Geissleria tahitiensis sp. nov. (*Cymbellaceae*, *Bacillariophyceae*), a common diatom in Society Islands rivers

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After investigations on freshwater diatoms of Tahiti and Moorea islands, Coste & Ricard (1990) characterised a taxon new to science, *Navicula ignota* var. *tahitiensis* Coste & Ricard, 1990, referring it to the section *Annulatae* Hustedt, 1937 of *Navicula* Bory, 1822. This new variety of *N. ignota* Krasske, 1932 was distinguished based on a greater length and a non-undulated shape. The section *Annulatae* was based on the presence at each side of the distal ends of raphe branches of few rows of enlarged slit-like areolae with small teeth on the inner side of the valve. This feature is called an annulus and its function may be excretion of mucus. Mainly on the basis of this distinctive morphological characteristic, the section *Annulatae* was erected as a new genus, *Geissleria* Lange-Bertalot & Metzeltin, 1996, and *N. ignota* var. *tahitiensis* was transferred to *Geissleria* as *G. schoenfeldii* var. *tahitiensis* (Coste & Ricard) Lange-Bertalot 1996, in accordance with apically taller areolae and the absence of clearly separated areolae on the mantle, from the valve face (Lange-Bertalot & Metzeltin 1996).

However, as noted by Coste & Ricard (1990), and confirmed by our investigations with scanning electronic microscopy on material collected in 2018, there is a clear difference from *G. schoenfeldii* and some other related taxa such as *G. ignota* (Krasske) Lange-Bertalot & Metzeltin 1996 and *G. cummerowii* (Kalbe) Lange-Bertalot 2001 (Lange-Bertalot & Metzeltin 1996, Lange-Bertalot 2001): the presence of a pore at one side of the central nodule (Table 1, Figs 22-25). Differences between *G. schoenfeldii* var. *tahitiensis* and other known closely related *Geissleria* species, listed in AlgaeBase (Guiry & Guiry 2022), are compiled in Table 1. Species with a different, somewhat indiscernible, annulus system (e.g. *G. bourbonensis* Le Cohu, Ten-Hage & Coste, *G. creolorum* Le Cohu, *G. mafatensis* Le Cohu, Ten-Hage & Coste, *G. mascarenicensis* Le Cohu, Ten-Hage & Coste, Le Cohu & al. 2009), or without central pore, except for previously considered related taxa (see above), have been excluded from the comparison. We propose therefore to treat *G. schoenfeldii* var. *tahitiensis* as a species.

Additionally, the name *Navicula ignota* var. *tahitiensis* Coste & Ricard, published after 1 January 1990 is invalid, as no type was designated (Guiry 2023; Turland & al. 2017, Art. 40.6). Consequently, the name *Geissleria schoenfeldii* var. *tahitiensis* (Coste & Ricard) Lange-Bertalot, is also invalid. We propose to create the following new species.

Geissleria tahitiensis Gassiole & O.Monnier *sp. nov.* (Figs 2-25)
Designation (in synonymy): "*Navicula ignota* var. *tahitiensis* Coste & Ricard", *In* Ricard M. (ed.) *Ouvrage dédié à la Mémoire du Professeur Henry Germain (1903-1989)*, p. 44, figs 2/12, 13; 6/12-14, 1990.
Holotypus: Slide PC0677383 in Museum National d'Histoire Naturelle, Paris (**PC**) (Fig. 5 repesents the holotype)
Registration: http://phycobank.org/103829
Etymology: the epithet "*tahitiensis*" refers to the island of Tahiti, where is the type locality.

Type locality: Stones in a lentic stretch of the lower Vaiha River (14 m.a.s.l.), Tahiti, French Polynesia (Fig. 1), 26 August 2018, leg. Laëtitia Bisarah.

Table 1. Morphometry of *Geissleria* species considered historically as close relatives of "*Navicula ignota* var. *tahitiensis* Coste & Ricard" and of other species with similar features. After Novais & al. (2013), Lange-Bertalot (2001), Kulikovskiy & al. (2012) and Coste & Ricard 1990.

Taxon	**Valve shape; apices shape**	**Length** (µm)	**Width** (µm)	**Striae** (/10 µm)	**Central pore**	**Annulus** rows/areolae
G. cummerowii (Kalbe) Lange-Bertalot 2001	linear-elliptical to elliptical; very slightly or not protracted	8–17	4–6.5	14–16	no	2/?
G. hinziae Novais & Ector 2013	elliptical to linear-elliptical; slightly protracted	11,3–15.7	4.8-5.7	15–18	yes	2/1-2
G. ignota (Krasske) Lange-Bertalot & Metzeltin 1996	linear with slightly triundulate margins; protracted, slightly or not capitate	17–25	4.5–5	12–14	no	2/2–3
G. lusitanica Novais & Ector 2013	linear-elliptical to elliptical; slightly protracted to protracted	11.3–17	5–5.9	14–15	yes (2)	2-3/2–3
G. matrioschka Kulikovskiy, Metzeltin & Lange-Bertalot 2012	rhombical-elliptic; obtusely rounded, almost truncated	11.6–12.7	4.5–4.7	15–17	yes	2/?
G. ovisimilis Kulikovskiy, Metzeltin & Lange-Bertalot 2012	linear-elliptical to elliptical; broadly rounded	10. 7-18. 7	4. 7-6	10–11	yes	3/3
G. paludosa (Hustedt) Lange-Bertalot & Metzeltin 1996 (morphotype I)	linear to linear-elliptic slightly protracted, rounded	14-28	5-7	13–18	yes, usually	2-4/2–4
G. schoenfeldii (Hustedt) Lange-Bertalot & Metzeltin 1996*	elliptic-lanceolate to elliptical; broad round	11.3–18.3	6.3–6.7	13–14	no	2/1–3
"N. ignota var. *tahitiensis* Coste & Ricard 1990"	linear-elliptical to elliptical; not to slightly protracted, rounded	16.5–20	5–5.8	12–13	yes	2-3/3–6

*Morphometry based on the type material examination of *Navicula schoenfeldii* Hustedt 1930 by Novais & al. 2013.

Description (on the basis of LM and SEM observations):

Length: 9.2–22.9 µm, width: 4.5–6.3 µm, striae: 11–16 in 10 µm. Frustule in girdle view narrow, rectangular. Valve shape elliptical in small individuals to linear-elliptical in big ones, with broad rounded apices, not to slightly protracted. Valve plan flat. Mantle shallow. Valve plan/mantle transition rounded, fairly marked. Striae extending on the valve plan to the valve plan/mantle transition by two to three areolae, with a more or less clear interruption at the valve plan/mantle transition. At the level of the central area, more or less perpendicular to the apical axis, one to three more or less shorter striae, linear to weakly arcuate. Following striae slightly radiating and arcuate. Striae appearing as a weak furrow externally, deeper internally. Areolae openings apically elongated, very thin. Sometimes, one to three randomly oriented and shaped areolae at the apices of the valve, after the annulus. Annulus composed of two to three rows of three to five -exceptionally seven in larger individuals- more elongate and larger slit-like areolae. Annulus rows prolonged by clearly separated normal striae of a few areolae, extending only on the mantle, except for larger individuals. 70 to 80 areolae in 10 µm. Virgae larger than striae. Axial area (sternum) narrow, linear-lanceolate, with laterally expanded central and distal nodules. Inside of the valve, raphe sternum slightly prominent. Central area expanded laterally,

rectangular, bordered by one to three shorter striae. One central pore, at the secondary side of the central nodule, with a round to slightly elongated opening externally. Raphe branches coaxial, filiform, straight to weakly arcuate. Helictoglossae slightly prominent inside. Central raphe endings weakly expanded and somewhat deflected towards the primary side externally, straight and slit-shaped internally. Terminal fissures hooked externally, sometimes forked, turned towards the primary side at the valve plan/mantle transition.

Distribution: *G. tahitiensis* is presently known only from Tahiti and Moorea islands in French Polynesia.

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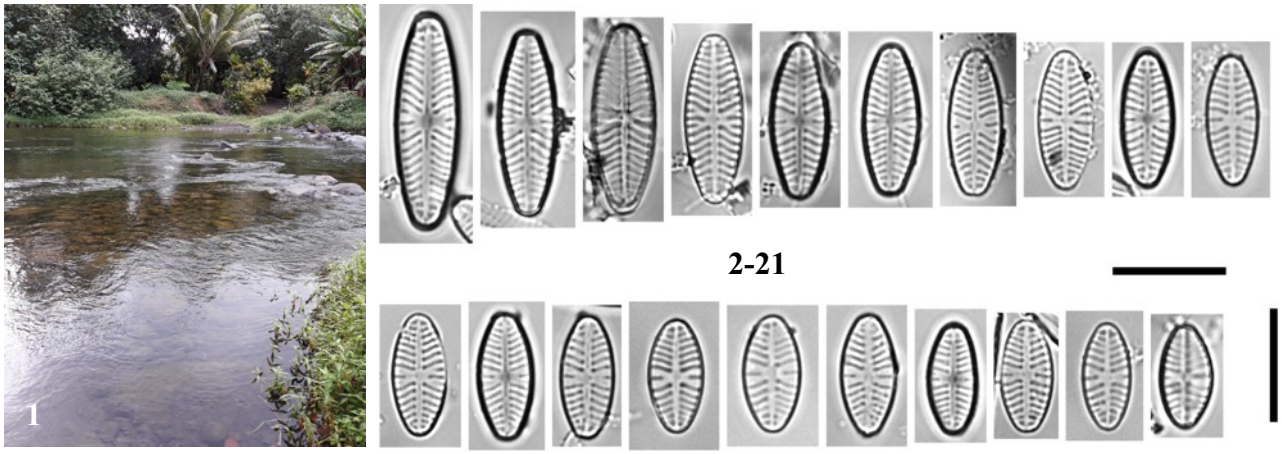
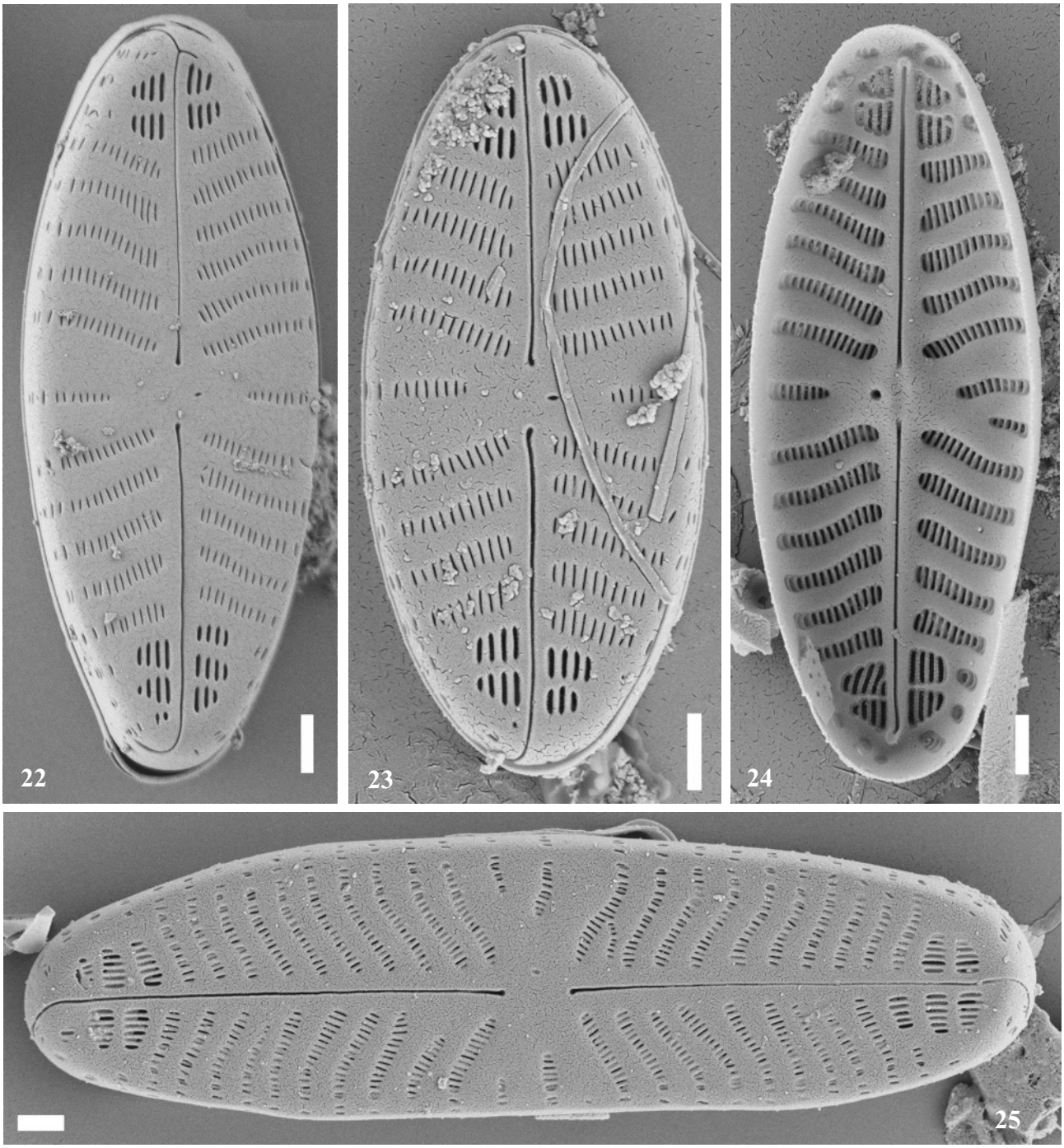


Figs 1-21. ***Geissleria tahitiensis*****. Fig. 1.** The type locality in the lower Vaiha river, Tahiti, French Polynesia, 2018. Photograph by Laëtitia Bisarah. **Figs 2-21.** LM micrographs of the type population. Fig. 5 represents the holotype. Scale bars = 10 µm.



Figs 22-25. *Geissleria tahitiensis* SEM micrographs. Figs 22, 23, 25. External valve views. Fig. 24. Internal valve view. Fig. 22. Vaitepiha River, Tahiti, 2018. Fig. 23. Vaiare River, Moorea, 2018. Figs 24, 25. Afareaitu River, Moorea, 2018. Scale bars = 1 µm.