5 Rethinking the Historiography of Western Science in Light of Bessarion's Heritage

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The coexistence of Arabo-Persian and Hellenistic astronomy within the Byzantine scientific legacy warrants a nuanced re-evaluation of the narrative surrounding the development of science during the Renaissance. Traditionally, the flourish of science in the Renaissance has been attributed to the 'rebirth' of Greek science, brought into Italy by Byzantine expatriates fleeing the fall of Constantinople. This myth was later fuelled by purist approaches to mathematics, notably by the so-called Commandino School.[1] However, this narrative oversimplifies the complex interplay of cultural influences that shaped scientific thought during this period. The notion of 'purity', i.e. Greek science as a pristine and unadulterated body of knowledge, fails to account for the dynamic nature of scientific inquiry, which is inherently shaped by the historical context in which it unfolds. Science, as a human endeavour, is subject to the vicissitudes of history, undergoing modifications and adaptations as it encounters new cultural, social, and intellectual currents. A closer examination of primary sources within Bessarion's collection has revealed a more complex picture of the Byzantine scientific heritage. Rather than a monolithic tradition derived solely from Greek sources, Byzantine scholars actively assimilated and integrated Arabo-Persian and Hebrew scientific works into their intellectual framework. This synthesis of diverse cultural influences enriched the Byzantine scientific tradition, resulting in a hybrid body of knowledge that defies simplistic categorisation.

1 Rose, *The Italian Renaissance of Mathematics*; Omodeo, Renn, *Science in Court Society*, 7-11.

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In light of these findings, it is imperative to reassess our understanding of the historiography of science in Renaissance Europe. Rather than viewing Greek science as the sole progenitor of scientific progress, we must recognise the contributions of other cultural traditions incorporated into the intellectual milieu of the time. This reframing of the narrative invites a more inclusive and comprehensive approach to the study of scientific thought during the Renaissance, one that acknowledges the multiplicity of influences that shaped the development of science in Europe.

1 Bessarion's Collection between Purity and Hybridisation

To contrast a narrative based on the notion of 'purity' I will use the term 'hybrid' and its relatives. For this idea I am benefitting from my previous study[2] and some influential achievements in the field of intellectual history, especially the notion of hybridisation in knowledge as "an admixture of information drawn from diverse sources drawn together to make something new".[3]

Hybridity characterised Bessarion's years of education and apprenticeship. The astronomical scene Bessarion experienced both in Constantinople and Mistra mixed the *Almagest* with *zijes* and Hebrew astronomical tables, and this was not perceived as 'suspicious' or 'incorrect' in the 1420s and 1430s. This hybridity in the approach to astronomy accompanied Bessarion for the rest of his life. The notion of purism is present in Bessarion's political discourse, a tool he used to contrast the Ottomans in his homeland, but his views on science remained unaffected by that. In fact, hybridity is attested to in the renowned Paduan lecture by Regiomontanus, which drew heavily upon Bessarion's manuscripts.

Examination of Bessarion's manuscripts collection reveals that he himself was taught Arabo-Persian astronomical tables and that he took care to preserve those copies. This astronomical education was common in the second half of the fifteenth century in Byzantine scholarly circles. Therefore, the astronomical culture of late Byzantium can well be described as the result of a process of hybridisation, and this is what was transmitted into Europe by the Byzantines.

2 Deconstructing Purism and Historiographical Biases

Upon examination of Bessarion's heritage, the narrative of the rebirth of science proves not to be consistent. Hence, the question of transmission of science through the Middle Ages to the Renaissance opens up the problem about the decline of science due to the rise of Christianity. This decline thesis usually goes as follows. Science was created by the ancient Greek philosophers around the sixth century BCE by means of freeing philosophical inquiry into nature from religious and mythological elements in order to find only rational explanations for natural phenomena. Science then died

2 Bardi, "Hybrid knowledge and the historiography of science".

3 Winterbottom, *Hybrid Knowledge and the Early East India Company*, 2. I am also indebted to Burke, *Cultural Hybridity*; Burke, *Hybrid Renaissance*; Stockhammer (ed.), *Conceptualizing Cultural Hybridization*; Stross, "The Hybrid Metaphor"; Shapin, *A Social History of Truth*; Shapin, *Never Pure*.

during the Middle Ages due to the rise of Christianity and Islam, but eventually the humanists rediscovered Greek science and thanks to them it experienced a rebirth.

This narrative has often been used till recently in the historiography of science,[4] but it was never unanimously accepted.[5] Criticism of such a historiographical approach has pointed out that this narrative reflects a projection of a progressivist view of science alongside modern categories applied to the history of ancient philosophy. First, ancient Greek philosophers did not avoid employing their myths and gods in their philosophical inquiries. Second, the transmission of science from Antiquity to the Renaissance as a direct link proves to be problematic, for there were scholars who cultivated and worked on Greek science in a timespan lasting more than a thousand years after Antiquity and before the so-called Renaissance.

The case of Bessarion teaches that what can be considered 'Greek science' is a hybrid product mediated by Christian scholars (especially the Byzantines) through their re-reading of Greek sources and comparing them with other traditions. Therefore, Bessarion's scientific interests, his patronage of arts and sciences in Italy, and his manuscripts collection constitute an important gateway to deal with the historiographical questions that the aforementioned narrative of the rebirth of Greek science has brought to the fore.

Some historiographical accounts are in favour of a continuity, instead of a decline, between the Greek knowledge cultivated by Byzantines and the humanists in Italy, and thus they reject a decline of science during the Middle Ages. The point shared by continuity theses and decline theses is consideration of Thales of Miletus (d. 546 BCE) as the founding father of science because of his struggle to search for rational explanations of natural phenomena and unitary principles of nature and the world.[6] Examination of Bessarion's manuscripts certainly points towards a continuity.

It is also useful to consider the material aspects in the transmission and transformation of science. Science was transmitted through the transcription of papyri and manuscripts, which – unlike the photocopies and digitisation tools used in our era – is extremely energy-consuming and characterised by several kinds of mistakes and modification processes. On this account, a direct link between ancient Greeks and Renaissance scholars must remove (intentionally) the so-called Middle Ages (both in the Western Latin world and Byzantium) from historiographical consideration.

Research in historical epistemology has compellingly demonstrated that science is inherently intertwined with ideologies and political agendas, challenging the notion of scientific neutrality and objectivity. The notion that scientific inquiry occurs in a vacuum, divorced from social, cultural, and political influences, is debunked by historical analysis. Instead, historical epistemology reveals that scientific knowledge production is shaped by broader socio-political contexts, with scientists often operating within frameworks influenced by prevailing ideologies and agendas. This recognition underscores the importance of critically examining the historical and societal contexts in which scientific knowledge is produced and

4 Taton, *Ancient and Medieval Science*, 180-242; Popper, "The Myth of the Framework" 40-3; Russo, *The Forgotten Revolution*; Deming, *Science and Technology in World History*, 2: 26-31.

5 Among others, Ben-Zaken, *Reading Ḥayy Ibn-Yaqẓān*; Poskett, *Horizons*; Harrison, *The Territories of Science and Religion*, 22-5.

6 For instance, cf. Roller, "Aristotle, Plato, and Gemisthos".

disseminated, acknowledging the inherent biases and power dynamics that can influence scientific discourse and decision-making processes.[7] Similarly, studies on the reception of Arabic science in Renaissance Europe have shown that the notion of purity of Greek science is a consequence of a process of constructivism of the Western tradition as essentially Greek, Roman, and Christian.[8] Indeed, the notion of purity of Greek knowledge is anything but a modern construction. It was already emphasised by those Byzantine scholars finding refuge in Italy. They used, albeit unsuccessfully, the prestige of Greek knowledge as a diplomatic tool to persuade the Latins to help them reconquer Byzantium. This propaganda was likely what generated a common perception that Greek science, and Greek heritage more in general, was in peril due to the Muslim enemies.

To sum up, there are three notions of purism involved in discourses about the reception of Greek science in Renaissance Europe:

- The purity underlying the rebirth after the decline due to Christianity.
- The purity of Greek science as opposed to an enemy (the Ottomans) of the Byzantine expatriates in Italy.
- The purity of Greek science as opposed to Arabic knowledge in the Renaissance.

After examining Bessarion's manuscripts, one can reply with the following working questions.

- If Christianity neglected science, where was it kept and how could it be preserved as pure as it was when cultivated by the ancient Greeks?
- To what extent is the notion of purism detected in Bessarion's manuscripts collection and his patronage of arts and sciences?
- Did Bessarion adhere to anti-Arabic humanist programmes?

The next section addresses these points.

3 Transmission and Hybridisation

It is obviously false that Christianity was not interested in science during the Middle Ages or even worked to suppress it due to lack of accordance with its own agenda. Upon examination of Bessarion's manuscripts and efforts to preserve sciences, as well as the claims about science by Regiomontanus (and also many other collections of European libraries), one finds thousands of medieval manuscripts with scientific content. Moreover, the labour of transcribing scientific materials was undertaken chiefly by monks who were, if not prestigious churchmen, at least Christian scholars. Before the age of writing machines and computers, transcription of texts was an

7 Omodeo, *Political Epistemology*.

8 Hasse, *Success and Suppression*, 314.

extremely energy-consuming task, similar to a heavy physically demanding job nowadays. What led the scribes and monks to undertake such an effort if they were not interested in science?

Although Western Christianity knew Greek science chiefly due to translations into Latin mediated through Arabic, the Eastern Roman Empire, cradle of Orthodox Christianity, had Greek (Attic Greek) as an official language of the ruling class, and kept cultivating and transcribing scientific manuscripts in Greek.

Being extremely demanding, the transcription of manuscripts was a process of selection of content and assignment of labour capital. In the Byzantine Empire this occurred in monasteries, led by churchmen, and in environments related to the imperial administration.[9] It is true that Byzantium selected and shaped the canon of Greek classics in all genres, but, most importantly, it was the most direct point of contact with ancient Greek thought, thus essential to an understanding of the transmission of Greek science.

The study of Bessarion's astronomical manuscripts suggests that the canonical Greek works of astronomy, first of all Ptolemy, were combined with Arabo-Persian and Hebrew sources. The process of hybridisation attested in the manuscripts was undertaken to have easier computations and to pursue astrological goals, such as casting horoscopes. Even before the age of Copernicus, scholars knew that Ptolemy needed to be reformed. Some sought a solution by comparing Ptolemaic sources with other traditions, and others tried to re-translate the *Almagest* from Greek into Latin (Bessarion's task assigned to Regiomontanus) to get rid of the errors that had accumulated during the textual transmission.

No notion of purism is detectable in Bessarion's activity of preserving scientific manuscripts. He collected sources from Islamic authors and well acknowledged advancements in sciences by Arabic mathematicians in Islamicate territories. The notion of purism pertains to the political domain, when he engaged in a diplomatic fight against the Ottomans, depicting them as barbarians, because he was promoting a union between the two Churches. In spite of being an opponent of the Ottoman conquest, Bessarion was not part of a humanist anti-Arabic agenda. He never worked to suppress the Arabo-Persian materials he had collected in his manuscripts, and he never regretted having been educated on them. In other words, the transmission of astronomical knowledge in Bessarion's manuscripts shows a process of hybridisation begun in Byzantium and continued in Italy by scholars like Regiomontanus. Bessarion never worked against this.

In our exploration of the influence of Bessarion's manuscripts on the trajectory of science in Italy and Europe, we find ourselves confronted with a multitude of complexities and nuances that characterise the intricate tapestry of intellectual exchange during the medieval era. While our inquiry has shed light on the potential significance of Bessarion's manuscripts in shaping scientific thought, we must acknowledge the challenges inherent in tracing their precise impact. Navigating the labyrinth of manuscripts and printed texts has revealed both the richness of the historical record and the gaps that compel historians to draw upon imaginative reconstruction. Indeed, the very absence of certain historical artefacts or narratives

9 Manolova, Pérez-Martin, "Science Teaching and Learning Methods in Byzantium".

serves as a catalyst for deeper inquiry, prompting us to uncover overlooked dimensions of the past.

The keen interest exhibited by non-Byzantine scholars in Arabo-Persian sources underscores the significance of this intellectual exchange in shaping European scientific discourse. As we reflect on the intersections of Byzantine and other European intellectual traditions, our inquiry prompts us to reconsider conventional narratives and embrace a more nuanced understanding of the evolution of scientific thought. While the precise extent of the influence of Bessarion's manuscripts may remain elusive, our exploration has enriched our understanding of the complex interplay between culture, politics, and science in medieval Europe. By situating Bessarion's manuscripts within the broader context of global intellectual networks, we have gained deeper insights into the diverse influences that shaped the scientific landscape of the time.

4 Conclusions: A Global Microhistory

An exploration of Bessarion's life and intellectual formation has been the starting point to approach the study of his astronomical manuscripts. The cultural ambience of Trebizond contained *in nuce* some of the elements that culminated in Bessarion's astronomical interests and in his intellectual curiosity for philosophy and science at large (chapter 1). Trebizond endowed him with a cultural heritage which had happily integrated oriental influences with Byzantine and Western aspects. Later, Bessarion encountered the post-hesychasm phase in Constantinople, in which hesychasts hegemonised the institutions and education. Bessarion started his apprenticeship in astronomy there but then moved to Mistra, which, for many circumstances, was the opposite of Constantinople, with its unique unorthodox figures like Georgios Gemistos Plethon. Thanks to him, Bessarion encountered in Mistra notions of necessity, causalism and determinism, aimed at a reform of society through a political model inspired by Platonic philosophy, Zoroaster, and the Chaldean Oracles, in which astrology was the most important mathematical science. At the opposite pole, Constantinople was the fortress of conservativism and orthodoxy, to the point of violence and intolerance. Between these two poles, the approach to astronomy was decisive and essential for Bessarion's future career. In fact, the intellectual activity in Mistra, contrary to the radical hesychast Constantinople, did not view inquiry into the domains of natural philosophy with suspicion. This aspect was the key for Bessarion's future efforts to foster astronomical studies.

Therefore, the influential background of the three cities in which Bessarion lived before expatriating was important for his entire life. Trebizond, Constantinople and Mistra (and their peculiarities) were the three key factors of Bessarion's education in light of their cultural backgrounds: Trebizond for astronomical studies and cross-cultural influences, Constantinople because of the controversies about hesychasm and Palamas, and Mistra for Plethon and his desire to reform astronomical studies and society at large. All of this generated tension between Greek vs non-Greek astronomy and religious knowledge vs secular knowledge, which was absorbed by the young Bessarion and resolved in his comparative approach to philosophy and sciences. This allowed him to easily engage in controversies over several issues and become a patron of arts and sciences.

Two main periods shaped Bessarion's life. The years in the area of the late Byzantine Empire, as a Christian Orthodox, and the expatriation to Italy after 1438 and his conversion to Catholicism: the former shaped his hybrid approach to astronomical studies thanks to Chortasmenos and Plethon (chapter 2), the latter was the phase in which he could create propaganda by stressing the Greekness of the Byzantines and their culture, while the scientific heritage they were bringing to the rest of Europe was hybrid (chapter 4). The hybridity in Byzantine science is reflected in Regiomontanus's lecture (chapter 3).

Bessarion was trying to save the sovereignty of Byzantium by an alliance with the Italians. The *topos* of Greek purity as something imperilled by the Ottoman threat, used only at the political level, became a bias which has influenced later historiography (chapter 5). All these facets form a complex scenario in which the evidence of the coexistence of Greek and Arabo-Persian astronomy is at odds with the notion of purism of Greek science. On this account, some historiographical myths linked to notions of purism in Greek science could be deconstructed and replaced by a notion of hybridity, which permeated the scientific culture Bessarion had assimilated and was promoted by him and through his protégé Regiomontanus.

If the Renaissance might still be seen as the rebirth of Greek science after the decline of the Middle Ages or the neglect by Christianity, the rebirth of Greek astronomy is undoubtedly characterised by the re-reading and comparison of astronomical sources in order to obtain better results (think of Copernicus), in other words, all the attitudes Bessarion and Regiomontanus employed in their astronomical activity. Regiomontanus, notably one of the major inspirations of Copernicus, owes much to Bessarion and his manuscripts. Ultimately, unless we wish to remove the hybrid astronomical culture that Bessarion brought into Latin Europe from historiographical discourse, Regiomontanus can well be seen as one of the major promoters of the spirit of that tradition.

What significance does the existence of a global microhistory hold? Despite Bessarion's political views proving unsuccessful and his status as an émigré hindering full integration into the Church of Rome, he remains an important figure in the Italian landscape, where he engaged in political and scientific patronage. Nonetheless, his astronomical education embodies a comparative spirit mixing several traditions, and his support for astronomy reflects this cultural hybridity. This is underscored by the global impact of the sources he bestowed upon Venice. It is worth noting that future astronomers heavily relied on works such as the *Almagest* and the *Persian Tables*: needless to say, Copernicus emulated the *Almagest*, while Boulliau and others utilised the data provided by the *Persian Tables*.