CABINET OF INSTRUMENTS · NO. 3

Three Astrolabes



YEMEN 1291 · IRAN 1654 · EUROPE 1462

A map of the sky you can turn

An astrolabe is the night sky pressed flat. Its maker projects the celestial sphere onto the plane of the equator, so that every circle of the sky stays a circle on the brass, and a reader can turn the stars by hand to match the hour. With it an astronomer could find the time by day or by night, the height of a tower, the direction of Mecca or the moment a star would rise.

The instrument is a stack of parts held on one pin. The body, the *mater*, has a raised rim engraved with the hours or the degrees. Inside it lie the plates, one for each latitude where the instrument would be used, engraved with the circles of altitude and the lines of direction for that place. Over them turns the rete, a pierced frame whose pointers mark the bright stars and whose ring carries the Sun's path through the year. On the back an alidade, a sighting rule, measures how high a star stands.

The words came to Europe with the instrument. Arabic astronomers called the rete *al-ʿankabūt*, the spider, and Latin writers kept the name as *aranea*; the alidade is *al-ʿiḍāda*, the rule, in a Latin spelling.

The three instruments in this booklet were made almost four centuries and thousands of kilometres apart. They share the same parts and the same geometry, and each one carries the language and the taste of the workshop that made it.

The sultan's instrument

The oldest of the three was made in Yemen in 1291 by ʿUmar ibn Yūsuf, a prince of the Rasulid house who ruled the country as sultan from 1295 to 1296. He was also an author on astronomy and wrote on how astrolabes should be built, and his own instrument shows that he knew the craft: the brass is cast and hammered, pierced and chased, and inlaid with silver. Four plates, each 12.7 cm across, fit inside a case 15.6 cm wide.

TELLING THE TIME BY A STAR

Hold the astrolabe by its ring and sight a bright star through the alidade; read its altitude on the scale of the back. On the front, turn the rete until that star's pointer lies on the circle of the same altitude. A rule laid from the centre across the Sun's place on the ring then points to the hour on the rim.

A garden of stars

The second instrument comes from Safavid Iran. Muhammad Zaman, who was active from 1643 to 1689 and whose name al-Asturlabi means the astrolabe maker, finished it in 1654–55, probably in Mashhad. Its rete is a lattice of leaves and scrolls, so that the star pointers seem to grow from a climbing plant. The throne, the piece that carries the ring, rises above the rim in a pointed arch. An instrument like this served its owner every day, for the hours of prayer and the direction of Mecca, and it also showed a patron's taste on the shelf of a library.



Figure 1.1. Planispheric astrolabe, Iran, 1654–55. Brass and steel.
The Met, 63.166a–j, CC0

Three instruments side by side

The third was made in Europe in 1462 and is attributed to the astronomer Regiomontanus, Johannes Müller (1436–1476). It is the smallest of the three, 13.5 cm high and 283 grams in weight, and the

plainest, and its star names are in Latin, many of them Arabic names in a Latin spelling.

Regiomontanus worked in Vienna, in Italy and in Nuremberg, and wrote on the tables and instruments of astronomy. An astrolabe of his time was read exactly as its Arabic models were, with the same rete, the same plates and the same alidade on the back.

Set side by side, the three instruments answer the same questions with the same moving parts. What changes is the script on the brass and the ornament around the stars. A reader who has learned one of them can read the other two.



Figure 1.2. Astrolabe attributed to Regiomontanus, 1462. Copper alloy.
The Met, 2025.347a–j, CC0

Made	Where	Maker	Size
1291	Yemen	ʿUmar ibn Yūsuf	15.6 cm wide
1654–55	Iran, Mashhad?	Muhammad Zaman	21.6 cm high
1462	Germany or Italy	Regiomontanus	13.5 cm high

Table 1.1. The three instruments.

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