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# Marine Diatoms of St. George Sound, the Northeastern Gulf of Mexico: II. *Neodelphineis pelagica* Takano (Diatomaceae, Bacillariophyceae)

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## SHORT PAPERS AND NOTES:

# MARINE DIATOMS OF ST. GEORGE SOUND, THE NORTHEASTERN GULF OF MEXICO: II. *Neodelphineis pelagica* TAKANO (DIATOMACEAE, BACILLARIOPHYCEAE)

The marine coastal diatom genus *Neodelphineis,* of the family Diatomaceae, was described from eutrophic estuaries of Japanese waters (Takano, 1982). *Neodelphneis pelagica* Takano, the only species in the genus, includes diatoms with linear-elliptical to rhombic-elliptical valves possessing transverse grooves on striae that are parallel but non-aligned across the hyaline axial area and a single fine pore (occasionally two pores) near each apex.

In the course of the study of marine diatoms of St. George Sound, the northeastern Gulf of Mexico, a number of rare or otherwise interesting diatoms were observed, including a new species of *Delphineis,* which has been named *D. livingstonii* (Prasad, 1986). The purposes of this paper are to record the occurrence of *Neodelphineis pelagica* in Gulf waters of the north Florida coast and to discuss its affinities with *Delphineis* Andrews. A description of the study area is given elsewhere (Prasad, 1986).

## MATERIALS AND METHODS

Samples were obtained by means of 2-min trawl collections with an 80-$\mu$m net. Diatoms were cleaned with boiling nitric acid and were mounted in Naphrax resin for observations with a Nikon Biological microscope fitted with phase contrast optics. For scanning electron microscopy, acid-cleaned diatom frustules were mounted on copper stubs, air dried, and sputter coated with gold-palladium. Coated specimens were examined with a JEOL scanning electron microscope operating at an accelerating voltage of 20 kv.

Terminology is that suggested by the Working Party on Diatom Terminology (Anonymous, 1975; Ross *et al.*, 1979).

## RESULTS

Observations of *Neodelphineis pelagica* Takano (Figs. 1-6)
Family *Diatomaceae*
Subfamily *Fragilarioideae*
*Neodelphineis pelagica* Takano 1982, p. 45-53

This species was described by Takano (1982) from eutrophic estuaries in Atsumi Bay, Fukuoka Bay, Dokai Bay, and the river Sumida in Tokyo, Japan. Our field samples from St. George Sound, northeastern Gulf of Mexico (29°55′N, 84°30.6′W) show little variation from the published account (see Table 1). Although frustules were observed only as solitary specimens in our collections, zigzag and stellate colonies similar to those of *Thalassionema nitzschioidea* were observed in plankton samples from Japanese marine waters (Takano, 1982).

The frustules are rectangular in girdle view. The valves are linear-elliptical or elliptical-lanceolate with lateral margins tapering with only slight curvature toward rounded apices (Figs. 1, 4-6). Length is 11.5-16.0 $\mu$m. Width is about 2.5 to 4.0 $\mu$m, with transverse striae formed by external grooves containing 2 or 3 round poroid areolae near the center, but reduced to 1 or 2 near the apices, with fifteen to nineteen transverse striae per 10 $\mu$m. The hyaline axial area is

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**Table I.** Characteristics of *Neodelphineis pelagica* Takano.

| | length (μm) | width (μm) | striae/ 10 μm | areolae/ stria | fine pore |
|---|---|---|---|---|---|
| Takano (1982) | 4.9-23.0 | 2.8-5.8 | 14-18 | 2-5 | 1-2 |
| Present study | 11.5-16.0 | 2.5-4.0 | 15-19 | 2-3 | 1 |

distinct but narrow. Transverse rows of areolae are not aligned across the hyaline axial area of the valve. The outermost row of areolae on the valve mantle and the areolae on the submarginal row of the areola and near the apices are

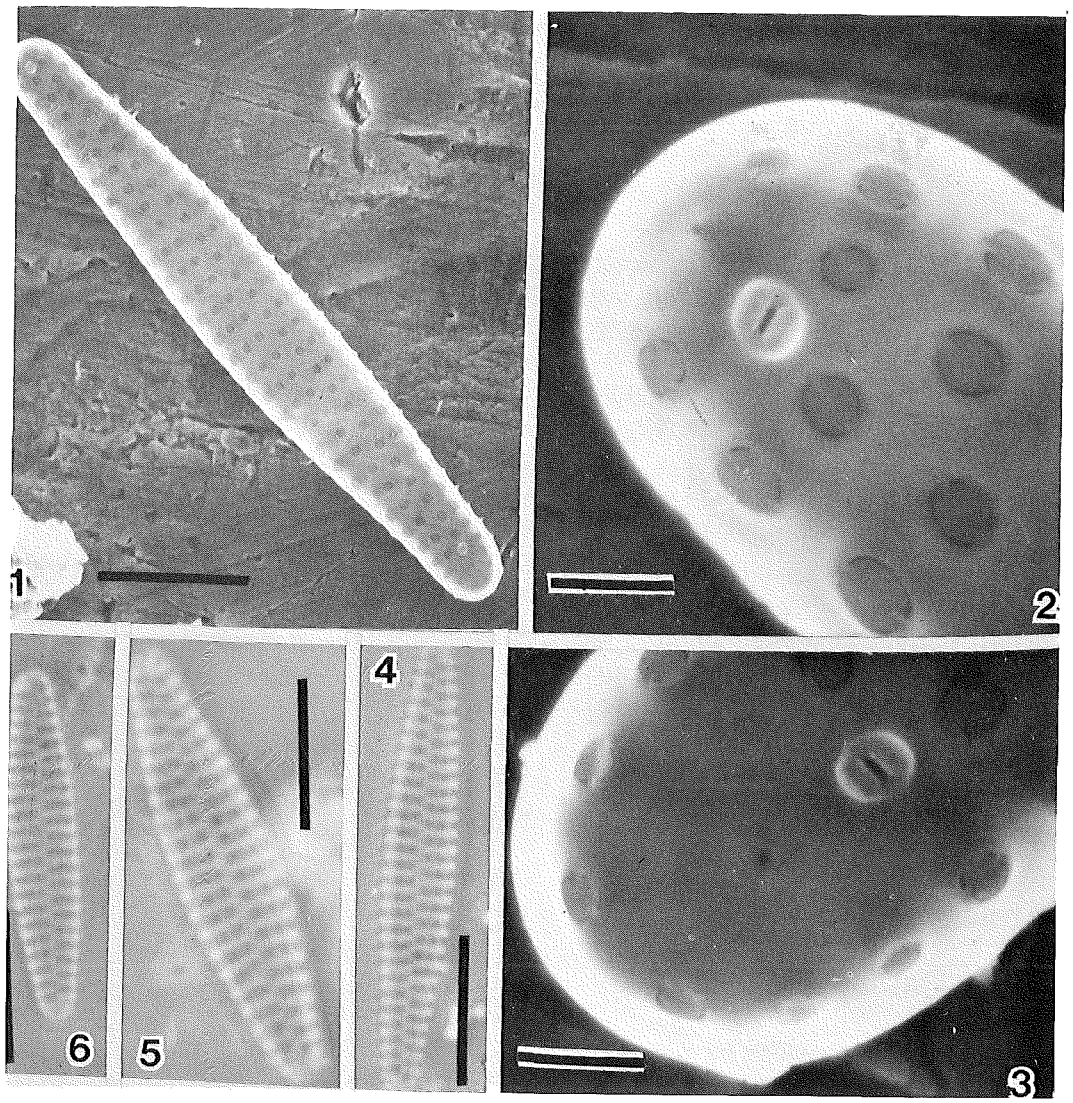


**Figure 1.** *Neodelphineis pelagica* Takano from St. George Sound, northeastern Gulf of Mexico. SEM photographs of the interior of the valve. Inset 1-3 show details of valve apices with a single rimoportula, rota type of velum on the areolae, and a single fine pore between the rimoportula and the valve margin. Scale bar, 1 = 5 μm, 2 and 3 = 0.5 μm. Inset 4-6, light microscope photographs of valve view; scale bar = 5 μm.

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roughly the same size and evenly spaced. The velum or sieve plate near the inside of the valve is simple, of the rota type apparently attached to the walls of the areolae by two strut-like thickenings parallel to the margin of the valve (Figs. 3 and 4). A single extremely small pore located between the apical margin and the labiate process penetrates the valve at each apex a short distance inside the row of submarginal areolae (Figs. 2 and 3). A single internal rimoportula (labiate process), circular in outline, is present in each end of the valve (Figs. 1-3), and the pair is usually arranged diagonally to the longitudinal axis. The rimoportula consists of two wide lip-like structures separated by a central, narrow slit. The raised transverse ribs or grooves are equipped externally with stubby spine-like projections on the margin of the valve directed outward. These may or may not have a regular distribution along the shoulder of the valve. The projections appear to be processes that function in some manner to link the frustules in chains.

In view of slight variations in dimensions, we rely heavily on evidence from valve proceses, areolar structure, and the presence of a single pore in identifying our specimens as *Neodelphineis pelagica.* Although we see minor differences (Table I) from the published account of the genus by Takano (1982), it is not clear that these differences are genetic or consistent; therefore they will not be recognized at the varietal level at present.

## DISCUSSION

The genus *Neodelphineis* appears to be closely related to *Delphineis* Andrews (1977). However, features such as non-alignment of transverse rows of areolae across the axial area and the occurrence of a single pore in the apical area seem to justify its separation into a distinct genus (Andrews and Stoelzel, 1984). It is of some interest to note that *Perissonoe* Andrews, a genus with radial symmetry but morphology similar to certain araphis pennate genera, shows a similar non-alignment of the rows of the areolae and occasionally a single fine apical pore (Andrews and Stoelzel, 1984). The rows of pores are not aligned across the hyaline axial area in *Neodelphineis.* This lack of alignment occurs in most of the species of *Rhaphoneis*, excepting species belonging to the lanceolate group, in which the rows are aligned.

The rimoportulae in *Neodelphineis* are located nearly diagonally across the apical axis, whereas they are in the tips of *Rhaphoneis*, nearly central to the angles. The rimoportulae in the genus *Neodelphineis* follow generally the "one per pole" pattern of Simonsen (1979); i.e. there is normally one process near each apex of a valve, as in *Delphineis* and *Rhaphoneis*. These terminal processes are located on opposite sides of the axial area, resulting in a diagonal symmetry.

The vela or sieve plates of *Neodelphineis* are rotae, located near the inside of the valve and apparently attached to the valve by pegs aligned parallel to the margin of the valve, closely analogous to those of the extant species of *Delphineis,* such as *D. surirella* (Andrews, 1982), *D. karsteni* (Fryxell and Miller, 1978), and probably *D. livingstonii* Prasad (1986), whereas it is of the vola type in *Rhaphoneis, Perissonöe,* and certain fossil species such as *D. biseriata* Andrews.

Apical pore fields are absent in *Neodelphineis,* which probably represents the reduced condition and close relationship to most species of *Delphineis,* which have no apical pore

fields.

Some specimens of *Neodelphineis* show some short stubby spines at the valve margin. Such spines have been observed in *Delphineis* species but not in *Rhaphoneis.* A single isolated fine pore at the apical region is seen in both *Neodelphineis* and *Perissonoe.* However, in *Neodelphineis* a single pore is seen internally between the valve margin and the rimoportula, suggesting that these pores may not be the external openings of internal rimoportula, whereas in *Perissonoe* a single isolated fine pore set apart from the apical pore field (pseudocellus?) is seen in occasional specimens (Andrews and Stoelzel, 1984). *Delphineis* shows two fine pores in the apical region, usually found just below the rimoportulae at the extreme end of the hyaline axial area.

## ECOLOGY AND DISTRIBUTION

*Neodelphineis pelagica* was reported to occur prominently in eutrophic estuaries in southern Japan during summer. It was common in Atsumi Bay every year from June to September and found abundantly in Fukuoka Bay in August (Takano, 1982). This species was frequently observed in coastal waters of St. George Sound and Choctawhatchee Bay, north Florida coast of the Gulf of Mexico, during December, January, and February. It has been reported to occur as a benthic diatom on the Texas coast of the Gulf of Mexico (Medlin, 1983). This pattern suggests that *Neodelphineis* is not an endemic far-eastern genus but more widely distributed. Thus far, an occurrence of *Neodelphineis pelagica* in fossil deposits has not been established. The modern distribution of *Neodelphineis pelagica* appears to be in a shallow marine environment similar to that of *Delphineis surirella* and *D. livingstonii* Prasad (1986). The phylogenetic relationship of *Neodelphineis* with the rest of the Diatomaceae is not yet known. It is apparently closely related to genera such as *Delphineis,* especially species with transverse grooves on the striae, but a more extensive study of the genus must precede the final judgement.

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