

Scale bearing Chrysophyceae from the Panama Canal

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Scale-bearing Chrysophyceae (Mallomonadaceae, Paraphysomonadaceae) from the Panama Canal have been examined using transmission and scanning electron microscopy. Eight species of the genera *Mallomonas*, *Paraphysomonas*, and *Spiniferomonas* are illustrated.

Key Index Words: Chrysophyceae; Mallomonadaceae; Mallomonas; Panama Canal; Paraphysomonadaceae; Paraphysomonas; Spiniferomonas.

Several studies have been made on the phytoplankton of the Panama Canal (see PRESCOTT 1967 for literature review). In his photosynthetic activity study on the Panama Canal and its major tributary, Madden Lake, GLIWICZ (1976) included a list of phytoplankton differing slightly from that recorded by PRESCOTT (1936, 1951, 1955, 1967).

PRESCOTT (1955) does not list any species belonging to the Mallomonadaceae or Paraphysomonadaceae in his checklist of flagellated algae, but does mention *Mallomonas* and *Synura* in his Panama Canal algal ecology paper (PRESCOTT 1951). The 1951 paper is the only reference to this group of organisms occurring in the canal although no species are mentioned.

The purpose of this paper is to report the occurrence of eight taxa of scaled chrysophytes from the Panama Canal. Because electron microscopy is needed for identification of these siliceous scale-bearing organisms, all observations are by means of electron microscopy.

Materials and Methods

Phytoplankton samples were collected in January, 1984 near the vicinity of Barro

Colorado Island, Panama, with a plankton net (5 μ m mesh), and were either unfixed or fixed with a few drops of Lugol's solution or 1% phosphate buffered osmium tetroxide. For transmission electron microscopy samples were placed on Formvar coated-carbon stabilized grids, air-dried and then examined with a Philips EM 300. Although no scanning micrographs are presented in this paper, samples were also examined with an AMR 1200 scanning electron microscope. Prior to examination these samples were air-dried on aluminum stubs and then sputtered with gold as previously described (WUJEK 1984a).

Observation and Discussion

Spiniferomonas bourrellyi TAKAHASHI Fig. 1

NICHOLLS (1981) recently synonymized *S. conica* with this species because of the difficulty in establishing characters to separate the two species. The past two years this species has been referred to as *Chromophysomonas bourrellyi* (TAKAHASHI) PREISIG and HIBBERD, but NICHOLLS (1985) has demonstrated the presence of a chloroplast reestablishing *Spiniferomonas* as a valid genus. This species has been found in many parts of the world (Asia, Europe, North America) and undoubtedly will prove to have even a

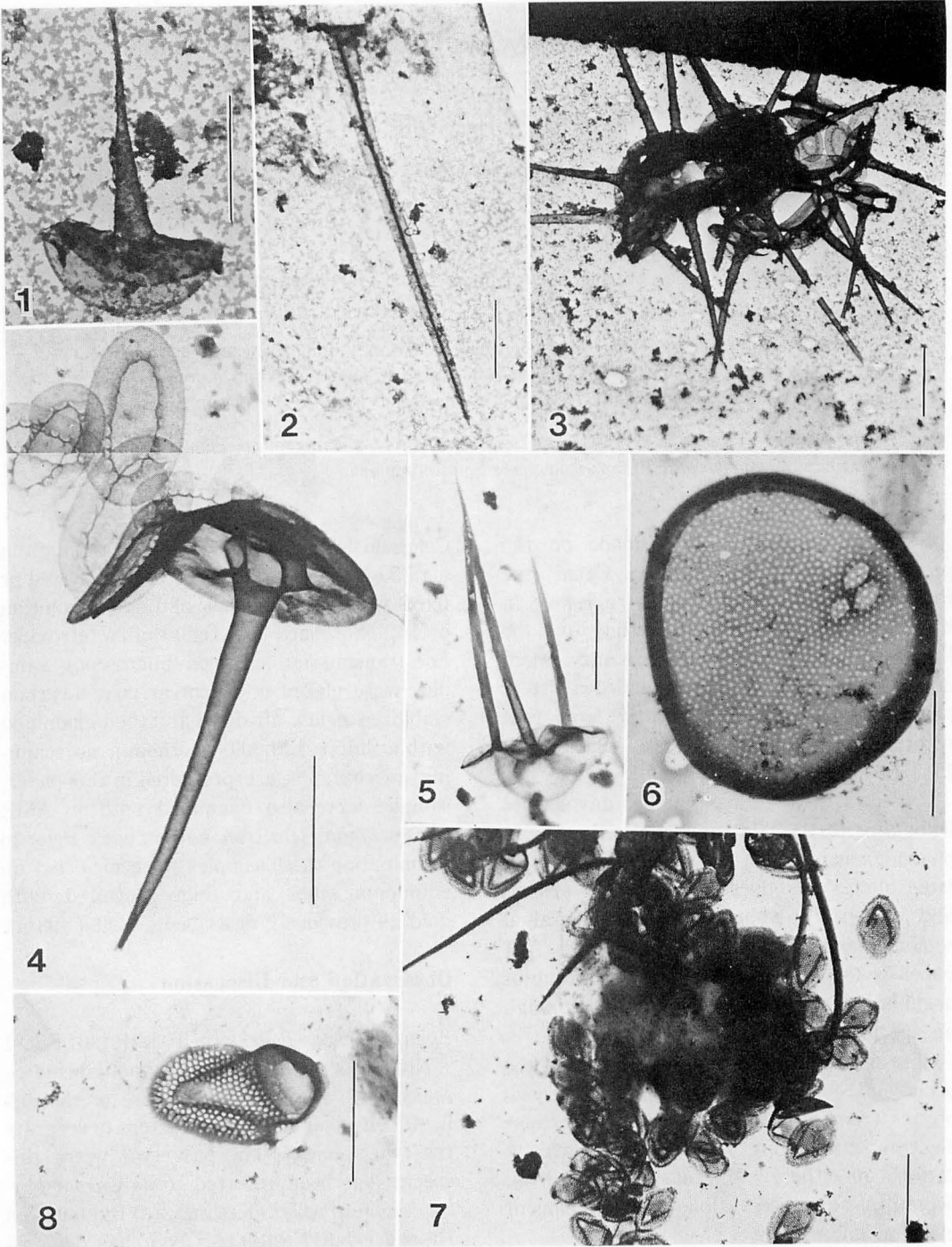


Fig. 1. *Spiriferomonas bourrellyi*, scale. Fig. 2. *S. trioralis*, scale. Figs. 3, 4. *S. enigmata*, whole cell; scales and bristle. Fig. 5. *Paraphysomonas imperforata*, scales. Fig. 6. *Mallomonas caudata*, scale. Fig. 7. *M. tonsurata*, scales. Fig. 8. *M. alpina*, scale. Bar=2 μ m.

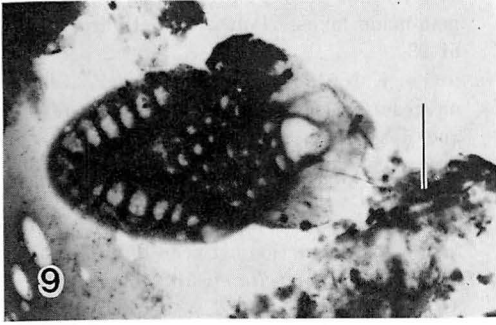


Fig. 9. *Mallomonas pseudocoronata*, scale.
Bar = 2 μ m.

wider distribution.

Spiniferomonas trioralis TAKAHASHI Fig. 2

Easily recognized by its winged spine scale, this species is the most widely reported for the genus.

Spiniferomonas enigmata NICHOLLS Figs. 3, 4

This is the second report of this taxon. Described from Ontario, Canada, the specimens in my samples consistently possessed shorter shafts (4–6 μ m) on the spine scales than those observed by NICHOLLS (1984) in his original description of the species which possessed shafts of much greater length (15–32 μ m).

Paraphysomonas vestita (STOKES) de
SAEDELER Fig. 5

This species is the most widely reported of its genus. It tolerates a wide range of salinities, temperatures and pH values. It has recently been reported from Costa Rica (WUJEK 1984b).

Mallomonas caudata IWANOFF emend.
KRIEGER Fig. 6

First examined with the electron microscope by ASMUND (1955), it is a large species and is easily identified using light microscopy. It is widely distributed throughout the world.

Mallomonas tonsurata TEILING emend.
KREIGER var. *tonsurata* Fig. 7

This is one of the most common *Mallomonas* species and occurs in many parts of the world. Easily confused with *M. alpina*, it is separated from it by the presence of a secondary layer on the base plate and a

furcate bristle tip.

Mallomonas alpina RUTTNER in PASCHER
Fig. 8

A common and widespread species, it is frequently treated as a variety of *M. tonsurata* owing to its lack of a secondary layer on the shield.

Mallomonas pseudocornata PRESCOTT Fig. 9

This species is one of the few *Mallomonas* species easily identified by cell or scale morphology with the light microscope. Known exclusively from North America, this is its most southern report. It has been reported from Canada and the northern United States and only recently was reported from south Florida (WUJEK, 1984a). DÜRRSCHMIDT (1980, 1982a, 1982b, 1983a, 1983b, 1983c) in her examination of South American Chrysophyceae did not observe this species.

Based on the species observed, the Chrysophycean flora of the Panama Canal does not deviate from what is found in the northern hemisphere. Although many species common in Europe or Japan were not found during this investigation, it must be considered that many areas within Panama still remain to be investigated. Surprisingly absent in this survey were taxa belonging to the genus *Synura*. In most every siliceous-scaled chrysophycean flora published to date, one or more species of this genus are reported.

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ビェック, D. E.: パナマ運河産の鱗片を有する黄藻綱について

パナマ運河産の鱗片を有する黄藻綱植物を TEM および SEM を用いて調べた。 *Mallomonas*, *Paraphyso-*
monas, *Spiniferomonas* に属する 8 種について図示した。