Dinoflagellates in the Australian Region

III. Further Collections

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DIVISION OF FISHERIES AND OCEANOGRAPHY TECHNICAL PAPER NO. 17

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, AUSTRALIA 1963

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Technical Paper No. 17

Commonwealth Scientific and Industrial
Research Organization, Australia
Melbourne 1963

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III. FURTHER COLLECTIONS

By E. J. F. WOOD*

[*Manuscript received July 25, 1963*]

Summary

This paper describes 61 species and varieties of Dinoflagellates which have recently been recorded from the central Coral Sea and eastern Indian Ocean. Eleven new species and two new varieties are included.

I. INTRODUCTION

The species described and figured in this paper are derived from plankton collections made by means of closing water samplers since the preparation of Part II in this series (Wood 1963). The samples were taken during cruises in ocean waters north of latitude 34° S. and in the seas to the north of Australia, i.e. in tropical or subtropical waters.

II. TAXONOMY

Order ADINIFERIDEA

Family PROROCENTRIDAE Kofoid

Genus EXUVIAELLA Cienkowski

EXUVIAELLA OVUM Schiller

Fig. 1

Exuviaella ovum Schiller, 1918, p. 257, fig. 9*a,b*.

Body oval, more or less blunt in front with a somewhat deep hollow from which protrude the two flagella which are flat and of different lengths; theca with irregularly spaced pores. Length 35 μ.

Distribution.—Indonesian waters.

Genus PROROCENTRUM Ehrenberg

PROROCENTRUM DIAMANTINAE, sp. nov.

Fig. 2

Cells in side view ovate-lanceolate; apex with strong, pointed spine; flagellar pore deep; antapex pointed, acute; surface with a row of large pores near margin, whole surface finely porulate. Length 50 μ.

Distribution.—Indonesian waters.

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PROROCENTRUM GRACILE Schütt

Fig. 3

Prorocentrum gracile Schütt, 1895, pl. 1, fig. 3.

Body elongate, rounded anteriorly, widest about one-third distance from apex; posteriorly tapering, sides slightly concave; with a long, sharp process, slightly sigmoid. Length 40–60 μ.

Distribution.—Atlantic Ocean; Coral Sea.

Order DINIFERIDEA

Family **DINOPHYSIDAE** Kofoid & Michener

Genus THECADINIUM Kofoid

THECADINIUM KOFOIDI Kofoid & Skogsberg

Fig. 4

Thecadinium kofoidi Kofoid and Skogsberg, 1928, p. 32.

Body flattened, oval in side view; epitheca asymmetrical, low, much smaller than hypotheca, subovate; girdle anterior, deep, dipping on ventral side and continuous with sulcus which reaches antapex. Length 40 μ.

Distribution.—Isle of Man; North Tasman Sea.

Genus DINOPHYSIS Ehrenberg

DINOPHYSIS HYALINA, sp. nov.

Fig. 5

Body spherical to slightly oval; epitheca approximately equal to girdle in height; collar about body width; left sulcal list longer than body but R3 absent. Diameter 30 μ.

Distribution.—Java Sea.

DINOPHYSIS CARPENTARIAE, sp. nov.

Fig. 6

Body somewhat pyriform, with flat antapex and greatest diameter about one-third length from apex; girdle slightly concave ventrally; collar about two-thirds width of transdiameter, anterior girdle list ribbed; left sulcal list about three-fourths body length, of even width, R3 absent. Transdiameter 35 μ, length 30 μ.

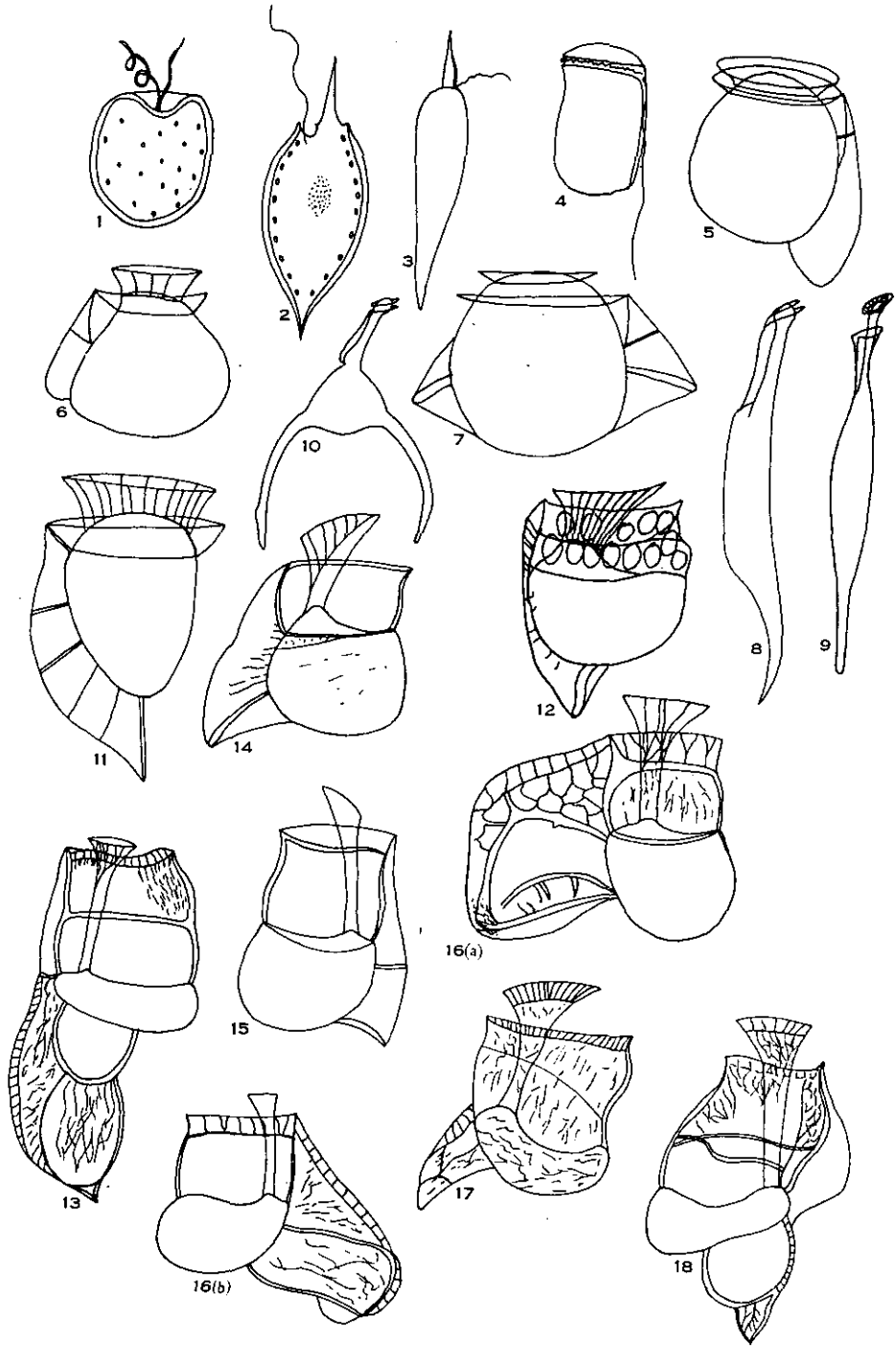
Distribution.—Gulf of Carpentaria.

DINOPHYSIS OPPOSITA, sp. nov.

Fig. 7

Body rotund, epitheca rounded; anterior girdle list shallow; posterior list more so; right sulcal list small, rounded; left list triangular with R3 strong, supporting apex of list; this species is distinguished by the presence of a dorsal sail supported by a strong rib opposite R3. Diameter 45 μ.

Distribution.—North Tasman Sea.



Figs. 1–18.—Dinoflagellates. 1, *Exuviaella ovum.* 2, *Prorocentrum diamantinae*, sp. nov. 3, *P. gracile.* 4, *Thecadinium kofoidi.* 5, *Dinophysis hyalina*, sp. nov. 6, *D. carpentariae*, sp. nov. 7, *D. opposita*, sp. nov. 8, *Amphisolenia brevicauda* var. *curvata*, var. nov. 9, *A. laticincta.* 10, *Triposolenia bicornis.* 11, *Ornithocercus carpentariae*, sp. nov. 12, *Parahistioneis pachypus.* 13, *Histioneis cymbalaria.* 14, *H. diamantinae*, sp. nov. 15, *H. inornata.* 16(*a*,*b*), *H. milneri.* 17, *H. panaria.* 18, *H. panda.*

Genus AMPHISOLENIA Stein

AMPHISOLENIA BREVICAUDA var. CURVATA, var. nov.

Fig. 8

Differs from type (Wood 1963) in strongly sigmoid curvature of body.

Distribution.—Arafura Sea.

AMPHISOLENIA LATICINCTA Kofoid

Fig. 9

Amphisolenia laticincta Kofoid, 1907, p. 198, pl. 13, fig. 80.

Body straight, swollen in the middle, spindle-shaped, extended antapically; girdle unusually wide, anterior and posterior girdle lists therefore widely separated.

Distribution.—Coral Sea.

Genus TRIPOSOLENIA Kofoid

TRIPOSOLENIA BICORNIS Kofoid

Fig. 10

Triposolenia bicornis Kofoid, 1906*b*, p. 96, pl. 15, figs. 1, 2.

Body subconical, epitheca rounded, low; neck elongate, angled dorsally; antapical horns evenly bent towards longitudinal axis, slightly rugose towards ends on outside. Length 120–150 μ.

Distribution.—Atlantic, Pacific, Mediterranean; Coral and Timor Seas.

Genus ORNITHOCERCUS Stein

ORNITHOCERCUS CARPENTARIAE, sp. nov.

Fig. 11

Body ovate, longer axis greater than trans-axis; anterior sulcal list moderately high, ribbed; posterior list hyaline; left sulcal list moderate, widening posteriorly to R4 which is posterior. Length 50 μ.

Distribution.—Gulf of Carpentaria.

Genus PARAHISTIONEIS Kofoid & Skogsberg

PARAHISTIONEIS PACHYPUS Böhm

Fig. 12

Parahistioneis pachypus. Schiller, 1933, p. 213, figs. 202*a,b*.

Body in side view very like *P. crateriformis*; anterior girdle list funnel-shaped, without tube, ribbed, arising from rounded or flattened epitheca; lower girdle list much wider, not ribbed, constricted anteriorly; sulcal list thickened, narrow, R3 strong, slightly ventral, posterior.

Distribution.—Southern Coral Sea.

Genus HISTIONEIS Stein

HISTIONEIS CYMBALARIA Stein

Fig. 13

Histioneis cymbalaria Stein, 1883, pl. 22, fig. 7.

Body naviculate in lateral view; girdle anterior; apex conical, small; anterior girdle list with long tube and symmetrical funnel; posterior list gibbous, anterior part reticulate; left sulcal list narrow, reticulate, anterior R2 directed posteriorly, posterior R2 anastomosing with R3 and lobed; posterior part of sail reticulate. Length 95 μ.

Distribution.—North-east Indian Ocean.

HISTIONEIS DIAMANTINAE, sp. nov.

Fig. 14

Body subrotund; epitheca small, girdle conical; anterior girdle list with small tube and flared, ribbed funnel; posterior list hyaline; left sulcal list triangular, narrow to R2 then widening to clavate R3 which is ventero-posterior. Length 50 μ.

Distribution.—North-east Indian Ocean.

HISTIONEIS INORNATA Kofoid & Michener

Fig. 15

Histioneis inornata Kofoid and Michener, 1911, p. 297. Kofoid and Skogsberg, 1928, p. 654, pl. 85, fig. 2, pl. 95, fig. 11.

Body in lateral view round with depressed girdle and low epitheca; anterior girdle list with long tube and angled funnel; posterior list gibbous, larger than body; left sulcal list ventral extending to R3 which is curved posteriorly. Diameter 35 μ.

Distribution.—Java Sea.

HISTIONEIS MILNERI Murray & Whitting

Fig. 16

Histioneis milneri Murray and Whitting, 1899, p. 33, pl. 33, fig. 2.

Body sausage-shaped to rounded; girdle anterior; anterior girdle list with moderate tube and angled flare, ribbed; posterior list slightly gibbous, anteriorly reticulate; R2 and R3 long, parallel, R3 sigmoid; sail broad, ventral; anterior and outer parts reticulate. Length 120 μ.

Distribution.—North-east Indian Ocean.

HISTIONEIS PANARIA Kofoid & Skogsberg

Fig. 17

Histioneis panaria Kofoid and Skogsberg, 1928, p. 659, pl. 85, figs. 8,9; pl. 95, fig. 6.

Body sausage-shaped; girdle anterior, epitheca small; anterior girdle list with short tube, flared, ribbed funnel; posterior list larger than body, irregular in shape, upper part ribbed; left sulcal list triangular, R2 straight, inclined somewhat dorsally,

more or less parallel to R3 which terminates sail; lists may be reticulate. Length 60–70 μ.

Distribution.—North-east Indian Ocean; Java Sea.

HISTIONEIS PANDA Kofoid & Michener

Fig. 18

Histioneis panda Kofoid and Michener, 1911, 298. Kofoid and Skogsberg, 1928, p. 694, fig. 85,1, pl. 95,9.

Body sausage-shaped, higher dorsally; girdle anterior; anterior girdle list with long tube and symmetrical, reticulate funnel; posterior list strongly gibbous, contracted anteriorly; upper part reticulate; left sulcal list posterior with R2 joining R3, sail triangular and supported by extension of R3. Length 90 μ.

Distribution.—North-east Indian Ocean.

HISTIONEIS REMORA Stein

Fig. 19

Histioneis remora Stein, 1883, p. 22, fig. 11.

Body subcircular; epitheca in lateral view bluntly conical; hypotheca rotund; anterior girdle list with a short tube and long funnel, ribbed; posterior list cylindrical, hyaline; left sulcal list long and narrow with marginal rib between R2 and R3, more or less reticulate, R2 bent posteriorly, R3 posterior. Length 130 μ.

Distribution.—Arafura Sea.

Genus CITHARISTES Stein

CITHARISTES REGIUS Stein

Fig. 20

Citharistes regius Stein, 1883, p. 22, fig. 1–4.

Body in side view C-shaped, posterior margin semicircular or nearly so; left sulcal list rounded, somewhat variable, may be ribbed.

Distribution.—Southern Coral Sea.

Family **GYMNODINIDAE** Kofoid

Genus AMPHIDINIUM Claparède & Lachmann

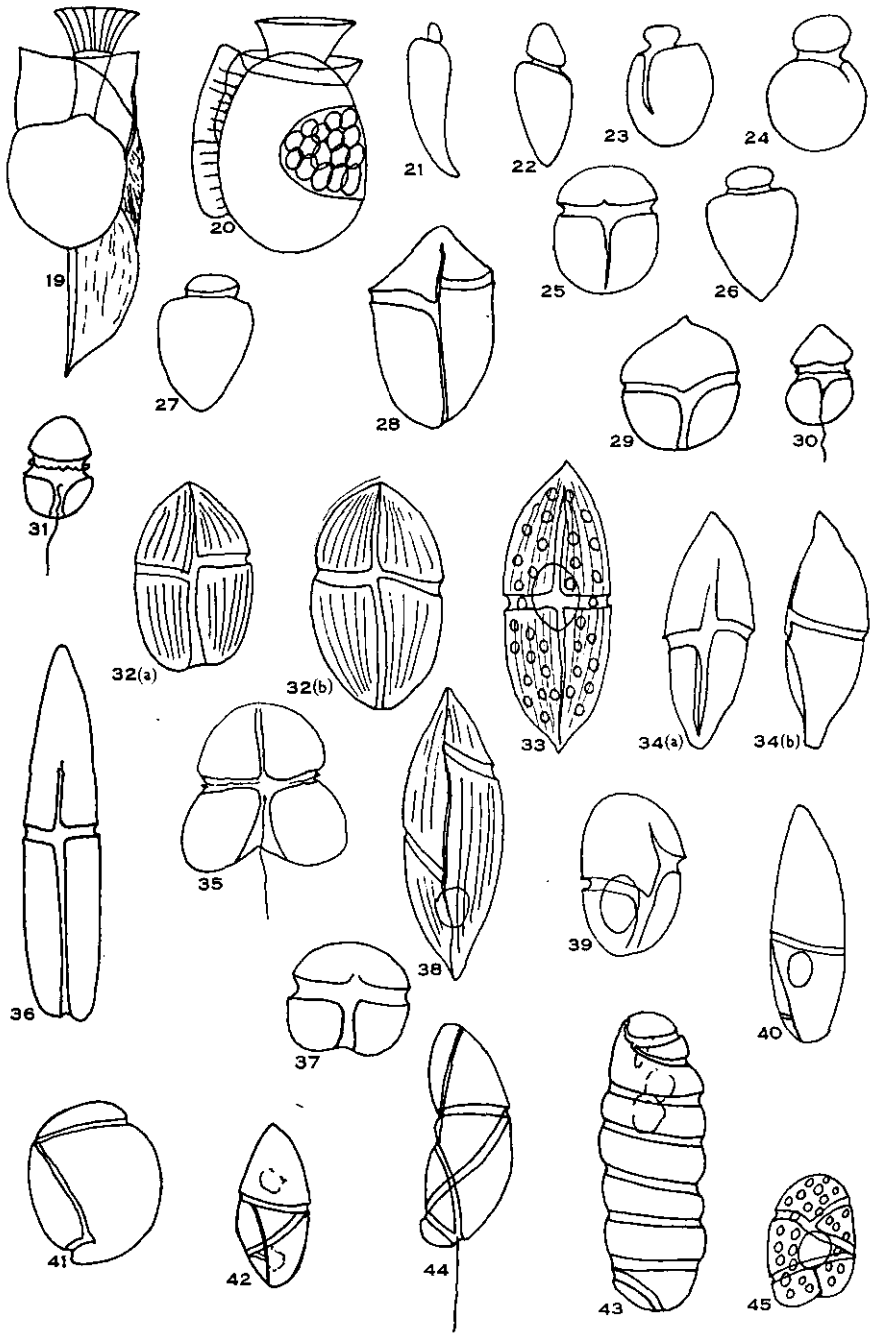
AMPHIDINIUM CURVATUM Schiller

Fig. 21

Amphidinium curvatum Schiller, 1928, p. 133, fig. 7.

Epicone very small, knobbed; hypocone tapering, sharply curved towards acute antapex; girdle minute. Length 30 μ.

Distribution.—Adriatic Sea; Indonesian waters.



Figs. 19–45.—Dinoflagellates. 19, *H. remora.* 20, *Citharistes regius.* 21, *Amphidinium curvatum.* 22, *A. extensum.* 23, *A. glaucum.* 24, *A. globosum.* 25, *A. lissae.* 26, *A. oceanicum.* 27, *A. rotundatum.* 28, *Gymnodinium achromaticum.* 29, *G. agile.* 30, *G. agilliforme.* 31, *G. albulum.* 32(*a,b*), *G. hyalinum.* 33, *G. multilineatum.* 34, *G. scopulosum.* 35, *G.* sp. 36, *G.* sp. 37, *G. virescens.* 38, *Gyrodinium britannica.* 39, *Gyro. capsulatum.* 40, *Gyro. fusiforme.* 41, *Gyro. grave.* 42, *Gyro. ovatum.* 43, *Cochlodinium brandti.* 44, *C. cavatum.* 45, *C. helicoides.*

AMPHIDINIUM EXTENSUM Wulff

Fig. 22

Amphidinium extensum Wulff, 1916, p. 104, pl. 1, fig. 8*a–d*.

Cells elongate with diagonal girdle; epicone subconical, longer than broad, smaller than hypocone, apex rounded; hypocone long, tapering, antapex bluntly rounded. Length 40 μ.

Distribution.—Indonesian waters.

AMPHIDINIUM GLAUCUM Conrad

Fig. 23

Amphidinium glaucum Conrad, 1926, p. 75, pl. 1, figs. 3–5.

Body ovate to almost spherical; epicone very small, flattened; hypocone slightly asymmetric, left shoulder higher than right, antapex broadly rounded; girdle circular, sulcus running from girdle posteriorly narrowing towards antapex. Length 35 μ.

Distribution.—Nieuport (Belgium); Indonesian waters.

AMPHIDINIUM GLOBOSUM Schröder

Fig. 24

Amphidinium globosum Schröder, 1911, p. 616, 651, fig. 16.

Body rotund, oval; epicone low, symmetrical, apex flat to convex, smaller than hypocone which is broad, almost spherical; girdle deep, sulcus broad, tapering towards antapex. Length 40–50 μ.

Distribution.—Indonesian waters.

AMPHIDINIUM LISSAE Schiller

Fig. 25

Amphidinium lissae Schiller, 1925. In Schiller, 1933, p. 302, fig. 299*a,b*.

Epicone evenly and broadly rounded, lower than hypocone which is broadly oval, antapex broadly rounded; girdle almost circular; sulcus slightly evident in epicone, nearly reaching base of hypocone. Length 20 μ.

Distribution.—Lissa Harbour; Indonesian waters.

AMPHIDINIUM OCEANICUM Lohmann

Fig. 26

Amphidinium oceanicum Lohmann, 1920, p. 142, fig. 44.

Epicone very small; hypocone cordate, acute, sides convex, shoulders rounded; girdle circular. Length 20–30 μ.

Distribution.—Northern Tasman Sea.

AMPHIDINIUM ROTUNDATUM Lohmann

Fig. 27

Amphidinium rotundatum Lohmann, 1908, pp. 147, 199, 202, 254, 261, 324, fig. 9.

A minute species; body rotund; epicone minute; hypocone cordate with rounder shoulders; girdle deep and wide. Length 30 μ.

Distribution.—North Tasman Sea.

Genus GYMNODINIUM Stein

GYMNODINIUM ACHROMATICUM Lebour

Fig. 28

Gymnodinium achromaticum Lebour, 1917, p. 190, fig. 5.

Body of moderate size, with low, conical epicone and semi-elliptical hypocone with rounded base, striate; girdle displaced 2–3 widths; sulcus on epicone and hypocone, extending to base, indented. Length 60–80 μ.

Distribution.—Plymouth Sound; Coral Sea.

GYMNODINIUM AGILE Kofoid & Swezy

Fig. 29

Gymnodinium agile Kofoid and Swezy, 1921, p. 184, fig. Y9, pl. 3, fig. 31.

Body flattened dorsoventrally; epicone rounded with small asymmetrical apical point; hypocone rotund; girdle equatorial, not displaced, broad and deep; sulcus small, from girdle to antapex. Length 20–30 μ.

Distribution.—Pacific Ocean; Coral Sea.

GYMNODINIUM AGILIFORME Schiller

Fig. 30

Gymnodinium agiliforme Schiller, 1933, p. 329, fig. 332*a–d*.

Body longer than broad, slightly constricted dorsoventrally; epicone somewhat bluntly conical; hypocone rounded asymmetric; girdle broad, deep, circular; sulcus small, only on hypocone. Length 30 μ.

Distribution.—Adriatic; Coral Sea.

GYMNODINIUM ALBULUM Lindemann

Fig. 31

Gymnodinium albulum Lindemann, 1928, p. 292, figs. 8–10.

Body variable in shape; epicone and hypocone almost equal, rounded; girdle deep and very wide; sulcus broad to narrow, only on hypocone and reaching antapex. Length 10–30 μ.

Distribution.—South Coral Sea; Indonesian waters.

GYMNODINIUM HYALINUM Lebour

Fig. 32

Gymnodinium hyalinum Lebour, 1925, p. 48, pl. 6, figs. 3, 4.

Body ovate, about twice as long as broad; epicone subconical; apex blunt; hypocone rounded or with depressed antapex; sulcus from apex to antapex; surface striate. Length 40 μ.

Distribution.—Tasman Sea; Indonesian waters.

GYMNODINIUM MULTILINEATUM Kofoid & Swezy

Fig. 33

Gymnodinium multilineatum Kofoid and Swezy, 1921, p. 235, fig. Y18.

Body large, broadly fusiform, apex rounded, slightly constricted, antapex more obtuse, girdle slightly displaced; sulcus on both epicone and hypocone but not reaching apices; surface striate. Length 100–120 μ.

Distribution.—Indonesian waters.

GYMNODINIUM SCOPULOSUM Kofoid & Swezy

Fig. 34

Gymnodinium scopulosum Kofoid and Swezy, 1921, p. 225, fig. X6.

Body sub-biconical to subovoid; epicone longer than hypocone, sides rounded, apex acute, antapex blunt; hypocone more slender; girdle submedian, slightly displaced; sulcus straight, on both epicone and hypocone. Length 50–55 μ.

Distribution.—Pacific Ocean; Coral Sea.

GYMNODINIUM sp.

Fig. 35

Epicone hemispherical, hypocone deeply divided, one lobe tending to be longer than the other; girdle deep, little or not displaced; sulcus shallow on epicone, deeper and widening on hypocone. Length 30–40 μ.

Distribution.—Coral Sea; Indonesian waters.

GYMNODINIUM sp.

Fig. 36

Body very elongate; epicone tapering with rounded acute end; hypocone with sides almost parallel and rounded, indented antapex; girdle relatively small; sulcus extending on epicone but not reaching apex, narrow and even on hypocone, reaching antapex. Length 100 μ.

Distribution.—Northern Tasman Sea.

GYMNODINIUM VIRESCENS Kofoid

Fig. 37

Gymnodinium virescens Kofoid, 1931, p. 19, pl. 1, fig. 2.

Body broadly elliptic, epicone hemispherical; hypocone round but indented; girdle moderately wide and deep; sulcus extending slightly into epicone, reaching base of hypocone. Length 25 μ.

Distribution.—Mutsu Bay; North Tasman Sea.

Genus GYRODINIUM Kofoid & Swezy

GYRODINIUM BRITANNIA Kofoid & Swezy

Fig. 38

Gyrodinium britannia Kofoid and Swezy, 1921, p. 287, fig. DD13.

Body elongate, fusiform, ends acute; girdle spiral, displaced about 1·5 transdiameters; sulcus from apex to base; surface sparsely striate. Length 150–160 μ.

Distribution.—Indonesian waters.

GYRODINIUM CAPSULATUM Kofoid & Swezy

Fig. 39

Gyrodinium capsulatum Kofoid and Swezy, 1921, p. 268, fig. CC14.

Body oval, girdle depressed, submedian, displaced about 0·4 diameters; sulcus short on epicone, reaching antapex. Length 40–50 μ.

Distribution.—La Jolla; Timor Sea.

GYRODINIUM FUSIFORME Kofoid & Swezy

Fig. 40

Gyrodinium fusiforme Kofoid and Swezy, 1921, p. 307, fig. EE4–8.

Body small, slender, fusiform; girdle a descending left spiral displaced 1·4 diameters; sulcus narrow. Length 75 μ.

Distribution.—Arctic Ocean; Indonesian waters.

GYRODINIUM GRAVE (Meunier) Kofoid & Swezy

Fig. 41

Spirodinium grave Meunier, 1910, p. 64, pl. 14, figs. 27, 28.
Gyrodinium grave Kofoid and Swezy, 1921, p. 309, fig. DD7.

Body small, rotund; girdle displaced over 0·5 transdiameter; sulcus at an angle with longitudinal axis. Length 40–60 μ.

Distribution.—Arctic Ocean; Indonesian waters.

GYRODINIUM OVATUM (Gourret) Kofoid & Swezy

Fig. 42

Gymnodinium ovatum Gourret, 1883, p. 88, pl. 1, fig. 22.
Gyrodinium ovatum Kofoid and Swezy, 1921, p. 322, fig. EE7.

Body small, fusiform; girdle a left spiral displaced about 1 diameter; sulcus from girdle to antapex; angled. Length 50 μ.

Distribution.—Gulf of Marseilles; North Tasman Sea.

Genus COCHLODINIUM Schütt

COCHLODINIUM BRANDTI Wulff

Fig. 43

Cochlodinium brandti Wulff, 1916, p. 108, figs. 17*a,b*. Schiller, 1933, p. 514, fig. 544.
Cochlodinium augustum Kofoid and Swezy, 1921, p. 354, fig. HH15.

Body symmetrically fusiform with rounded ends; girdle and sulcus deeply indented, both spiral in same direction.

Distribution.—Barents Sea; English Channel; Pacific Ocean; Tasman Sea.

COCHLODINIUM CAVATUM Kofoid & Swezy

Fig. 44

Cochlodinium cavatum Kofoid and Swezy, 1921, p. 356, fig. HH10.

Body of medium size, irregularly reniform, concave ventrally, convex dorsally; girdle a left spiral of 1·5 turns, sulcus with apical and antapical loops and 0·5 turns. Length 50–80 μ.

Distribution.—La Jolla; Tasman Sea; Indonesian waters.

COCHLODINIUM HELICOIDES Lebour

Fig. 45

Cochlodinium helicoides Lebour, 1925, p. 62, pl. 9, fig. 2.
Cochlodinium helix Kofoid and Swezy, 1921, pp. 370, 371. Non *Cochlodinium helix* Schütt.

Body irregularly ovate, broad and asymmetric below; girdle and sulcus angled; chromatophores numerous. Length 40–60 μ.

Distribution.—Atlantic, Plymouth, La Jolla; Indonesian waters.

Family **PERIDINIIDAE** Kofoid

Genus PERIDINIUM Ehrenberg

PERIDINIUM SALTANS Meunier

Fig. 46

Peridinium saltans Meunier, 1910, p. 26, pl. 1, figs. 9–14.

Body rotund, somewhat depressed; apex tapering, acute, apical horn short; antapical horns curved, strongly diverging. Length 100 μ.

Distribution.—Indonesian waters.

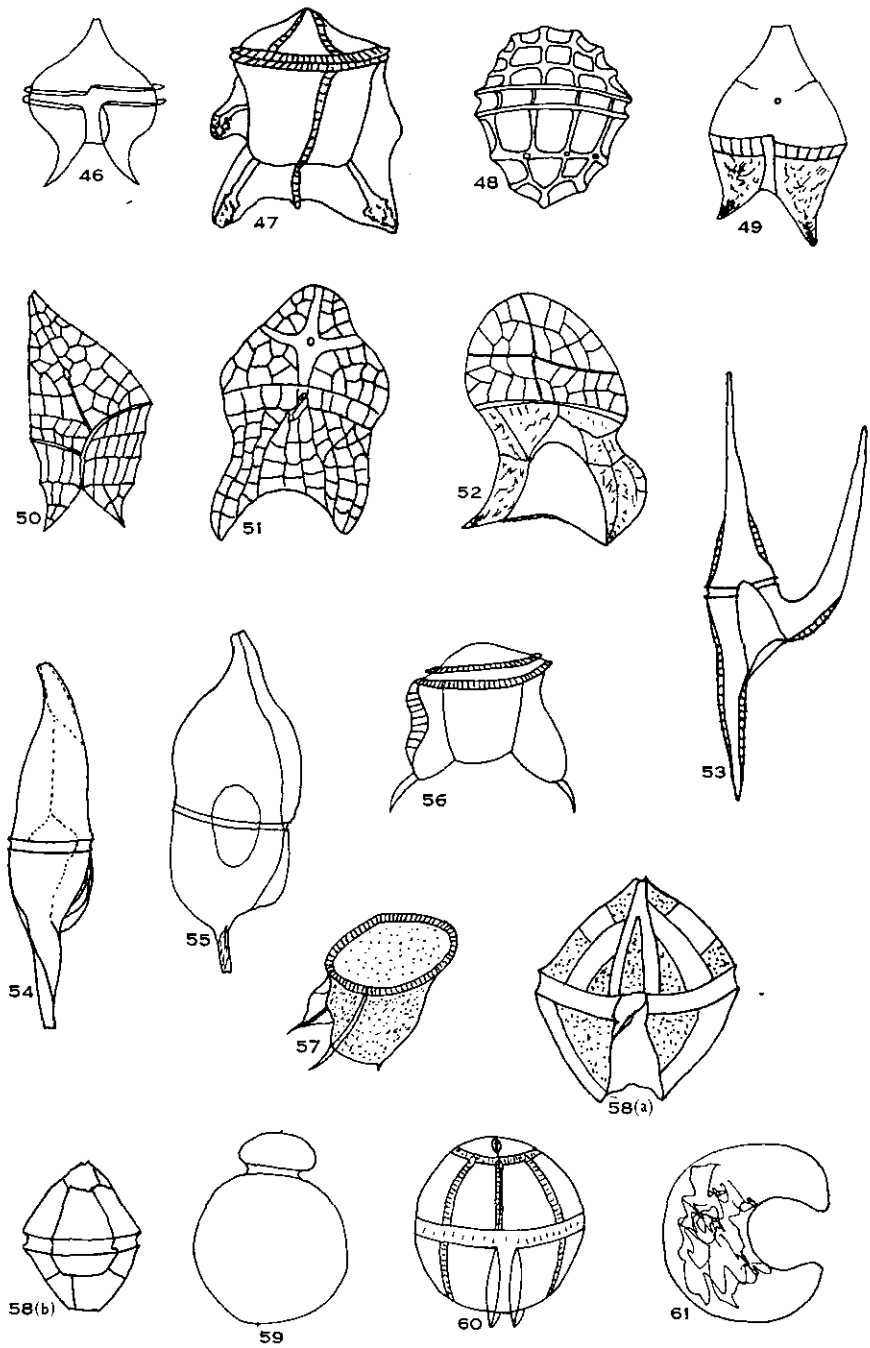
Genus GONIAULAX Diesing

GONIAULAX CERATOCOROIDES Kofoid

Fig. 47

Goniaulax ceratocoroides Kofoid, 1910, p. 182. Schiller, 1937, p. 309, fig. 321*a–c*.

Epitheca shallow-conical; plates separated by coarsely thickened ridges; hypotheca larger, five-sided, plates divided by strong ridges which are extended into



Figs. 46–61.—Dinoflagellates. 46, *Peridinium saltans*. 47, *Goniaulax ceratocoroides*. 48, *Protoceratium areolatum*. 49, *Heterodinium rigdenae*. 50, *H. scrippsae*. 51, *H.* sp. 52, *H. varicator*. 53, *Ceratium vultur* var. *productum*, var. nov. 54, *Centrodinium eminens*. 55, *Cent. intermedium*. 56, *Ceratocorys bipes*. 57, *Cerat. indicus*, sp. nov. 58(*a*,*b*), *Murrayella australica*, sp. nov. 59, *Oxytoxum globosum*. 60, *Blepharocysta paulseni*. 61, *Pyrocystis obtusa*.

curved and thickened horns supporting wings; girdle lists strongly ribbed; sulcus with numerous rows of pores. Length 50–60 μ.

Distribution.—Tropical Atlantic; Mediterranean; Coral Sea.

Family **PROTOCERATIIDAE**

Genus PROTOCERATIUM Bergh

PROTOCERATIUM AREOLATUM Kofoid

Fig. 48

Protoceratium areolatum Kofoid, 1907, p. 169, pl. 12, fig. 71.

Body elliptic, longer than broad; epitheca lower than hypotheca, domed; hypotheca semicircular; girdle very broad and deep, lists strongly ribbed, ends displaced one width to the left; sulcus straight, not reaching base; aerolae very large, polygonal to rectangular; with knobs at plate junctions. Length 30 μ.

Distribution.—North-east Indian Ocean.

Family **HETERODONIIDAE** Lindemann

Genus HETERODINIUM Kofoid

HETERODINIUM RIGDENAE Kofoid

Fig. 49

Heterodinium rigdenae Kofoid, 1906*a*, p. 356, pl. 18, figs. 6–8.

A medium-sized, angular species of pentagonal outline, axis oblique; epitheca erect, conical; hypotheca smaller, offset, right margin concave, left convex; horns offset, conical, equal to subequal. Length 120–130 μ.

Distribution.—East Indian Ocean.

HETERODINIUM SCRIPPSAE Kofoid

Fig. 50

Heterodinium scrippsae Kofoid, 1906*a*, p. 342, pl. 17, figs. 1–5*a,b*.

A medium-sized species, robust, angular; epitheca much larger than hypotheca, apical horn slightly emerging; hypotheca subconical with slightly concave right, convex left margins; antapical horns short, stout, conical, and pointed; post-margin asymmetrically concave; surface coarsely reticulate; areolae quadrilateral to polygonal, smallest at girdle. Length 150 μ.

Distribution.—East Indian Ocean.

Illustration is slightly angled away from ventral aspect.

HETERODINIUM sp.

Fig. 51

Body with bluntly rounded epitheca and convexo-concave sides; hypotheca constricted, equal to epitheca, margins undulate; antapicals unequal, blunt, slightly

incurved; surface coarsely reticulate; areolae quadrate to polygonal; epithecal plates well marked. Length 150 μ.

Distribution.—Coral Sea west of Noumea.

HETERODINIUM VARICATOR Kofoid & Adamson

Fig. 52

Heterodinium varicator Kofoid and Adamson, 1933, p. 116, pl. 16, fig. 39; pl. 20, figs. 66–72.

A large, stout, very asymmetrical species; epitheca dome-shaped, margin rounded, slightly overhanging; hypotheca with large sinistral lobe and dextrally deflected antapicals; postapex evenly rounded with toothed membrane; plates well outlined; surface unevenly reticulate. Length 145 μ.

Distribution.—East Indian Ocean.

Family **CERATIIDAE**

Genus CERATIUM Schrank

CERATIUM VULTUR var. PRODUCTUM, var. nov.

Fig. 53

Differs from type in having a stout, tapering right antapical directed posteriorly throughout its length.

Distribution.—At several stations in the east Indian Ocean.

Genus CENTRODINIUM Kofoid

CENTRODINIUM EMINENS Böhm

Fig. 54

Centrodinium eminens Böhm, 1933, p. 404, fig. 7.

Body biconical with slightly convex margins; mid-body constricted; epitheca with a blunt, tapering apical horn offset; hypotheca tapering into a twisted antapical horn; girdle median, depressed. Length 350 μ.

Distribution.—East Indian Ocean; South Atlantic.

CENTRODINIUM INTERMEDIUM Pavillard

Fig. 55

Centrodinium intermedium Pavillard, 1930, p. 436, figs. 178*a–c*.

Body subrotund; girdle constricted; apical horn short; antapical horn thin, moderate length, twisted, surface punctate near apical horn. Length 95 μ.

Distribution.—Mediterranean; Atlantic Ocean; East Indian Ocean.

Genus CERATOCORYS Stein

CERATOCORYS BIPES (Cleve) Kofoid

Fig. 56

Goniodoma? bipes Cleve, 1903, p. 371, fig. 2.
Ceratocorys asymmetrica Karsten, 1907, p. 419, pl. 47, fig. 9*a–d*.
Ceratocorys bipes Kofoid, 1910, p. 183.

Epitheca low-conical; girdle anterior with ribbed lists; hypotheca with two rounded lobes in the sagittal plane, each with a stout spine curved inwards; sulcal list narrow but obvious; plates well marked; surface porulate.

Distribution.—Indian Ocean, Red Sea, Arabian Sea.

CERATOCORYS INDICUS, sp. nov.

Fig. 57

Body roughly triangular; epitheca slightly raised, subconical; girdle anterior, with ribbed lists; antapex with 2 strong spines at ends of sutures; sulcus with strongly marked wing. Differs from *C. armata* in the low epitheca and well-developed sulcal list. Diameter 45 μ.

Distribution.—East Indian Ocean.

Family **OXYTOXIIDAE**

Genus MURRAYELLA Kofoid

MURRAYELLA AUSTRALICA, sp. nov.

Fig. 58

Body obtusely biconical; girdle median; epitheca low-conical, apex obtuse; hypotheca low-conical, antapex blunt, girdle not or slightly offset, wide; sulcus reaching antapex, wide, winged; plates 2′, 1a, 6″, 5‴, 2⁗. Length 30 μ.

Distribution.—Coral Sea.

Genus OXYTOXUM Stein

OXYTOXUM GLOBOSUM Schiller

Fig. 59

Oxytoxum globosum Schiller, 1937, p. 458, pl. 515*a,b*.

Epitheca low, elliptical, with or without a tiny spinule; girdle strongly constricted; hypotheca spherical with a small antapical spinule.

Distribution.—East Indian Ocean.

Family **PODOLAMPIIDAE** Lindemann

Genus BLEPHAROCYSTA Ehrenberg

BLEPHAROCYSTA PAULSENI Schiller

Fig. 60

Blepharocysta paulseni Schiller, 1937, p. 478, fig. 552*a–i*.

Body spherical; apical opening surrounded by a list; plate formula 1′, 5″, 5‴, 3⁗; margins of equatorial and postequatorial form an equatorial ring; sulcus even, with 2 wings. Diameter 60 μ.

Distribution.—East Indian Ocean.

Order DINOCOCCALES Pascher

Genus PYROCYSTIS Murray

PYROCYSTIS OBTUSA Pavillard

Fig. 61

Pyrocystis obtusa Pavillard, 1931, p. 38.

Body lunate, with ends directed towards each other and blunt. Diameter 125 μ.

Distribution.—East Indian Ocean.

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LIST OF SPECIES

Printed by CSIRO, Melbourne