



The star globe made in 1640 by the Dutch cosmographer Willem Blaeuw. It includes many far southern constellations whose stars were recorded by F. de Houtman a few years earlier.

**I**N THE LIBRARY of the ancient Strahov monastery (now the Museum of National Literature) in Prague, Czechoslovakia, is preserved an extraordinary astronomical globe, dating from about 1640. It was constructed by Willem Blaeuw of Amsterdam, a distinguished Dutch cartographer, astronomer, and mathematician. No duplicate is known to exist, and so far it has been impossible to retrace the globe's journey from Holland to Bohemia.

This depiction of the heavens is noteworthy both artistically and scientifically. For each constellation the Latin, Greek, and Arabic names are inscribed, with frequent references to Aratus' poetical work *Phaenomena*, famous since ancient times for its sky lore. What makes this globe most unusual, however, are several inscriptions describing the new stars of 1572, 1600, and 1604.

Under the head of Ursa Major, inside an ornamental border topped by a portrait of Tycho Brahe, is Blaeuw's dedication of the globe to the great Danish astronomer. As is well known, Tycho spent his last two years in Prague, at the court of the Emperor Rudolph II, and died there in 1601. Blaeuw's dedication tells in formal Latin how the stars were carefully plotted according to the positions determined by his former teacher, Tycho, "the greatest astronomer of all time." Blaeuw states that many more stars were inserted from his own observations, and that over 300 far southern stars were added from the measurements of Frederick de Houtman. All the star places have been reduced to the epoch 1640, he mentions.

Of the explanatory texts attached to the three new stars, the briefest is for

## Blaeuw's Celestial Globe and Three New Stars

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that of 1572 in Cassiopeia. This star is marked in gold, and its legend reads: "This new marvelous star, which shone for 16 months and was described by Tycho, was sighted in 1572."

The second nova, that of 1600 in Cygnus, was discovered by Blaeuw himself, and observed by Kepler in Prague. It is an indication of Blaeuw's familiarity with the sky that he noted this new object of the 3rd magnitude. The description on his globe reads: "The new star in Cygnus that I first observed on August 8, 1600, was initially of the 3rd magnitude. I determined its position as longitude  $316^{\circ} 15'$ , north latitude  $55^{\circ} 53'$  [?] by measuring its distance from Vega and from Albireo. It remains in this position but now is no brighter than 5th magnitude."

The third new star, that of 1604 in Ophiuchus, was also observed in Prague by Kepler and his assistant Jan Brunowski. Blaeuw's note states that when this star appeared in October, 1604, it exceeded even Jupiter in brightness. He then measured its position relative to Altair, Rasalhague, and Antares as longitude  $257^{\circ} 04'$ , north latitude  $1^{\circ} 42'$ . The next year the star was still visible but fainter. Blaeuw again measured its

coordinates on August 20, 1605, finding  $259^{\circ} 38'$ ,  $1^{\circ} 09'$  north.

Each of the new stars on Blaeuw's celestial globe invites comment. The supernova B Cassiopeiae, often called Tycho's star, was first sighted by him on November 11, 1572, during evening twilight. However, on the previous five nights it had been independently noted by many astronomers in Germany, Switzerland, and Italy. At maximum, it was almost as bright as Venus. Tycho carefully observed B Cassiopeiae until it finally faded from naked-eye view in March, 1574. The phenomena observed by him and others were described exhaustively in his *Pro-gymnasmata*, published in Prague in 1602. Today, radio telescopes indicate that the remnant of this supernova is an intense source of cosmic radio noise.

The nova P Cygni of 1600 was the subject of careful study by Kepler, who in 1606 published a treatise about it: *Astronomical Account of a 3rd-magnitude Star in Cygnus, unknown before 1600, which continues to shine*. Records show that this star began to fade in 1619 and became invisible by 1621, but reappeared as a 3rd-magnitude object in 1655. After further fluctuations, it became a 5th-mag-



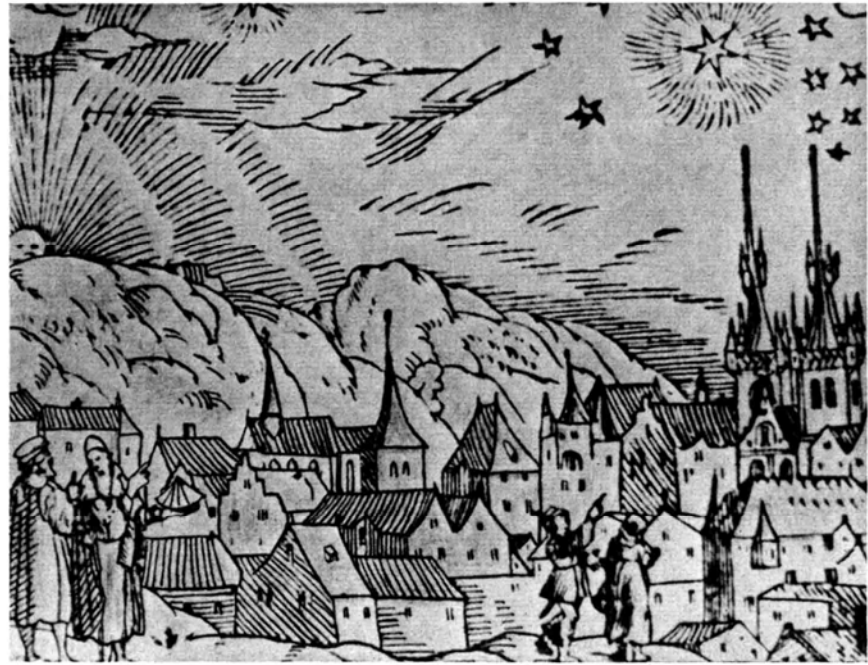
The part of Blaeuw's celestial globe that contains the portrait of Tycho Brahe and a tribute to him and his astronomical observations.

nitude star by 1715, and remains such to this day. Modern observations show that this atypical nova has a remarkable spectrum with broad emission lines, especially of hydrogen and helium, indicating the presence of a shell of gas. Light changes and spectral peculiarities are both explained by continued ejection of matter.

Although the supernova of 1604 in Ophiuchus is commonly known as Kepler's star, it was first seen by two observers in Italy on October 9th, low in the southwest after sunset. Astronomers were paying attention to that region of the sky because of a conjunction of Jupiter and Saturn, with Mars close by, that Kepler had predicted nine years earlier.

Kepler's assistant Brunowski had an exciting experience on the evening of October 10th when, crossing the old Charles bridge in Prague, he noted the expected planetary conjunction through a break in the clouds. He was, however, puzzled by an unknown bright star, more brilliant than Jupiter, within two degrees of it. Clouds soon hid them, and it was not until October 17th that the sky cleared to give Kepler his first view of the supernova, which he estimated to be nearly twice as bright as Jupiter.

In mid-November, the new star was in conjunction with the sun and therefore lost to view; on emerging into the morning sky in January, it was of 1st magnitude. From then on it faded until on the anniversary of its discovery it was a 5th-magnitude object. By the beginning of 1606 it was lost to sight. Some remnants of this great stellar explosion were detected more than three centuries later, when W. Baade photographed faint

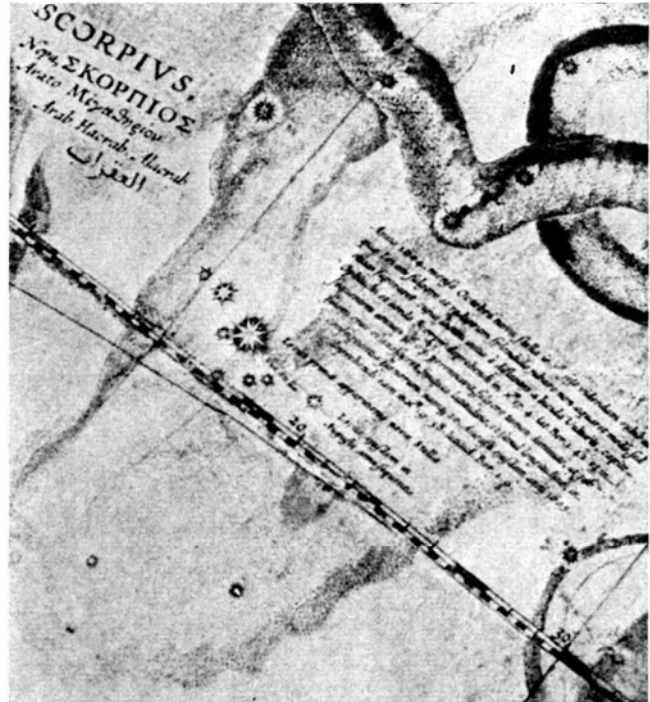


In this view of Prague in 1572, the supernova is represented at upper right, above the towers of the Tynsky Cathedral, where Tycho Brahe, who observed that star, is still buried. On the cathedral's facade is depicted a chalice, a religious symbol indicating that this scene was during the reign of the Hussite king of Bohemia, George of Podebrad. Later, this chalice was replaced by a statue of the Virgin Mary. This woodcut originally appeared in a book published in 1573 by Conrad Dasypodius (1532-1600), a scholar who was born in Switzerland and became canon at the Strasbourg Cathedral. All illustrations with this article are from the author.

wisps of nebulosity in this location, using the 100-inch telescope.

It is a little odd that such an experienced observer as Blaeuw should have inserted on his globe two positions for

this supernova, some two degrees apart. When he made his second determination, on August 20, 1604, the star was already rather faint. I wonder if he did not observe the wrong star on that occasion.



At left, above the picture's center at the end of a diagonal label, is the nova discovered by Blaeuw himself in 1600, now known as P Cygni. It is described in the Latin inscription below. At right, similar text tells about the supernova of 1604, for which the globe shows a large image left of center and a small one to its right (eastward on the sky).