



Summary :

In the heyday of the small independent state known as the Empire of Trebizond, between the 13th and the 15th century, the interest in astronomy was increased in Trebizond. The relations of the city with both the East and the West resulted in the development of an astronomical school with strong Persian influences, which influenced the scientific thought in both the Byzantine Empire and the West.

Date

13th-15th century

Geographical Location

Trebizond

1. Historical Background

In the 13th century, [Trebizond](#) became the capital of a small independent state known as the [Empire of Trebizond](#) under the rule of the [Grand Komnenoi](#) dynasty. Despite its relatively small population,¹ the city became a powerful commercial entrepot thanks to its position along the route of caravans connecting the East with Constantinople and the West through Persia of the Il-Khanid Dynasty. This very geographical position also favoured the direct contact with the scientific debate on astronomy, held in Persia in the same period, mainly in the cities of Tabriz, and Maraga (Marāgheh-Marāghah), where new observatories had been founded.²

2. Introduction of Persian Astronomy

In the 13th century, the [Mongol](#) descendants of the dynasty of Genghis Khan established two of the most important observatories in the history of the Islamic astronomy, one in Maraga³ (1259) and another one in Tabriz (late 13th century). According to the Arabic tradition, as the latter had been formed in Baghdad, the astronomers in Persia attempted to re-examine the principles of astronomy, as they had been introduced and established by Claudius [Ptolemy](#) and had been followed by the Byzantines until then. This effort led to a new way of establishing astronomical rules, which was entered in the Zij, the Persian astronomical textbooks, which probably were named after their tables that resembled meshes of tense strings (Zij: string).⁴

The new developments of the Persian astronomers were introduced to Trebizond by [Gregory Chioniades](#), who was actually the founder of the noteworthy astronomical school established in Trebizond. Chioniades visited Tabriz and attended the classes of Shams al-Din al-Bukhari, whom he mentions as Shams Pukharis.⁵ Then the scholar brought back to Trebizond Persian manuscripts and the handwritten notes he had taken in the classes of Bukhari, as well as the tables of his works. These texts were found in the hands of the monk Manuel, who was a teacher of astronomy in Trebizond in the early 14th century.

3. New Characteristics

When Chioniades introduced the texts from the observatory of Tabriz, it was a period when the Byzantine circle of scholars had begun to face some problems with the old Ptolemaic measurements, which resulted in problems with the astronomical calculations and the construction of tables; the problems were only to become bigger in the course of time. The fact that [Nikephoros Gregoras](#), in 1332, suggested the reformation of the existing calendar as a possible solution to the problem, is quite eloquent. The new Persian calculations seemed to actually provide more accurate positions of the planets, the sun and the moon, thus leading to more accurate calendar calculations and prediction of the eclipses.

Manuel started to teach astronomy based on the works of the Persian astronomers Shams Bukhari and Naṣīr al-Dīn al-Tūsī, that is, according to the new calculations carried out by those who belonged to the groups of the observatories of Maraga and Tabriz. Following the Ptolemaic method, this new approach takes into account the conclusions and measurements resulting from observation, thus changing the principles followed until then in calculations, while they introduced new evidence on the movement of planets, as this evidence results from observation.

The classes given by Manuel must have become well-known outside the territory of the small state in Pontus. Manuel wrote astronomical and astrological discourses⁶ (he is also considered to be the author of the '[Almanac of Trebizond for the year 1336](#)'). It should be noted that the new methods of calculation introduced from the Persian-Islamic astronomy are much easier in use than the respective Ptolemaic method. As a result, the positions of the celestial bodies, the syzygies and the eclipses, that is, anything used for the preparation of astrological and astronomical tables as well as for the estimation of the exact date of Easter, could be now calculated more easily. This fact helped both the diffusion of the new methods in Trebizond and their being accepted by a large number of scholars in Constantinople.

[George Chrysokokkes](#) travelled to Trebizond to acquire this knowledge and in 1347 he wrote the work '[Introduction to the Syntaxis of the Persians](#)',



as it is known, or 'Introduction to the Syntaxis of the Persians to His Brother Ioannes Charsianites', as its complete title is. This work introduced and spread the Persian astronomy all over the Byzantine Empire and the scientific circles of Constantinople, from where it was also spread to the West.

4. Evaluation

Astronomy as it was developed in Trebizond resulted from the convergence of the Ptolemaic and the Persian tradition. The new methods of calculation introduced from Persia were more convenient, although they were not always reliable, probably due to errors during their transferral. They renewed the interest in astronomy and promoted further developments by creating a new school in Trebizond, Constantinople and the western Europe.

1. Rosenqvist, Jan Olof, 'Byzantine Trebizond: a Provincial Literary Landscape', *Byzantino-Nordica 2004. Papers presented at the international symposium of Byzantine studies held on 7-11 May 2004 in Tartu, Estonia* [Acta Societatis Morgensternianae 2] (Tartu 2005).
2. Νικολαΐδης, Θ., 'Οι επιστήμες στο Βυζάντιο. Η ιστορική παράδοση του νεώτερου ελληνοισμού', in Γ. Καράς (ed.), *Ιστορία και φιλοσοφία των επιστημών στον ελληνικό χώρο* (Athens 2003), p. 38.
3. Sayili, A., *The Observatory in Islam* (New York 1981), chapter VI, 'The Maraga Observatory'.
4. Νικολαΐδης, Θ., 'Η έκδοση της "Συντάξεως περσικής Αστρονομίας" του Γεωργίου Χρυσοκόκη', in ΚΝΕ/ΕΙΕ, *Οι επιστήμες στον ελληνικό χώρο* (Athens 1997), pp. 135-141, 138.
5. According to Gregory Chioniadēs, 'από φωνής τοίνυν του Σαμς Πουχάρης, ανδρός το γένος Πέρσου πάσαν λογικήν παιδείαν εις άκρου εξησηκμένω, ταύτην περί της επιστήμης της κρείττονος των άλλων [ταύτης] την διδασκαλίαν ακήκοα, ην και εις μνήμην γραφή παραδέδωκα ως αν μη τω χρόνω και αύθις η θαυμασία επιστήμη τοις της λήθης βυθοίς εναποκρυβή και το σπουδασθέν επί τοσούτον ημίν ως τα των πολλών ανόνητον τοις εσομένοις αναφανή', David Pingree, *The Astronomical works of Gregory Choniades*, vol. I, *The Zij al-Alā' ī*, part I, text-trn.-comments, Gieben (Amsterdam 1985), p. 37.
6. About the connection between astronomy and astrology in the Byzantine period, see Γιάννα Κατσιμπούρα, *Πρόσληψη, μετάδοση και λειτουργία των επιστημών στους μεσοβυζαντινούς χρόνους και το Quadrivium του 1008* (Athens 2004).

Bibliography :

	Leurquin R., "La Tribiblos astronomique de Theodore Meliténiote (Vat. gr. 792)", <i>Janus</i> , 72, 1985, 257-282
	Pingree D., "Gregory Chioniadēs and Paleologan Astronomy", <i>Dumbarton Oaks Papers</i> , 18, 1964, 133-160
	Pingree D., <i>The Astronomical Works of Gregory Choniades</i> , 1, Amsterdam 1985
	Pingree D., <i>The Astronomical Works of Gregory Choniades</i> , 2, Amsterdam 1986
	Bryer A.A.M., Winfield D., <i>The Byzantine Monuments and Topography of the Pontos</i> , 1 (With Maps and Plans by R. Anderson and Drawings by J. Winfield), Washington D.C. 1985, Dumbarton Oaks Studies 20
	Νικολαΐδης Θ., "Η έκδοση της 'Συντάξεως περσικής Αστρονομίας' του Γεωργίου Χρυσοκόκη", ΚΝΕ/ΕΙΕ, <i>Οι επιστήμες στον ελληνικό χώρο</i> , Αθήνα 1997, 135-141
	Νικολαΐδης Θ., "Οι επιστήμες στο Βυζάντιο. Η ιστορική παράδοση του νεώτερου ελληνοισμού", Καράς, Γ. (επιμ.), <i>Ιστορία και φιλοσοφία των επιστημών στον ελληνικό χώρο</i> , Αθήνα 2003, 26-44
	<i>Théodore Méli-téniote, Tribilos Astronomique, Livre 1</i> , Régine Leurquin , Corpus des Astronomes Byzantins IV, Amsterdam 1990
	Kunitzsch P., "Das Fixsternverzeichnis in der 'Persischen Syntaxis' des Georgios Chrysokokkes", <i>BZ</i> , 57, 1964, 382-411
	Dachy P., <i>La Syntaxe Perse de Georges Chrysococcès (Chapitres 14, 15, 16, 31, 32, 33, 34, 35, 43, 48)</i> , Faculté de Philosophie & Lettres, Univ. Cathol. de Louvain, Louvain 1968
	Mercier R., <i>An Almanac for Trebizond for the year 1336</i> , Louvain-la-Neuve 1994, Corpus des Astronomes Byzantins VII



	Λάμπρος Σ., "Τραπεζουντιακόν ωροσκόπιον του έτους 1336", <i>Νέος Ελληνομνήμων</i> , 13, 1916, 33-50
	Rosenqvist J.O., "Byzantine Trebizond: a Provincial Literary Landscape", <i>Byzantino-Nordica 2004. Papers presented at the international symposium of Byzantine studies held on 7-11 May 2004 in Tartu, Estonia</i> , Tartu 2005, <i>Acta Societatis Morgenstermianae</i> 2, 29-51
	Sayili A., <i>The Observatory in Islam</i> , New York 1981

Webliography :

	Byzantine Trebizond: a provincial literary landscape http://books.google.gr/books?id=gItVKprpx7sC&pg=PA29&lpg=PA29&dq=Byzantine+Trebizond:+a+Provincial+Literary+Landscape&source=bl&ots=2iyJEe7-Rn&sig=96pfyTARq?WLNvhVg_LSXsrY0jk&hl=el&ei=5e6lTNaoEomaOoKnwKkC&sa=X&oi=book_result&ct=result&resnum=5&ved=0C
	Τραπεζούντα, Ανάπτυξη θετικών επιστημών http://www.fhw.gr/choros/trapezounda/gr/webpages/501.html

Sources

Mercier Raymond, *An Almanac for Trebizond for the year 1336*, Corpus des Astronomes Byzantins VII, Academia, Louvain-la- Neuve 1994.

Dachy Philippe, *La Syntaxe Perse de Georges Chrysococcès (Chapitres 14, 15, 16, 31, 32, 33, 34, 35, 43, 48)*, Mémoire (inédit), Faculté de Philosophie et Lettres, Université Catholique de Louvain 1968.

David Pingree, *The Astronomical works of Gregory Choniades*, vol. I, The Zij al-Alā' ī, part I, text-trn.-comments, Gieben, Amsterdam 1985, party 2, *Tables*, Gieben, Amsterdam 1986, Corpus des Astronomes Byzantins II.

Régine Leurquin (ed.), *Théodore Méliténote, Tribilos Astronomique, Livre 1*, Amsterdam 1990, Corpus des Astronomes Byzantins IV.

Régine Leurquin (ed.), *Théodore Méliténote, Tribilos Astronomique, Livre II*, Amsterdam 1993, Corpus des Astronomes Byzantins V.