

About the Presence of Genus *Pyrophacus* Stein, 1883 with Special Emphasis on *Pyrophacus vancampoeae* (Rossignol) Wall and Dale (Dinophyceae) in Eastern Mediterranean *

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Özet: Doğu Akdeniz'de *Pyrophacus* Stein, 1883 cinsinin varlığı ve *Pyrophacus vancampoeae* (Rossignol) Wall and Dale (Dinophyceae) türünün önemi. Bu araştırma 2000 - 2001 yılları arasında Bozcaada'da gerçekleştirilmiştir. *Pyrophacus vancampoeae* (Rossignol) Wall and Dale türü dinoflagellat doğu Akdeniz'den ilk defa rapor edilmektedir. *Pyrophacus* Stein cinsine ait üç türün (*Pyrophacus horologium* Stein, *P. steinii* (J. schiller) Wall and Dale and *P. vancampoeae* (Rossignol) Wall and Dale) sinonimleri, tanımsal ve morfolojik karakterleri ile orijinal fotoğrafları verilmiştir.

Anahtar Kelimeler: *Pyrophacus vancampoeae*, Dinophyceae, doğu Akdeniz, yeni kayıt.

Abstract: This research was carried out in Bozcaada between the years of 2000 and 2001. The dinoflagellate species *Pyrophacus vancampoeae* (Rossignol) Wall and Dale has been reported for the first time from the Eastern Mediterranean. Synonymies, diagnostic, morphological characters and original photographs of three species (*Pyrophacus horologium* Stein, *P. steinii* (J. schiller) Wall and Dale and *P. vancampoeae* (Rossignol) Wall and Dale) belonging to genus *Pyrophacus* Stein have been given.

Key words: *Pyrophacus vancampoeae*, Dinophyceae, Eastern Mediterranean, new record.

Introduction

The genus *Pyrophacus* Stein is the only genus of the family Pyrophacaceae Lindemann. This genus has three species (*Pyrophacus horologium* Stein, *P. steinii* (J. schiller) Wall and Dale and *P. vancampoeae* (Rossignol) Wall and Dale). *P. horologium* and *P. steinii* have shown widespread distribution in comparison with *P. vancampoeae* in the Mediterranean Basin. *P. vancampoeae* is reported for the first time from the Indian Ocean by Taylor (1976). On the other hand, although the current literature does not exhibit of its existence in the Mediterranean, *P. vancampoeae* has previously been described as *P. horologium* from the Mediterranean

coast of Spain (Margalef, 1948).

The aim of this study is to report the presence of *P. vancampoeae* not recorded previously from the Eastern Mediterranean and to eliminate the confusion among species of the genus *Pyrophacus*. Moreover, this study has contributed to the regional check-list of the microplankton species of Turkish seas (Koray *et al.*, 1999).

Materials and Methods

This research was carried out in Bozcaada (long. 25°57'80" E-26°05'00" E, lat. 39°47'30" N-39°50'90" N) in the northeast Aegean Sea between the years of 2000 and 2001 (Fig. 1). Biological samples

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were collected with horizontal tows from the subsurface (0.5 m) with a 55 µm plankton net from each sampling station and preserved in 4 % formaldehyde. Observations of the samples were made through the use of an inverted phase-contrast microscope equipped with a microphotosystem at a magnification of 400 X. References used to identify the

species were Margalef (1948), Wood (1954, 1968), Steidinger and Williams (1970), Taylor (1976), Rampi and Bernhard (1980), Dodge (1982), Balech (1988) and Steidinger and Tangen (1997).

Synonymies, diagnostic morphological characters and original photographs of 3 species were given (Figs. 2 a-c).

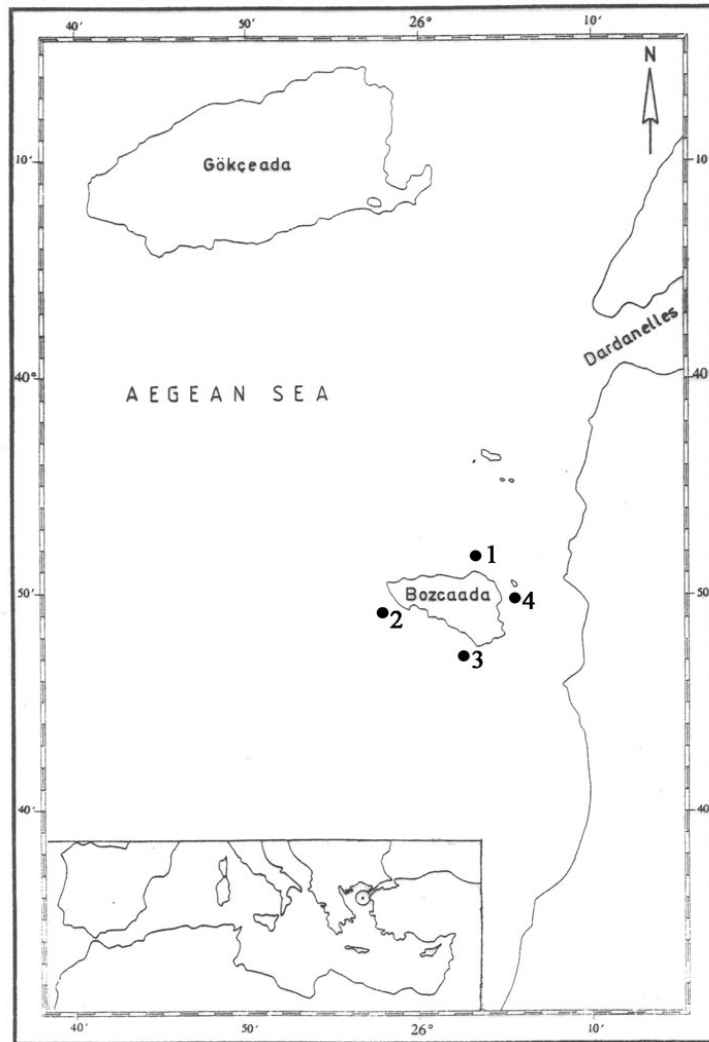


Figure 1. Sampling stations in the Bozcaada.

Results

inger and Tangen (1997) was followed

in classification of species. These species are listed.

Class: DINOPHYCEAE G.S. West and Fritsch
Order: Gonyaulacales F.J.R. Taylor
Family: Pyrophacaceae Lindemann
Genus: *Pyrophacus* Stein

Pyrophacus cells are biconvex, lens-shaped and compressed anteroposteriorly. Cingulum narrow, equatorial. Sulcus short. Theca growth striae and poroid. Standart plate formula: 5-9', 0-8a, 7-15'', 9-16c, 8-17''', 0-9p, 3-7'''' (Taylor, 1976).

Pyrophacus horologium Stein (Fig. 2a)

Pyrophacus horologium, Steidinger and Williams, 1970: 62, pl. 39, figs. 146 a, b; Taylor, 1976: 182, pl. 34, figs. 387, 388, 390; Rampi and Bernhard, 1980: 181, tav. 87, figs. a, b; Dodge, 1982: 144, figs. 17 a, b; Balech, 1988: 310, lam. 88, figs. 1-5; Delgado and Fortuno, 1991: 24, figs. 3 R, S; Steidinger and Tangen, 1997: 523, pl. 46, fig..

Pyrophacus horologicum, Wood, 1954: 221, fig. 84a; Drebes, 1974: 129, abbs. 110a-c.

Remarks: Cell discoidal, lens-shaped, epitheca and hypotheca equal. Thecal plate numbers are fewer than the other species. There is usually only a single posterior antapical plate (3''').

Its commonest plate formula: 5', 0a, 9'', 9c, 9''', 1p, 3''''.

Found in months: May, August, November (2000) and June (2001). 16.8-22.6 °C, 33-36.25 psu, 7.66-9.48 mg l⁻¹.

Pyrophacus steinii Schiller (Fig. 2b)

Pyrophacus steinii, Taylor, 1976: 183, 34, figs. 384-386, 389; Balech, 1988:

310, lam. 88, figs. 6-9; Steidinger and Tangen, 1997: 523, pl. 46, fig..

P. horologium var. *steinii*, Steidinger and Williams, 1970: 62, pl. 40, fig. 147.

P. horologicum var. *steinii*, Wood, 1954: 221, figs. 84 b, c.

Remarks: The diagnostic feature of *P.steinii* is the presence of marginal striations on the precingular plates in addition to thecal granules and pores (Taylor, 1976). Cell flattened.

Its commonest plate formula: 6-7', 0a, 11-13'', 11-13''', 1p, 5''''.

Found in months: August, November (2000), June and September (2001). 16.8-22.6 °C, 33-36.25 psu, 7.66-9.48 mg l⁻¹.

Pyrophacus vancampoe (Rossignol) Wall and Dale (Fig. 2 c)

Pyrophacus vancampoe, Taylor, 1976: 183, pl. 34, fig. 391.

P. steinii vancampoe, Balech, 1988: 310, lam. 88, figs. 10-14.

P. horologium, Margalef, 1948: 21, fig. 2 (1,2).

P. horologium form B1, Steidinger and Williams, 1970: 62, pl. 40, fig. 148.

P. steini, Rampi and Bernhard, 1980: 182, tav. 88, fig. b.

Remarks: It has the greatest number of thecal plates. Its posterior intercalary plates are more than the other species. Anterior intercalary plates are commonly present (Taylor, 1976).

Its commonest plate formula: 7-9', 0a, 14'', 14c, 14''', 1p, 5-8''''.

Found in months: November (2000) and September (2001). 16.8-22.08 °C, 33.70-36 psu, 8.80-9.48 mg l⁻¹.

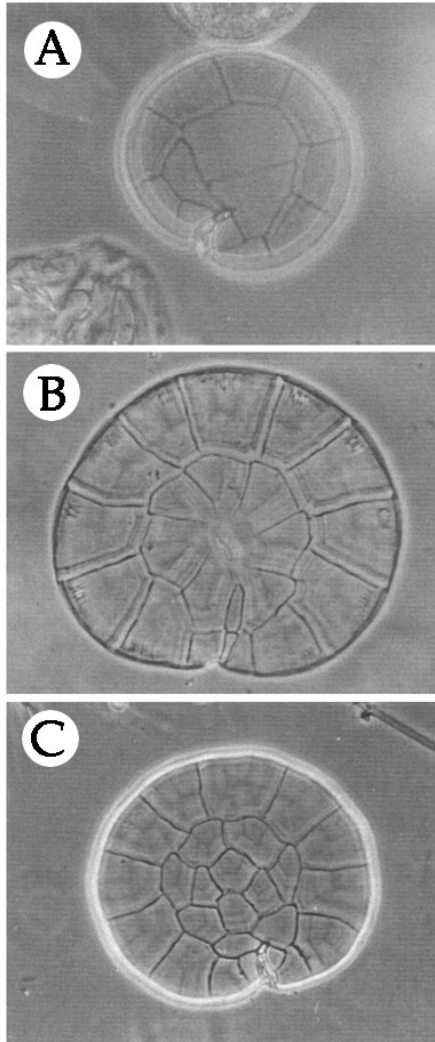


Figure 2. (A) *Pyrophacus horologium*. View of hypotheca (x375); (B) *Pyrophacus steinii*. View of epitheca (x200); (C) *Pyrophacus vancampoae*. View of hypotheca (x 200).

Discussion

These three species of the genus *Pyrophacus* have been recorded from the world's oceans, especially the Atlantic Ocean, Mediterranean and Indian Ocean. Although *P. horologium* and *P. steinii*

were reported from the Mediterranean Basin, the existence of *P. vancampoae* was not previously known in that region. However, the first record of *P. vancampoae* in the Mediterranean belonged to Margalef (1946). But, Margalef described this species as *P. horologium* from the Mediterranean coast of Spain and Rampi and Bernhard (1980) described it as *P. steinii* in the Mediterranean. Identification and hypothetical view of *P. steinii* in that book is similar to *P. vancampoae*. Moreover, *P. vancampoae* was reported for the first time from Indian Ocean by Taylor (1976). According to Taylor (1976), it has a fossil history dating back to the Lower Miocene.

As a result, *P. vancampoae* has been reported for the first time from the Mediterranean Eastern Basin and added to the regional check-list of the microplankton species of Turkish seas with this study.

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