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(ΙΣΤΟΡΙΑ)

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GEORGE STEIRIS*

George of Trebizond's contribution in the development of cosmology during the Renaissance

Human interest in cosmology was intense during the late Middle Ages. The cosmologists were engaged with the models of Aristotle and Claudius Ptolemy employing a philosophical approach insofar as they were mostly philosophers and their cosmological views were intrinsic parts of their respective philosophical systems. The development of a new approach started during the 15th century, which led to the innovative models by Copernicus and Bruno being finally introduced. The contribution of Greek scholars, those who fled to Western Europe in order to escape the advancing Ottomans, was great. These scholars brought manuscripts, up the date unknown in the West in their most, providing the western intellectual circles with new, more accurate translations of the already known ancient literature (Bolgar 1954: 283; Bisaha 2004: 72, 117, 124; Γιαννακόπουλος 1965, 1966; Cassirer 1963: 16; Copleston 1993: 210–11; Davies 1998: 121–35; Ζακυθηνός 1954–55: 126–38; Μαμαλάκις 1939: 125–76; Masai 1954: 82–90; Masai 1956; Livanos 2003: 24–41; Setton 1956: 1–76; Στείρης 2004: 111–19).

In this group George of Trebizond was one of the most prominent members. George was born and brought up in Crete (1395) and died

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in Italy (1472/73).[1] His family had migrated to Crete from Trebizond (Monfasni 1976: 5). George left Crete in his early 20s and arrived in Italy. Being proud of his education and culture he had no qualms in defining himself as "*educatus*". His cosmological interests were probably first raised during that period. We have to bear in mind that, during the 14th century, Trebizond, the land of George's origin, enjoyed a high level of cosmological knowledge because of the presence there of the intellectual Georgios Choniades whose interest in Persian astronomy later scientists found worth-referring (Fryde 2000: 344; Magdalino 2002: 45; Pingree 1964: 135–60).

By the 1420's George of Trebizond was already familiar with the thought of Paulus Venetus (1368–1429), a distinguished philosopher, who was one of the most prominent defenders of scholasticism and Aristotelian philosophy. George of Trebizond followed his path (Monfasani 1976: 14–15). Paulus Venetus upheld the traditional view, according to which the earth does not move, while the heavens do. He also believed that the perpetuity of birth and ruin of living beings presupposes incessant astrological influence (Duhem 1987: 277–91; Στείρης 2004: 114–15). By that time George of Trebizond did not show any special interest in cosmology, though there exist indications that he had started to change his views and, accordingly, the course of his studies, probably under the direct influence of Paulus Venetus (Monfasani 1976: 347).[2] Soon George turned to astrological and eschatological concerns. In this context "*studiorum genus mutare cogitamus*", a phrase from one of George's letters, seems not to have implied only a change of profession, as Monfasani suggests (Monfasani 1976: 17).

Around 1440 George's interest in cosmology was probably strengthened, as he started translating Aristotle in Latin, an effort that lasted until 1447 yielding the *Libri Naturales.* For some of these

1 *Comparatio philosophorum Platonis et Aristotelis*, Venice 1523, f. Rir: "at urbis Cretensis ubi natus".

2 Letter to Francesco Bragadin: "et modum vivendi et studiorum genus mutare cogitamus, cuius rei philosophus ille clarissimus poterit esse testis".

books, such as *Περὶ Οὐρανοῦ* and *Περὶ Γενέσεως καὶ Φθορᾶς,* he also composed commentaries, which show a thorough knowledge in the field of cosmology and physics (Monfasani 1976: 55–60). George of Trebizond utilized the works of Averroes, John Filoponus, Themistius, Thomas Aquinas and Aegidius Romanus in his commentaries (Monfasani 1984: 603–17). This was crucial for his intellectual evolution and career. Up to the point he was mainly occupied with rhetoric. It is highly probable that after the death of Paulus Venetus, George continued to deepen his knowledge in cosmology for several years, before his first attempt to write something of his own. In the translation of Aristotle's *Μετεωρολογικὰ* he refers to the low quality of the existing translations, based in their most on Arabic translations, which in turn contained many errors. George was utterly dissatisfied with the translations of William of Moerbecke who, due to his methodology, diminished the value of the original texts. George was unhappy with the fact that only a few scholars were engaged with cosmology. He firmly believed that a boost in science could only come through the careful study of Aristotle's originals (Monfasani 1976: 61).[3]

His estimation was correct and other philosophers would later confirm it (Wallace 1988: 203). I use here the term "philosophers" because the study of physical astronomy for George of Trebizond was part of philosophy and not astronomy (Στείρης 2004: 111–12). The view was dominant during the 15th century. Its roots can be traced to the Commentary of Simplicius to Aristotle's *Φυσικά*, where the essence of the celestial bodies, their creation and destruction, their magnitude and shape, become object of philosophical enquiry. According to this view astronomers had little to do with them (Grant 1994: 36–39).

3 "At Metaurorum quattuor libri perversi sunt magis quam versi, nec e Greco se dab Arabico traducti mendose sunt. At ea pars philosophie que de parvis naturalibus vulgo dicitur adhuc iunioribus intacta iacet".

A few years later (1451) George of Trebizond translated Claudius Ptolemy's *Μεγίστη Μαθηματικὴ Σύνταξις*, or *Almagest*.[4] Ptolemy's work became very popular during the 13th century, when those rejecting the cosmological model of Aristotle adopted the mathematical explanations of Ptolemy. Ptolemy's model, however, was least compatible with Aristotelian views. The model of Ptolemy enjoyed support from natural philosophers and astronomers because it *saved the phenomena*, while theologians rather backed the Aristotelian model because it rested upon the First Principles. It is quite indicative in the same respect that Thomas Aquinas strove to prove the compatibility of Aristotle's model with the experimental and empirical facts, in order to defend the views of the Church (Aquinas 1964–1980, I: 32,1; Crombie 1989: 73–75, 100–2; Lohr 1982: 92–94; Weisheipl 1982: 526).

When George of Trebizond completed the translation of Aristotle's *Libri Naturales,* he turned to the work of Claudius Ptolemy. His choice provokes certain questions. We are well aware of the tension between the champions of these two inconsistent cosmological models. Yet the most interesting thing is George of Trebizond's almost exclusive obsession with the thought of Ptolemy, which lasted until his death. Apart from his translations, George of Trebizond produced lengthy commentaries of Ptolemy's works and felt, time and again, obliged to defend his own texts against critique. Ptolemy became George's second nature. Remarkably, when he undertook the task of translating the *Almagest*, he studied Aristotle's *Προβλήματα*. He never ceased to see in Aristotle the uppermost of philosophical enquiry.

In 1451 George of Trebizond was commissioned by the Pope Nicholas V to translate the *Almagest* in Latin. Nicholas V did not possess the manuscript and asked therefore cardinal Bessarion to find one. As far as we know, Bessarion, at this point, had no intention of assigning the translation of *Almagest* to any of his numerous

4 "ut Μεγίστην Ptolomei Πραγματείαν…de Greco verterem".

colleagues. Bessarion and George of Trebizond had no direct contact. But at the end of the same year, George delivered not only the translation, but also a lengthy *Commentary* on the Almagest, which he almost immediately considered his *opus magnus*. The *Commentary* is composed from two parts. In the first, *Introductio*, he clarifies some basic notions, which are crucial for the overall meaning of the text. The second part contains comments. The structure of introduction seems to have followed the text of Eutocius from Ascalon (480–540), who had written an introduction to the *Almagest* that did not follow the original text (Monfasani 1984: 674).

Yet the main question remains: Why did George of Trebizond decide to compile the *Commentary*? As noted before, George of Trebizond probably started to be interested in cosmology under the influence of Paulus Venetus. Around 1430 he recorded that he studied in Venice Proclus' *Ὑποτύπωσις Ἀστρονομικῶν Ὑποθέσεων* (Monfasani 1984: 685).[5] In this work Proclus attempted to present and analyze the theories of Hipparchus and Claudius Ptolemy, trying to compromise their disagreements. Proclus wasn't sure that his remarks were accurate, because he found extremely difficult to understand the content of these books (Neugebauer 1975).

In the prologue of the second part of the *Commentary*, George of Trebizond, though admitting a measure unfamiliarity with this scientific field, declared that it was easy for him to trace plenty of errors in the previous attempts to translate and comment the *Almagest*. The source of the misunderstanding was Theon of Alexandria (335–405), a mathematician and astronomer who was father to the eminent Hypatia. Theon edited and commented, among others, Euclid's *Elements*. He also commented the *Almagest,* with the assistance of his daughter. Theon wished to beat the preceding commentators of Ptolemy by commenting on the difficult passages of the text that were customarily omitted. Theon, however, was not accurate with

5 Georgius Trapezuntius, Commentaria ad Claudii Ptolomei Magnam Compositionem: "Proculus enim et hoc et alia multa late in compendio et brevi et claro totius Magne Compositionis Ptolomei conscripsit".

the texts. He often erased passages adding his own views, thereby considerably changing the original text. As a result his readers were rather deceived (Pingree 1982: 185–192; Tihon 1976: 167–84; 1985: 106–23; 1985–1991; 1987: 201–218; Toomer 1970–1990: 321–25).

George of Trebizond noticed that Theon's commentary was full of errors which were aptly reproduced in the literary tradition of all those Latin-speaking authors who followed him, whose work, in turn, bore the marks of misunderstanding even of Theon himself! For one thing, Theon was not capable of conceiving the semicircular movements of celestial bodies considering all movements circular. He also misinterpreted the astronomical tables, leading in fallacies Thabit ben Qurra (9th century), Geber (Jabir ibn Aflah, 11–12th centuries) and Leo Iudaeus (Levi Ben Gerson, 1288–1294). Based, among others, on Theon, Thabit had attempted to refute crucial points of Ptolemy's theory (Carmody 1960: 151; Neugebauer 1962: 264–99). Geber had written a harsh critique of *Almagest* in Arabic, which was translated in Latin by Gerard of Cremona in 1175 and later studied by Averroes (Carmody 1956: 163–64; Lorch 1975: 85–107). Finally, Leo Iudaeus had tried to correct Ptolemy's astronomical tables. George of Trebizond accused him of misunderstanding Ptolemy's beliefs leading scientists in mistakes about the size of the celestial bodies and their distances (Goldstein 1974: 1–285; 1985; 1997: 1–30). George decided to restitute Ptolemy's reputation against critique, suggesting that critique should in fact be turned against Theon's work. It is worth noticing how amazed George of Trebizond felt at the fact that all of these previous scholars had carefully studied Theon but not Ptolemy (Monfasani 1984: 323–24, 679).[6]

6 "Semicirculi cordas atque arcus tabulis comprehendit Ptolomeus. Non putavit id sufficere Theon, ac breviter viam dare conatur qua totius circuli arcus et cordas habeamus. Nec vidit tabulas ideo in his conscribi ne aliquid ultra queramus…. Id per indemonstrabilem sectoris figuram accidisse illi contendunt, ut Geber, Tebir, aliique permulti quos in errorem impulit Theon, qui minores etiam proportiones".
"Sed Arabis quidem forsam ignoscet aliquis si propter malam librorum in linguam suam traductionem erase Ptolomeum putaverint, presertim cum

Similar remarks were made by George of Trebizond a few years later. Noticeably, in 1460–1462 he dedicated his *Commentary* to the eminent Venetian citizen Iacobus Antonius Marcellus with a view of getting his help (King 1994: 28). In his prologue George blamed once more the Arabs for misunderstanding Ptolemy. Their errors had been abundantly reproduced while Ptolemy's work remained in the dark instead of being brought to the light and studied. George was confident that his work would correct old mistakes and contribute to the enrichment of cosmological thought. He also admitted that his effort to translate Aristotle's *Libri Naturales* had the same purpose and concluded by saying that all scholars ought to follow Aristotle and Ptolemy if they wanted to avoid error. But he did not resign of his freedom to judge Ptolemy, if he find it necessary (Monfasani 1984: 250).[7]

Feeling inexperienced in the field, George of Trebizond asked Pope Nicholas V to appoint a reviewer of his writings (Monfasani 1984: 683–85).[8] Pope chose Iacobus Cremonensis, a student of Vittorino da Feltre, who had recently finished a translation of some of the works of Archimedes. It was April 1452 when George learned that Iacobus had severely criticized his views. Full of anger, he asked

Theonis, cuiusdam Greci, errata quedam inepte secuti sint. Grecis autem quis ignoscet, qui Theonem laudant Ptolomeoque ipsi preponunt? Et Arabes quidem nihil dicere Theonem intellexerunt. Nam ubicunque Ptolomei demonstrations reprobant, non ipsas certe, sed Theonis commentaries reprobant".

7 "In capiundis vero planetarum locis per instrumenta nulla nos alia instrumenta probamus nisi ea quorum constructionem et usum Ptolomeus exposuit, primum quia sicuti Aristotelem in rimandis nature secretis,…non alio certe pacto in scientia celestium unum sequi admirarique debemus….deinde textus Ptolomaici explanationem aggressi sumus".

8 "Memini, beatissime pater, quando sanctitati tue obtuli libros Ptolemei nuper a me traductos et commentarios meos, sanctitati tue supplicase ut etsi libri non essent adhuc limati sintque commentarii nonum premendi in annum, tamen alicui doctor proboque viro eos antequam ederentur sanctitas tua dignaretur ostendere; addidique sperare me omnes qui aliquid de material, nisi invidi sunt, illa intelligent commentarios apprime laudaturos. Respondit mihi tunc sanctitas tua humanissime, quod sibi innatum est, Cremonensem quondam hic esse virum et probum et mathematicarum doctrinarum studiis ardentem, quocum si de istis communicabis plurimum delectaberis".

Pope to be granted the chance to confront Iacobus in public (Monfasani 1984: 683–85).[9] Pope rejected the demand extorting him to stick to the work of translating only (Monfasani 1976: 106–8). George then openly charged Iacobus with ignorance and inability to grasp and appreciate not only Ptolemy's but also George's own work (Monfasani 1984: 249, 683).[10]

The climate for George changed abruptly in Rome making him suspicious. What had really happened? George's inklings were directed towards Cardinal Bessarion, who was owner of Ptolemy's Greek manuscript. Their relations were never close. When Bessarion borrowed it to Pope Nicholas he advised George of Trebizond to follow Theon's commentary. George disobeyed. His exact motives are not known but having in mind his odd temperament there is room for some conjectures. Did George decided to correct Theon's mistakes, when he realized them? Did he attempted to ridicule Bessarion? The answer is not easy. After George was dismissed from the papal service, Bessarion sent him a letter. He wrote that he expected a more severe punishment for him. It is for this reason that Bessarion had encouraged Theodore Gaza to retranslate Aristotle's *Libri Naturales* with a view to condemning George's work. Bessarion and other critiques focused mainly on the *Commentary* of *Almagest*. There weren't any complaints about the quality of the translation of the *Almagest* (Monfasani 1976: 104–13). The conflict had not only scholarly but also clear personal undertones.

George's adventure in Rome did not avert him of pursuing his goals. In Naples (1456–1457), in king's Alfonse court, he translat-

9 "Recusavi transferendi laborem, nolo dicere dedignatus, tum quia commentaria in Ptolomeum mea mihi erepta et in scelestum hominem Iacobum Cremonensem, nisi id fecissem, cum meo dedecore translate fuissent, ut schedule manu eius scripte ac in marginibus codicis affixe ostendut".

10 "Nam quod pape Nicolai Quinti seductor, Iacobus Cremonensis, ascripsit facile sextam magnitudinem datis quinque inveniri, furore ignorantie, ne amentie dicam, non vidit quibus id in magnitudinibus faciat Ptolomeus".
"sicut summon pontifici Nicolao Iacobus Cremonensis, falsi quicquam aut subiicere auctoritati tue aut detrahere, sed perepetua nobis nostra manebunt et nomen et dignitatem tuam".

ed and commented pseudo-Ptolemy's *Centiloquium*, whose content was primarily astrological. George had in the meantime focused his scope on eschatology and prophecy, a pursuit not incompatible with astrology. He admitted that *Centiloquium* needed much more labor than *Almagest,* but the result paid him back because he offered new knowledge. In the prologue of the *Centiloquium's Commentary*, George claimed that his cosmology was based on Aristotle, while at the same time he gave an account of some of the most basic Aristotelian cosmological views (Monfasani 1984: 99).[11] Until 1456 he had finished the composition of *De Antisciis in quorum Rationem Fata sua rejicit* and *Cur his temporibus astrologum iudicia plerumque fallant,* whose content was mainly astrological (Monfasani 1976: 118–19). George wanted to inform his contemporaries of antiscia's importance, which they ignored, for accurate astrological predictions. As a proof he presented his own horoscope. His sources were mostly Hipparchus and Dorotheos of Sidone. In *Cur his temporibus astrologum iudicia plerumque fallant* he mounted a fierce attack on Leo Iudaeus, who contended that heaven is moving from east to west, presupposing a ninth sphere at the same time (Monfasani 1984: 696).

Taking into account the character of Renaissance philosophy, we can see that George of Trebizond's interest in astrology was anything but eccentric. Platonism and neoplatonism enjoyed a comeback, driving philosophers to believe that they were capable of decoding the secrets of nature and manipulate the natural elements in order to obtain the results they desired. Renaissance cosmology was indeed inseparable from astrology and magic, which were merely the means to accomplish its goals (Copenhaver & Schmitt 1992: 288–89; Πελεγρίνης 1997: 179–90). George tried to prove that misinterpretation of Ptolemy, the assumption about the ninth sphere and the omission of antiscia had rendered astrological calculations unreliable. People were deprived of the ability to grasp the course of future

11 "Aristotelis enim eiusque philosophie fuit alumnus".

events. George's astrological and prophetic thoughts were in effect inseparable (Thorndike 1923–1941: 395).

George's passion with cosmology became once more obvious when he tried to reach Sultan Mehmed II in 1465. He carried with him to Istanbul the translation and the *Commentary* of *Almagest* indenting to offer them to the Sultan, who entertained an interest in this particular field. In the Introduction of the manuscript George insists that his work would be extremely helpful for the Sultan, helping him predict the future. George felt very proud about his work, because he had rendered accessible to wide masses such a complex text (Brotton 2002: 63; Monfasani 1976: 187; 1984: 283).[12] In his effort George had a very important ally: George Amirutzes, a Greek scholar in Istanbul. Noticeably, around the same time (1465), Amirutzes was making his own corrections to Ptolemy's *Geography* under the patronage of the sultan Mehmed II. Having a high interest in Ptolemy the Sultan was displeased realizing that the available text was full of mistakes and omissions (Baninger 1978: 248; Brotton 2000: 45; Bryer 1998: 791).

After the failure in Istanbul and with the clear intend to get wide recognition for his work on *Almagest*, George of Trebizond attempted to approach the Hungarian court (1467). King Matthias Corvinus was famous for his interest in astronomy and astrology (Thorndike 1923–1941: 420). George, however, failed again. The Hungarians were immersed in the work of Johann Muller Regiomontanus (1436–1476), who was already in Hungary as official royal guest. Regiomontanus was George's old enemy. Why? Bessarion was mindful of George's sour behaviour and wanted to see him punished for this. He wanted to defame George's translation and *Commentary* in

12 «Ἐπειδὴ γὰρ αὐτῷ φίλῳ ὄντι συνῆλθον εἰς λόγους, ἦσαν δὲ οἱ λόγοι καὶ περὶ ἄλλων πολλῶν, μάλιστα δὲ περὶ τῆς τοῦ Πτολεμαίου Μεγάλης Συντάξεως, πρὸς ὃ δὴ μάθημα πάντα τἄλλα ὡς εἰς τὸ ἀκρότατον ἀποβλέπει τέλος. Διά τε τὸ λεπτὸν καὶ δυσχερὲς καὶ βέβαιον ἠξίωσέ με αὐτὸς γράψαι σου τῇ βασιλείᾳ περὶ πολλαπλασιασμῶν καὶ μερισμῶν, οὐχ ὅλων ἀλλὰ μορίων, καὶ περὶ ἄλλων εἰς τὴν σύνταξιν εἰσαγωγικῶν, ἐξ ὧν ὁμοῦ καὶ τὸ δυσχερὲς καὶ οἱονεὶ ἀπρόσιτον τοῦ ἀκροτάτου τῶν μαθημάτων ἀναφανήσεται. Τὴν πρὸς ἐκεῖνον οὖν μου ὑπόσχεσιν πληρῶν, Ἕλληνι χρῆσθαι ἀναγκάζομαι λόγῳ».

the *Almagest*. Looking around for the right person for this undertaking took him almost ten years – something that proves George's high expertise and value on the field. In 1460 Bessarion traveled at Vienna, where he met Peurbach, one of the most famous astronomers of his age. He proposed him to undertake the composition of an *Epitome* of the *Almagest,* which, according to their ambition, would replace George's work. Peurbach accepted the task with pleasure (Aiton 1987: 4–43; Swerdlow 2004: 1–40; Shank 2003: 182–83).

Peurbach intended to produce a comprehensible text that would mend Theon's reputation, which had suffered a fatal blow from George's work. But Peurbach died next year (1461). His work was incomplete and, according to his wish, the task was taken up by his beloved pupil Johann Muller Regiomontanus. Regiomontanus had a serious disadvantage. He was not fluent in Greek, let alone the fact that the language Ptolemy used was difficult in any case (Belyi 1977: 50–60; Shank 1996: 129). Though of little experience, he had worked with Peurbach in the correction of astronomical tables and planet positions and stayed close to Bessarion from 1461 to 1465 (Grossing 1980: 223–41; Mett 1989).

Yet despite the deficiency, Regiomontanus not only continued the work on the *Epitome*, but he also started writing a brand new work: *Defensio Theonis contra Trapezuntium*. The title needs no elaboration; Bessarion had eventually found his man. In order to accomplish his goal Regiomontanus did borrow Theon's *Commentary* from Bessarion's library. He probably consulted Iacobus Cremonensis *Commentary* as well. In any event, Peurbach and Regiomontanus were prejudiced. After their arrival on Italy they had refused to use George of Trebizond's translation and *Commentary*, insisting on the old Latin translation instead which had proved erroneous. Regiomontanus' poor knowledge of Greek notwithstanding, it is not difficult to see how they missed the point. Zinner believed that Regiomontanus finally read George's works just before he left to Hungary, around 1465 (Zinner 1968: 76–137). Unfortunately, the *Epitome* was published at 1462. The *Epitome* is not just a summary of Ptolemy's work.

It contains Regiomontanus' comments and opinion. He also tried to correct Ptolemy's theory about the Moon, inspiring a few years later young Copernicus (Shank 1998: 157–66; Shank 2002: 179–207). George of Trebizond could not hide his contempt speaking ironically for those who promised to sharpen scientific knowledge with the aid of new tools. We know that in 1462 Regiomontanus demonstrated his astrolabes before Bessarion did (King 1994: 165–206).

George of Trebizond's response came a few years later, when he tried to gain support, as has already been mentioned, from the Hungarian court. Regiomontanus reacted by speeding up the completion of his *Defensio Theonis contra Trapezuntium*, a defense of Theon of Alexandria, Leo Iudaeus and Iacobus Cremonensis. The work was still incomplete as Regomiontanus left Hungary for Nurberg (1471) but he finally died in Rome on 6 July 1476. According to rumors, he died from intoxication by George's sons in a desperate attempt to defend their father's reputation. Just before his sudden death, Regiomontanus had declared that his plan was to publish his *Defensio Theonis contra Trapezuntium*, in the hope of exposing George's erroneous beliefs to a larger audience. He was known to have referred George of Trebizond in scornful words. George's sons were very sensitive about their father's work and repeatedly attempted to restore his fame, especially in the eyes of the Pope Sixtus V. Most historians, however, suggest that Regiomontanus' death was probably due to the plague (Heilbron 2001: 7; Jovius 1577; Schmeidler 1972: 533). In the meantime, Bessarion wary of the delay of Regiomontanus assigned the attack on George at the scholar Nicollo Perotti (1429–1480), who wrote the *Refutatio Deliramentorum Georgii Trapezuntii* (1471). However, neither this effort was adequate for Bessarion's expectations.

George of Trebizond's works were finally bound to enjoy high esteem and popularity in the 16th century, when Tycho Brahe fell astonished with the *Commentary* and attempted, albeit unsuccessfully, to put it in print. Quite indicatively, Brahe called it "*tanti viri excellens labor*" (Monfasani 1976: 232; 1984: 672; Rose 1975: ch.2-4).

His labors yielded what was perhaps the most accurate and complete translation for the time to come (Eisenstein 1979: 464). His dispute with Bessarion and Regiomontanus sparked scholarly interest in cosmology paving the way for the revolution of Copernicus. Without George of Trebizond and Regiomontanus, Ptolemy's authentic thought would have probably remained in the darkness, making astronomy and philosophy of nature to follow a totally different course (Shank 2002: 184–85; Swerdlow 1999: 11).

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