

## Peridinales

by **Johs. Schmidt.**

The following list of marine *Peridinales* is due to the examination of a number of plankton samples collected by the Danish Expedition in the inner part of the Gulf of Siam. The samples which are 10 in number, were obtained from the surface of the Sea by means of fine silk-nets and were preserved in formaline (4 0/0)<sup>1</sup>.

This is a list of the samples collected:

- Nr. 1. <sup>25</sup>/<sub>12</sub> 1899. Strait between Lem Ngob and Koh Chang.  
" 2. <sup>9</sup>/<sub>1</sub> 1900. Between Koh Kahdat and Koh Kut.  
" 3. <sup>11</sup>/<sub>1</sub> 1900. S. of Koh Chang.  
" 4. <sup>16</sup>/<sub>1</sub> 1900. W. of Koh Chang, N. of Koh Savan.  
" 5. <sup>17</sup>/<sub>1</sub> 1900. W. of Koh Chang, S. of Koh Savan.  
" 6. <sup>18</sup>/<sub>1</sub> 1900. S. of Koh Chang.  
" 7. <sup>27</sup>/<sub>1</sub> 1900. North End of Koh Kut.  
" 8. <sup>28</sup>/<sub>1</sub> 1900. 7 miles S. of Koh Kut.  
" 9. <sup>31</sup>/<sub>1</sub> 1900. 18 miles W. of Koh Chang<sup>2</sup>).  
" 10. <sup>21</sup>/<sub>3</sub> 1900. 1—2 miles S. of Koh Kram.

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In the following list of species recorded

*c* means *predominant*

+ " *common*

*r* " *rare*

*rr* " *very rare* (only a few specimens seen).

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<sup>1</sup>) The *Diatoms* contained in the Plankton-samples will be published later on.

<sup>2</sup>) This sample seems to consist exclusively of *Trichodesmium Hildebrandtii* Gomont.

## Prorocentraceae.

### *Exuviella* Cienk.

1. *E. compressa* (Bail.) Ostenfeld, Iagttagelser over Overfladevandets Temperatur, Saltholdighed og Plankton paa islandske og grønlandske Skibsrouter, 1899, p. 59; *Dinopyxis compressa* Stein, Der Organismus der Infusionsthier. III. Abtheil., Leipzig 1878—83, Pl. I, f. 34—38.

6 (rr).

Area: Almost ubiquitous.

### *Prorocentrum* Ehrenbg.

2. *P. micans* Ehrenbg.

1 (rr) — 2 (rr) — 3 (rr) — 6 (rr) — 8 (rr).

Area: Atlantic, Mediterranean, Red Sea, Indian Ocean.

## Peridiniaceae.

### *Pyrophacus* Stein.

3. *P. horologium* Stein l. c., Pl. XXIV, f. 1—13.

1 (rr) — 2 (rr) — 7 (rr) — 10 (rr).

Area: Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

### *Ceratium* Schranck.

4. *C. tripos* (O. F. Müller) Nitsch.

var. *baltica* Schütt, Pflanzenleben d. Hochsee, p. 266, f. 4 a.

I observed two slightly different forms both of which may be referred to the above variety by Schütt. The first form differs from Baltic specimens by the left posterior horn being somewhat bent forward. The second form observed is characterized by the posterior horns being longer and running more parallel. I name this form:

f. *parallela* Schm. n. f. (see fig. 1).

It closely approaches to the forms figured by Cleve in Report on the Phytoplankton collected on the expedition of H. M. S. „Research“, 1896, Fifteenth Annual Report of the Fishery Board for Scotland, Part III, Pl. 1, fig. 1, 1897.

1 (rr) — 2 (rr) — 3 (rr) — 4 (rr) — 6 (rr)  
8 (rr).

Area: Atlantic.

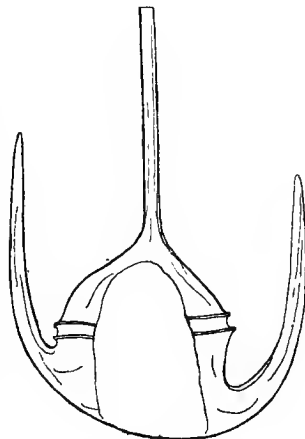


Fig. 1. *Ceratium tripos*, var. *baltica* Schütt, f. *parallela*. Ventral view.

var. **brevis** Ostenfeld & Schmidt, Plankton fra det Røde Hav og Adenbugten, Vidensk. Meddel. Naturh. Foren. Kjøbenhavn, 1901, p. 164, f. 13.

10 (rr).

Area: Red Sea, Indian Ocean.

var. **dispar** Pouchet, Contributions à l'histoire des Périidiniens marins, Journ. de l'anat. et de la physiol. 1883, p. 423, fig. D; non Pouchet in Voyage de „La Manche“ à l'île Jan Mayen et au Spitzberg (Juillet—Août 1891), p. 171, fig. 13 B, Paris 1894 = *C. curvicorne* (Daday) Cleve.

A few specimens not differing from Pouchet's figure were met with in two collections.

2 (rr) — 6 (rr).

Area: Mediterranean.

var. **gracilis** Schröder, Phytoplankton des Golfes von Neapel, Mitth. a. d. Zool. Stat. zu Neapel, Bd. 14, 1900, Pl. 1, f. 17 b, e; Ostenfeld & Schmidt l. c. p. 164, f. 14; non Gourret, Périidiniens du golfe de Marseille, Annal. du Musée d'hist. nat. de Marseille, zool., vol. 1, n° 8, 1883, Pl. 1, f. 1.

2 (rr) — 3 (rr) — 4 (+) — 5 (rr) — 6 (r) — 10 (rr).

Area: Mediterranean, Red Sea, Indian Ocean.

5. **C. dens** Ostenfeld & Schmidt, l. c., p. 165, f. 16.

In the main species the left posterior horn is straight or somewhat curved (l. c. fig. 16). In one collection I found a variety of *C. dens* viz.

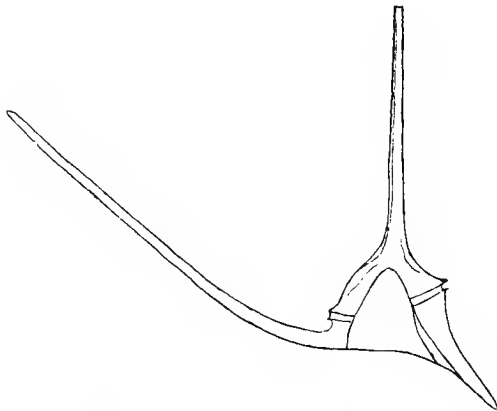


Fig. 2. *Ceratium dens* Ostenfeld & Schmidt, var. *reflexa*. Ventral view.

var. **reflexa** Schm. n. var. (Fig. 2), which is characterized by the direction of the left posterior horn.

In the Gulf of Siam this characteristic species often occurs in short chains (4 specimens together).

1 (rr) — 2 (+) — 3 (+) — 4 (+) — 5 (r) — 7 (+).  
and var. *reflexa* 4 (rr).

Area: Red Sea, Indian Ocean.

6. *C. curvicorne* (Daday) Cleve, Notes on some Atlantic Plankton-Organisms, Kgl. Sv. Vet.-Ak. Handl., Bd. 34, No. 1, p. 14; *C. tripos* var. *curvicorne* Daday, Termesztarjazi füzetek, 1887—88, Pl. Ill, figg. 4, 8, 12, 14; figuræ nostræ 3 et 4.

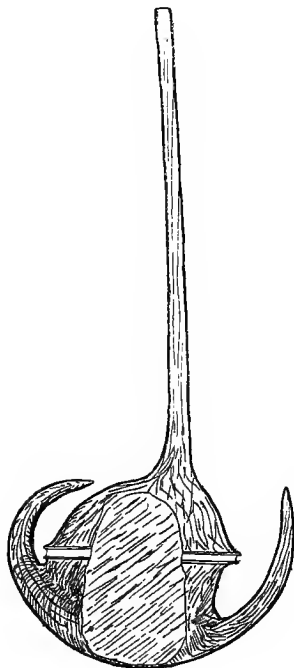


Fig. 3.  
*Ceratium curvicorne* (Daday) Cleve.  
Ventral view.

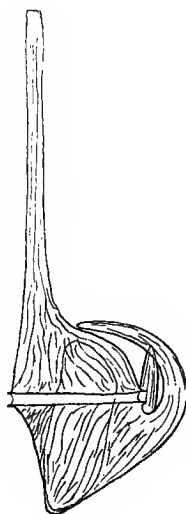


Fig. 4.  
*Ceratium curvicorne* (Daday) Cleve  
Lateral view.

This species seems to be abundant in the Gulf of Siam. The specimens observed agree well with Daday's figures; but sometimes the curvature of the right posterior horns is less pronounced. As shown in fig. 4 the ventral face of the body is concave and the basilar parts of the posterior horns proceed in a nearly right angle to the transversal axis.

2 (r) — 3 (+) — 4 (+) — 5 (rr) — 6 (+) — 7 (+) — 8 (rr) — 10 (rr).  
Area: Warmer Atlantic, Mediterranean, Red Sea, Indian Ocean.

7. **C. contortum** (Gourret) Cleve, Notes on some Atlantic Plankton-Organisms, Kgl. Sv. Vet.-Ak. Handl. Bd. 34, No. 1, p. 14, Pl. VII, f. 12, 1900; *C. gibberum* var. *contortum* Gourret l. c. Pl. II, f. 33; Schütt, Pflanzenleben d. Hochsee, p. 268, fig. 78 VII b.

2 (rr) — 4 (r).

Area: Warmer Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

8. **C. tenue** Ostenfeld & Schmidt l. c. p. 166, fig. 18.

2 (rr).

Area: Red Sea, Indian Ocean.

9. **C. macroceras** Ehrenberg?; *C. tripos*  $\beta$  *macroceras* Claparède & Lachmann, Études sur les Infusoires et les Rhizopodes, vol. 1, Pl. 19, f. 1, Mém. de l'Inst. Générois, t. V—VI, 1858—59.

This species varies much in regard to length, direction and spinosity of the posterior horns. I saw forms agreeing with Bergh's figure (Organismus d. Ciliolflagellaten, Morphol. Jahrb. Bd. 7, 2, Taf. XIV, fig. 27), further a form with longer and more straight posterior horns (cfr. the quoted figure by Claparède & Lachmann) and also the form figured by Ostenfeld & Schmidt l. c. fig. 19, where the posterior horns are short and ventrally bent. In the Gulf of Siam *C. macroceras* sometimes occurs in short chains (2 specimens together).

2 (r) — 3 (r) — 4 (rr) — 5 (rr) — 7 (r) — 10 (r).

Area: Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

10. **C. volans** Cleve, Notes on some Atlantic Plankton-Organisms, Kongl. Sv. Vet.-Ak. Handl., Bd. 34, No. 1, p. 15, Pl. VII, Fig. 4, 1900; Ostenfeld & Schmidt, Plankton fra det Røde Hav og Adenbugten, Vidensk. Meddel. Naturh. Foren. Kjøbenhavn, 1901, p. 168, f. 21.

2 (rr).

Area: Warm Atlantic, Red Sea, Indian Ocean.

11. **C. flagelliferum** Cleve, Notes on some Atlantic Plankton-Organisms, Kongl. Sv. Vet.-Ak. Handl., Bd. 34, No. 1, p. 14, Pl. VII, Fig. 12, 1900.

The horns are often much longer than figured by Cleve.

1 (rr) 2 (+) 3 (+) 4 (r) 5 (rr) 6 (rr) 7 (r) 10 (r).

Area: Tropical Atlantic, Red Sea, Indian Ocean.

12. **C. furca** (Ehrbg.) Dujardin, Hist. nat. d. Zoophytes, Infusoires, Paris 1841.

This species occurs in large quantity in our area.

1 (rr) — 2 (+) — 3 (+) — 4 (r) — 5 (r) — 6 (c) — 7 (+) — 8 (rr) — 10 (r).

Area: Ubiquitous.

13. **C. lineatum** (Ehbg.) Cleve, Plankton collected by the Swedish Expedition to Spitzbergen in 1898, Kgl. Sv. Vet.-Ak. Handl. Bd. 32, No. 3, 1899, p. 36; *Peridinium lineatum* Ehrenbg.

Sparingly with the preceding species.

Area: Atlantic, Mediterranean, Red Sea, Indian Ocean, Bering Sea.

var. **longiseta** Ostenfeld & Schmidt, Plankton fra det Røde Hav og Adenbugten, Vidensk. Meddel. Naturhist. For. Kjøbenhavn, 1901, p. 163, fig. 12.

This variety sometimes occurs in short chains (2 specimens together); then only the free specimen has a long superior horn.

2 (rr) — 3 (rr) — 4 (+) — 5 (rr) — 6 (r).

Area: Red Sea, Indian Ocean.

var. **robusta** Cleve, Plankton from the Southern Atlantic and the Southern Indian Ocean, Öfv. af Kongl. Sv. Vet.-Ak. Förh. Nr. 8, p. 925, fig. 6, 1900.

4 (rr).

Area: Southern Indian Ocean.

14. **C. candelabrum** Ehbg.; Stein, l. c. Pl. XVI, f. 15, 16.

2 (rr) — 4 (rr) — 7 (rr).

Area: Warm Atlantic, Mediterranean, Red Sea, Indian Ocean.

15. **C. fusus** (Ehbg.) Dujardin l. c.

1 (rr) — 2 (r) — 3 (r) — 6 (r) — 7 (r) — 10 (r).

Area: Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

var. **extensum** Gourret, Annal. du Musée d'hist. nat. de Marseille, zool., vol. I, n° 8, p. 52, Pl. 4, f. 56.

2 (rr) — 3 (rr).

Area: Warm Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

### **Gonyaulax** Diesing.

16. **G. polygramma** Stein, l. c. Pl. IV, f. 15.

2 (rr) — 4 (+) — 5 (r) — 6 (+) — 7 (r).

Area: General in warm and temperate Seas.

17. **G. spinifera** (Clap. & Lachm.) Stein, l. c. Pl. IV, f. 10—12.

2 (rr) — 3 (r) — 6 (+).

Area: Atlantic, Mediterranean.

18. **G. hyalina** Ostf. & Schm., l. c. p. 172, f. 24.

4 (r) — 5 (r) — 6 (r).

Area: Indian Ocean.

**Goniodoma** Stein.

19. **G. acuminatum** Stein, Pl. VII, f. 1—16.

2 (rr) — 3 (rr) — 4 (rr) — 5 (rr) — 6 (r) — 7 (r) — 10 (rr).

Area: Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

20. **G. armatum** (Schütt); *G. acuminatum* var. *armata* Schütt, Die Peridinieen Pl. IX, fig. 32; *G. fimbriatum* Murray & Whitting, Transactions of the Linnean Society of London, 2<sup>nd</sup> Ser., Botany, Vol. V, Part 9, 1899, p. 325, Pl. XXVII, fig. 1 a, b.

2 (rr) — 4 (rr) — 10 (rr).

Area: Atlantic, Red Sea, Indian Ocean, Pacific.

**Diplopsalis** Bergh.

21. **D. lenticula** Bergh, l. c. Pl. XVI, fig. 60—62.

1 (+) — 2 (rr) — 3 (rr) — 10 (+).

Area: Atlantic, Mediterranean. Red Sea, Indian Ocean, Pacific.

22. **D. saecularis** Murray & Whitting l. c. p. 325, Pl. XXVIII, fig. 5 a, b.

10 (rr).

Area: Atlantic from a little south of the Azores to the Isthmus of Panama. Red Sea, Indian Ocean.

**Ostreopsis** Schm. nov. gen.

Body flattened, oyster-shaped. Apex excentric, marked by a narrow, slit-shaped area. Longitudinal girdle small, not proceeding to apex, only to be seen on the inferior valve. 3 apical plates (one of which being reduced) and 1 antapical plate are present. Structure of plates porous.

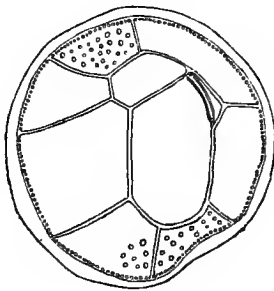


Fig. 5. *Ostreopsis siamensis* Schmidt. Arrangement of plates in the superior valve.

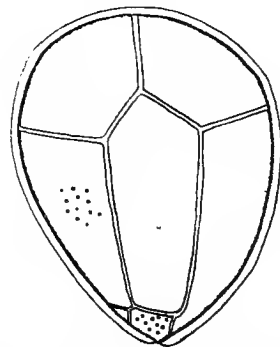


Fig. 6. *Ostreopsis siamensis* Schmidt. Another specimen. Arrangement of plates in the inferior valve.



Fig. 7. *Ostreopsis siamensis* Schmidt. Sketch of a specimen in lateral view. Arrangement of plates not indicated.

In its shape this peculiar genus is nearest to *Pyrophacus* Stein of the genera hitherto known; the number of apical- and antapical plates reminds of *Gonyaulax* Diesing, but from both those genera it is easily distinguished by the above features.

23. ***O. siamensis*** Schm. n. sp., figg. 5, 6, 7.

Body flat, oyster-shaped, somewhat convexo-concave, in a transversal section view triangular or roundish. Superior valve convexe, with 3 apical plates (one of which being very small) and 7 præmedian plates; inferior valve a little concave, with 1 antapical and 4 larger postmedian plates (and sometimes with small accessory plates). Longitudinal girdle short, only on the inferior valve. Structure coarsely porous, like that of *Ceratium tripos*. Length of sagittal axis about 90  $\mu$ .

2 (r) — 3 (rr) — 6 (rr).

**Peridinium** Ehrenberg.

24. ***P. divergens*** Ehrenberg.

This species, which appears in large quantity in the Gulf of Siam, varies exceedingly much in regard to size, shape and length of the posterior horns.

1 (+) — 2 (r) — 3 (+) — 4 (rr) — 5 (r) — 6 (+) — 7 (+) — 10 (+).  
Area; Ubiquitous.

25. ***P. conicum*** (Gran) Ostenfeld & Schmidt l. c., p. 174; *P. divergens* var. *conica* Gran, Hydrographic-Biologic Studies of the North-Atlantic Ocean and the Coast of Nordland, 1900, p. 47; Fig. Bergh l. c., Pl. XV, f. 43—44; Pouchet l. c., Contributions I, fig. 31—33; Schütt l. c. Pl. XIII, f. 43<sub>13</sub>, 14.

1 (rr) — 6 (r) — 7 (rr) — 10 (r).  
Area: Atlantic, Mediterranean, Red Sea, Indian Ocean.

26. ***P. oceanicum*** Vanhöffen, in Drygalski, Grönland-Expedition der Gesellsch. für Erdkunde zu Berlin, vol. II, 2 part, Pl. V, fig. 2.

2 (rr) — 6 (rr) — 7 (rr) — 10 (rr).  
Area: Atlantic, Red Sea, Indian Ocean.

27. ***P. elegans*** Cleve, Notes on some Atlantic Plankton-Organisms, Kgl. Sv. Vet.-Ak. Handl., Bd. 34, No. 1, p. 16, Pl. VII, fig. 15—16.

3 (rr) — 6 (rr).  
Area: Warm Atlantic, Red Sea, Indian Ocean.



28. **P. Steinii** Jørgensen, Protophyten u. Protozoën im Plankton aus der norweg. Westküste, Bergens Museums Aarbog, 1899, No. VI, p. 38; *P. Michaelis* Stein l. c., Pl. IX, f. 9—14 (non Ehrenberg).

2 (rr) — 3 (rr) — 4 (rr) — 6 (r).

Area: Atlantic, Mediterranean, Red Sea, Indian Ocean.

29. **P. tristylum** Stein var. **ovata** Schröder l. c., p. 18, Taf. 1, fig. 13.

2 (rr) — 3 (rr) — 6 (rr).

Area: Mediterranean, Red Sea, Indian Ocean.

30. **P. pellucidum** (Bergh) Schütt, Die Peridineen p. 157, Pl. XIV, f. 45.

1 (rr) — 2 (rr) — 6 (rr).

Area: Atlantic, Mediterranean, Red Sea, Indian Ocean.

31. **P. globulus** Stein, l. c. Pl. IX, f. 5—8.

5 (rr) — 10 (rr).

Area: Atlantic, Red Sea, Indian Ocean.

32. **P. pedunculatum** Schütt, Die Peridineen, Pl. XIV, f. 47.

1 (rr) — 4 (rr) — 6 (rr) — 10 (rr).

Area: Atlantic, Red Sea, Indian Ocean.

#### **Podolampas** Stein.

33. **P. bipes** Stein l. c., Pl. VIII, fig. 6—8.

2 (rr) — 3 (rr) — 4 (rr) — 5 (rr) — 6 (rr) — 7 (rr).

Area: Tropical and subtropical Seas.

#### **Blepharocysta** Ehrenberg.

34. **B. splendor maris** Ehrenberg; Stein, l. c. Pl. III, f. 17—19, Pl. VIII, f. 3—5.

2 (rr) — 3 (rr) — 4 (rr) — 5 (+) — 6 (r) — 10 (r).

Area: Atlantic, Mediterranean, Red Sea, Indian Ocean, Pacific.

#### **Phalacroma** Stein.

35. **P. doryphorum** Stein, l. c. Pl. XIX, f. 1—4.

2 (rr).

Area: General in warm Seas.

36. **P. vastum** Schütt, Die Peridineen, Pl. III, fig. 16.

6 (rr) — 7 (rr).

Area: Warm Atlantic.

37. **P. Rudgei** Murray & Whitting l. c., p. 331, Pl. XXXI, fig. 6 a, b.

In one single sample I found a small species of *Phalacroma*, which agrees with the quoted figure by Murray & Whitting.

2 (rr).

Area: Atlantic (37° 55' N., 36° 42' W.).

## Dinophysis Ehrenberg.

38. **D. homunculus** Stein, l. c. Pl. XXI, f. 2, 5.

Together with the type there occurs in the Gulf of Siam a form viz. f. **pedunculata** Schm. n. f., which is characterized by the long and plainly set off posterior protuberance.

3 (r) — 4 (r) — 6 (+) — 7 (rr).

Area: General in warmer Seas.

39. **D. miles** Cleve, Plankton from the Red Sea, Öfv. af Kongl. Sv. Vet.-Ak. Förh. 1900, No. 9, p. 1030, Fig. 1; *D. aggregata* Weber van Bosse, Annal. du Jardin Bot. de Buitenzorg, 2<sup>e</sup> sér., vol. II, p. 140, Pl. XVII, f. 3—4; *Heteroceras Schröteri* Achille Forti, Ber. d. deutsch. Botan. Ges. 1901, p. 6, f. 1—II.

var. **indica** Ostf. & Schm. l. c. p. 170.

2 (rr) — 4 (rr).

Area: Indian Ocean.

40. **D. sphaerica** Stein l. c. Pl. XX, f. 3—4.

5 (rr) — 10 (rr).

Area: Atlantic, Red Sea, Indian Ocean.

41. **D. rotundata** Clap. & Lachm., l. c. p. 409, Pl. XX, f. 16; Jørgensen, l. c. p. 31.

5 (rr).

Area: Atlantic.

## Amphisolenia Stein.

42. **A. bidentata** Schröder, l. c. p. 20, Pl. 1, f. 16 a—c.

2 (rr) — 3 (rr) — 4 (rr) — 5 (rr) — 7 (rr).

Area: Mediterranean, Red Sea, Indian Ocean.

## Ornithocercus Stein.

43. **O. magnificus** Stein. l. c. Pl. XXIII, f. 1; Schütt, Centrifugal. Dickenwachstum der Membran, Bot. Ztg. 1900, p. 18 (Sep.), f. 8—10.

2 (rr).

Area: Warm Atlantic, Mediterranean, Red Sea, Indian Ocean.

## Murracystae.

### Pyrocystis Murray.

44. **P. lunula** Schütt.

2 (rr).

Area: Atlantic, Mediterranean, Red Sea, Indian Ocean.

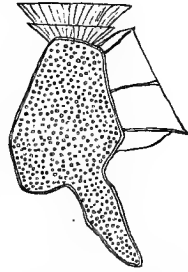


Fig. 8. *Dinophysis homunculus* Stein, f. *pedunculata*. Lateral view.