



External ultrastructure of *Progonoia diatreta* sp. nov. (Bacillariophyta, Scoliotropidaceae) differs from *P. musca* and *P. intercedens* comb. nov.

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Abstract

Navicula musca was described by Gregory in 1857 as having moniliform areolae in unbroken striae; a detailed ultrastructural study by Schrader, who transferred the species to *Progonoia* in 1971, was consistent with the original description. However, going back at least to Peragallo & Peragallo at the turn of the 20th century, the same species has been described as having alveoli with fine puncta around the edge and a longitudinal break in the striae. I found examples of both forms in a collection of calcareous sand from Guam, examined them with light and scanning electron microscopy, and also examined authentic material of *N. musca* in the light microscope. I conclude that one of these taxa is consistent with *N. intercedens*, which must be removed from synonymy with *P. musca*, and that the form with the fine puncta is an undescribed species not previously observed ultrastructurally. This species, *P. diatreta* sp. nov., has an internal valve structure that clearly places it in *Progonoia*, but an external structure quite different from that of its congeners.

Key words: coral reefs, diatoms, Guam

Introduction

One of the many genera that have been split off *Navicula* Bory de St. Vincent (1822: 128) in modern times is *Progonoia* Schrader (1969: 58), which has several fossil species, for instance in the Oamaru diatomite, as well as a few rare, extant species (Schrader 1969, 1971, Round *et al.* 1990). The key characters of *Progonoia*, as seen in SEM are i) the distinctive internal aspect of the alveolae, bounded internally by a delicate membrane that has tiny pores along the edges where it abuts onto the valve margin and onto the axial area, ii) the alveoli have two chambers divided by a partition that forms a longitudinal rib, and iii) internal raphe slits ending centrally in a “small ‘beak’ resembling 2 helictoglossae back-to-back” (Round *et al.* 1990: 550).

One extant species now included in *Progonoia* is *P. musca* (Gregory) Schrader 1971: 922 [= *Navicula musca* Gregory 1857: 7 = *Oestrupia musca* (Greg.) Hustedt 1935: 17; including *N. intercedens* A. Schmidt in Schmidt *et al.* 1890: pl. 160 according to Schrader (1971)]. Gregory (1857, p. 476, pl. 9, fig. 6) figured and described the striae as moniliform, without a break in them (Fig. 1). The drawing in Gregory (1857) (by Greville) seems to correspond to the external SEM views shown in Schrader (1971, pl. 1 fig. 4), Navarro (1982, figs 101–105) and Round *et al.* (1990, pp. 550–551, figs b–d, species not identified), where alveoli open to the exterior by a few large pores. In contrast, Peragallo & Peragallo (1897–1908, p. 79–80, pl. 14, figs 14–16) and Hendey (1964, p. 228, pl. 29, fig. 17) described and illustrated the striae in this species as alveolae with fine puncta around the edges, and they showed a break in the striae. A break in the striae was also shown in A. Schmidt’s 1890 drawing (Schmidt *et al.* 1874–1959) (Fig. 1B), which is captioned ‘*N. musca* Greg. “typus!”’, indicating that he had seen the type specimen. So far as I can determine from Gaul *et al.* (1993), Henderson & Reimer (2003), and more recent literature, there are no SEM figures corresponding to this concept of *P. musca*.

In trying to determine the identity of two *Progonoia* species in a sample of sand from Guam, I came to suspect that there might be two species under the name *P. musca* and that the synonymy of *N. intercedens* was probably unjustified. The objective of this paper is to describe the two species, which have the key internal characters of *Progonoia* but differ greatly in external appearance, and to discuss this taxonomy.