicius' commentary on the definitions and postulates and from Heron's commentary on the propositions. Unfortunately, only the commentary on books 1-6 survive in Arabic; some lacunae are filled in the Latin translation by Gerard of Cremona of the commentary on books 1-10. One of Nayrīzī's most interesting contributions to the study of Euclid was his citation of the discussions of the fifth postulate, i.e., that on parallel lines, by Aḡānīs (convincingly identified with Agapius by Sabra, 1974, X, p. 6) and Simplicius (see Sabra, 1969). Nayrīzī, basing himself on Aḡānīs, also wrote an independent treatise called *Resāla fī bayān al-moṣādara al-mašhūra* (Sezgin, *GAS* V, pp. 284-85).

Ebn al-Nadīm (ed. Flügel, p. 279) ascribes to Nayrīzī two sets of astronomical tables, a *Ketāb al-zīj al-kabīr* and a *Ketāb al-zīj al-šaḡīr* (Kennedy, p. 131, no. 46 and p. 135, no. 75; see Sezgin, *GAS* VI, p. 192). Ebn al-Qeṭṭī (p. 254) informs us that the former follows the *Sendhend*—that is, the Islamic adaptation of Indian



astronomy best known in the 9th century through the *Ketāb al-zīj al-Sendhend* of Moḥammad b. Mūsā K̄vārazmī. The *Ketāb al-zīj al-kabīr*, then must be the work referred to by Šāʿed Andaloṣī (tr. p. 112) and by Abū Rayḥān Bīrūnī (q.v.) in his *Ketāb fī efrādal-maqāl fī amr al-ẓelāl* (Bīrūnī, *Rasāʿel*, pp. 39, 51-53, 94), where Nayrīzī is associated in his treatment of gnomonics with such followers of the *Sendhend* as Ebrāhīm b. Ḥabīb Fazārī, Yaʿqūb b. Ṭāreḡ, Moḥammad K̄vārazmī, Aḥmad b. ʿAbd-Allāh Ḥabaš Marvazī, and Abū Mašār Balkī (q.v.). If this *Zīj al-kabīr* is the one consistently referred to by Bīrūnī, as seems plausible, then it was dedicated to al-Moʿtazed, since once in *al-Qānūn al-masʿūdī* (II, pp. 675-76) Bīrūnī refers to the motion of the solar apogee expounded by Nayrīzī in the third *maqāla* of his *al-Zīj al-moʿtazedī* (for other references to Nayrīzī's *Zīj* by Bīrūnī, see Bīrūnī's *al-Qānūn al-masʿūdī* II, pp. 581-85, 591, 595, 604, 952-54; *Ketāb taḥdīd*, p. 196; and *Ketāb maqālīd*, pp. 132-33). Also Ebn Yūnos (pp. 60-65, 68-75, 118-21, 160-61, 164-65) frequently criticizes Nayrīzī for mostly minor errors, especially those consequent on his blindly accepting the results of Yaḥyā b. Abī Maṣṣūr Ṭabarī and his *al-Zīj al-momtaḥan al-raṣādī al-maʿmūnī*. Perhaps in *al-Zīj al-šaḡīr* Nayrīzī became a partisan of *al-Zīj al-momtaḥan*. It is not clear to which *zīj* might be attributed Nayrīzī's adoption under the name *al-jadwal al-jāmeʿ* of Ḥabaš's *jadwal al-taqwīm* and his use of them in the solution of problems in spherical trigonometry described at length by Abū Naṣr b. ʿErāḡ (pp. 30-58). Like the two *zīj*es, Nayrīzī's *Tafsīr al-ketāb al-majestī*, a commentary on Ptolemy's *Almagest*, is lost (Ebn al-Nadīm, ed. Flügel, p. 268; Ebn al-Qeftī, p. 254; Sezgin, GAS VI, p. 192). It is, however, often referred to by Bīrūnī (*Āṭār*, tr. Sachau, pp. 139-40; idem, *Taḥdīd*, p. 95; idem, *Qānūn* II, pp. 779-80; idem, *Ketāb maqālīd*, pp. 148-51), and is mentioned by Neẓāmī ʿArūzī (*Ĉahār maqāla*, ed. Qazvīnī, text, p. 88) as the best commentary on the *Almagest*.

Unlike these three major works, Nayrīzī's minor works on astronomy (Sezgin, GAS VI, p. 192) for the most part are extant. His *Ketāb le'l-ʿamal be'l-aṣṭorlāb al-korawī*, said to be the best on the subject, and *Resāla fī samt al-qebala* have been translated into German.

Nayrīzī composed a number of works on astrology. His commentary on Ptolemy's *Quadripartitum* (*Ketāb al-arbaʿa*; Ebn al-Nadīm, ed. Flügel, p. 279; Ebn al-Qeftī, p. 98; Sezgin, GAS VII, p. 44) is lost, nor is it at all certain that Bīrūnī's quotation from Nayrīzī in his *Maqāla fī sayr saḥmay al-saʿāda* (pp. 24-27) is, as Sezgin states, from this commentary. Bīrūnī's other citation of an astrological opinion held by Nayrīzī (*Tafhīm*, sec. 389, pp. 236-37) is from his



equally non-extant *Ketāb al-mawālīd*. There does survive from Nayrīzī's pen an unpublished *Maqāla fī hawādeṭ al-qerānāt wa'l-kosūfāt al-dālla 'ala'l-fetan wa'l-ḥorūb*. . . (Sezgin, GAS VII, p. 156).

Nayrīzī is also the author of two works dealing more or less with meteorology. The first is philosophical and mathematical, entitled *Ketāb fī ma'refat ālāt to'lamo behā ab'ād al-ašyā' al-šākeša fī'l-hawā' wa'llatī 'alā basīṭ al-'arż wa ajwār al-awdīa wa'l-ābār wa 'orūz al-anhār* (Sezgin, GAS VII, pp. 268-69); the other work, entitled *Resāla fī aḥdāt al-jaww*, is more astrological. According to Ebn al-Nadīm (p. 279) and Ebn al-Qefṭī (p. 254), the latter was dedicated to al-Mo'tazed, but the Istanbul manuscript examined by Sezgin (GAS VII, p. 330) refers only to an unnamed vizier.

## BIBLIOGRAPHY

(for cited works not given in detail, see "Short References"):

Editions and translations of Nayrīzī's works: (1) *Faṣl fī taḳṭīṭ al-sā'āt al-zamāniya fī koll qobba wa fī qobba yosta'mal lahā*, published in *al-Rasā'el al-motafarreqa fī'l-hay'a le'l-motaqaddemīn wa mo'āšerīn al-Bīrūnī*, Hyderabad, 1948.

(2) *Ketāb le'l-'amal be'l-aṣṭorlāb al-korawī*, tr. H. Seemann as *Das kugelformige Astrolab nach den Mitteilungen von Alfons X von Kastilien und den vorhandenen arabischen Quellen*, Abh. zur Geschichte der Naturwissenschaften und der Medizin 8, Erlangen, 1925, pp. 32-40; reprod. in F. Sezgin, ed., *Arabische Instrumente in orientalistischen Studien IV*, Frankfurt, 1991, pp. 359-431 (Seemann's tr. pp. 394-402).

(3) *Resāla fī samt al-qebla*, tr. C. Schoy as "Abhandlung von al-Faḍl b. Ḥātīm an-Nayrīzī. Über die Richtung der Qibla," *Sitzungsberichte der Bayerischen Akademie der Wissenschaften*, Math.-phys. Kl., 1922, pp. 55-68.

(4) *Šarḥ ketāb Oqlīdes fī'l-oṣūl*, first six books ed. with Latin translation by R. O. Besthorn and J. L. Heiberg as *Codex Leidensis 399 1*, 3 parts in six fascicles (fasc. 1-3/1, Leiden, 1893-1910; 3/2, ed. G. Junge, J. Raeder, and W. Thomson,



Leiden, 1932); books 1-10 in Gerard of Cremonā's Latin translations, publ. by M. Curtze as *Anaritii in decem libros priores elementorum Euclidis commentaria*, Leipzig, 1899; new ed. of books 1-4 by P. M. J. E. Tuumers, Nijmegen, 1994.

Sources and studies. Abū Naṣr Maṣṣūr b. 'Alī b. 'Erāq, *Resāla fī barāhīa'māl jadwal al-taqwīm fī zīj Ḥabaš al-ḥāseb*, in idem, *Rasā'el Abī Naṣr Maṣṣūr b. 'Erāq elā al-Bīrūnī*, Hyderabad, 1948, treatise iv. Abū Rayḥān Bīrūnī, *al-Taḥfīm le awā'el šenā'at al-tanjīm*, ed. and tr. R. R. Wright as *The Book of Instruction in the Elements of the Art of Astrology*, London, 1934.

Idem, *al-Qānūn al-mas'ūdī fī'l-hay'a wa'l-nojūm*, ed. S. H. Baranī, 3 vols., Hyderabad, 1945-56.

Idem, *Rasā'el al-Bīrūnī*, Hyderabad, 1948. Idem, *Ketāb taḥdīd nehāyat al-amāken*, ed. P. G. Bulgakov, Cairo, 1964.

Idem, *Maqāla fī sayr saḥmay al-sāda wa'l-ḡayb*, ed. and tr. with commentary, F. I. Haddad, D. Pingree, and E. S. Kennedy as "Al-Bīrūnī's Treatise on Astrological Lots," *Zeitschrift for Geschichte der Arabisch-Islamischen Wissenschaft* 1, 1984, pp. 9-54.

Idem, *Ketāb maqālīd 'elm al-hay'a*, ed. M. T. Debarnot, Damascus, 1985. Ebn al-Qeṭṭī, *Ta'rīk al-ḥokamā'*, ed. J. Lippert, Leipzig, 1903.

Abu'l-Ḥasan 'Alī Ebn Yūnos, *Zīj al-kabīr al-ḥākemī*, ed. and tr. C. Caussin as "Le livre de la grande table Hakémite," *Notices et extraits des manuscrits de la Bibliothèque nationale* 7, 1804, pp. 16-240.

T. Heath, *A History of Greek Mathematics*, 2 vols., Oxford, 1921, II, pp. 228-30 (Aḡānīs, whom Heath identifies with Geminus) and pp. 309-14 (Heron).

Kh. Jouiche, *La théorie des parallèles en pays d'Islam*, Paris, 1986, pp. 127-37.

E. S. Kennedy, "A Survey of Islamic Astronomical Tables," *Transactions of the American Philosophical Society*, N.S. 46, 1956, pp. 121-77.

A. Qorbānī, *Rīāzīdānān-e īrānī az K'vārazmī tā Ebn Sīnā*, Tehran, 1350 Š./1971, pp. 73-85.

A. I. Sabra, "Simplicius's Proof of Euclid's Parallels Postulate," *Journal of the Warburg and Courtauld Institutes* 32, 1969, pp. 1-24.



Idem, *Dictionary of Scientific Biography*, New York, 1974, X, pp. 5-7.

Qāzī Abu'l-Qāsem Şā'ed b. Aḥmad Andaloṣī, *Ketāb ṭabaqāt al-omam*, ed. H. Bū 'Alwān, Beirut, 1985; tr. R. Blachères, as *Catégories des nations*, Paris, 1935.