

Observations on and lectotypification of *Luticola ventricosa* (Hustedt) D.G.Mann (*Diadesmidaceae*, *Bacillariophyceae*)

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Friedrich T. Kützing (1807–1893) described *Stauroneis ventricosa* Kützing (1844: 105) and illustrated it with two very small line drawings (Kützing 1844 pl. 30: fig. 27; Fig. 1, herein) accompanying a brief description (Fig. 25): *St. minutissima media valde, apicibus minus inflata, capitata, bis constricta, apertura media oblonga transversali non percurrente. Long. 1/110"* [St. very minute in the middle, less inflated at the tips, capitate, twice constricted, the oblong middle opening not running transversely, length ca 20.5 µm]. Twelve years later, Gregory (1856: 3) reported the species (for the first time) from Scotland (Elchies and Elgin deposits) adding one small illustration (Gregory 1856: pl. I [1]: fig. 10). Cleve & Grunow (1880: 41) treated it as a variety of *Navicula mutica* Kützing: *Navicula mutica* var. *ventricosa* (Kützing) Grunow. Van Heurck's *Atlas of the Synopsis des Diatomées de Belgique* originally mentioned *Stauroneis ventricosa* (Van Heurck 1880: pl. 4: fig. 1b) but five years later, in the *Texte du Synopsis* (Van Heurck 1885: 96), the taxon was treated as *Navicula mutica* var. *ventricosa*. Cleve (1894: 129) reduced its rank to that of forma in his *Synopsis of the Naviculoid Diatoms* as *Navicula mutica* f. *ventricosa* (Kützing) Cleve.

When Mereschowsky published in 1903 his new genus *Placoneis*, he transferred *Navicula mutica* and all its infraspecific taxa to this new genus, including the var. *ventricosa* (Mereschkowsky 1903: 12: pl.1, fig. 27). This transfer was only rarely followed by later authors. Hustedt (1930: 275) reported the taxon as *Navicula mutica* var. *ventricosa* although he erroneously attributed the variety only to Cleve, omitting Grunow as author of the combination. Moreover, the drawing Hustedt added (Hustedt 1930: fig. 453e) did not correspond to all previous illustrations of the taxon published previously, raising some doubt about the identity of the Hustedt material. It is likely that Hustedt's figure corresponds to another taxon.

Mills (1934: 1176) indexed the name *Stauroneis ventricosa* under the genus *Navicula* without introducing a new combination, adding that the correct name for this taxon should be *Navicula mutica* f. *ventricosa* (Kützing) Cleve. A new combination, *Navicula ventricosa*, would be a later homonym of *Navicula ventricosa* Ehrenberg (1839 130, pl. IV [4]: fig. Xi), a fossil from marl at Oran, Algeria. This combination was incorrectly attributed to Van Heurck in Cleve (1894: 129) but none of the references given (Van Heurck 1880: pl. 4: fig. 1b; Van Heurck 1885: 96) actually made that combination. Most likely later applications of the combination *N. ventricosa* (Kützing) Van Heurck are simply based on the incorrect interpretation of Cleve (1894). Mills (1934: 1472) also listed the name *Navicula mutica* [var. *goppertina*] f. *ventricosa* (Kützing) Cleve as the correct name for *Stauroneis ventricosa* but as quadrinomials and quinquenomials are excluded nomenclaturally by Art. 24.1, the correct citation should be *N. mutica* f. *ventricosa* (Kützing) Cleve, although Art. 24.1, Ex. 1, indicates that the taxon can usefully be referred to as "*Navicula mutica* var. *goppertina* f. *ventricosa* (Kützing) Cleve" for taxonomic purposes.

Hustedt (1966: 612) proposed the new name *Navicula neoventricosa* Hustedt, when he wanted to transfer the taxon to the genus *Navicula* at the species level, justifying his choice for a new name,

referring to the species described by Ehrenberg in 1839. The illustrations (Hustedt 1966: fig. 1612), however, do not correspond to the original drawings of *S. ventricosa* but show a taxon with a more undulated central margin. Germain (1981, pl. 80: figs 1–5) illustrated five valves as *N. neoventricosa* in his *Flore des Diatomées des eaux douces et saumâtres*, but at least the first four illustrations differ from the valves in Hustedt (1966), being more elongated in outline and lacking the central undulations. Krammer & Lange-Bertalot (1986, fig. 61: 9–11) examined the *N. neoventricosa* valves in the Hustedt collection (**BRM**) and illustrated some of them as *N. mutica* var. *ventricosa*. On the same figure, they also added two valves (illustrations 14, 15) collected in a waterfall near Kassel-Wilhelmshöhe (Germany) that showed more similarity to the original *S. ventricosa* drawings but identified them as *Navicula muticopsis* adding a question mark before their identification.

When the genus *Luticola* D.G.Mann was first described in Round & al. (1990: 670), *Stauroneis ventricosa* was transferred to the new genus as it presented all the features typical of the genus.

Although he probably did not investigate the original Kützing material from Nordhausen (sample 24), Lange-Bertalot in Lange-Bertalot & al. (2003) separated a new species, *Luticola ventriconfusa* Lange-Bertalot (2003: 72) from *Luticola ventricosa* based on observations of the published drawings in Hustedt (1966), Germain (1981) and Round & al. (1990). Both species were separated based on the undulated valve outline, a smaller central area and the more sturdy valve outline of *L. ventriconfusa*. As synonyms for *L. ventriconfusa*, Lange-Bertalot added the valves illustrated by Hustedt (1966) and the three valves in Krammer & Lange-Bertalot (1986, pl. 61: figs 9–11) but he excluded *Stauroneis ventricosa* Kützing from the synonymy. By contrast, several valves of *L. ventricosa* collected from Sardinia were illustrated by Lange-Bertalot & al. (2003, pl. 73: figs 1–9). Information regarding the original collection by Kützing is also absent from the most recent comprehensive monograph of the genus *Luticola* by Levkov & al. (2013). Although the latter mentions and illustrates *L. ventricosa*, it is most likely that the valves shown in Levkov & al. (2013, plates 124[1–37] & 125[1–6]) represent a different, currently undescribed taxon. This conclusion is based on the more elongated outline and larger, more capitate apices of the latter, compared to the type of *L. ventricosa* as illustrated in this contribution.

Here we detail the morphology of the type material of *Luticola ventricosa* using both light and scanning electron microscopy. Kützing (1844) had described his species from Nordhausen (Thuringia, Germany). During an examination of an original slide from Nordhausen (sample 24) conserved in the Kützing collection in **BM** (London, UK), a large population of *Stauroneis ventricosa* was observed. As there was also unmounted material available, we were able to study the ultrastructure of this species. Since it was the only sample from Nordhausen in the Kützing collections in **BM** and in **BR** (Meise Botanic Garden, Belgium), we here designate this slide as lectotype for the species.

Luticola ventricosa (Kützing) D.G.Mann (Figs 1–30)

- ≡ *Navicula mutica* var. *ventricosa* (Kützing) Cleve & Grunow (in Cleve & Grunow 1880: 41)
- ≡ *Navicula mutica* f. *ventricosa* (Kützing) Cleve (in Cleve 1894: 129)
- ≡ *Placoneis mutica* var. *ventricosa* (Kützing) Mereschowsky (in Mereschowsky 1903: 12)
- ≡ *Navicula ventricosa* (Kützing) F.W.Mills nom. illeg. (in Mills 1934: 1176)
- ≡ *Luticola mutica* var. *ventricosa* (Kützing) P.B.Hamilton (in Hamilton & al. 1994: 309)
- ≡ *Luticola mutica* f. *ventricosa* (Kützing) Bukhtiyarova (in Bukhtiyarova 1995: 421)
- = *Navicula neoventricosa* Hustedt (in Hustedt 1964 [1966]: 612, fig. 1612 [first 4 illustrations])

Basionym: *Stauroneis ventricosa* Kützing, *Die Kieselschaligen Bacillarien oder Diatomeen*, p. 105, pl. 30: fig. 27, 1844.

Lectotype (here designated): BM 17826, original slide in the Kützing collection made from sample 24 and labelled ‘*Amphora atomus* – Nordhausen’. Fig. 13 illustrates a specimen from this slide representative of the type.

Registration (of the lectotypification): <http://phycobank.org/105203>

Type locality: Nordhausen, Thuringia, Germany.

Description: Valves weakly asymmetrical, slightly bent, lanceolate-elliptic with clearly convex margins. Valve apices protracted, capitate to mostly rostrate in smaller specimens. Valve dimensions (n=25): length 12–18 µm, valve width 5.5–6.5 µm. Axial area narrow, linear, weakly widening near central area. Central area forming a wide, asymmetrical, bowtie-shaped stauros, bordered by 3–4 isolated round areolae on each side. Internally, central nodule thickened forming a stauros. One buciniportula present at the end of a short stria in the central area. Internally, buciniportula semilunate. Raphe branches straight to weakly curved, filiform. Central raphe endings unilaterally bent, away from the buciniportula. Terminal raphe fissures hooked, relatively long, occasionally shorter and then deflected. Striae uniseriate, composed of 3–4 rounded to elongated areolae, 19–22 in 10 µm. Areolae decreasing in size from the valve margin towards the axial area. Internally, areolae occluded by strip-like continuous perforated, hymenes.

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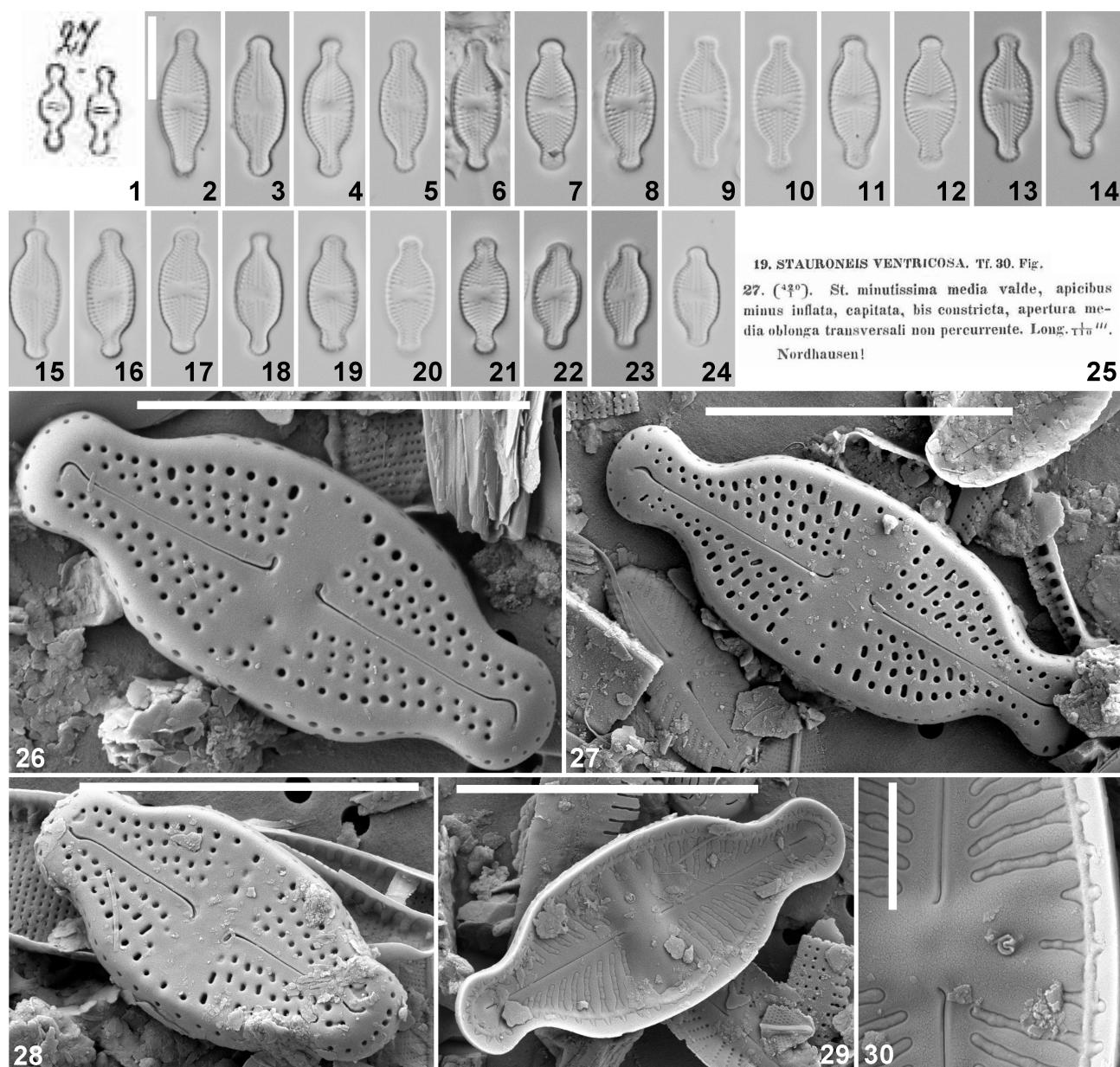
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Figs 1–30. *Luticola ventricosa* (Kützting) D.G.Mann LM and SEM pictures taken from the lectotype slide and material (slide BM 17826, Kützting sample 24, Nordhausen, Thuringia, Germany). **Fig. 1** Original drawings of *Stauroneis ventricosa* Kützting taken from Kützting (1844, pl. 30: fig. 27). **Figs 2–24** LM views of a size diminution series. **Fig. 25.** Original description of *S. ventricosa* taken from Kützting (1844, p. 105–106). **Figs 26–28.** SEM external views of three valves showing the variability in the terminal raphe fissures. **Fig. 29.** SEM internal view of an entire valve. **Fig. 30.** SEM internal detail of the buciniportula and the hymenes covering the striae. Scale bar = 10 μ m, except for Fig. 30 where scale bar = 2 μ m.