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ABŪ NAṢR MANṢŪR

ABŪ NAṢR MANṢŪR B. ʿALĪ B. ʿERĀQ, mathematician and astronomer, born probably in Gīlān about 349/960. Abū Naṣr presumably belonged to the Banū ʿErāq, who were the Ḵᵛārazmšāhs ruling from Kāṭ until their overthrow by Abū ʿAlī Maʾmūn in 385/995-96. Bīrūnī, who calls him his teacher (*Āṯār al-bāqīya*, pp. 184-85; *Chronology*, p. 167, written in A.D. 1000), states that he was a freedman (*mawlā*) of the Amīr-al-moʾmenīn, who should be the Samanid ruler Amir Nūḥ II (365-87/976-97). He apparently accompanied his learned student to the court of Sultan Maḥmūd of Ḡazna in 1017. Bīrūnī speaks of him as if already dead in his *Resāla*, written in 427/1035-36 (ed. P. Kraus, Paris, 1936, p. 44).

Abū Naṣr's most important work was in spherical trigonometry and its application to astronomical problems. He also wrote widely on other topics in geometry and astronomy, especially critiques of early Islamic scientists. A list of his works addressed to Bīrūnī is preserved in the latter's *Resāla* (pp. 44-45): 1. *Ketāb fi'l-somūt* ("Book on azimuths"); lost except for references in no. 11 below and in various works of Bīrūnī (see, e.g., E. S. Kennedy, "Al-Bīrūnī's *Maqālīd ʿilm Al-Hayʾa*," *JNES* 30, 1971, pp. 308-14). 2. *Ketāb fī ʿellat tanṣīf al-taʿdīl ʿenda aṣḥāb al-Sendhend* ("Book on the reason for halving the equation according to the authors [of works in the tradition of the *zīǰ*] *al-Sendhend*"); lost. 3. *Ketāb fī taṣḥīḥ ketāb Ebrāhīm ebn Senān fī taṣḥīḥ eḵtelāf al-kawākeb al-ʿolwīa* ("Book on correcting the book of Ebrāhīm b. Senān on correcting the variations of the superior planets"); lost. 4. *Resāla fī barāhīn aʿmāl ǰadwal al-taqwīm fī zīǰ Ḥabaš al-ḥāseb* ("Epistle on demonstrations of the workings of the

table of equations in the *zīǰ* of Ḥabaš the Calculator"); printed as work no. 4 in his *Rasāʾel*, Hyderabad, Deccan, 1947. 5. *Resāla fī taṣḥīḥ mā waqaʿa le Abī Jaʿfar al-Ḵāzen men al-sahw fī zīǰ al-ṣafāʾeḥ* ("Epistle on correcting what happened to Abū Jaʿfar al-Ḵāzen because of negligence in his *Zīǰ al-ṣafāʾeḥ*"); printed as work no. 3 in his *Rasāʾel*. 6. *Resāla fī maǰāzāt dawāʾer al-somūt fi'l-asṭorlāb* ("Epistle on the crossings of the azimuth circles on an astrolabe"); printed as work no. 14 in his *Rasāʾel*. 7. *Resāla fī ǰadwal al-daqāʾeq* ("Epistle on the table of minutes"); printed as work no. 5 in his *Rasāʾel*; see C. Jensen, "Abū Naṣr Manṣūr's Approach to Spherical Astronomy as Developed in his Treatise *The Table of Minutes*," *Centaurus* 16, 1971, pp. 1-19. 8. *Resāla fi'l-barāhīn ʿalā ʿamal Moḥammad b. al-Ṣabbāḥ fī emteḥān al-šams* ("Epistle on demonstrating the operation of Moḥammad b. al-Ṣabbāḥ in the examination of the sun"); printed as work no. 2 in his *Rasāʾel*; discussed in E. S. Kennedy and H. Sharkas, "Two Medieval Methods for Determining the Obliquity of the Ecliptic," *The Mathematics Teacher* 55, 1962, pp. 286-90. 9. *Resāla fi'l-dawāʾer allatī taḥodd al-sāʿāt al-zamānīya* ("Epistle on the circles which delimit the time-hours"); printed as work no. 1 in his *Rasāʾel*. 10. *Resāla fi'l-borhān ʿalā ʿamal Ḥabaš fī maṭāleʿ al-samt fī zīǰeh* ("Epistle on demonstrating the operation of Ḥabaš concerning the rising-times of the azimuth in his *zīǰ*"); printed as work no. 11 in his *Rasāʾel*. 11. *Resāla fī maʿrefat al-qosīy al-falakīya be ṭarīq ḡayr ṭarīq al-nesba* ("Epistle on knowing spherical arcs by a method different from the method of proportion"); printed as work no. 8 in his *Rasāʾel*; tr. P. Luckey, "Zur Entstehung der Kugeldreiecksrechnung," *Deutsche Mathematik* 5, 1940, pp. 423-33. 12. *Resāla fī ḥall šobha ʿarażat fi'l-ṯāleṯa ʿašra men Ketāb al-oṣūl* ("Epistle on the solution of an uncertainty in the thirteenth [book] of the *Elements* [of Euclid]"); printed as work no. 7 in his *Rasāʾel*.

Besides these works written for his brilliant pupil, Abū Naṣr composed a number of other important texts on astronomy and spherical geometry. Most noteworthy among these is his edition of Menelaus' *Sphaerica*. 13. *Eṣlāḥ ketāb Mānālāwos fi'l-aškāl al-korīya* ("Improvement of the book of Menelaus on spherical figures"), completed in 398/1007-08; ed. and tr. M. Krause, *Die Sphärik von Menelaos aus Alexandrien in der Verbesserung von Abū Naṣr Manṣūr b. ʿAlī b. ʿIrāq*, Berlin, 1936; see also the *Taḥrīr ketāb Mānālāwos* of Naṣīr-al-dīn Ṭūsī, published as work no. 9 in his own *Rasāʾel*, Hyderabad (Deccan), 1358-59/1939-40, II. 14. *Maqāla fī eṣlāḥ šakl ketāb Mānālāwos* ("Treatise on the improvement of a figure in the book of Menelaus"); printed as work no. 12 in his *Rasāʾel*. 15. *Al-Maǰestī al-šāhī* ("The royal Almagest"), presumably dedicated to the Ḵᵛārazmšāh Abu'l-Ḥasan ʿAlī b. Maʾmūn (A.D.

997-1009); see E. S. Kennedy, *A Survey of Islamic Astronomical Tables*, Philadelphia, 1956, p. 135, no. 77; the work is often cited by Abū Naṣr himself (e.g., in works no. 8 and 16) and by Bīrūnī (e.g., *Taḥdīd al-amāken*, ed. P. Bulgakov, Cairo, 1964, p. 153; tr. Ali, Beirut, 1967, pp. 116-17; comm. by E. S. Kennedy, Beirut, 1973, pp. 87-88); an India Office ms. contains an excerpt titled *Esteḵrāǰ boʿd mā bayn al-markazayn* ("Derivation of the distance between the two centers"). 16. *Maqāla fī kašf ʿawār al-Bāṭenīya be mā mawwahū ʿalā ʿāmmatehem fī roʾyat al-ahella* ("Treatise on disclosing the fault of the Bāṭenīya [school] in common in the sighting of lunar crescents"); printed as work no. 6 in his *Rasāʾel*. 17. *Resāla fī korīyat al-samāʾ* ("Epistle on the sphericity of heaven"), a chapter from a longer work; printed as work no. 9 in his *Rasāʾel*. 18. *Resāla fi'l-ǰawāb ʿan baʿż masāʾel al-handasa* ("Epistle on replying to some questions about geometry"); printed as work no. 10 in his *Rasāʾel*. 19. *Resāla fi'l-borhān ʿalā ḥaqīqat al-masʾalat allatī waqaʿat bayn Abī Ḥāmed wa bayn monaǰǰemī al-Rayy fīhā monāzaʿa wa hīa men aʿmāl al-asṭorlāb* ("Epistle on demonstrating the truth about a question that occurred between Abū Ḥāmed [al-Ṣāgānī] and the astrologers of Ray in which there was a quarrel concerning the operations of an astrolabe"); printed as work no. 13 in his *Rasāʾel*. 20. *Resāla fī ṣaṇʿat al-asṭorlāb be'l-ṭarīq al-ṣenāʿī* ("Epistle on the construction of an astrolabe by a craft method"); printed as work no. 15 in his *Rasāʾel*. 21. *Tahḏīb al-taʿālīm* ("Correction of the sciences"); lost, but quoted by Bīrūnī in his *Estīʿāb al-woǰūḥ al-momkena fī ṣaṇʿat al-asṭorlāb*; see E. Wiedemann and J. Frank, "Allgemeine Betrachtungen von al Bīrūnī in einem Work über die Astrolabien," *Sitzungsberichte der Physikalisch-medizinischen Sozietät in Erlangen* 52/53, 1920-21, p. 119; repr. in E. Wiedemann, *Aufsätze zur arabischen Wissenschaftsgeschichte* II, Hildesheim and New York, 1970, p. 538. It is also quoted in Bīrūnī's *Maqālīd ʿelm al-hayʾa* (see Kennedy, *JNES* 30, 1971, pp. 308-14). 22. *Resāla fi'l-asṭorlāb al-saraṭānī al-monaǰǰaḥ* ("Epistle on the winged crab astrolabe"); lost, but mentioned by Ḥāǰǰī Ḵalīfa, *Kašf al-żonūn* (Leipzig) III, p. 5966. 23. A work on trigonometry cited by Bīrūnī in a letter to Seǰzī; see tr. in H. Suter, "Zur Trigonometrie der Araber," *Bibliotheca mathematica*, 3rd series, 10, 1910, pp. 156-60.

A list of additional citations from Abū Naṣr's works is given by Krause, *Sphärik*, pp. 115-16.

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See also: Sezgin, *GAS* V, pp. 338-41; VI, pp. 242-45.

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