A benthic colonial Dinoflagellate from the Eastern Mediterranean Sea*

by

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Abstract

Within recent years a benthic colonial dinoflagellate has gained ecological prominence in certain parts of the Eastern Mediterranean Sea. *Dinocapsis sociale*, heretofore undescribed, forms large palmelloid colonies which blanket the sea floor in coastal waters of Turkey, Rhodes, and Cyprus in the late summer.

Attempts to culture the alga have been unsuccessful. Preserved samples indicate the presence of at least three distinct stages in the hypothesized life cycle of *D. sociale :* an immobile vegetative stage, a *Gymnodinium*-like swarmer cell stage, and a thecate stage nearly identical to that of *Peridinium sociale* [BEICHELER ex HENNEGUY. 1935], *P. gregarium* [LOMBARD & CAPON, 1971], and *P. subsalum* Ostenfeld [BALECH, 1964]. The theca formula is 4′, 3a, 7″. 5″, and 2″ ″. Despite the presence of a *Peridinium*-like theca, *Dinocapsis* is most correctly classified as a new genus among the Dinocapsales in view of its palmelloid colonies. Accordingly, *P. sociale* and *P. gregarium* which were previously described as forming cloud-like colonies appear to be synonyms and should be included under the species *Dinocapsis sociale.*

Résumé

Durant les dernières années, une colonies de dinoflagellés benthiques d'une importance écologique, s'est installée dans quelques régions de la Méditerranée orientale. *Dinocapsis sociale*, non encore décrite, constitue de grandes colonies palmelloïdes qui couvrent les fonds marins des eaux côtières de Turquie, Rhodes et Chypre vers la fin de l'été.

Des tentatives de mettre en culture cette algue n'ont pas réussi. Les échantillons fixés ont montré la présence d'au moins trois stades distincts dans l'hypothétique cycle biologique de *D. sociale :* un stade végétatif immobile analogue au stade cellulaire de *Gymnodinium* et un stade thécal presque identique à celui de *Peridinium sociale* [BEICHELER ex HENNEGUY, 1935], *P. gregarium* [LOMBARD & CAPON, 1971] et *P. subsalum* Ostenfeld [BALECH, 1964]. La formule thécale est 4′, 3a, 7″, 5″, et 2″ ″. Malgré la présence d'une thèque comme celle de *Peridinium*, *Dinocapsis* est plus correctement classifié comme un nouveau genre parmi les Dinocapsales étant données ses colonies palmelloïdes. Ceci étant, *P. sociale* et *P. gregarium* qui étaient déjà décrites comme des colonies nuageuses semblent être des synonymes et devraient être incluses sous l'espèce *Dinocapsis sociale.*

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Introduction

A unique benthic marine alga recently appeared in the Eastern Mediterranean Sea, and seems to be increasing its area of distribution each season. The organism, a microscopic colonial dinoflagellate, forms yellow-green to yellow-brown gelatinous masses on the sea floor ranging from several centimeters in dia-

* This study was supported by a grant from the School of Arts and Sciences, A.U.B.

meter to thick and continuous carpets. The optimum growth period extends from late July through mid-October, in bays along the southern coast of Cyprus, the southwestern Turkish coast, and in the vicinity of Lindos, Rhodes.

The gelatinous colonies have appeared in southern Cyprus within the last decade according to a long time resident and water sportsman of Famagusta, Cyprus. Fishermen in Rhodes, however, reportedly observed it, or a similar form, as early as the late 1950's. All reliable local sources of information agree that the organism occupies an increasingly dominant role in the benthic ecology of those areas where it occurs. Its sudden appearance and annual increase may indicate some environmental change or changes taking place in the Eastern Mediterranean Sea.

In Cyprus, the organism results in the following undesirable phenomena : **1.** fouling of beaches by large dead masses of the alga which have detached from the sea floor and floated ashore; **2.** rendering offshore waters undesirable for water sports, such as swimming, diving, and water skiing, as the slimy floating masses cling to water sportsmen; **3.** entangling of fishing nets; **4.** blocking of water-circulating systems of outboard and other marine engines; **5.** replacement of other organisms, presumably through competition and dominance by this organism.

Our study was undertaken in order to identify and document the distribution of this organism.

Methods and materials

Sampling was conducted during August and September, 1972 and 1973, from the R/V *Atoll II* along a portion of the Eastern Mediterranean coastline, including Southern Turkey, the southeastern coastline of Rhodes Island, and the northeastern and southeastern coasts of Cyprus. Samples were immediately preserved in either 5 % buffered formalin or Lugol's Iodine and fresh colonies were collected from the sea floor near Famagusta.

Results and observations

D. sociale occurs in relatively protected bays within the Eastern Mediterranean, at depths from 50 cm to 13 m, and temperatures ranging from 21° C to 29° C. surface salinities generally range from 38.9 to 39.4 ‰. The damming of the Nile River at Aswan in 1964 has had a measurable influence on increasing the salinities throughout the Levant Basin of the Eastern Mediterranean [NEUMANN & PEARSON, 1966] *D. sociale* colonies were observed to form on a variety of bottom types including the more exposed faces of boulders, rocks, stationary gravel, sand which is not subject to much movement, or epiphytically an other algae, particularly on *Cystoseira* or eel grasses.

In Cyprus, small yellow-green fringed tufts of " young " growth, 2 to 5 cm in diameter and 1 to 5 cm in height, begin to appear at scattered locations during mid to late July. These small cloud-like colonies grow loosely attached to the sea floor or epiphytically on other benthic algae. By late September, the same areas of sea floor are carpeted with a luxuriant growth 10 cm or more in thickness.

On the basis of the palmelloid colonial habit of vegetative cells, presence of a gymniodinoid swarmer cell stage, theca morphology of *Peridinium*-like motile cells, and previous reports of four different species, each more of less identical to this form, we designate this form as a new combination.

Dinocapsis sociale

Division Pyrrophyta
Class Dinophyceae (Pascher, 1914)
Order Dinocapsales (Pascher, 1927)
Family Gloeodinaceae (Pascher, 1973)

Dinocapsis sociale (comb. nova)

Syn. *Peridinium tabulatum* forma *brasiliana*, Mobius, 1866; *Glenodinium sociale*, Henneguy, 1890; *Glenodinium sociale*, Labbé, 1924; *Peridinium subsalum*, Ostenfeld, 1908; *Peridinium sociale* (Henneguy), Biecheler, 1935, 1952; *Peridinium gregarium*, Lombard & Capon, 1971. Vegetative cell rounded, diameter 15 µ to 25 µ. Numerous yellow-green to yellow-brown discoid peripheral chloroplasts. Ovoid nucleus central or inferior to a large vacuole in anterior 1/3 to 1/2 to cell. Vegetative cells embedded in a mucous matrix to form benthic palmelloid colonies ranging from several centimeters to several meters

in diameter. Swarmer cells ovoid, length 10 μ to 22 μ. Walls thin, smooth, devoid of conspicuous ornamentation or pores. Transverse groove inferior to midline plane. Large elongate nucleus in epicone, extending upward from the girdle. Thecate cell spherical to pyriform, length 20 μ to 45 μ.
Plates : 4 apicals, 3 intercalories, 7 precingulars, 5 post-cingulars, 2 antapicals. Apical pore in an octagonal closing plate surrounded by a raised collar. Theca striated differentially among specimens. Habitat : Protected bays in the Eastern Mediterranean Sea.

Summary

Dinocapsis sociale, a newly-described benthic colonial dinoflagellate, is playing an increasingly prominent role in parts of the Eastern Mediterranean Sea. The rapidity of its increases, both in abundance and distribution, suggest changing conditions within the Levant Basin of the Eastern Mediterranean Sea. The conspicuous and undesirable qualities of *D. sociale* have brought it to the attention of local fishermen, divers, and water sportmen in general within recent years.

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