

Where, if anywhere, did Rheita see Veronica's Veil?

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Illustrations are on the last page of this preprint.

ABSTRACT: The asterism of Veronica's Veil reported by Rheita in 1645 is argued to be real, though inconspicuous; not a star cluster; and not correlated with Johannes Zahn's picture published in 1686 and widely redistributed. The asterism is most likely the rectangle bounded by ρ Leonis, α Sextantis, σ Leonis, and ι Hydrae, with some scattered interior stars interpreted as a face.

KEYWORDS: Rheita (A. M. S. de, 1604-1660), Zahn (Joannes, 1641-1707), Smyth (W. H., 1788-1865), asterism, star cluster, Veronica's Veil

Pioneer telescope maker Antonius Maria Schyrleus de Rheita (1604-1660) described an asterism in or near Leo that resembled the veil or handkerchief (*sudarium*) of St. Veronica, a piece of cloth with the face of Jesus imprinted on it.¹ His report has been passed along to subsequent generations of astronomers by Zahn, Smyth, Flammarion, and O'Meara,² but no striking asterism or star cluster is seen at the position he gave. I argue that the asterism in fact exists but is inconspicuous.

The texts

Rheita gives two descriptions of the asterism. One is in his 1645 book about telescopic astronomy, after a passage about the amazing number of stars revealed by the telescope:³

Ita nos Orionis constellationem quasi tunicae Domini inconsutilis figuram; aliam vero infra Leonem, Sudarii Veronicae (quam et depictam videbis in defensione nostrarum observationum stellarum novarum contra [G]assendum circa Iovem) similitudinem referre deprehendimus.

Indeed, we discover the constellation of Orion [or: an asterism in Orion] as if it were the shape of the seamless garment of the Lord; and another, below Leo, bearing a

resemblance to the Veil of Veronica (which you will also see depicted in the defense of our observations of new stars around Jupiter against Gassendi).

The “defense” to which he refers is a letter to Juan Caramuel dated April 24, 1643, and published by Caramuel in 1670 along with correspondence with Pierre Gassendi.⁴ The letter is about the observability of satellites of Jupiter and the ability of the telescope to reveal numerous faint stars.

Quid? Et adhuc heri cum stupore et summa admiratione atque delectatione Sudarium Veronicæ (sive faciem Domini) maxima similitudine in Astris expressum in signo quasi Leonis (vicit namque Leo de Tribu Iuda) intra Aequinoctialem et Zodiacum circulum clarissime detexit, et ita primo statim intuitu hanc similitudinem menti oculisque impressit, ut centies, reiteratis vicibus inspiciens nullam figuram aliam, aut magis similem imaginem ei affingere possibile fuerit, quam Sudarii Veronicæ, aut faciei Domini? Continet autem hæc pulcherrima constellatio (libero oculo et tubo ordinario Galilæano vere visibilis) ultra 120 aut 130 lucidissimas stellulas densissime uti agmen apum in medio compactas, 4 maioribus in angulis quasi conclusas; uti hæc figura qualitercumque exhibet.

What? And did [the telescope] just yesterday most clearly detect, to [my] astonishment and extreme amazement and delight, the Veil of Veronica (or the face of the Lord) with the greatest accuracy expressed in the stars, in approximately the sign of Leo (for Lion of Judah [Revelation 5:5] was victorious) between the celestial equator and the ecliptic, and so quickly impressed this likeness intuitively on the mind and eyes, that looking at it a hundred times over and over, it would not be possible to attach to it any image more similar to it than the Veil of Veronica or face of the Lord? Moreover, this beautiful constellation (visible to the naked eye and with an ordinary Galilean telescope) contains over 120 or 130 very bright small stars densely crowded in the middle, like a swarm of bees, with four larger ones enclosed in the corners, as this figure shows in some way.

Rheita goes on to describe the hundreds of stars revealed by the telescope in small constellations such as Lyra and Taurus. The picture mentioned at the end of the quoted material was not published with the letter.

In 1686 Zahn quoted part of this description and added a picture (Fig. 1),⁵ giving the impression that it was copied from Rheita’s original; Zahn’s picture was passed on to modernity by Smyth, Flammarion, and O’Meara. However, both Zahn’s text and Zahn’s picture leave out the four bright stars in the corners.

The asterism

Smyth, Flammarion, and O'Meara report that they are unable to identify Rheita's asterism (or, perhaps, Zahn's picture) with anything they can see in the sky. Because of its location, Smyth and O'Meara somewhat misleadingly mention Rheita's asterism in connection with H.I.4 (NGC 3169). That 11th-magnitude galaxy that cannot be what Rheita saw.

Rheita was not writing about star clusters or deep-sky objects; he was enthralled by the number of stars the telescope revealed *everywhere*. Taking account of his vivid imagination and knack for finding pictures in the stars, what we are looking for is an approximate rectangle with four stars in the corners (to look like an unfolded veil or handkerchief) and a scatter of fainter stars in the middle that could be interpreted as a face. Such configurations are very common.

Rheita specifies that his asterism is visible to the naked eye, though most of the stars within it are telescopic. That rules out compact star clusters. He describes the location as *infra Leonem* (below Leo), *in signo quasi Leonis* (roughly between ecliptic longitude 120 and 150, which takes in only the western end of Leo), and located between the celestial equator and the ecliptic. These descriptions together point to an area of indeterminate size about 10 degrees southwest of Regulus.

In fact, there is a rectangular pattern of stars in that area, covering nearly the whole space between the equator and the ecliptic (Fig. 2). Its corners are ρ Leonis, α Sextantis, σ Leonis, and ι Hydrae (magnitudes 3.9, 4.5, 3.5, and 3.9 respectively). The stars ζ Leonis and β Sextantis (magnitudes 4.4 and 5.1), midway along its top and bottom edges, could alternatively be taken as the left corners of a narrower rectangle that falls completely within the sign of Leo. Whether the interior stars resemble a face is not obvious, but there are definitely several naked-eye stars present, and the main rectangle contains approximately 200 stars down to magnitude 9, which is a reasonable limit for a seventeenth-century telescope.

Rheita's description of stars like an *agmen apum*, a swarm of bees, does not imply a central condensation, which would imply a star cluster. A swarm of bees in the air can be several meters in diameter, and the bees within it are spaced randomly but evenly within its borders. That is not unlike the rich starry background revealed by a telescope everywhere in the sky.

Note that Rheita is not creating a new constellation out of "unformed" (unassigned) stars. Since Ptolemy, the northern three stars have been part of the figure of Leo, and the one at the southwest has been part of Hydra. After Rheita's time, Hevelius added the constellation Sextans at the southeast. Given that Rheita also offers a reinterpretation of part or all of Orion, this is not an objection.

We still have to reject Zahn's picture as fanciful, as Smyth, Flammarion, and O'Meara have already done. There is no way to avoid rejecting Zahn's picture; it matches nothing in the sky. One look at it convinces us that it is not a realistic star pattern – it has neat rows of stars all along its edges and even along the scrollwork. Rather, it looks as if someone copied a picture of *sudarium Veronicæ* (perhaps the famous one by Claude Mellan, 1649)⁶ and added stars to decorate it. This, however, does not make Rheita himself a humbug.

Notes

1. I am indebted to James C. Evans and the anonymous reviewers for substantial helpful suggestions. For a brief biography of Rheita see Wolf Böhm, "Schyrle(us)," in *Neue deutsche Biographie* (Berlin: Franz Steiner, 2010), vol. 24, pp. 93–94.
2. Johannes Zahn, *Pro practice construendo et elaborando oculo artificiali teledioptrico sive telescopio Fundamentum III: Practico-mechanicum*. (Herbipolis [Würzburg], 1686); William Henry Smyth, *A cycle of celestial objects*, vol. 2: *The Bedford catalogue* (London, 1844, reprinted, Richmond, Va.: Willmann-Bell, 1986), pp. 227–228; Camille Flammarion, *Les étoiles et les curiosités du ciel* (Paris, 1899), p. 361; Stephen James O'Meara, *The secret deep* (Cambridge: Cambridge University Press, 2011), p. 184; Stephen James O'Meara, "The secret of Sextans," *Astronomy*, April 2012, p. 14.
3. Antonius Maria Schyrleus de Rheita, *Oculus Enoch et Eliae, sive radius sideromysticus, Pars prima* (Antwerp, 1645), p. 198.
4. Juan Caramuel, *Mathesis nova* (Campagna, 1670), pp. 1599–1600.
5. Zahn, ref. 2, pp. 209–210.
6. Mellan's picture can be viewed online at https://en.wikipedia.org/wiki/Claude_Mellan and is of mathematical, not just artistic, interest. Anticipating modern raster graphics, Mellan made engravings consisting of parallel lines whose thickness varied to produce shading. His picture of Veronica's handkerchief, also known as *The face of Christ*, uses a single tight Archimedean spiral as its raster.

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Figure 1. The asterism resembling Veronica's veil as depicted by Zahn (see notes 2 and 5) and reprinted by Smyth, Flammarion, and O'Meara. This does not match Rheita's description.

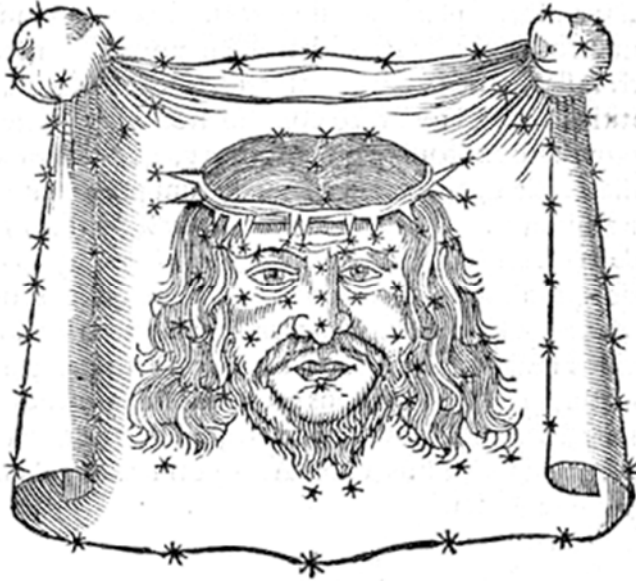


Figure 2. The large rectangle and its right-hand half both fit Rheita's description of the asterism. Whether the interior stars resemble a face is for the reader to judge. (Chart to mag. 9 created with *Cartes du Ciel*, <https://www.ap-i.net/skychart>.)

