

Rediscovery, lectotypification and epitypification of the marine diatom *Licmophora aurivillii* Cleve (*Licmophoraceae*, *Fragilariophyceae*)Christopher S. Lobban¹¹*Division of Natural Sciences, University of Guam, Mangilao, GU 96923, USA* (correspondence: clobban@triton.uog.edu)

Licmophora aurivillii Cleve (1901: [29] 58, text-fig. 2; Fig. 1) was described from the Malay Archipelago littoral zone, “Gaspar Sound, Sumba, Timor, Semau Sound, Langkäss, not rare,” i.e., several islands along the southern edge of Indonesia. Cleve received material via Prof. Johan Hjalmar Théel, on loan from the Rijksmuseum of Stockholm (Cleve 1901: [2]), collected by [Carl W.S. Aurivillius \(1854-1899\)](#), a plankton zoologist at Uppsala University who had died unexpectedly on his way back from the expedition. A 2010 search of the cryptogamic and fossil collections for *L. aurivillii* by staff at the Swedish Museum of Natural History (Stockholm) did not locate either a type slide or the remainder of Aurivillius’s material (Lobban & al. 2011). The species we were comparing it to, *L. flucticulata* Lobban, Schefter & Ruck (2011: 15, figs 1–24), is also very long and spatulate but the frustules are tightly appressed into fans, and the narrow basal portion is strongly undulate. At that time, we thought Cleve’s species might be unknowable, but it was easily recognized in a sample of seaweed epiphytes from Singapore, collected by Manfred Voigt in 1937 and shared with [Robert Ross \(1912–2005\)](#) at the then British Museum (Natural History) (**BM**). This cleaned material is one of the few Voigt samples still in existence; I tell that story in a tribute to Voigt’s life and work (Lobban 2026). A second population was found in a sample from W. Kalimantan, Indonesia, part of the Risjani & al. (2021) collections.

The material of sample S.111 at **BM** had been acid cleaned. A portion was cleaned again using my standard protocol (Lobban 2025) and both were observed in a PhenomWorld XL G2 desktop scanning electron microscope (SEM) and a Nikon 80i light microscope (LM) with DIC and phase contrast. Two entire specimens and many fragments were observed in SEM, and several fragments in LM; an epitype was selected from the latter. Specimens were also found in a sample (SZCZ26967 stub 2021, GUAM Diatoms accession number 702021) from the Risjani & al. (2021) study, a *Padina* seaweed sample, LM4-2, coll. A. Witkowski, 17 Feb. 2020, Lemukutan Island, West Kalimantan, Borneo, Indonesia, 0.73222° N, 108. 71917° E (about 540 km due east of Voigt’s site). Terminology follows Lobban & al. (2018).

Licmophora aurivillii Cleve 1901: 29, 58, text-fig. 2 (reproduced here as Fig. 1)

Description: Entire valves 625–705 µm long, spatulate, wider portion to ca. 250 µm long (Figs 2–10; Table 1). Width varied in wider portion, from apex 9–10 µm, narrowing slightly to 7–8 µm, then broader portion 12–13 µm wide, decreasing to 5 µm wide in long stem, finally increasing to 10 µm across basal pole. Striae parallel except radiate around apex, 33 in 10 µm throughout, lacking vimines except near base and often becoming shredded by acid cleaning (Figs 11, 12). Apical rimoportula large, labiate, short stalked, on valve–mantle boundary (Figs 2, 3, 6, 13, 14). Basal pole slightly asymmetrical with sternum straight and rimoportula on one side of it but not consistently left and right (Figs 15–17). Moderately large basal rimoportula without labia (Fig. 17). Multiscissura with about 52 slits (Figs 15–17). Copulae: Valvocopula (VC) midrib thickened near and around apex, but not constituting a septum, somewhat abvalvar of middle of band at apex; apex porate, the rest rimate (Figs 18, 19). Path of midrib could not be traced towards open end. The 1st and 3rd pleurae could not be identified except in the apical profile (Fig. 9). The 2nd pleura was distinguished from the VC by lack of thickening on midrib, and pattern of rimae + pores on each side of central midrib (Fig. 20). All bands generally rimate, i.e., with slits

rather than pores on each side of midribs. General character of the 4th pleura – whether wide throughout or an apical cap with narrow band – could not be positively identified but a specimen tapering rapidly suggests it may be wide at apex but not a cap (Figs 21–23).

Lectotype (here designated): Cleve (1901: text-fig. 2 [p. 58], reproduced here as Fig. 1)

Epitype (here designated for above lectotype): Specimen at 10.1 mm E and 9.7 mm S of mark on slide “VOIGT Singapore slide 1” prepared from Ross Collection, **BM**; coll. Voigt, September 1937, S.111, “Off floating algae at high tide, Sea View Hotel, Katong. Rich in *Licmophora*, *Cocconeis*, *Mastogloia*, etc.” ca. 1.2968° N, 103.9044° E. Fig. 3.

Additional specimens: on stub 2216. Slides and stubs prepared by C. Lobban in 2026.

Registration of lectotype and epitype: <http://phycobank.org/106997>

Cleve’s drawings of *Licmophora aurivillii* seem to have been made from a wet mount, because of the presence of plastids and the girdle band view characteristic of the genus. The shape of the wide portion does not show a clear narrowing and widening from the apex, but the outline is somewhat undulate and the basal pole notably wider than the stem; the length: width proportion is not well represented (compare Fig. 8). The stated length was 0.8 mm, which is extreme for *Licmophora* but comparable to *L. fluticulata*; entire specimens measured here were 625–705 µm long. Thus, while the drawings are rather vague, they do seem to fit the present specimens, which are from the same region. I am confident in identifying the Singapore and Indonesia specimens as *L. aurivillii*.

Cleve’s description makes no mention of colony formation. However, *Licmophora* spp. are often colonial, and the cells tend to separate within a day from the mucilage stalks, so that it is likely that *L. aurivillii* has arbuscular colonies like those in the comparable species and in the widespread species *L. flabellata* (Greville) C. Agardh.

I re-examined stubs of *L. fluticulata* to search for copula characters that were overlooked in 2011 and here show the apical portion of the VC (Figs 24, 25). As with *L. aurivillii*, it was still not possible to trace bands for the length of the cell. These images confirm that the midrib thickening seen in *L. aurivillii* is absent in *L. fluticulata*. Other differences between these species are the colony formation, undulate stem and presence of regular vimines in most of the basal portion in *L. fluticulata*. Major similarities are the length and spatulate shape of the valves, the prevalence of striae without vimines and the prominent apical rimoportula.

Two other long species in Guam share the lack of vimines in parts of the valve. In *L. comnavmaria* Lobban & Scheffer, vimines are absent throughout the wider portion but present in more of the basal portion than in *L. aurivillii*. It has a uniformly tapering valve with much finer striae in the apical portion than the other species compared. However, *L. comnavmaria* is unusual in sharing the character of intercalary rimoportulae well known in *L. flabellata* and, also like *L. flabellata*, there are two spines on the valve apex, but it differs markedly from *L. flabellata* in having numerous small plastids (like most *Licmophora* spp.). *Licmophora labianatis* Lobban, Tharngan & Ashworth lacks vimines only in a short section just below the wider apical portion.

Two European species with most striae lacking vimines were shown by Honeywill (1998): *L. hyalina* (Kützing) Grunow and *L. communis* (Heiberg) Grunow, both < 60 µm long. There are two small *L. hyalina* simulacra in Guam—still awaiting description—that also lack vimines.

Although three large species resembling *L. aurivillii* in several characters have been described from Micronesia in the last 15 years, Cleve’s species has not been observed here. Elsewhere species with reduced vimines are small, e.g., in Europe. Although there were many specimens of *L. aurivillii* in both the Voigt and Risjani samples, making it seem common, it is almost certainly colonial, but

colonies have been very rarely collected. This is also true of *L. comnavmaria* and *L. labianatis*, which have been collected several times in Guam but not frequently. For *L. flucticulata*, the unique colony formation and growth habit along the edges of *Halimeda* fronds make it easy to recognize in the field, but this is not so for the other species compared here. Lobban & Santos (2022) made a case for at least broad-scale regional endemicity in the *Licmophora* floras of the Western Pacific (broadly taken) and Europe. Risjani & al. (2021) showed that Indonesian coral reef habitats have “exceptionally high” species richness and biodiversity of diatom assemblages, implying that there will be species there that do not occur elsewhere. Proving endemicity of a single microscopic taxon is impossible, but perhaps the large, shredded species are a Western Tropical Pacific cluster. Fortunately, Indonesian diatomists are extending the work on their floristics and taxonomy (e.g. Arsad & al. 2026, Luthfi & al. 2024a, b).

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Table 1. Characters of the *Licmophora aurivillii* and comparable long species having some striae lacking vimines.

Character	<i>L. aurivillii</i> * = from Cleve	<i>L. flucticulata</i> Lobban & al. (2011)	<i>L. comnavmaria</i> Lobban & Schefter (2013)	<i>L. labianatis</i> Lobban & al. (2018)
Mucilage stalk	unknown	short, multistranded pedestal	long, multi-stranded, branched	long, single-stranded, branched
Colony form	unknown	tightly adherent into fan-shaped blades	arbuscular	arbuscular
Plastids	apparently numerous discoid (from fixed material) *	numerous lenticular	numerous lenticular	numerous lenticular
Valve shape	spathulate with narrow, elongate straight “stem,” broad basal pole	spathulate with narrow elongate wavy “stem,” broad basal pole	uniformly attenuated	clavate-spathulate
Valve length (µm)	625–705 [800*]	450–850	215–285	311–365
Max. valve width (µm)	12–13 [20*] (apical); 10 (basal)	10–14 (apical) 8–9 (basal)	13–14 (apical) 8–9 (basal)	16–19 (apical) 6–7 (basal)
Striae orientation	parallel, except radiating, dichotomous around apex; radiate at base	parallel, except radiating, dichotomous around apex; radiate at base	parallel, except radiate around apex	parallel, except radiating, dichotomous around apex
Striae in 10 µm head pole / basal pole (if diff.)	32 / —	37–38 / 34	53–55 / 36–40	32–35 / —
Areolae in 10 µm	generally lacking vimines, except sometimes along margins; to 34 near base but vimines irregular	apex: lacking vimines; base: ca. 45	apex: lacking vimines base: ca. 44	apex: 14–16; base: ~30; patch lacking vimines between “blade” and “stem” of spatula
No. of head rimoportulae per cell	1	1	2 (plus 10–15 intercalary along sternum)	1
Head rimoportula	on valve face–mantle, short stalk, broad labia	on valve mantle; short stalk, broad labia	on valve face; oval, sessile	on valve mantle, short stalk, broad labia
Basal rimoportula (all perpendicular to valvar plane)	medium wide, oval, sessile	narrow, oval, sessile	wide, oval, sessile	narrow, oval, sessile
Head spines	0	0	2	0
Number of multi-scissura slits	52	40	ca. 50	34–41
Valvocopula septa	none: thickened rib for ~20 µm from apex	none (barely thickened)	none	narrow

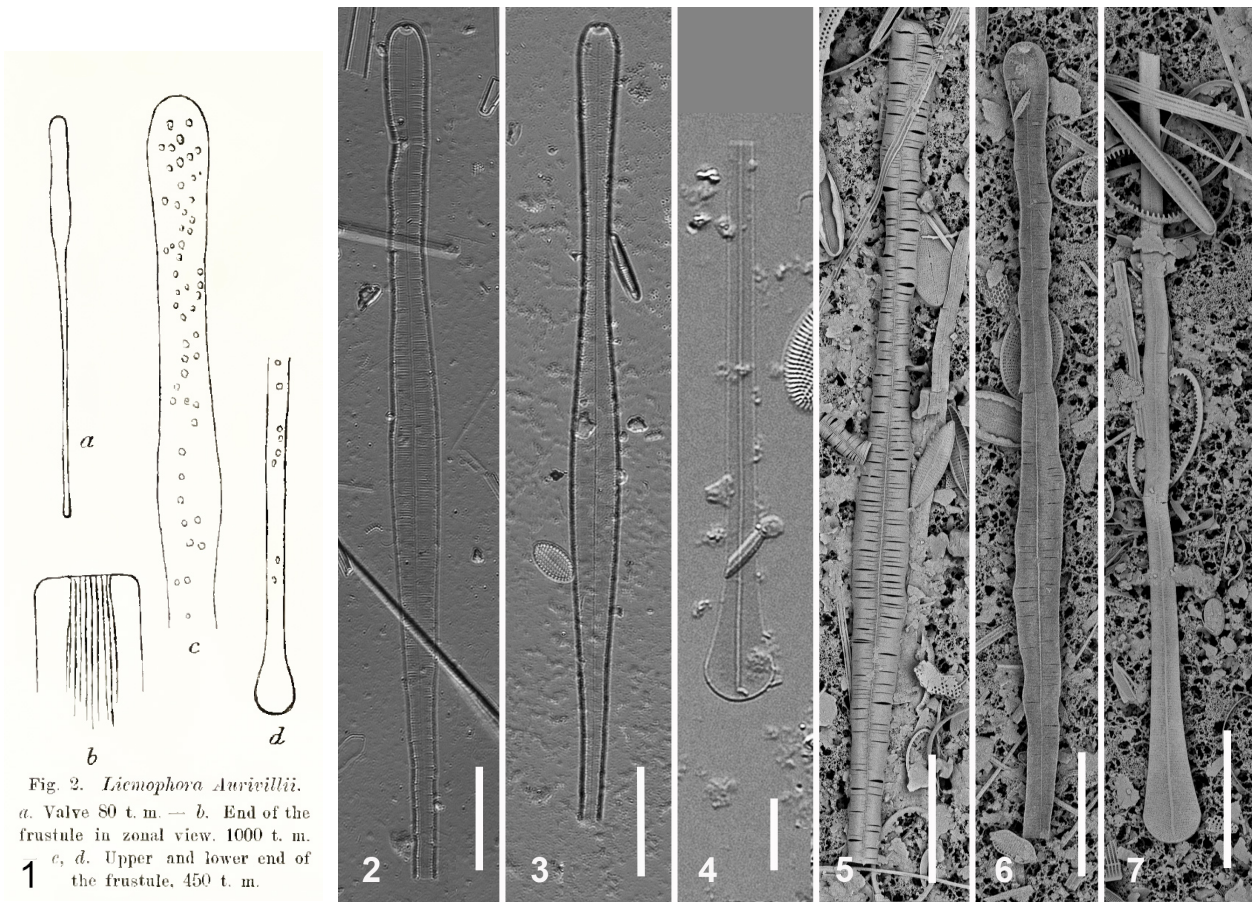
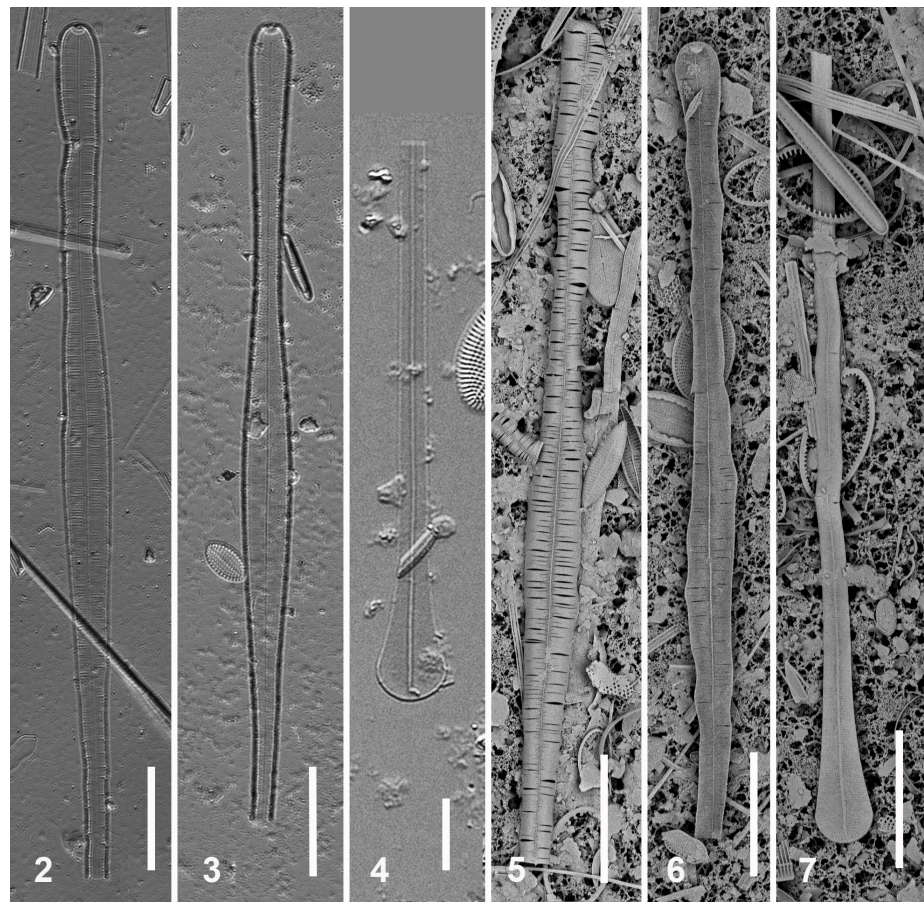
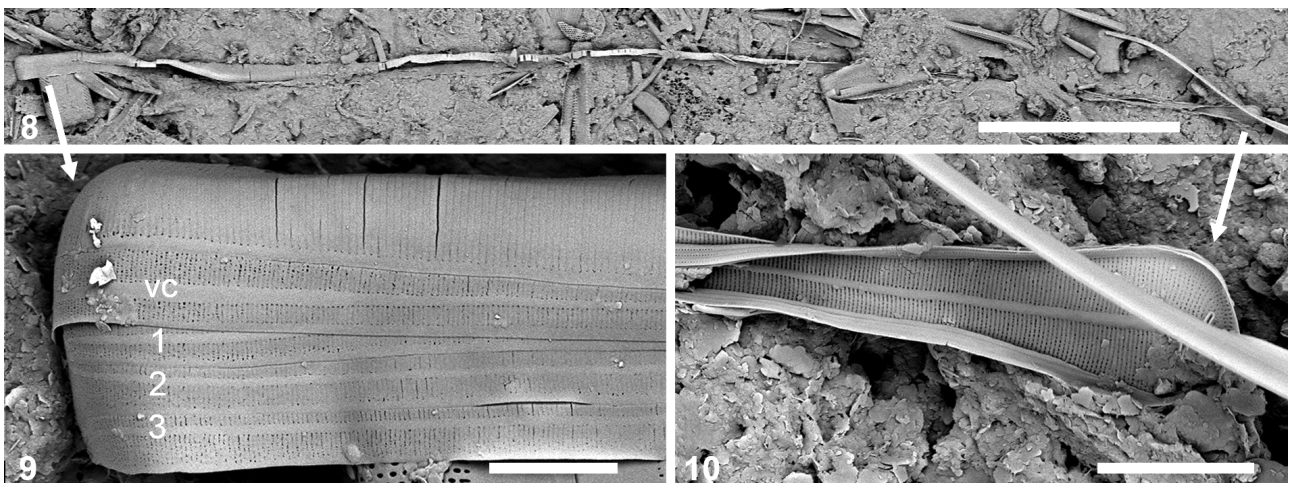


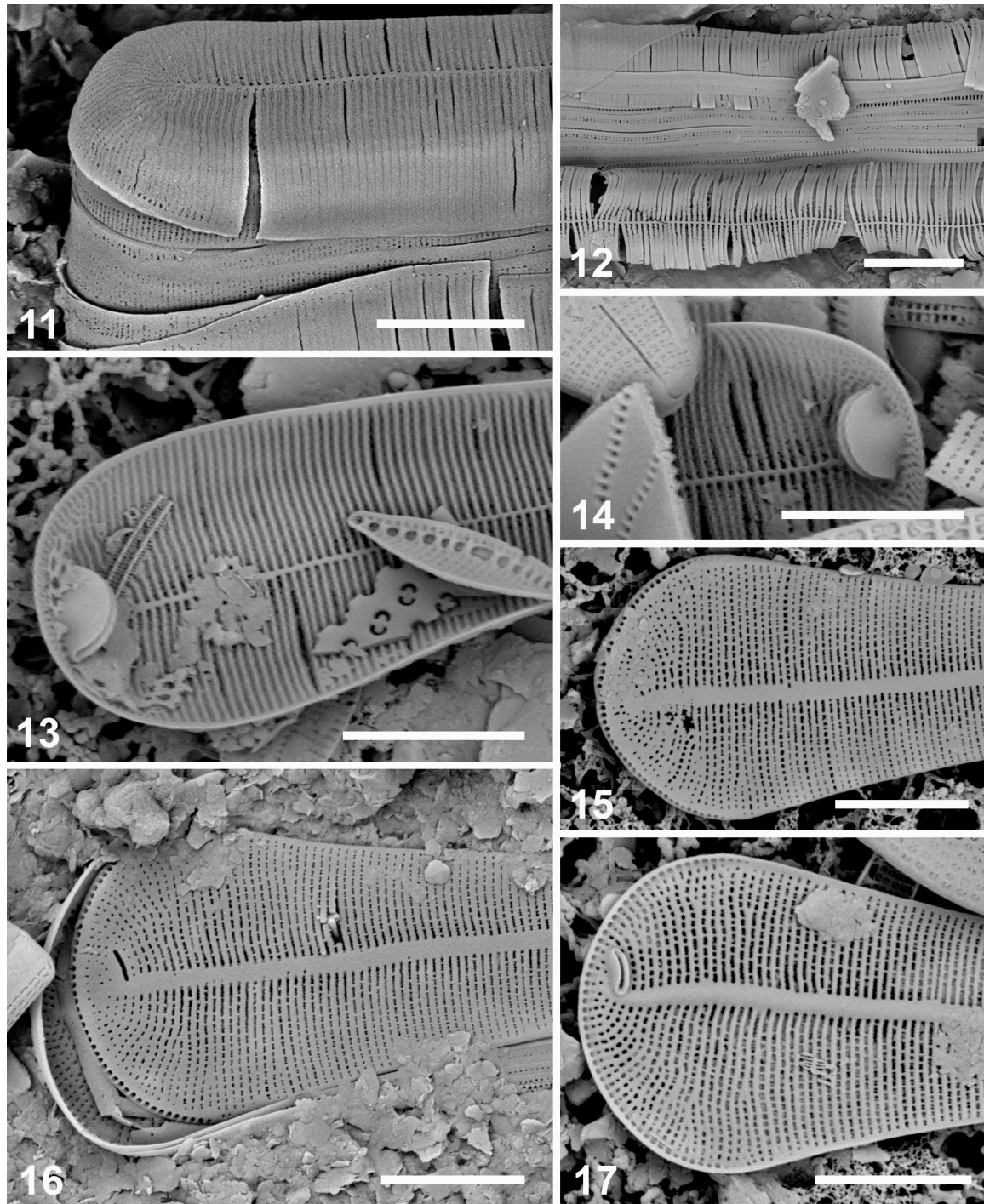
Fig. 2. *Licmophora aurivillii*.
 a. Valve 80 t. m. — b. End of the frustule in zonal view. 1000 t. m.
 1 c, d. Upper and lower end of the frustule. 450 t. m.



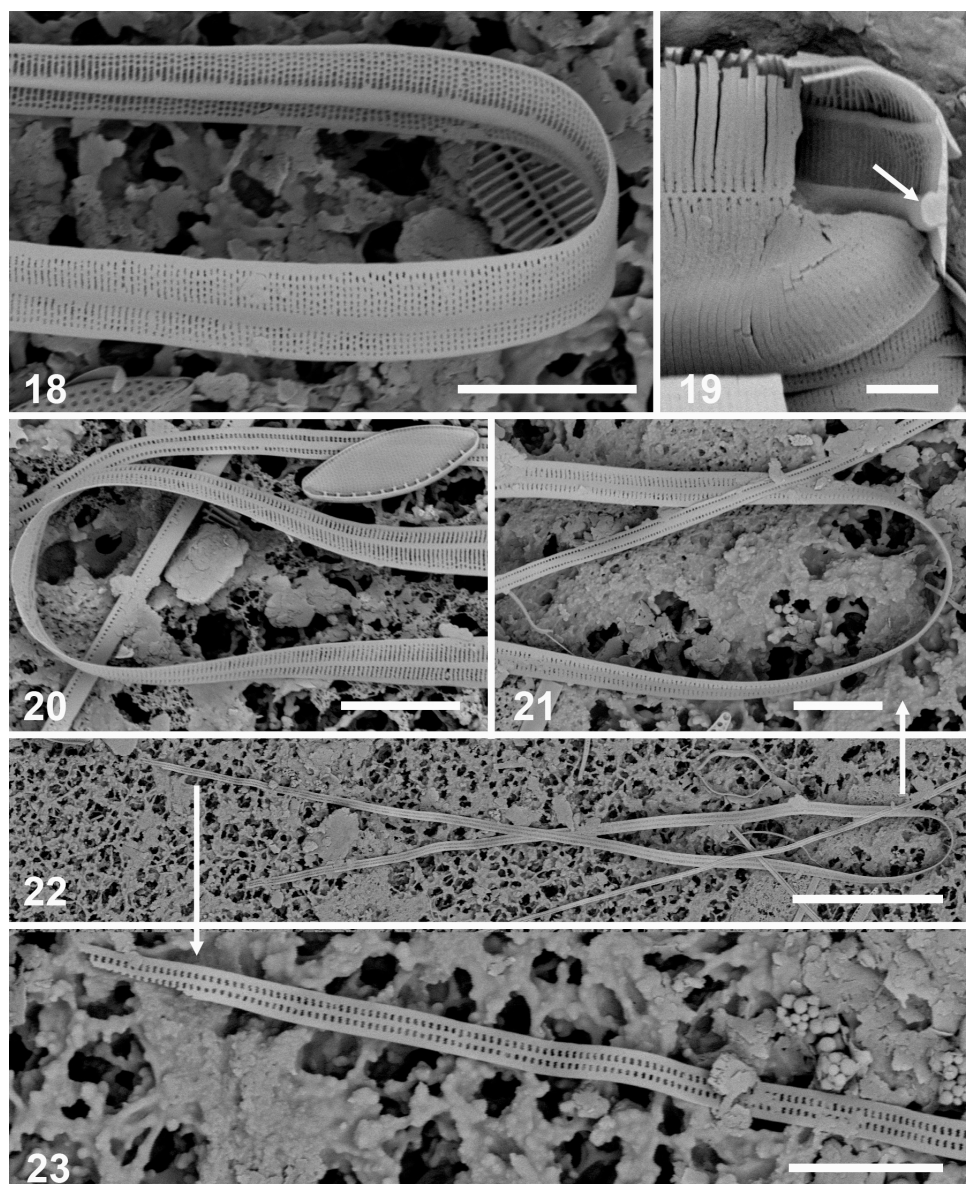
Figs 1–7. *Licmophora aurivillii*. **Fig. 1.** Lectotype: drawings from Cleve (1901, text-fig 2, p. 58). Public domain. **Figs 2–7.** Images of apical (Figs 2, 3, 5, 6) and basal (Figs 4, 7) fragments in LM (Singapore) and SEM (Indonesia). Head-pole fragment in Fig. 3 designated as epitope. Scale bars 25 μm except Fig. 3 = 10 μm .



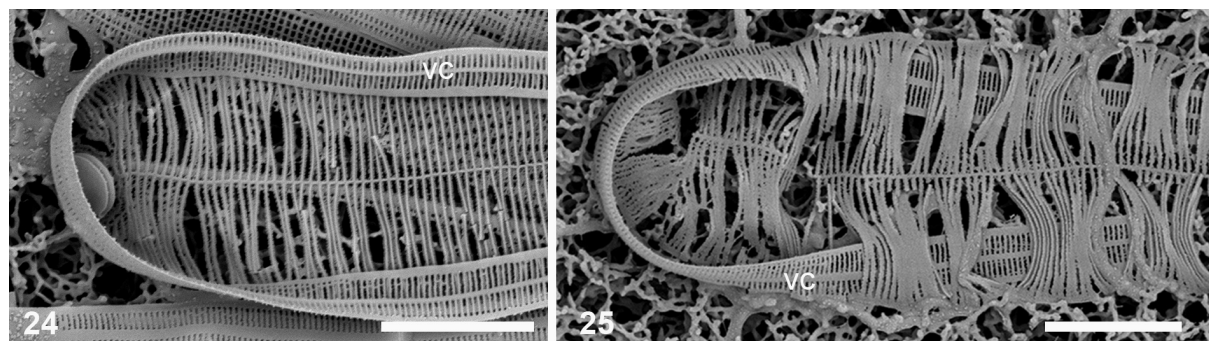
Figs 8–10. *Licmophora aurivillii*. SEM view of entire valve ($L = 625 \mu\text{m}$) with some attached girdle bands (Fig. 8), with details of apical pole (Fig. 9), girdle bands labelled (vc = valvocopula, 1, 2, 3 = 1st, 2nd, 3rd pleurae), and basal pole internal face (Fig. 10) (Singapore sample). Scale bars: Fig. 8 = 100 μm , Fig. 9 = 5 μm , Fig. 10 = 10 μm .



Figs 11–17. *Licmophora aurivillii* valve structure, SEM. **Fig. 11.** Apical pole showing radiate striae from end of sternum. **Fig. 12.** Mid-portion of frustule showing shredding in acid-cleaned material. **Figs 13, 14.** Apical pole interiors showing prominent rimoportula on short stalk. **Figs 15–17.** Basal poles without (16) and with (16, 17) rimoportula; 15, 16 external, 17 internal showing sessile rimoportula. Figs 11, 12, 15, 16 Singapore specimens, Figs 13, 14, 17 Indonesian. Scale bars = 5 μ m.



Figs 18–23. *Licmophora aurivillii* girdle bands, SEM. **Fig. 18.** Apex of valvocopula showing porate striae. **Fig. 19.** Broken apex of frustule showing cross section of thickened valvocopula midrib (arrow). **Fig. 20.** Apex of 2nd pleura. **Figs 21–23.** Possible 4th pleura (Fig. 22) with details of apex (Fig. 21) and broken end, already narrow (Fig. 23). Scale bars: Fig. 22 = 25 μm , Figs 18, 20, 21, 23 = 5 μm , Fig. 19 = 2 μm .



Figs 24–25. *Licmophora flucticulata* (Guam) valve apices showing valvocopula (vc). Scale bars = 5 μm .