KARSTEN, G. 1907. Das Indische Phytoplankton. *Wiss. Ergebn. Dtsch. Tiefsee-Exped. "Valdivia" 1898–99*, **2** (2): 221–544.

KOFOID, C. A. 1906 b. On *Triposolenia*, a new genus of the Dinophysidae. *Univ. Calif. Publ. Zool.*, **3**: 93–116.

———— 1907. New species of Dinoflagellates. *Bull. Mus. Comp. Zool. Harv.*, **50** : 161–208.

———— AND E. MICHENER 1911. Reports on the scientific results of the expeditions to the eastern tropical pacific in charge of Alexander Agassiz. 22. New genera and species of dinoflagellates. *Bull. Mus. Comp. Zool. Harv.*, **54** : 265.

———— AND T. SKOGSBERG 1928. Dinoflagellata; the Dinophysidae. *Bull. Mus. Comp. Zool. Harv.*, **51**.

LINDEMANN, E. 1928. Peridineae (Dinoflagellatae). *Die Natur. Pflanzenfamilien, Zweite Auflage.*, **11** : 1–104.

MURRAY, G. AND F. WHITTING 1899. New Peridiniaceae from the Atlantic. *Trans. Linn. Soc. Lond.* (Bot), **5** : 1–321.

OKAMURA, K. 1912. Plankton organisms from Bonita fishing grounds. *Rep. Imp. Bur. Fish. Jap.*, **1**.

SCHILLER, J. 1931. Ueber autochtchone pflanzliche Organismen in der Tiefsee. *Biol. Zbl.*, **51**: 329–334.

———— 1933–1937. Dinoflagellatae. In "Rabenhorsts Kryptogamenflora von Dutschl and Osterreich und der Schweiz", **10** (1–3): 1–617.

SCHÜTT, F. 1895. Die Peridineen der plankton expedition. *Ergeb. Plankton Exped. Humboldt Stiftung.*, **4 A**: 1–170.

SOURNIA, A. 1968. Quelques nouvelles donnies sur le phytoplancton marin et la production primaire a Tulear (Madagascar). *Hydrobiol.*, **31** (3–4): 545–560.

———— 1970. A checklist of planktonic diatoms and dinoflagellates from the Mozambique Channel. *Bull. Mar. Sci.*, **20** (3): 678–696.

STEIDINGER, K. A. AND J. WILLIAMS 1970. Dinoflagellates. *Mem. Hourglass Cruises*, **2**: 1–251.

STEIN, F. R. VON. 1883. Die Naturgeschichte der arthrodeten Fagellater. *Der Organismus der Infusionstiere.*, **3** (2): 1–30.

SUBRAHMANYAN, R. 1958. Phytoplankton organisms of the Arabian Sea off the west coast of India. *J. Indian Bot. Soc.*, **37** (4): 435–441.

———— 1968. The Dinophyceae of the Indian Seas. I. Genus *Ceratium* Schrank. *Mem. mar. biol. Ass. India*, **2**: 1–129.

———— 1971. The Dinophyceae of the Indian Seas. II. Family Peridiniaceae. *Mem. mar. biol. Ass. India*, **2** : 1–334.

WOOD, E. F. J. 1954. Dinoflagellates in the Australian region. *Austr. J. Mar. Freshw. Res.*, **5** : 171–351.

———— 1963a. Checklist of dinoflagellates recorded from the Indian Ocean. *Rep. Div. Fish. Comm. Sci. Ind. Res. Org. Austr.*, **28** : 1–55.

———— 1963b. Dinoflagellates in the Australian region. II. Recent collections, CSIRO, *Austr. Div. Fish. Oceanogr. Tech. Paper*, **14**: 1–55.

———— 1963c. Dinoflagellates in the Australian region. III. Further collections. *Ibid.*, **17** : 1–20.

Occurrence: *Varuna* st. No. 3378 (lat. 11°00′N and long. 72°32′E during February 1966).

Body pear shaped, tapering into a tube like apical horn and with two sub-equal spines joined by wing which also extends to outer sides of the spines; length 55μ.

Distribution in the Indian Ocean: Red Sea, Gulf of Aden, west coast of Australia and India.

Podolampas spinifera Okamura (Pl. II F)

Podolampas spinifer Okamura, 1912, p. 17, pl. 2, figs 35–36; Schiller, 1937, p. 476, fig. 458; Wood, 1963b, p. 50, fig. 187.

Occurrence: *Varuna* st. No. 3390 (lat. 12°34′N and long. 73°59′E during April 1966).

Body long, top shaped to pyriform, with one antapical wing like process and one antapical spine; this species closely resembles *P. elegans* but due to its long body structure and unequal antapical processes, it could be distinguished; length 72μ.

Distribution in the Indian Ocean: Java Sea, Timor Sea and west coast of India.

DISCUSSION

From the preceding account, it may be seen that all the dinoflagellates were recorded from the west coast of India either during pre-monsoon (January-April) or monsoon periods (May-August) except *Triposolenia bicornis*, which was observed only during September. All the species described here are oceanic species, temperate or tropical, except species of *Prorocentrum*, which are neritic in habit. Wood (1963a-c) has given brief accounts of these species from the Australian waters and a few of these species have been recorded from the Madagascar regions and Mozambique Channel by Sournia (1968, 1970). No other information is available about their distributional records from the Indian Ocean, except cursory reports of expeditions (Karsten, 1907).

The observations on *Ceratium gravidum* var. *elongata*, *Triposolenia bicornis*, *Amphisolenia thrinax*, species of *Dinophysis*, *Prorocentrum*, *Podolampas* and *Oxytoxum* are significant features of this account, because the only detailed information available so far is from the Australian waters (Wood, 1954, 1963 a, b, c).

REFERENCES

BALECH, E. 1971. Microplancton del Atlantico Ecuatorial oeste (Equalant I). *Armada Argentina Servicio de Hydrografia Naval*, **654**: 1–103.

BÖHM, A. 1936. Dinoflagellates of the coastal waters of the western Pacific. *Bernice P. Bishop Mus. Bull.*, **137**: 1–54.

JÖRGENSEN, E. 1923. Mediterranean Dinophysiaceae. *Rep. Danish. Oceanogr. Exped.* 1908–1910, **2**, *Biology*, 1–48.

J. mar. biol. Ass. India, 1975, **17** (1) : 177–186

OBSERVATIONS ON SOME NEW RECORDS OF DINOPHYCEAE FROM THE INDIAN SEAS

C. P. GOPINATHAN AND C. THANKAPPAN PILLAI

Central Marine Fisheries Research Institute, Cochin-682 018

ABSTRACT

This paper embodies descriptions and illustrations of 25 species of dinoflagellates observed in the samples of the cruises of R. V. VARUNA from 1962 to 1966. All the species are found to be new distributional records for the Indian Seas.

INTRODUCTION

LITERATURE on the Dinoflagellates of the Indian Seas is scanty. The only records of these diversified group of phytoplankton of the Indian Seas is a taxonomic list and two recent monographs by Subrahmanyan (1958, 1968, 1971).

The material was collected using a half metre bolting nylon net (No. 21, mesh size 0.069 mm) from the west coast of India between latitudes 8–16°N and longitudes 70–76°E. Apart from the south-western coastal regions of India, a part of the oceanic regions are also included.

A list of 25 species of dinoflagellates belonging to 11 genera is given here. All the species described here have previously recorded either from the southern Indian Ocean (Wood, 1963a, b, c) or from the Madagascar region and Mozambique channel (Sournia, 1968, 1970).

The authors are grateful to Dr. S. Z. Qasim, former Director for encouragement. They also wish to express their gratitude to Dr. E. G. Silas, Director, Central Marine Fisheries Research Institute for going through the manuscript critically and offering advice and suggestions and to Dr. R. Subrahmanyan and Dr. Alain Sournia for helping with literature and to Dr. P. V. Ramachandran Nair for correcting the manuscript.

LIST OF SPECIES

CLASS: DINOPHYCEAE

SUB CLASS: DESMOKONTAE

Order: Prorocentrales
Family: Prorocentraceae
Genus: *Prorocentrum* Ehrenberg
Prorocentrum rostratum Stein
Prorocentrum maximum Schiller
Prorocentrum gracile Schütt

SUB CLASS: DINOKONTAE

Order: Dinophysiales
Family: Dinophysiaceae
Genus: *Phalacroma* Stein

Phalacroma circumsutum Karsten
Phalacroma apicatum Kofoid and Skogsberg
Phalacroma hindmarchii Murray and Whitting
Genus: *Dinophysis* Ehrenberg
Dinophysis caudata var. *pedunculata* Schmidt
Dinophysis hastata Stein
Dinophysis schuetti Murray and Whitting
Dinophysis nias Karsten
Dinophysis uracantha Stein
Genus: *Ornithocercus* Stein
Ornithocercus steinii Schütt *emend* Kofoid and Skogsberg
Ornithocercus thumii (Schmidt) Kofoid and Skogsberg
Ornithocercus quadratus Schütt
Ornithocercus splendidus Schütt
Family: Amphisoleniaceae
Genus: *Amphisolenia* Stein
Amphisolenia thrinax Schütt
Triposolenia bicornis Kofoid
Order: Peridiniales
Family: Goniaulacaceae
Genus: *Goniaulax* Diesing
Goniaulax pacifica Kofoid
Family: Ceratiaceae
Genus: *Ceratium* Schrank
Ceratium gravidum Gourret var. *elongata* Wood
Family: Oxytoxaceae
Genus: *Oxytoxum* Stein
Oxytoxum scolopax Stein
Oxytoxum tesselatum Stein
Family: Ceratocoryaceae
Genus: *Ceratocorys* Stein
Ceratocorys bipes Kofoid

Family: Podolampaceae
Genus: *Podolampas* Stein
Podolampas reticulata Kofoid
Podolampas elegans Schütt
Podolampas spinifera Okamura

DESCRIPTION OF SPECIES

Prorocentrum rostratum Stein (Pl. III G)

Prorocentrum rostratum Stein, 1883, pl. 1, figs. 16–17; Böhm, 1936, p. 14, fig. 4c; Wood, 1963a, p. 51; Sournia, 1970, p. 692; Steidinger and Williams, 1970, p. 37, pl. 38, fig. 138.

Occurrence: *Varuna* st. No. 2261 (lat. 10°00′N and long. 75°48′E, during May 1964).

Cells compressed laterally; body in lateral view with blunt apex and a finger or rostrum-like process; posterior portion tapering to an acute antapex; length 98μ and breadth 18μ.

Distribution in the Indian Ocean: Mozambique channel, west coast of Australia and India.

Prorocentrum maximum Schiller (Pl. III J)

Prorocentrum maximum Schiller, 1931, p. 41, fig. 44; Böhm, 1936, p. 12, fig. 3a; Wood, 1963a, p. 15.

Occurrence: *Varuna* st. No. 2261.

Cells in lateral view roundish to oval, with parallel sides; apex blunt with a finger like process, antapex round; length 41μ and breadth 26μ.

Distribution in the Indian Ocean: West coast of Australia and India.

Prorocentrum gracile Schütt (PL. II H)

Prorocentrum gracile Schütt, 1895, pl. 1, fig. 3; Wood, 1963 a, p. 51; 1963c, fig. 3; Steidinger and Williams, 1970, p. 37, figs. 134a–c.

Occurrence: *Varuna* st. No. 2261.

Cells elongate, cylindrical, rounded anteriorly and tapering posteriorly, with a sharp anterior long process which is slightly sigmoid; length of cell 65μ and breadth 16μ.

Distribution in the Indian Ocean: West coast of Australia and India.

Phalacroma circumsutum Karsten (Pl. I D)

Phalacroma circumsutum Karsten, 1907, p. 421, pl. 53, fig. 8; Jörgensen, 1923, p. 17, fig. 18; Kofoid and Skogsberg, 1928, p. 182, pl. 23, fig. 6; Wood, 1963b, p. 5, fig. 6; Sournia, 1968, p. 555.

Occurrence: *Varuna* st. No. 3382 (lat. 11°15′N and long. 74°49′E during April 1966).

Body in lateral view oval, middle portion wide; girdle anterior, epitheca rounded; posterior end of body has a large spine which connects left sulcal list by means of a sail. It is distinguishable from other species since antapical spine and lower supporting spine are joined by a more or less broad sail list. Also epitheca lower and girdle lists broader; length 82μ and breadth 64μ.

Distribution in the Indian Ocean: Zanzibar, west coast of Australia and India.

Phalacroma apicatum Kofoid and Skogsberg (Pl. II D)

Phalacroma apicatum Kofoid and Skogsberg, 1928, p. 111, fig. 10; Sournia, 1968, p. 555; Steidinger and Williams, 1970, p. 59, pl. 35, fig. 120.

Occurrence: *Varuna* st. No. 3382 (lat. 11°15′N and long. 74°49′E during April 1966).

Body in lateral view oval, middle portion wide, girdle anterior and epitheca rounded; cingulum not cup shaped, rather straight in lateral view; marked difference from other species is the absence of posterior or lateral spines; length 35μ and breadth 65 μ.

Distribution in the Indian Ocean: Australian waters and west coast of India.

Phalacroma hindmarchii Murray and Whitting (Pl. II H)

Phalacroma hindmarchii Murray and Whitting, 1899, p. 330, pl. 31, fig. 5; Wood, 1963 a, p. 48; Steidinger and Williams, 1970, pl. 55, fig. 169.
Phalacroma favus Kofoid and Michener, 1911, p. 289; Jörgensen, 1923, p. 15, fig. 16.

Occurrence: *Varuna* st. No. 3360 (lat. 08°20′N and long. 76°29′E during February 1966).

Body armoured, cingulum cup shaped, epitheca low, girdle anterior; body throughout striated and hypotheca with broad protuberance; left sulcal list ventral, not extending to antapex; length 120 μ and breadth 112 μ.

Distribution in the Indian Ocean: Australian waters and west coast of India.

Dinophysis caudata var. **pedunculata** Schmidt (Pl. I C)

Dinophysis caudata var. *pedunculata* Schmidt, 1901, p. 221; Böhm, 1936, p. 20, fig. 7b; Steidinger and Williams, 1970, p. 29, pl. 17, fig. 47.

Occurrence: *Varuna* st. No. 3382 (lat. 11°15′N and long. 74°49′E during April 1966).

Body armoured, laterally compressed and hypotheca drawn out into a posterior long protuberance; sulcal lists prominent, often resembling wings and supported by ribs with simple posterior sails; length 130μ and breadth 85μ.

Distribution in the Indian Ocean: Java Sea, west coast of Australia and India.

Dinophysis hastata Stein (Pl. I F)

Dinophysis hastata Stein, 1883, pl. 19, fig. 12; Böhm, 1936, p. 17, fig. 6; Jörgensen, 1923, p. 31, fig. 40–41; Wood, 1963, p. 19; Steidinger and Williams, 1970, p. 24, pl. 17, fig. 48.

Occurrence: *Varuna* st. No. 3382.

Cells in lateral view more or less irregular, asymetrically oval and girdle anterior; terminal spine displaced towards the ventral side and directed obliquely ventral by pointing straight down with a distinct median rib and having broad sail lists; length 120 μ and breadth 85μ.

Distribution in the Indian Ocean: Java Sea, west coast of Australia and India.

Dinophysis schuetti Murray and Whitting (Pl. II A)

Dinophysis schuetti Murray and Whitting, 1899, p. 331, pl. 31, fig. 10; Schiller, 1933, p. 147, fig. 140; Böhm, 1936, p. 20; Jörgensen, 1923, p. 34, fig. 46; Wood, 1963a, p. 20; 1963b, p. 7, fig. 17.

Occurrence: *Varuna* st. No. 3332 (lat. 13°35′N and long 73°25′E during January 1966).

Body spherical to elliptical, epitheca very low, anterior list deep, sulcal list wide with distal dorsal rib and sail. The characteristic feature of this species from others is the presence of three long diverging spines—two ventral in the left longitudinal fin and one antapical curved dorsal terminal; girdle anterior; length 65μ and breadth 55μ.

Distribution in the Indian Ocean: Australian waters and west coast of India.

Dinophysis nias Karsten (Pl. II C)

Dinophysis nias Karsten, 1907, p. 421, pl. 49, fig. 7; Wood, 1963a, p. 19.
Dinophysis triacantha Kofoid, Jorgensen, 1923, p. 34, fig. 47.

Occurrence: *Varuna* st. No. 3331 (lat. 13°35′N and long. 73°25′E during January 1966).

This species resembles to some extent *D. schuetti.* It has, in common a strongly developed median spine in left longitudinal fin; cell body in lateral view broad, ovate to almost circular; girdle list broad, upper median high with very distinct radial ribs; length 78μ and breadth 62μ.

Distribution in the Indian Ocean: Australian waters and west coast of India.

Dinophysis uracantha Stein (Pl. III, I)

Dinophysis uracantha Stein, 1883, pl. 20, fig. 22; Jörgensen, 1923, p. 32, figs. 42–43; Wood, 1963 a, p. 20; Sournia, 1970, p. 690.

Occurrence: *Varuna* st. No. 2236 (lat. 12°00′N and long. 74°30′E during April 1964).

Cells in lateral view oval, upper girdle list well developed, expanding upward with radial ribs; left longitudinal list large and almost reaching the end of hypotheca and lower part curving downward, supported by a distinct spine; terminal spine long and strongly developed; cell walls with distinct areolae; length 96μ and breadth 51 μ.

Distribution in the Indian Ocean: Red Sea, Gulf of Aden, Australian waters and west coast of India.

Ornithocercus steinii Schütt emend Kofoid and Skogsberg (Pl. I H)

Ornithocercus steinii Schütt, 1900, p. 260, figs. 5–6; Kofoid and Skogsberg, 1928, p. 551, fig. 83–84; Böhm, 1936, p. 27, fig. 11a; Wood, 1963 a, p. 32; Sournia, 1968, p. 555; Steidinger and Williams 1970, p. 33, pl. 25, fig. 80.

Occurrence: *Varuna* st. No. 3395 (lat. 07°40′N and long. 76°35′E during May 1966).

Body urn shaped, compressed laterally, cingular list long, supported by ribs; anterior cingular list funnel shaped; body with ribs supported by left sulcal list having more than three lobes. This species altogether different from *O. magnificus* due to large size, with broader epitheca and antapical sail list which is bounded by two straight ribs; length 115μ and breadth 85 μ.

Distribution in the Indian Ocean: Mozambique Channel, Australian waters and west coast of India.

Ornithocercus thumii (Schmidt) Kofoid and Skogsberg (Pl. I G)

Ornithocercus thumii Schmidt, 1888, pl. 144, fig. 59–61; Kofoid and Skogsberg, 1928, p. 540, figs. 81–82 and pl. 18, figs. 4–6; Sournia, 1970, p. 691; Steidinger and Williams, 1970, p. 33, fig. 81.

Ornithocercus thurni (Schmidt) Kofoid and Skogsberg, Böhm, 1936, p. 28, fig. 11b; Wood, 1963a, p. 32.

Occurrence: *Varuna* st. No. 3395.

Closely resemble *O. steinii* in structure, but the principal difference lies in the development of left border of longitudinal furrow and the number of ribs of upper border of transverse furrow; left longitudinal wing in *O. steinii* is divided into four lobes near the cleavage rib; in this species it is divided into three lobes; length 132μ and breadth 114μ.

Distribution in the Indian Ocean: Zanzibar, Mozambique Channel, Australian waters and west coast of India.

Ornithocercus quadratus Schütt (Pl. I, I)

Ornithocercus quadratus Schütt, 1900, p. 254, fig. 1–4, 12–13; Jorgensen, 1923, p. 37, fig. 50; Wood, 1963 a, p. 32; Sournia, 1970, p. 691; Steidinger and Williams, 1970, pl. 54, fig. 164.

Occurrence: *Varuna* st. No. 3395.

Closely resembles both *O. steinii* and *O. thumii* in structure, but antapical sail cuts off almost straight together with large and broad left longitudinal fin gives the organism in lateral view almost a squarish appearance; anterior cingular list region funnel shaped with more ribs than any other species; length 144μ and breadth 118 μ.

Distribution in the Indian Ocean: Red Sea, Gulf of Aden, Mozambique Channel, Australian waters and west coast of India.

Ornithocercus splendidus Schütt (Pl. II E)

Ornithocercus splendidus Schütt, 1893, p. 272, fig. 82–83; Lindemann, 1928, p. 75, fig. 61; Wood, 1963a, p. 32; Sournia, 1968, p. 555; Steidinger and Williams, 1970, pl. 44, fig. 165a-b.

Occurrence: *Varuna* st. No. 3395.

Body urn shaped, compressed laterally, similar to *O. steinii*, but anterior cingular list, though funnel shaped have reticulate ribs, besides the parallel; length 75μ and breadth 62μ.

Distribution in the Indian Ocean: Red Sea, Java Sea, Australian waters and west coast of India.

Amphisolenia thrinax Schütt (Pl. III D, E and F)

Amphisolenia thrinax Schütt, 1893, fig. 25; Kofoid and Skogsberg, 1928, p. 432; Wood, 1963a, p. 3; Sournia, 1968, p. 552.

Occurrence: *Varuna* st. No. 3372 (lat. 09°55′N and long. 75°18′E during February 1966).

Distribution in the Indian Ocean: Red Sea, Timor Sea and west coast of India.

Triposolenia bicornis Kofoid (Pl. II, I)

Triposolenia bicornis Kofoid, 1906a, p. 105, pl. 15, figs. 1–2 and pl. 16, fig. 6; Lindemann, 1928, p.78, fig. 66; Jörgensen, 1923, p. 41, fig. 62; Wood, 1963c, p. 5, fig. 10.

Occurrence: *Varuna* st. No. 2569 (lat. 08°50′N and long. 76°10′E during September 1964).

Body subconical, epitheca roŭnded, neck elongated angled dorsally; both posterior horns almost equally curved and turned slightly outward at the points, without spines at the ends; chromatophores numerous, distributed in the perepheral region; length 135μ and breadth 120 μ.

Distribution in the Indian Ocean: Timor Sea and west coast of India.

Goniaulax pacifica Kofoid (Pl. I A)

Goniaulax pacifica Kofoid, 1907, p. 308, pl. 30, figs. 37–39; Wood, 1963a, p. 25.

Steiniella cornuta Karsten, 1907, p. 420, pl. 53, figs. 7 a-e.

Occurrence: *Varuna* st. No. 3456 (lat. 11° 24′N and long. 74°36′E during June 1966).

Body top shaped, slightly compressed dorsoventrally, longer than broad with hyaline spiral bands running from anterior to posterior end; whole cell is transparent with well developed apical horn and a distinct antapical spine; girdle median, resembling the genus *Peridinium*; length 85μ and breadth 56μ.

Distribution in the Indian Ocean: West coast of Australia and India.

Ceratium gravidum Gourret var. **elongata** Wood (Pl II B)

Ceratium gravidum Gourret var. *elongata* Wood, 1963b, p. 40, fig. 146.

Occurrence: *Varuna* st. No. 3379 (lat. 11°20′N and long. 73°36′E during February 1966).

Characteristic differenciation from the type is that epitheca elongate, not oval or round with parallel sides and rounded apex; no anterior horn; length 480μ and breadth 210μ.

Distribution in the Indian Ocean: Timor Sea, west coast of Australia and India.

Oxytoxum scolopax Stein (Pl. III A)

Oxytoxum scolopax Stein, 1883, p. 95, pl. 5, fig. 1–3; Lindemann, 1928, p. 97, fig. 84A; Wood, 1963a, p. 34; Sournia 1968, p. 555; 1970, p. 691; Steidinger and Williams, 1970, p. 34, pl. 27, fig. 87.

Occurrence: *Varuna* st. No. 3397 (lat. 07°40′N and long. 76°08′E during May 1966).

Body spindle shaped, hypotheca exceeds epitheca in size by at least 2/3 of body, cingular area necklike, apices pointed, theca delicately marked with linear striae and often pitted; length 88 μ and breadth 16μ.

Distribution in the Indian Ocean: Red Sea, Timor Sea, west coast of Australia and India.

Oxytoxum tessalatum Stein (Pl. III B)

Oxytoxum tessalatum Stein, 1883, p. 64, pl. 6, figs. 2–3; Lindemann, 1928, p. 97, fig. 84B; Wood, 1963, p. 34; Steidinger and Williams, 1970, p. 34, pl. 27, fig. 88; Balech, 1971, p. 30, pl. 7, figs. 130–134.

Occurrence: *Varuna* st. No. 2321 (lat. 11°00′N and long. 75°15′E during May 1964).

Epitheca hemispherical and girdle seems to be middle; hypotheca top shaped with a small antapical process; length 50μ and breadth 26μ.

Distribution in the Indian Ocean: Red Sea, Gulf of Aden, west coast of Australia and India.

Ceratocorys bipes Kofoid (Pl. II G; Pl. III C)

Ceratocorys bipes Kofoid, 1910, p. 183; Wood, 1963c, p. 16, fig. 56.

Ceratocorys assymmetrica Karsten, 1907, p. 419, pl. 47, figs. 9a-d.

Occurrence: *Varuna* st. No. 3399 (lat. 13°30′N and long. 72°53′E during May 1966).

Body conical, low, girdle anterior with ribbed lists, hypotheca with two broad lobes, each with a stout spine curved inwards; sulcal list narrow and body distinctly sculptured; length 65μ and breadth 58μ.

Distribution in the Indian Ocean: Red Sea, west coast of Australia and India.

Podolampas reticulata Kofoid (Pl. I B)

Podolampas reticulata Kofoid, 1907, p. 187, pl. 2, fig. 11; Steidinger and Williams, 1970, p. 36, pl. 36, fig. 126 a-b.

Podolampas bipes f. *reticulata* Wood, 1963a, p. 50.

Occurrence: *Varuna* st. No. 3372 (lat. 09°55′N and long. 75°18′E during February 1966).

Body very broad, top shaped to pear shaped with tapering apical horn; characteristic feature of this species is that posterior broad portion have two wing processes which are serrate and reticulate. Length 95 μ and breadth 65 μ.

Distribution in the Indian Ocean: West coast of Australia and India.

Podolampas elegans Schütt (Pl. I E)

Podolampas elegans Schütt, 1895, p. 18, fig. 57; Wood, 1963b, p. 50, fig. 186; Sournia, 1968, p. 556; Steidinger and Williams, 1970, p. 35, pl. 36, fig. 127.

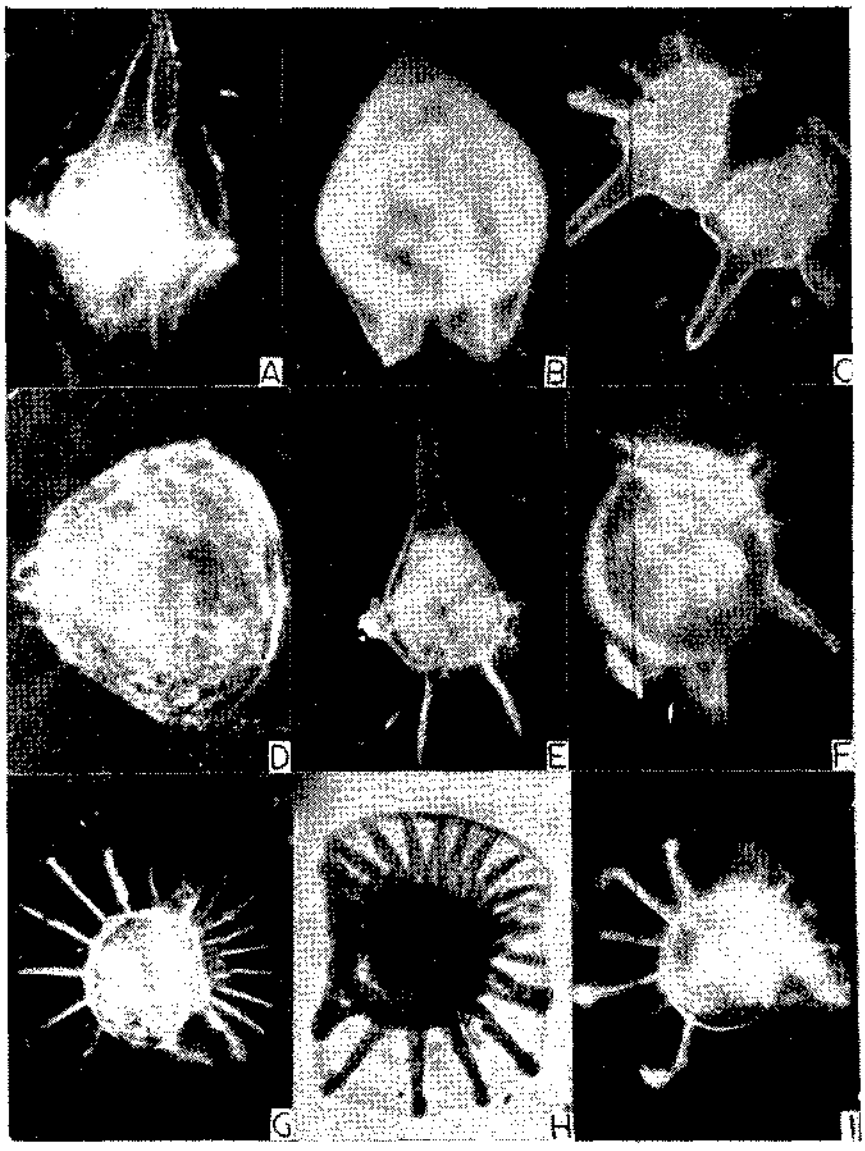

Plate I. A. *Goniadax pacifica*; B. *Podolampas reticulata*; C. *Dinophysis caudata* var. *pedunculata*; D. *Phalacroma circumsutum*; E. *Podolampas elegans*; F. *Dinophysis hastata*; G. *Ornithocercus thumii*; H. *Ornithocercus steinii* and I. *Ornithocercus quadratus*.

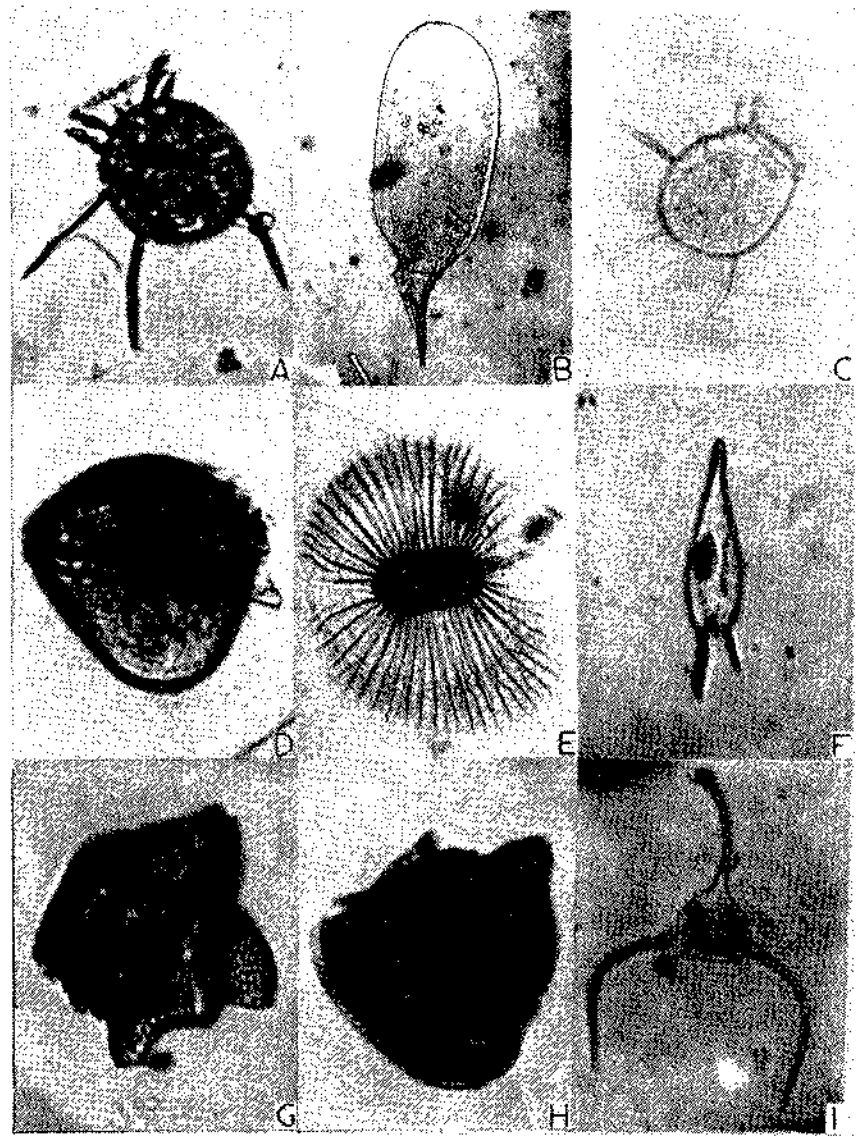

Plate II. A. *Dinophysis schuettii*; B. *Ceratium gravidum* var. *elongata*; C. *Dinophysis miles*; D. *Phalacroma apicatum*; E. *Ornithocercus splendidus*, antapical view; F. *Podolampas spinifera*; G. *Ceratocorys bipes*; H. *Phalacroma hindmarchii* and I. *Triposolenia bicornis*.

Plate III. A. *Oxytoxum scolopax*; B. *Oxytoxum tesselatum*; C. *Ceratocorys bipes*, showing epitheca liberated; D, E and F. *Amphisolenia thrinax*; G. *Prorocentrum rostratum*; H. *Prorocentrum gracile*; I. *Dinophysis uracantha* and J. *Prorocentrum maximum*.