(55) J. Southworth, *MNRAS*, **386**, 1644, 2008.
(56) P. Lenz & M. Breger, in *The A-Star Puzzle* (Cambridge University Press). (J. Zverko, J. Žižnovsky, S. J. Adelman, & W.W. Weiss, ed.), 2004, *IAU Symposium*, vol. 224, pp. 786–790.
(57) D. M. Bowman *et al.*, *Nature Astronomy*, **3**, 760, 2019.
(58) A. Tkachenko *et al.*, *MNRAS*, **438**, 3093, 2014.
(59) T. M. Rogers *et al.*, *ApJ*, **772**, 21, 2013.
(60) C. Aerts & T. M. Rogers, *ApJ*, **806**, L33, 2015.
(61) S. Zucker & T. Mazeh, *ApJ*, **420**, 806, 1994.
(62) S. Rucinski, in *IAU Colloq. 170: Precise Stellar Radial Velocities* (J. B. Hearnshaw & C. D. Scarfe, ed.), 1999, *Astronomical Society of the Pacific Conference Series*, vol. 185, p. 82.
(63) K. P. Simon & E. Sturm, *A&A*, **281**, 286, 1994.
(64) K. Pavlovski *et al.*, *MNRAS*, **400**, 791, 2009.
(65) A. B. Underhill *et al.*, *MNRAS*, **189**, 601, 1979.
(66) M. J. Pecaut & E. E. Mamajek, *ApJS*, **208**, 9, 2013.
(67) Y. Wu *et al.*, *A&A*, **525**, A71, 2011.
(68) A. Prša *et al.*, *AJ*, **152**, 41, 2016.
(69) J. Southworth, P. F. L. Maxted & B. Smalley, *A&A*, **429**, 645, 2005.
(70) L. Girardi *et al.*, *A&A*, **391**, 195, 2002.
(71) G. Hill & A. H. Batten, *A&A*, **141**, 39, 1984.
(72) D. M. Popper & E. F. Guinan, *PASP*, **110**, 572, 1998.
(73) E. F. Guinan *et al.*, *ApJ*, **544**, 409, 2000.
(74) A. Tkachenko *et al.*, *MNRAS*, **424**, L21, 2012.
(75) W. J. Borucki, *Reports on Progress in Physics*, **79**, 036901, 2016.
(76) Y. Chen *et al.*, *MNRAS*, **444**, 2525, 2014.

CORRESPONDENCE

To the Editors of 'The Observatory'

Identifying Polophylax — a 430-year Mystery Solved?

During the history of celestial mapping various newly invented constellations have appeared on star charts from time to time, only to drop out of sight again as they were ignored by other astronomers or were replaced with competing innovations. One of the oddest and shortest-lived of these new constellations was an enigmatic figure called Polophylax, introduced by the great Dutch celestial cartographer Petrus Plancius (1552–1622) in 1592 but then dropped by its own inventor within a few years and never seen again. Where did the idea for this figure come from and why did it disappear so rapidly?

Polophylax made its debut on a small planisphere of the southern sky tucked into the margin of Plancius's world map of 1592 (Fig. 1; ref. 1). At that stage, knowledge of the far southern sky was limited to sketchy reports from explorers and navigators, much of it kept under wraps for commercial reasons by the trading companies who had opened up sea routes to lucrative markets in the East. Plancius himself never travelled on any such voyages of exploration so had to rely on the word of others.

In this case, as Plancius explained in his text on the 1592 chart, his source for the far southern stars was a sketch by the Italian explorer Andrea Corsali (1487–15??) made in 1515 and sent in a letter to his patron, Giuliano de Medici.* This letter and the accompanying diagram were first privately published in 1516 and later reprinted for wider circulation[2].

*Thomas Blundeville, the English scholar, published a translation of Plancius's Latin text in 1594 as follows: "I haue taken these Southerne starres out of the obseruations of Andreas Corsalius Florentine". See T. Blundeville, *His Exercises*, 1594.

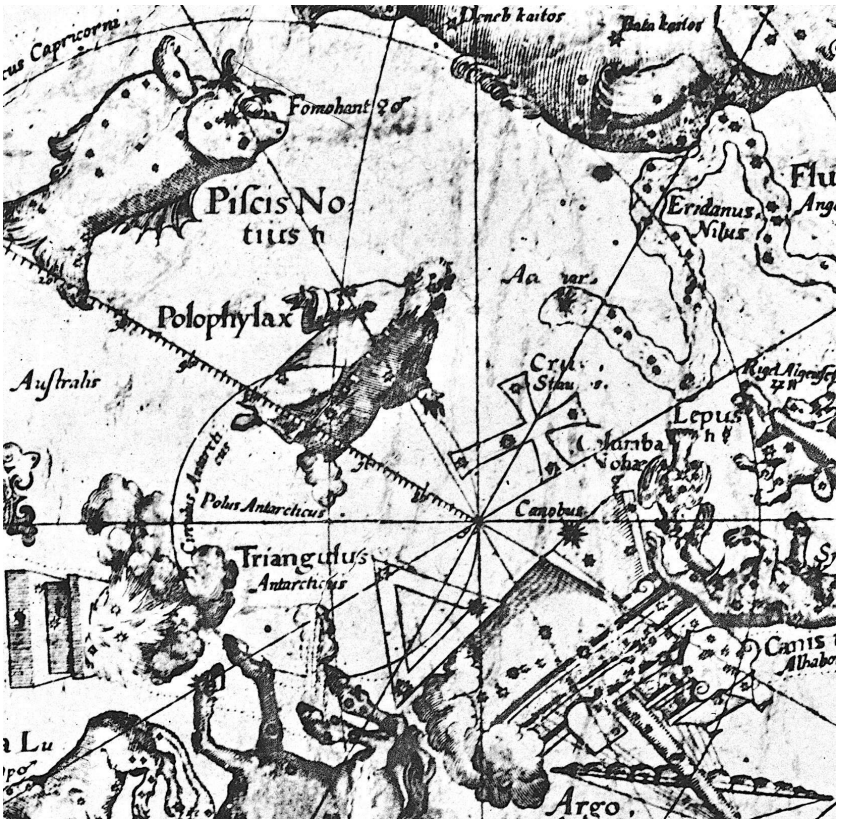

Fig. 1

Polophylax seen on a southern celestial planisphere that was part of Petrus Plancius's world map of 1592. To the right of Polophylax is an imaginary Southern Cross, and below centre is an equally imaginary southern triangle. This reproduction comes from a photographic facsimile of the one surviving copy of the map. (National Library of Australia)

Corsali's diagram showed the southern cross, some surrounding stars, and the two Magellanic Clouds (Fig. 2). However, Corsali was not an astronomer and gave no positional measurements or magnitudes. Hence Plancius was left guessing the orientation of the drawing, and got it wrong. He placed its stars almost 180° from their true positions, where they at least served the purpose of filling an otherwise empty space.

Assuming that the seven stars in the tower-like group to the left of the cross in Corsali's diagram were previously unrecorded, Plancius created a new constellation out of them in the form of a bearded man in a long gown he called Polophylax. Plancius did not explain why he chose such a figure but it is generally thought to represent a pole watcher or pole guard, a southern counterpart of Boötes, the bear watcher or bear guard of northern skies, who was also known in Greek as Arctophylax.

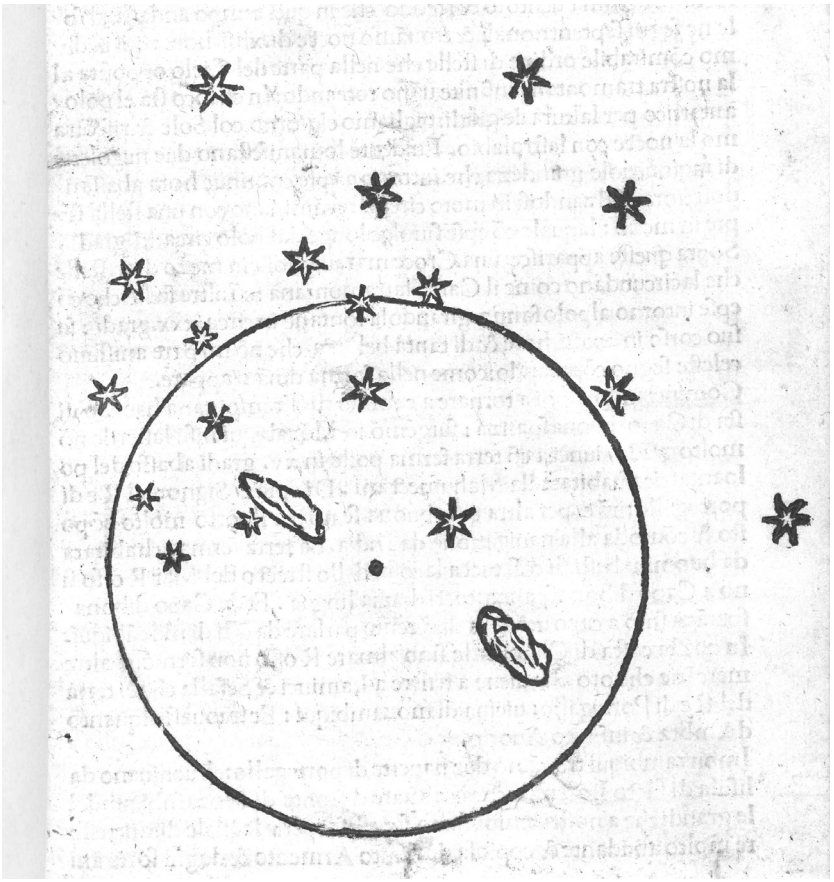

Fig. 2

Andrea Corsali's sketch of the south polar region of the sky, printed in 1516. The Southern Cross is above centre. The stars from which Petrus Plancius created Polophylax are to the left, and the Magellanic Clouds below. To the right of the drawing are the two pointers to the Cross, Alpha and Beta Centauri. The drawing, which contains distortions of scale, shows the sky from an external viewpoint, as on a globe. (State Library of New South Wales)

This mysterious southern pole-watcher appeared again on another Plancius map two years later, with the spelling of his name slightly amended to Polophilax[3]. Only one copy of the 1592 map still survives, in the Colegio del Corpus Christi, Valencia, but well-preserved examples of the later version are more common*.

Plancius recognized that better observations of the southern sky were sorely needed, and he saw his chance to obtain them in the form of the first Dutch trading expedition to the East Indies, known as the *Eerste Schipvaart*. During preparations for that voyage, Plancius instructed the chief navigator, Peter Dirkszoon Keyser (*c*.1540–96), to make accurate observations for him. Keyser

* Unfortunately, the engravings of the constellation figures on the second map are not as detailed as on the 1592 original and the labelling is sparser. See, for example, https://exhibits.stanford.edu/ruderman/catalog/fb595jz5474

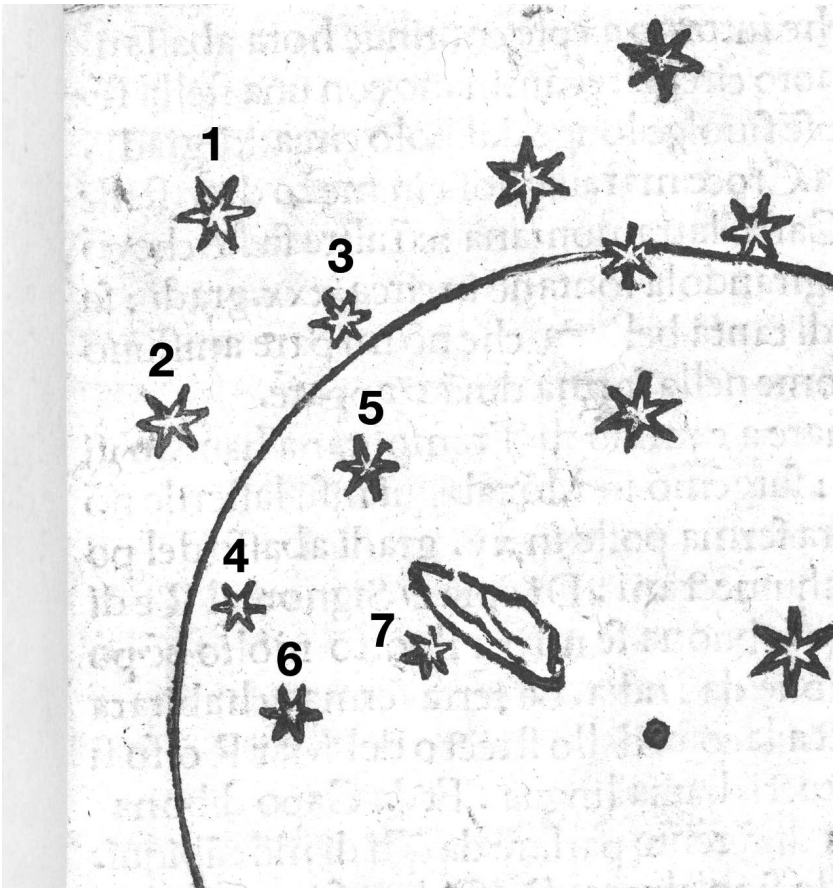

Fig. 3

The seven stars on Corsali's sketch from which Plancius formed Polophylax. See Table 1 for proposed identifications.

died during the mission but his pioneering catalogue of around 130 southern stars was duly delivered to Plancius on the fleet's return to Holland in 1597. (The catalogue was never published and the original observations are long lost.)

Keyser's stars appeared on a Plancius globe the following year, 1598, arranged into 12 new constellations representing some of the wonderful things the sailors had seen on their voyage, such as a bird of paradise, a dorado chasing a flying fish, a toucan, a chameleon eating a fly, a peacock with an opulent tail, and a water snake. But of Polophylax there was no sign. What happened to it, and can traces of it still be found?

The first question is easy enough to answer. Once Plancius had received Keyser's observations he would have quickly realized that the stars of the southern cross actually lay in the hind legs of Centaurus, the centaur, and had

been catalogued by the Greek astronomer Ptolemy in the *Almagest* in the second century AD, although they were not at that time identified as a cross*.

If Corsali's sketch is rotated so that Crux is in its correct position over the hind legs of Centaurus, and Polophylax is rotated with it, then we find that the stars of Polophylax fall in Argo Navis, the ship. In other words, this was not an uncharted area of sky after all, but had been known to the ancient Greeks until precession took it below their horizon. That, in answer to our first question, is why Plancius dropped Polophylax.

So, coming to the second question, what were the stars of Polophylax? All previous attempts to identify them have failed because the investigators have been looking in the wrong place. Given the realization that they were actually part of Argo we can make a fresh attempt, although even then the task is not straightforward.

As noted by Dekker[4], Corsali's chart showed the sky as on a globe, not as it appears from Earth. However, she also noted that the map contains errors such as the enlarged scale of the Cross and the misplacing of the Magellanic Clouds with respect to the pole which she attributed to "the confusion of different sets of data by some other author".

Further evidence of this confusion emerges when trying to match up the stars of Polophylax with the real sky. A reasonable match can be obtained only if we assume that the seven stars of Polophylax were not reversed as on a globe like the rest of the map but are in fact positioned as they appear in the sky (Fig. 3). If that is indeed the case, the identifications of the seven stars in Fig. 3 are as in Table I.

TABLE I

Identification of the stars of Polophylax, as numbered in Fig. 3.

1 = Lambda Vel (mag. 2·2)
2 = Kappa Vel (2·5)
3 = Delta Vel (1·9)
4 = Iota Car (2·2)
5 = Epsilon Car (1·9)
6 = Beta Car (1·7)
7 = NGC 2070.

The stars numbered 2, 3, 4, and 5 are the False Cross. Hence, if these identifications are correct, Corsali's diagram contains not one but two southern crosses. It seems reasonable that Corsali would include both the real cross and its look-alike on his diagram.

And, no matter which way you flip the drawing, number 7 can only be the first recorded observation of the Tarantula Nebula (NGC 2070, or 30 Doradus), which is bright enough to have been catalogued by Keyser and appeared as a star on Johann Bayer's chart of the southern sky in his *Uranometria* atlas of 1603[5].

Yours faithfully,
IAN RIDPATH

* This, incidentally, had already been pointed out by the English mathematician Thomas Hood in his book *The Use of the Celestial Globe in Plano* of 1590 in which he wrote that the stars of the Southern Cross "are none other then [sic] those which are in the hinder feete of the Centaure". The source of Hood's information was probably the English explorer Robert Hues who had returned from circumnavigating the globe two years earlier.

48 Otho Court
Brentford
TW8 8PY

ian@ianridpath.com

2023 June 14

References

(1) P. Plancius, *Nova et Exacta Terrarum Orbis Tabula Geographica ac Hydrographica* (Amsterdam), 1592.
(2) A. Corsali, *Lettera di Andrea Corsali allo Illustrissimo Signore Duca Iuliano de Medici*, 1516.
(3) P. Plancius, *Orbis Terrarum Typus de Integro Multis in Locis Emendatus*, 1594.
(4) E. Dekker, *Annals of Science*, **47**, 546, 1990.
(5) I. Ridpath, *The Antiquarian Astronomer*, **8**, 100, 2014.

REVIEWS

For the Love of Mars. A Human History of the Red Planet, by Matthew Shindell (University of Chicago Press), 2023. Pp. 248, 23·5 × 16 cm. Price £22/$27·5 (hardbound; ISBN 978 0 226 82189 4).

Writing this book during the Covid lockdown, author and Smithsonian curator Matthew Shindell wanted to go beyond the few sentences other Mars books had devoted to ancient beliefs about the planet. Who cared about Mars in the past? Who cares about it today? The result is a well-crafted narrative, rich in human history and literature, and a book that addresses questions such as why we continue to visit the Red Planet.

A great deal of patient research must have been needed to prepare the earlier chapters, which range from the era of the Mayans to the invention of the telescope. Included are visions of Mars imagined by Dante and Kircher, explored in scholarly but always accessible detail. From Chapter 4 we are on to the time of telescopic observers, and scientific popularizers like Proctor, and it is clear that Shindell knows the literature well. It's not generally true to write (page 102) that telescopic sketches of Mars might only show one or two details, but this is a tiny point. I enjoyed the way in which he explores Martian science fiction, which even by the late 19th Century had become voluminous. Shindell spends some time describing the campy film *Total Recall*, based upon a clever story by Philip K. Dick. Kim Stanley Robinson's rather turgid Mars trilogy is also discussed, though in your reviewer's opinion the same author's *Icehenge* is a more finely crafted work that also discusses ecosystems, longevity, and aspects of human memory, and a future Martian rebellion, and which I commend to those interested. John Carter of Mars gets a mention in the text but fails to reach the index. Chapter 5 takes us into the Cold War period, and we are soon with the latest robotic rovers crawling over the surface of the planet. A Conclusion considers the human future of Mars. Shindell's final comment is that the most important question we can ask now is not "How will we get to Mars?" but "Who do we want to be when we become Martians?"

Historically insightful in chronicling human engagement with the Red Planet, and complete with a pseudo-dog-eared retro dust jacket, *For the Love of Mars* is likely to have a wide appeal. — Richard McKim.