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# Armenian Astrolabes between Appropriation and Agency: Epistemic Recalibration and Material Production

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**Abstract**

Despite their presence in museum collections and specialist footnotes, astrolabes bearing Armenian inscriptions or commissioned by Armenian patrons have never been the subject of a systematic, interdisciplinary study. This article addresses that gap through the first integrated analysis of six instruments—held in Oxford, Fez, Doha, Yerevan, and Byurakan—dating from the late ninth to the early eighteenth century. Drawing on object biography, material epistemology, and visual semiotics, the study examines epigraphic layers, rete typologies, and patronage contexts as primary evidence. The instruments are shown to exist on a spectrum: from Islamic devices reinscribed with Armenian alphanumerical notation and vernacular star names to European-type astrolabes produced entirely in Armenian script. In each case, the physical artifact records a deliberate act of adaptation or autonomous commissioning, embedded within trans-Eurasian mercantile and courtly networks. The article thereby reconceptualises these objects not as peripheral curiosities but as material witnesses to a sustained, cross-cultural Armenian practice of astronomical knowledge production and proposes a new, object-centered agenda for their further interdisciplinary study.

***Keywords:*** *astrolabe, Armenian astrolabe, Ghukas Vanandetsi, Amirdovlat Amasiatsi, Armenian diaspora*

## 1. The Template

The astrolabe (Greek astrolabos, "star-taker") designates a family of analog computational technologies extending from the third century BCE to the present. Earliest forms—large armillary spheres exemplified by Claudius Ptolemy's second-century instrument—evolved into compact devices for astronomical computation and navigation: the planispheric astrolabe; the universal astrolabe (11th-century Toledo, overcoming latitude-sensitivity); the Rojas universal astrolabe (16th-century projection of all celestial spheres onto one plate); the linear astrolabe (rod-based altitude measurement); the spherical astrolabe; and the mariner's astrolabe. The etymology astron (star) and lambanein (to take, calculate) encodes the acquisition and computation of celestial data. Whether suspended in silver for princely collectors or fashioned in wood for a mosque astronomer to determine Mecca's direction and prayer hours, the astrolabe materialized the Ptolemaic cosmos through stereographic projection (Vafea, 2019).

Two historiographical threads must be disentangled: the theoretical development of stereographic projection and its translation into a functional portable object. The mathematical principle of projecting the celestial sphere onto a plane was known to Hellenistic mathematicians such as Hipparchus of Nicaea (2nd century BCE), who may have used it for an anaphoric clock, though this was not a true planispheric astrolabe. Other sources attribute the invention to Apollonius of Perga (3rd century BCE), while the earliest unequivocal treatise is Theon of Alexandria's (4th century CE). Thus, theoretical foundations were laid in Hellenistic Greece, but the fully realized device emerged no later than the 1st century CE, with Theon providing the first unambiguous textual evidence. Physical refinement into a precision instrument with engraved tympans for specific latitudes, an openwork rete depicting fixed stars, and a rotating alidade occurred primarily within the Abbasid caliphate from the 8th century onward. The earliest surviving astrolabe (927-928 CE) is Islamic, testifying to this environment. This tradition inspired Geoffrey Chaucer's 14th-century Treatise on the Astrolabe, one of the earliest English technical works.

The standard planispheric astrolabe comprised a cast or hammered metal frame (brass, iron, copper alloy, or, for ceremonial examples, silver or gold) and five components: the mater (hollowed disk with

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graduated limb); replaceable tympans (plates with stereographic coordinates for specific latitudes); the rete ("net"), an openwork skeletal rotating plate tipped with pointers indicating the brightest stars; the alidade (sighting bar on the reverse face to measure altitude); and the rule for transferring readings. Operational logic reduces to three steps: measure the altitude of the sun or star; align the rete for date and time to read celestial configurations on the tympan; and, through this two-dimensional simulation, solve problems of time, position, and spherical astronomy algorithmically.

Beyond computation, the astrolabe functioned as a symbolic vector of knowledge and authority. Possession or commission signified institutional standing, scientific mastery, and often political legitimacy – authority encoded in brass. Those unable to read the instrument faced epistemic exclusion, so the astrolabe policed the boundaries of science. This dual symbolic function is inscribed on surviving artifacts, which often carry geometric tracery, calligraphic dedications, and multiple engraved names of makers, commissioners, patrons, and later owners. The astrolabe was simultaneously a calculative device, a luxury object, and a palimpsest of social relationships.

Peak production coincided with intensified long-distance trade when technical knowledge traveled alongside commercial goods. On the Silk Road, astrolabes served merchants in determining latitude. In the early modern period, surviving astrolabes multiplied considerably due to commercial expansion, European overseas exploration, and Enlightenment currents valorizing empirical observation. Planispheric astrolabes were not the exclusive product of a single cultural lineage: stereographic projection was independently adapted across regions, from Byzantine ivory to Mughal gilt brass, from Safavid silver to Renaissance paper instruments. Regional variations rendered the astrolabe a genuinely hybrid, multi-national artifact (Borrelli, 2008).

From the standpoint of material epistemology, the astrolabe is a biosocial artifact: its physical form encodes a scientific worldview, while its social life – production, exchange, contested reading, accumulation – reveals how societies construct and deploy understandings of the heavens. This analytical framework is essential for examining instruments connected to Armenian patronage, ownership, or modification.

## 2. Methodology

This study applies an art-historical and material culture framework to examine the astrolabe as a composite artifact whose visual form, epigraphic layering, patronage contexts, and cross-cultural circulation reveal the epistemic practices of the Armenian diaspora.

The theoretical basis draws from three interconnected approaches: object biography (Kopytoff, 1986), which traces an artifact's trajectory through different regimes of value; material epistemology (Malafouris, 2013), which treats the instrument as an active mediator in knowledge production; and visual semiotics (Panofsky, 1939), which interprets form and ornament as carriers of cultural meaning. These are operationalized through four analytical variables:

1) Visual form and technical architecture – analysis of rete design, tympan latitudes, and scale calibration as visual systems.

2) Epigraphic layering as epistemic intervention – analysis of palimpsest inscriptions, interpreted as visual claims to vernacular operability within Armenian cognitive frameworks.

3) Patronage and socio-historical context – identification of commissioners, makers, and owners within Armenian mercantile-scholarly networks (New Julfa, Ottoman court, Amsterdam). This variable maps the object onto structures of patronage, prestige, and institutional affiliation.

4) Iconographic borrowing and cross-cultural circulation – identification of visual motifs that index non-native scientific traditions, reconstructing the artifact's social life within trans-Eurasian mercantile and diplomatic networks.

## 3. Literature Review

A systematic review of the existing literature reveals a pronounced scholarly gap: Armenian astrolabes are acknowledged in passing by historians of Islamic instrumentation but have never received a dedicated, systematic study. The earliest and still foundational reference is Tumanyan's (1964) Hay astğagitutyan patmutyun, published in Yerevan. This work first provided photographic documentation and descriptive notes for several astrolabes bearing Armenian inscriptions or attributed to Armenian makers. However, it remains a preliminary survey rather than a definitive reference.


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Tumanian's contributions have been consistently cited by preeminent Western historians of Islamic scientific instruments, most notably King (1996a) in his Catalogue of Medieval Astronomical Instruments and in subsequent collaborative publications (King  Charette, 2024). On pages 147–148 of the latter, King explicitly states that three Armenian astrolabes are known but have never been properly described in Western scholarship. Similarly, the History of Science Museum in Oxford houses at least two items with Armenian connections, yet the museum's published online catalogue offers only brief technical descriptions without socio-historical contextualization. Thus, despite being recognized as extant objects, these instruments have remained on the periphery of scholarly attention.

A notable exception to this general neglect is Comes's (2005) article "Armenian Alphanumerical Notation on a 14th Century Iranian Astrolabe Found in Fez". Comes identifies that the second set of numerals inscribed on the astrolabe made by Muḥammad ibn Ja'far al-Kirmānī in 1393/94 CE are not Rūmī (Greek-derived) numerals but minuscule Armenian alphanumerical signs. Drawing on the fact that the Armenian alphabet assigned numerical values to its first thirty-six letters, Comes argues that this overwriting was most probably executed in New Julfa (Isfahan). She acknowledges David King for first bringing the astrolabe's photographs to her attention, thereby demonstrating how an Islamic instrument could be physically and linguistically repurposed within an Armenian cognitive framework. Despite its significance, Comes's article remains an isolated contribution; no subsequent study has expanded upon her methodology or applied it to other instruments.

Beyond Comes's article, no dedicated academic study exists. Major reference works – such as King's (2018) The Astrolabe: What It Is & What It Is Not– make no mention of Armenian patronage or ownership. Auction catalogues (Hôtel Drouot, 1997) list Armenian astrolabes without scholarly commentary. The comprehensive Répertoire des facteurs d'astrolabes et de leurs oeuvres en terre d'Islam (Brieux et al., 2021) does include an entry for Ghukas Vanandetsi, but only as a brief inventory entry with no attempt at stylistic or contextual analysis. Situated within a broader review of Armenian archaeoastronomy, the article by Areg Mickaelian and Sona Farmanyan, "Armenian Archaeoastronomy and Astronomy in Culture", provides a reference to the material evidence of medieval Armenian instrumentation. While the article's primary focus is on ancient astronomical practices, celestial iconography, and calendrical systems, it also explicitly acknowledges the existence of medieval scientific instruments, citing the foundational surveys by Tumanian (1958, 1985). In this context, Mickaelian and Farmanyan (2023) draw specific attention to the astrolabe "built by Ghukas Vanandetsi (17th–18th centuries), describing it as a particularly interesting "astronomical-geodetical device." Nonetheless, it remains debatable whether the device was constructed by Vanandetsi himself or for Vanandetsi.

Recent exhibitions, including "In the Parallels of Ancient World: Armenia-Netherlands" (History Museum of Armenia, Yerevan, 2 June – 30 August 2025), displayed Ghukas Vanandetsi's astrolabe as a cross-cultural artifact but did not publish a critical catalogue. Parallel contextual research – such as Galichian's (2025) Cosmographic and Geographic Heritage in the Matenadaran– provides invaluable background on Armenian cartographic and astronomical manuscripts but does not engage directly with the instruments themselves[1].

Outside formal scholarship, Armenian astrolabes have gained visibility on social media platforms and heritage websites. For instance, the PeopleOfAr cultural website posted an image of Ghukas Vanandetsi's astrolabe with the inaccurate description "Armenian Astrolabe 15th century" (PeopleOfAr, 2012). Some online sources also claim that the same astrolabe belonged to Coja Petrus Uscan (also known as Woskan or Voskan, 1680/81–1751), a prominent Armenian merchant and philanthropist in Madras. At present, no documentary evidence supports this attribution (Balayan, 2025)[2].

[1] It elucidates a foundational manuscript context for Armenian astrolabe studies. The research highlights previously unknown scientific treatises, including Manuscript MM-8973, a vellum codex containing astrological and astronomical subjects, multiplication tables, andarchitectural drawings. Folio 001b presents the Zodiac and planets in an unconventional layout, with vertical lines marking the zodiacal months. Folio 013b contains a complex diagram of concentric circles with thirteen radial divisions, linking zodiacal names to planets on their orbits. Crucially, folio 032a is interpreted by the author as a "partial astrolabe, " featuring a meticulous description of the instrument's use, explicitly naming it in Armenian as "sturlap". This codicological evidence confirms that the material astrolabes were supported by a sophisticated and native textual tradition.

[2] On 25 September 2025, Karen Balayan, president of the "Ayas" Marine Research Club and captain of the sailing vessel "Cilicia," delivered a lecture at the History Museum of Armenia in which he stated that one of the astrolabes on display "was made by Ghukas Vanandetsi for Khoja Petros, a merchant and shipowner from Julfa"; however, he did not furnish any documentary or material evidence to support this attribution.


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Figure 1. The Khafif Astrolabe. History of Science Museum, Oxford, Inv. 47632. Late 9th century (Museum of the History of Science, Oxford, n. d.)

## 4. Corpus Analysis: Six Case Studies

### 4.1. The Khafif Astrolabe

The astrolabe constructed by Khafīf, ghulām (apprentice) of the astronomer 'Alī ibn 'Īsā al- Asturlābī, is the earliest object in this corpus (History of Science Museum, Oxford, Inv. 47632). The names of several of 'Alī ibn 'Īsā's apprentices and of their own apprentices are known, providing an approximate date for this instrument and establishing him as one of the pioneers of astrolabe-making in the early centuries of Islam. 'Alī ibn 'Īsā lived in the mid-9th century in the region approximating to modern Syria, and Khafīf's astrolabe, dated to the late 9th century, is the oldest in the Oxford collection. It is made of brass and was presented by J. A. Billmeir in 1957.

The throne is of the pierced type, made of brass, with an integrated base of brass, a simple squared-cross-section ring of brass, and an omega-type shackle of brass. The mater and limb are of one-piece construction, with a tab used to hold the tympans in place located at the bottom of the instrument, 180° from the throne. The limb carries a degree scale. There are three plates with latitudes ranging from 33°0' to 41°0', a range that the Oxford catalogue notes is appropriate to the region of Syria and, to the north, Armenia. The rete contains 17 stars. The zodiac on the rete is labelled in Arabic: al-amal (Aries), al-Thawr (Taurus), al-Jawzā (Gemini), al-Saraṭān (Cancer), al-Asad (Leo), al-Sunbulah (Virgo), al-Mīzān (Libra), al-'Aqrab (Scorpio), al-Qaws (Sagittarius), al-Jady (Capricorn), al-Dalu (Aquarius), al-Samakah (Pisces). The rete is attached using a pin and wedge; the head of the pin is decorated with radial lines. The back of the instrument contains four scales: altitude, cotangent, shadow square, and dastūr circle. The pointer is single-ended, and its front is engraved with a decorative pattern. The alidade is double-ended, counter-changed, and its front is engraved with the same decorative pattern found on the pointer.

The inclusion of this astrolabe in a study of Armenian scientific instrumentation is justified not by its original manufacture, which is unequivocally Abbasid Syrian, but by the later, demonstrably Armenian modifications that transformed its functionality and cultural identity. As documented by David King and Benik Tumanyan, and confirmed in the Oxford catalogue, the astrolabe features "early additions in Armenian": Armenian numerals, a shadow square recalibrated to a base-12 system with an inscription for "shadow" on the diagonal, and latitude indications in Armenian on two of the three plates (King, 1996b). These are not passive provenance marks (such as a name or date of acquisition) but active, substantive recalibrations that altered the instrument's computational capabilities. The addition of a trigonometric grid and the recalibrated shadow square would have required a practitioner with both the skill to manipulate a precision device and the motivation to integrate it into a local Armenian scientific tradition. This appropriation took place during a period when Armenia, though under Abbasid suzerainty, was reasserting its cultural and political identity. By the late 9th century, the Bagratid dynasty had risen to power, and


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in 885 CE, the Caliphate recognised an independent Armenian kingdom. Armenia's position astride the Silk Road facilitated the movement of goods and knowledge between the Abbasid world and the Caucasus. Archaeological evidence, including Abbasid coins and Abbasid ceramics excavated in Armenia (Zohrabyan et al., 2018), confirms the scale of commercial and cultural exchange along these routes.

Figure 2. The rete fragment. History of Science Museum, Oxford, Inv. 48470. Early 10th century (Museum of the History of Science, Oxford, n.d.)

## 4.2. The rete fragment

The rete fragment documents the cross-cultural circulation of Islamic scientific material and its later adaptation by an Armenian user. Stylistic features – angular Kufic script and dagger-shaped star pointers (a diagnostically early form) – position the object within early 10th-century Syrian manufacture. David A. King, in his unpublished working catalogue (entry 2529; King, 1996b), explicitly attributes the rete to the workshop of Khafīf, apprentice of 'Alī ibn 'Īsā al-Asturlābī (Maddison, 1957, 1976). King's attribution rests on multiple concordances: the script type, the selection of seventeen stars, the presence of dagger pointers on each star, the absence of a star pointer opposite qalb al-'aqrab, and the placement of the rotation tab on the left support of the lower circular bar. He notes that the rete's star positions are more accurate than those on the complete Khafif astrolabe (inv. 47632), suggesting a refinement in the workshop's production chronology. The rete is of the indicator-line (simple) type, with a single tab for rotation – a feature shared with the Khafif instrument. It carries the same seventeen stars as the Khafif astrolabe, each marked with a dagger pointer, and the zodiacal signs are labelled in Arabic (al-amal through al-Samakah). The object was acquired by J. A. Billmeir between 1955 and 1957 and presented to the museum in 1957 (accession number 1957-84/156).

The Oxford rete's scholarly value derives not from its Abbasid provenance but from a deliberate epigraphic intervention: the systematic addition of Armenian translations adjacent to each Arabic star and zodiac name, a linguistic overlay documented by both the museum catalogue and 8 Benik Tumanyan. This operation functionally recalibrated the instrument for an Armenian user, converting a monolingual Islamic artifact into a bilingual interface. Unlike the Khafif astrolabe— where Armenian numerals and latitude inscriptions occupy the back and plates—the rete's Armenian glosses supplement rather than supplant the original Arabic, producing a bilingual palimpsest. This strategy prioritized vernacular accessibility: star and zodiac names, the most frequently consulted elements for time-telling and astrological calculation, were translated to enable use without full Arabic literacy. The rete's isolated survival suggests its continued utility as an instructional tool. Its inclusion as a case study documents Armenian epistemic agency—active re-engineering of foreign instruments, not passive reception.


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Figure 3. The astrolabe from the Dār al-Batḥā' in Fez, Morocco. Inventory no. 764; International Instrument Checklist no. 2710. 1393–1394 CE.

### 4.3. The astrolabe from the Dār al-Batāḥ' in Fez, Morocco Figure

The astrolabe dated 796 H (1393/94 CE) and signed by Muḥammad ibn Ja'far al-Kirmānī, known as Jalal, is now preserved in the Dār al-Batāḥ' in Fez, Morocco. David A. King, in his unpublished working catalogue (part XIVd, pp. 772-774), provides a detailed description of this instrument, noting that its reported diameter is either 135 mm or 122 mm. Although the date 1393/94 CE seems relatively early for the quality of execution, the reading is unequivocal. King characterizes the instrument as "not in the same class as the Copenhagen astrolabe or the Oxford rete and Istanbul plate," being more typical of the productions of al-Kirmānī's grandfather and father. Those other pieces, King observes, "well reflect what a competent craftsman can achieve when he has a generous sponsor and an intellectual milieu conducive to excellence." The Fez astrolabe, by contrast, represents a more modest level of craftsmanship. King further remarks on the instrument's physical condition and subsequent history, noting that he has not seen the instrument in person but came across photographs of the front and back in May 2004. He states that, "one could argue that it has not fared well, neither when it first landed in the Maghrib nor more recently. Centuries ago, some Maghribi craftsman did not like it and tried to fix it up according to his own limited local tradition. In 1990, the astrolabe was intended for an exhibition on the Maghrib at the Musée du Petit Palais in Paris, but none of the astrolabes from Morocco reached Paris, and the catalogue entries are "pathetically inadequate (King, 2005)."

The object's principal scholarly significance, however, lies in its additional markings. When King first examined the additional numbers on the outer scale and the ecliptic scale, he initially hypothesized that they might be al-qalam al-fāsi ("chiffres de Fès"), a numeral system attested in Andalusian, Maghribi, and Spanish Latin sources. As King writes, "What would have been more appropriate for an Iranian astrolabe ending up in Fez?"

However, Rosa Comes of the University of Barcelona demonstrated conclusively that the additional numbers are not "chiffres de Fès" but rather lower-case Armenian alphanumerical notation. The Armenian alphabet, created by Mesrop Mashtots around 400 CE on a Greek model with Syriac influence, assigns numerical values to its first thirty-six letters according to their sequential order. Comes's (2005) analysis shows that on the Fez astrolabe, the Armenian ciphers were added directly on top of the original Eastern Arabic abjad numerals, sometimes overlapping the Arabic figures. On the outer scale, the Armenian notation begins at a distance of 60° anticlockwise from the Arabic graduation, marking every 5° and covering the full 360° (though not every numeral is written). On the ecliptic, the Armenian hand inserted degrees corresponding to each zodiacal division, starting with Capricorn (30° through 360°), a choice that Comes


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interprets as intended for the computation of right ascensions. The Armenian notation thus creates an independent, offset 360-degree scale, enabling astronomical calculations without erasing the underlying Arabic data.

The crucial historical question is where and why this numeral overwriting occurred. Comes proposes that the Armenian notation was most probably added in New Julfa, the Armenian mercantile colony established near Isfahan after Shah 'Abbās I the Great deported Armenian merchants and craftsmen from Old Julfa between 1603 and 1605. New Julfa was not merely a commercial entrepôt; it developed into a sophisticated centre of Armenian intellectual, artistic, and technological activity. The colony's merchants controlled a substantial portion of trans-Asian trade in silk, textiles, spices, and precious stones, operating networks that extended from the Levant and Venice to the Indian Ocean and Southeast Asia. This commercial infrastructure simultaneously functioned as a conduit for the circulation of books, manuscripts, scientific instruments, and technical knowledge. The intellectual environment of New Julfa supported diverse scholarly pursuits. The colony maintained schools, a printing press established at the Holy Savior's Monastery in 1638 (McCabe, 1999) – the first printing press in Persia – and scriptoria where manuscripts in Armenian, Persian, and other languages were copied and illuminated. The monks of the monastery, despite never having seen a printing press before, manufactured their own ink and paper and commissioned local Armenian goldsmiths to cast the type. New Julfa Armenians also patronized the production of luxury goods that blended Persian, European, and Armenian stylistic elements: illustrated manuscripts, metalwork, textiles, and, relevantly, scientific instruments. Surviving records document commissions of astrolabes and other precision instruments by wealthy Armenian merchants, some of whom maintained personal libraries containing both Eastern and Western scientific texts. Although no documentary record currently links a specific New Julfa patron to the Fez astrolabe, the cumulative evidence of Armenian agency in modifying imported scientific instruments – seen also in the Khafif astrolabe (Inv. 47632) and the Oxford rete (Inv. 48470) – makes Comes's attribution plausible.

Figure 4. The Amirdovlat' Amasiatsi Astrolabe. Museum of Islamic Art, Doha, Inv. MW.498.2013. 1479 CE.

### 4.4. The Amirdovlat' Amasiatsi Astrolabe

An astrolabe dated 1479 CE (Armenian calendar 928) and linked to the court of Mehmed II has circulated in scholarly literature largely through auction records and passing references by David A. King (King & Charette, 2024). The Paris Drouot catalogue of 19 December 1997 described the piece as unsigned, with a corrupted maker's name – "Zilmaspout" or "Zilmanfous" – derived from the Arabic shadow-scale terms ill mabsūṭ (horizontal shadow) and ill ma'kūs (vertical shadow). That catalogue also noted plates for latitudes 41° (Istanbul) and 42° (Edirne) and an Armenian inscription "in memory of the medic Amirdovlat." (Hôtel Drouot, 1997) King later observed that Amirdovlat Amasiatsi died in 1496, so an astrolabe dated 1479 would have been produced within his lifetime, presumably for his personal use or as a commemorative instrument. This research definitively identifies that previously elusive astrolabe as the instrument now held by the Museum of Islamic Art in Doha (MW.498.2013). Prior to this identification, the Doha astrolabe was catalogued anonymously as "Turkish," without recognition of its Armenian epigraphy or its connection to the Ottoman court physician. A published account of Armenian cultural heritage specifies that the artifact is crafted from tin and bears a rotating frame engraved with Armenian symbols, letters, star and constellation


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names, and circles. The honorific "Amirdovlat' Brzhskapet" (scientific doctor) together with the date "928 Armenian era" (1479 CE) confirms its epigraphic link to Amirdovlat' Amasiatsi. Provenance aligns with the 1997 Paris auction: the same source reports acquisition at that sale by a princess of the Qatari royal family, who can presumably be Sheikha Al-Mayassa bint Hamad bin Khalifa Al Thani – acting for the museum collection, at a price exceeding 200,000 US dollars. In fact, the Doha astrolabe is not an anonymous Turkish object but a precision instrument commissioned or used by an Armenian chief physician serving the Sultan, inscribed in Armenian script and calibrated for Ottoman latitudes.

The attribution to Amirdovlat' Amasiatsi correlates precisely with his known biography and intellectual profile. Born in Amasya around 1420–1425, Amirdovlat' was a polyglot fluent in six languages and served as bzhshkapet (chief physician) to Mehmed II in Constantinople. He authored medical and pharmacological works, notably Angitats Anpet (Useless for Ignoramuses) and the 1474 pharmacognosy Girk' Rhamkakan, which catalogues hundreds of medicinal substances from across Eurasia. His methodology integrated empirical observation with astrological cosmology. The functional link between his textual prescriptions and the astrolabe is established by the instrument's engraved rete and ecliptic, featuring Capricorn and other zodiacal markers – the computational apparatus required for his astrologically governed medicine. Vardanyan's (1999) study documents a definitive example: Amirdovlat"s instruction for harvesting mandrake root demanded that Mars occupy the twenty-fourth degree of Aries or Capricorn, with the Moon in conjunction within the same zodiacal house, on a Tuesday after sunrise. The astrolabe's capacity to compute planetary longitudes for any moment would have been essential for such determinations. Amirdovlat"s empirical reach extended far beyond local Armenian flora to a global geography of medicinal substances, mapping contemporary Eurasian exchange networks. His compendium synthesizes knowledge from classical (Greco-Roman), Eastern (Arabic, Persian), and oral sources (travelers, merchants) across Armenia, Anatolia, the Balkans, Iran, the Iberian Peninsula, North Africa, Arabia, India, Central Asia, China, and the Mediterranean and Black Sea littorals – an encyclopedic awareness facilitated by long-distance trade circuits. His pharmacognosy and his possession of a precision astrolabe are thus interrelated facets of a single diasporic socio-intellectual system: the same mercantile networks that supplied exotic substances also provided capital, cosmopolitan connections, and technological access enabling the commissioning and use of such instruments.


Figure 5. The Ghukas Vanandetsi Astrolabe. History Museum of Armenia. Late 17th–early 18th century.

### 4.5. The Ghukas Vanandetsi Astrolabe

The copper astrolabe produced under the auspices of Ghukas (Luca) Vanandetsi (also known as Gukas Vanandetsi or Gukas Nurijanyan) differs fundamentally from the Islamic-derived instruments discussed in previous case studies because its rete follows a lost medieval Dutch or German prototype, marking a complete departure from Islamic rete typologies (King, 2005). Vanandetsi was not a craftsman himself but a versatile Armenian intellectual—chronicler, translator, philosopher, publisher, and man of culture active during the second half of the 17th century and the first quarter of the 18th century. Born in the village of Vanand (in


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present-day Nakhichevan) around the early 1650s, he received his initial education in his native village before continuing his studies from 1679 to 1682 at the Urbana School in Rome. This Roman education exposed him to the latest European intellectual currents, including cartography and scientific instrument design. In 1690, he joined his compatriot, the printer Matteos Vanandetsi, in Amsterdam and actively participated in the work of the Armenian printing house, becoming a central figure in the Armenian press (Nahapetyan & Aleksanyan, 2021).

His published oeuvre included the first Armenian world map, Amatarats Ashkharatsuits (1695), and a practical mercantile manual entitled Gandz ch‘ap‘voy, kshrroy, t‘uots‘ yev dramits‘ bolor ashkharhi (A Treasure Trove of Measures, Weights, Numbers and Currencies from Around the World, Yemsterdem [Amsterdam], 1699; known in English as the Treasury of Measures, Weights, Numerations and Currency From All Over the World). This manual, containing conversion tables, accountancy exercises, silk standards, and ethnographic observations, catered directly to the globally dispersed Armenian merchant class. His scholarly profile, honed in Rome and exercised in Amsterdam, made him a conduit for European scientific knowledge, which he then adapted for his diasporic audience.

We presume that the astrolabe itself was executed by specialised Dutch artisans whom Vanandetsi commissioned. Unlike the earlier astrolabes in this corpus, where Armenian script appeared selectively alongside Arabic or Persian originals, the Ghukas Vanandetsi astrolabe is inscribed entirely in Armenian – from the graduated scales to the rete pointers and the dedicatorial formula – a linguistic completeness that signals a deliberate shift from passive appropriation to confident vernacular ownership, transforming the instrument into an autonomous Armenian epistemic artifact rather than a modified import. Amsterdam at that time possessed a dense network of such professionals, including the Blaeu firm (Keuning, 1973), which produced precision quadrants and globes, and wood-engravers like Christoffel van Sichem the Younger, who supplied approximately 150 illustrations for the Psalter printed by Ghukas Vanandetsi in 1714–1715. The core Armenian identity of the object, however, is explicitly asserted by the inscription engraved on its frontal part (Ghuk Vananden, i.e., Ghukas Vanandetsi). The most revealing evidence of Vanandetsi's broader astronomical and epistemological ambitions, however, is not the astrolabe alone but the frontispiece of his 1699 Treasury. The engraving shows a pair of serpentine dragons supporting an armillary sphere – an iconography that cannot be explained by Western armillary traditions. In contemporary European depictions, the armillary sphere was a compact, portable demonstrative device resting on a plain tripod or a simple stand. By contrast, the Chinese armillary sphere (Hunyi) was conceived as a monumental, fixed observatory instrument, and from at least the Ming Dynasty (1368–1644) (Sun, 2015), its most distinctive structural feature was the use of sculpted dragons as load-bearing supports. This tradition was codified in the instruments installed at the Beijing Ancient Observatory and was reproduced in Jesuit treatises and printed engravings that circulated in Europe. Therefore, the dragon-supported armillary sphere on Vanandetsi's frontispiece is not a vague piece of chinoiserie; it is a precise, technically informed citation of Chinese imperial astronomical material culture (Smith, 1998).

Figure 6. The Gevorg Vanandetsi Astrolabe. Byurakan Astrophysical Observatory. Early 18th century.


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### 4.6. The Gevorg Vanandetsi Astrolabe

A distinct astrolabe preserved at the Byurakan Astrophysical Observatory in Armenia is entirely inscribed in Armenian – from its numerals (using Armenian alphabetic notation) to its dedicatory formula and all operational labels. The instrument bears the unequivocal inscription ("For the Enjoyment of Gevorg Vanandetsi"), naming an owner different from the Ghukas Vanandetsi astrolabe held in the History Museum of Yerevan. David A. King catalogued this piece as item #3800 in his working inventory, identifying it as an 18th-century Dutch construction whose rete is unrelated to contemporary Islamic patterns and derives from a lost medieval exemplar from the Low Countries (King, 2005). King noted that the numeral scales are executed entirely in Armenian alphabetic notation, a feature unique among known astrolabes, and recorded that photographs of the instrument are preserved in the Ernst Zinner Archives at the Institute for the History of Science in Frankfurt am Main. Although King misattributed this astrolabe to Ghukas Vanandetsi, the inscription explicitly names Gevorg Vanandetsi, a hitherto less documented member of the same family. The palaeographic style of the Armenian script – the letter forms, spacing, and engraving technique – is identical to that on the Ghukas Vanandetsi astrolabe, indicating that both instruments were produced within the same workshop or by the same letter-cutting tradition, likely commissioned through the Vanandetsi family's extensive network in Amsterdam (Merian, 2022). The Vanandetsi family constituted a multi-generational intellectual and commercial dynasty: Tovma Vanandetsi (1617-1708), a bishop and publisher, operated one of the most active Armenian printing houses in Amsterdam; Ghukas Vanandetsi and Gevorg Vanandetsi were later representatives of the same lineage, combining printing, map-making, and the commissioning of precision astronomical instruments. The existence of two separate astrolabes – one named for Ghukas, the other for Gevorg – both entirely in Armenian and both based on Dutch prototypes, demonstrates that this engagement with European instrument-making was not an isolated individual effort but a deliberate, multi-generational family enterprise. Nonetheless, as no specific information survives concerning Gevorg Vanandetsi's life and oeuvre, it remains impossible to determine which astrolabe served as the prototype or primary source for the production of another.

## 5. Conclusion

The present study established that Armenian engagement with astrolabes constituted a systematic, polycentric practice rather than an accidental accumulation of objects. This practice emerged as a logical extension of a broader epistemic tradition in which astronomical knowledge was continuously interpreted across textual, visual, and material registers, enabling the simultaneous assimilation of Eastern and Western scientific systems. Islamic instruments were not merely adopted but recalibrated through vernacular epigraphic intervention, while Europeanderived retes were commissioned with exclusively Armenian inscriptions, demonstrating a deliberate oscillation between appropriation and autonomous production. Such dual competency was sustained by mercantile patronage and courtly networks. The research rectifies several historiographic inaccuracies: the Doha astrolabe is reattributed from an anonymous "Turkish" classification to Amirdovlat'; the instruments of Ghukas and Gevorg Vanandetsi are disentangled after prolonged conflation; and Rosa Comes's identification of Armenian alphanumerical notation on the Fez astrolabe is brought into Armenological discourse. Future inquiry requires in-situ analysis and interdisciplinary publication co-authored with astronomers, advancing these artifacts from peripheral notices to a central position in the global history of science.

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