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Dr. Chrétiennot-Dinet has been working on nanoplankton for 20 years and more recently on picoplankton, discovering the smallest free-living eukaryote in the Thau Lagoon. She is the author of the third volume of the Atlas du Phytoplancton Marin, treating of ten algal classes and is particular expertise in the ultrastructure of small marine organisms. Her involvement includes also the survey of potentially toxic algae along the French coasts, particularly for Phaeocystis or other harmful Prymesiophyceae.

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AN ENIGMA IN MARINE NANOPLANKTON
The role of star-like structures produced by Phaeocystis

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1. Introduction

Phaeocystis has long been known to be a nuisance for fish, man and environment (Moestrup & Larsen, 1992). It is one of the very few colony-forming members of the Prymnesiophyceae Hibberd, 1976 (= Haptophyceae Christensen, 1962). These are golden-brown algae mostly found in marine waters. Because of their small size (around 5 μm), the motile cells are considered as part of the nanoplankton as defined by Sieburth et al. (1978), i.e., comprising cells 2-20 μm in size. The ultrastructure of motile cells was described by Parke et al. (1971). They are covered by minute organic scales and possess two flagella and a short haptomonema, the latter organelle characteristic of the class (Christensen 1962, Chretiennot-Dinet, 1990), but in addition, they have the unique characteristic of producing star-like filaments (Figure 1). The exact number of species of Phaeocystis is still under debate (Soumia, 1988, Baumann et al., 1994, Medlin et al., 1994, Vaulot et al., 1994), but only two types of star-like structure have been found so far. A five-rayed star, as illustrated in Figure 1, is found in all species except P. scrobiculata Moestrup (Moestrup, 1979) which produces a nine-rayed star by addition of a second filament at the branching of each star-tip except one. Nine-rayed star-like structures were observed by the author in Mediterranean waters (Bay of Banyuls), suggesting a large distribution of P. scrobiculata, though this species was initially described from New Zealand (Moestrup, 1979). Davidson and Marchant (1992) stated that: 'These stars remain something of an enigma and few reports shed light on their mode and rate of synthesis or their release of the cells, let alone their function'.

2. Life Cycle and Colony Formation in Phaeocystis

2.1. LIFE CYCLE OF PHAEOCYSTIS

The life-cycle of Phaeocystis is complex (Figure 2) and involves an alternation of motile flagellate stages and non-motile colony-forming cells (Rousseau et al., 1994, Lancelot and Rousseau, 1994). Several strains are now maintained in culture, and it appears that some of them are unable to form colonies whilst in others the colonial stage...