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Key to Some of the Marine Diatom Genera in Virginia Waters

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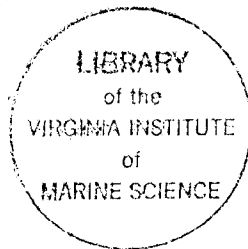
Key to Some of the Marine Diatom Genera
in Virginia Waters

by

R. A. Mulford and M. H. Roberts, Jr.

VIRGINIA INSTITUTE OF MARINE SCIENCE
Gloucester Point, Virginia
1965

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INTRODUCTION

The information compiled herein is intended to assist students and scientific staff in making preliminary generic identifications of diatoms they encounter when definite speciation is not necessary. Other more extensive keys (e.g. Cupp, 1950 and Hendey, 1964) are available and should be consulted when verification is needed or when identification to species is desired. Generic descriptions and drawings have been included to supplement the key.

Acknowledgements

The generic descriptions have been adapted from Boyer (1916), Cupp (1943) and Van Heurck (1880-1885). Some of the figures have been copied, with modification, from Griffith (1961).

CLASSIFICATION OF BACILLARIOPHYCEAE

The following classification, revised by R. A. Mulford from Hendey (1937), includes only the more common genera.

Class Bacillariophyceae

Order Bacillariales

Suborder Discineae

Family Coscinodiscaceae

Subfamily Melosiroideae

Melosira Agardh (8)

Subfamily Skeletonemoideae

Skeletonema Greville (11)

Stephanopyxis Ehrenberg (11)

Subfamily Thalassiosiroideae

Coscinosira Gran (7)

Lauderia Cleve (9)

Schroderella Pavillard (10)

Thalassiosira Cleve (6, 7)

Subfamily Coscinodiscoideae

Actinocyclus Ehrenberg (13)

Coscinodiscus Ehrenberg (14)

Planktoniella Schutt (13)

Family Actinodiscaceae
Subfamily Actinoptychoideae

Actinoptychus Ehrenberg (14)

Suborder Biddulphineae
Family Biddulphiaceae
Subfamily Biddulphioideae

Bellerochea Van Heurck (28)
Biddulphia Gray (23)
Cerataulina H. Peragallo ex Schutt (9)

Subfamily Triceratioideae

Ditylum Bailey (26)
Lithodesmium Ehrenberg (28)
Triceratium Ehrenberg (27)

Subfamily Hemiauloideae

Hemiaulus Ehrenberg (23)

Subfamily Eucampioideae

Climacodium Grunow (25)
Eucampia Ehrenberg (24)
Streptotheca Shrubsole (25)

Family Chaetoceraceae
Subfamily Chaetoceroideae

Chaetoceros Ehrenberg (21)

Suborder Soleniineae
Family Bacteriastraceae
Subfamily Bacteriastroideae

Bacteriastrum Shadbolt (17)

Family Rhizosoleniaceae
Subfamily Rhizosolenioideae

Guinardia H. Peragallo (19)
Rhizosolenia (Ehrenberg) ex Brightwell (15)

Family Leptocylindraceae
Subfamily Leptocylindroideae

Dactyliosolen Castracane (18)
Leptocylindrus Cleve (19)

Family Corethronaceae
Subfamily Corethronoideae

Corethron Castracane (17)

Suborder Araphidineae

Family Fragilariaceae

Subfamily Fragilarioideae

Asterionella Hassal ex Wm. Smith (42)

Fragilaria Lyngbye (41)

Thalassionema Grunow ex Hustedt (41)

Thalassiothrix Cleve and Grunow (42)

Subfamily Tabellarioideae

Grammatophora Ehrenberg (39)

Licmophora Agardh (38)

Rhabdonema Kutzing (39)

Suborder Monoraphidineae

Family Achnanthaceae

Subfamily Achnanthoideae

Achnanthes Bory (36)

Subfamily Cocconeioideae

Cocconeis Ehrenberg (36)

Suborder Biraphidineae

Family Naviculaceae

Subfamily Naviculoideae

Gyrosigma Hassall (33)

Navicula Bory (31)

Pleurosigma Wm. Smith (33)

Subfamily Amphiproroideae

Amphiprora Ehrenberg (34)

Tropidoneis Cleve (34)

Family Cymbellaceae

Subfamily Cymbelloideae

Amphora Ehrenberg (32)

Family Bacillariaceae

Subfamily Nitzschioideae

Nitzschia Hassall (30)

KEY TO COMMON GENERA OF LOWER CHESAPEAKE BAY

- 1. Raphe or pseudoraphe present ----- 29
- 1. Raphe or pseudoraphe absent ----- 2
- (1) 2. Cells circular or oval in valve view, narrowly rectangular
in girdle view ----- 3
- 2. Cells in all views angular or gonoid, not naviculoid, girdle
view not narrowly rectangular, or with projections at angles-- 20
- (2) 3. Pervalvar axis about twice diameter or less----- 4
- 3. Pervalvar axis 4-20 times diameter ----- 15
- (3) 4. Colonial----- 5
- 4. Solitary ----- 12
- (4) 5. Valves connected by mucous thread(s)----- 6
- 5. Valves connected directly by faces----- 8
- 5. Valves connected by marginal spines----- 10
- (5) 6. Cells united as chains ----- 7
- 6. Cells united as aggregates of no definite shape ----Thalassiosira
- (6) 7. Mucous thread single -----Thalassiosira
- 7. Mucous thread fasciculate ----- Coscinosira
- (5) 8. Valves punctate, radially furrowed ----- Melosira
- 8. Valves hyaline ----- 9
- (8) 9. Marginal process single, reduced to an apicule ----- Lauderia
- 9. Marginal processes two, each bearing a small mucro---Cerataulina
- (5) 10. Spines minute, one spine centrally located-----Schroderella
- 10. Spines greater than one-half pervalvar axis----- 11
- (10) 11. Valve surface coarsely areolate -----Stephanopyxis
- 11. Valve surface hyaline----- Skeletonema
- (4) 12. Valves with extensions or ocelli----- 13
- 12. Valves without extensions or ocelli----- 14
- (12) 13. Valves with loculate extensions -----Planktoniella
- 13. Valves with marginal ocelli----- Actinocyclus
- (12) 14. Valves with coarse areolation, not undulating-----Coscinodiscus
- 14. Valves with radial markings forming undulating seg-
ments-----Actinoptychus
- (3) 15. Valve face conical----- Rhizosolenia
- 15. Valve face flat or weakly convex----- 16
- (15) 16. Valves with marginal corona of setae----- 17
- 16. Valves without marginal corona of setae----- 18
- (16) 17. Setae bifurcate -----Bacteriastrum
- 17. Setae not bifurcate----- Corethron

- (16) 18. Intercalary bands spirally arranged -----Dactyliosolen
 18. Intercalary bands not spirally arranged----- 19
- (18) 19. Valves flat, with marginal spur----- Guinardia
 19. Valves convex, lacking marginal spur-----Leptocylinrus
- (2) 20. Cells with two angles in valve view----- 21
 20. Cells with more than two angles in valve view----- 26
- (20) 21. Each angle of cell bearing one long seta----- Chaetoceros
 21. Each angle of cell bearing more than one process----- 22
- (21) 22. Processes cornutate----- 23
 22. Processes simple, boss-like projections----- 24
- (22) 23. Processes terminated with spines----- Hemiaulus
 23. Processes not terminated with spines----- Biddulphia
- (22) 24. Cells in curved, ribbon-like chains----- Eucampia
 24. Cells in chains with a slight spiral twist-----25
- (24) 25. Intercellular spaces large and elliptical----- Climacodium
 25. Intercellular spaces lacking, cells weakly
 siliceous----- Streptotheca
- (20) 26. Valves with long central spine----- Ditylum
 26. Valves lacking central spine----- 27
- (26) 27. Valve surfaces hexagonally areolate, areolation transverse,
 angular processes cornutate----- Triceratium
 27. Valves not as above----- 28
- (27) 28. Valve surfaces contiguous-----Bellerochea
 28. Valve surfaces not contiguous-----Lithodesmium
- (1) 29. Valves both with true raphe----- 30
 29. One or both valves with pseudoraphe----- 35
- (29) 30. Raphe located medially or eccentrically but not on keel----- 31
 30. Raphe located eccentrically on keel----- Nitzschia
- (30) 31. Valves linear to oval-lanceolate, punctate, striation
 reaching to margin of valve----- Navicula
 31. Valves sigmoid, sublunate, or spirally twisted----- 32
- (31) 32. Cells sigmoid----- 33
 32. Cells spirally twisted----- 34
 32. Cells sublunate----- Amphora
- (32) 33. Striations transverse and oblique----- Pleurosigma
 33. Striations transverse and longitudinal----- Gyrosigma
- (32) 34. Raphe medial and straight----- Tropidoneis
 34. Raphe not medial and sigmoid; with alate
 projections----- Amphiprora

(29)	35.	Cells with raphe on one valve and pseudoraphe on other-----	36
	35.	Cells lacking true raphe on either valve-----	37
(35)	36.	Valves symmetrical about apical and transapical axes-- <u>Cocconeis</u>	
	36.	Valves asymmetrical about apical axis----- <u>Achnanthes</u>	
(35)	37.	Internal septa in valvar plane, often perforated-----	38
	37.	No internal septa-----	40
(37)	38.	Valves broadly clavate, girdle cuneate----- <u>Licmophora</u>	
	38.	Valves not clavate-----	39
(38)	39.	Cells in zig-zag chains, septa 4-12, straight or nearly so----- <u>Rhabdonema</u>	
	39.	Cells solitary or colonial, usually 2 septa at either end, wavy----- <u>Grammatophora</u>	
(37)	40.	Bilaterally symmetrical about transapical axis-----	41
	40.	Asymmetrical about transapical axis-----	42
(40)	41.	Cells in ribbon-like chains, valves usually linear-- <u>Fragilaria</u>	
	41.	Cells solitary with small terminal spines----- <u>Thalassionema</u>	
(40)	42.	Cells in stellate clusters, valve clavate----- <u>Asterionella</u>	
	42.	Cells solitary, spirally twisted, often in dense masses, one end of cell only slightly large than other----- <u>Thalassiothrix</u>	

DESCRIPTION OF GENERA

Achnanthes Bory - Plate II, Fig. 13

Frustule stipitate, solitary or in short chains, flexed. Valves elliptical or lanceolate, naviculoid, dissimilar, the lower with a raphe and median and terminal nodules, the upper with a pseudoraphe.

Actinocyclus Ehrenberg - Plate I, Fig. 3

Single cells with slightly convex valves having flat centers; valves circular to elliptical. Central space circular to irregular, sometimes inconspicuous. Markings in radiating rows of unequal length, leaving radiating hyaline spaces; rows sometimes fasciculate. Margin distinct or indistinct, with clear round spot (ocellus); small marginal or submarginal spines sometimes present.

Actinoptychus Ehrenberg - Plate I, Fig. 2

Frustule cylindrical, length less than diameter, in girdle view undulated. Valve divided into six or more sectors alternately raised and depressed, areolate and punctate alternately. Marginal processes three or more. Umbilicus circular or angular, hyaline.

Amphiprora Ehrenberg - Plate II, Fig. 17

Frustules twisted in the longitudinal axis, constricted in middle. Valve lanceolate, acute. Raphe confined within a sigmoid keel, central and terminal nodules indistinct. Striae transverse, punctate, with coarser striae at junction of keel and lower part of valve.

Amphora Ehrenberg - Plate II, Fig. 16

Valves asymmetrical along the longitudinal axis, with the plane passing through the dorsal and ventral sides of one valve at an angle with that of the other.

Asterionella Hassall - Plate II, Fig. 15

Cells clavate, united by larger ends into star-shaped or spirally curved colonies, sometimes almost straight bands. Intercalary bands and septa absent. In girdle view linear, usually widened at the ends, sometimes perivalvarly constricted. Valve with delicate transapical striae and narrow median pseudoraphe. Chromatophores a small plate or small granules.

Bacteriastrium Shadbolt - Plate I, Fig. 10

Cells cylindrical, bound into loose chains by fusion of bristles regularly arranged around margins of cells, Terminal setae different from others, often curved; not fused and therefore not bifurcate. Intercalary bands absent, apertures between cells of varying widths. Cell wall delicate and hyaline, Chromatophores numerous, small, roundish, more or less lobed. Resting cells near middle of cell with small spines on one valve. All species marine pelagic.

Bellerochea Van Heurck - Plate I, Fig. 9

Cells in narrow chains with corners and centers of neighboring valves touching; creating narrow, elliptical apertures; weakly siliceous. Valve 3 or 4 sided, with undulating margins; raised marginal parts connecting with valve of next cell. Cell usually broader than long.

Biddulphia Gray - Plate I, Fig. 18

Frustule prismatic or subcylindrical. Cells in filamentous or zig-zag chains or free. Valve triangular, polygonal, elliptical or subcircular, convex, more or less elevated at the angles into processes or horns.

Cerataulina Peragallo - Plate I, Fig. 13

Cells cylindrical, usually in chains. Valves slightly arched, with two blunt projections or processes near margin, attached to adjacent cell by means

of a fine, small, curved, hair-like process which fits into the valve of the adjacent cell. Intercalary bands numerous, annular. Chromatophores numerous, small. Cell wall soft and weakly siliceous, sculpturing very delicate.

Chaetoceros Ehrenberg - Plate I, Fig. 19

Cells oval to almost completely circular in valve view; in broad girdle view quadrangular with straight sides and concave, flat, or slightly convex ends. Valve with more or less flat surface and mantle, bound together without a suture. A long thick or thin seta, bristle, or awn, at each end of valve on corners. Opposite setae of neighboring cells touching one another near their origin, usually directly or sometimes by a bridge, and fusing firmly at a point near their bases to hold the cells in chains. Usually with large or small apertures between cells. Basal portion of setae parallel to the perivalvar axis or directed diagonally outward with the outer portion frequently perpendicular to the axis of the chain. Most species with special end cells bearing terminal setae usually shorter, thicker and more nearly parallel to the chain axis than are the other setae. A few species with cells solitary. Chromatophores varying greatly in size, number, form, and position in different species but constant for a given species and consequently indispensable for species determination.

Climacodium Grunow - Plate II, Fig. 5

Cells straight but usually forming somewhat twisted chains. Apertures oval or squarish-oblong as a result of the hammer-like ends of cells. Cell wall weakly siliceous, without visible sculpturing. Intercalary bands absent. Perivalvar axis of cell usually short. Chromatophores numerous, small.

Cocconeis Ehrenberg - Plate II, Fig. 11

Valves elliptical, dissimilar, upper valve with a pseudoraphe, lower valve with a true raphe and nodules; usually with an annulus. Epiphytic.

Corethron Castracane - Plate I, Fig. 6

Cells solitary; cylindrical, with rounded valves having a marginal crown of long thin spines or setae directed outward at an angle. Intercalary bands numerous, scale-like, often distinct. Cell wall delicate, weakly siliceous. Chromatophores numerous, small.

Coscinodiscus Ehrenberg - Plate I, Fig. 1

Frustules solitary, cylindrical, compressed; valve circular or elliptical; surface flat or sometimes convex near border; markings more or less angular, radiating, sometimes fasciculate. Central space, if present, hyaline.

Coscinosira Gran - Plate II, Fig. 9

Cells drum-shaped to short cylindrical with flat or convex valves. United in loose chains by several long gelatinous threads. Intercalary bands distinct. Valves with large areolae. Margins with spinulae, rarely with spines. Chromatophores numerous, small, round plates.

Dactyliosolen Castracane - Plate I, Fig. 21

Cells cylindrical, solitary or in long, stiff, closed chains, attached by the flat valve surfaces. Valves circular, without noticeable spines or processes. Intercalary bands numerous, mantle surface with fine or coarse areolae. Girdle band frequently unilaterally displaced and considerably closer to younger valve.

Ditylum Bailey - Plate I, Fig. 11

Cells elongate, prismatic to box-shaped; solitary except immediately after division. Valves with 3 to 4 corners, seldom bipolar, with a strong central siliceous hollow spine and a marginal ridge strengthened by ribs. Intercalary bands more or less numerous. Valve surface more or less wavy, with usually poorly developed humps on the corners. The 3-cornered elevated region often with a circle of short perivalvar-directed spines. Outer valve margin wavy, giving the appearance of lines running from valve to valve. Cell wall weakly siliceous, valve

membrane delicately areolated. Chromatophores numerous, small.

Eucampia Ehrenberg - Plate II, Fig. 1

Valves elliptical in surface view, with two blunt processes, without spines or setae. Numerous intercalary bands difficult to see in water mounts. Chains spirally curved. Large apertures between cells.

Fragilaria Lyngbye - Plate II, Fig 13

Frustules rectangular, valve lanceolate, oblong or elliptical in general outline, with convex or sinuate margins; lacking costae; pseudoraphe narrow or indistinct; striae transverse.

Grammatophora Ehrenberg - Plate II, Fig. 7

Frustules quadrangular, adnate, in zigzag chains, united by an isthmus or free. Valve linear or oblong, sometimes with sinuate sides, and with a pseudoraphe and transverse punctate lines.

Guinardia H. Peragello - Plate I, Fig. 8

Cells cylindrical, longer than broad, with a straight or slightly curved perivalvar axis, solitary or in straight to twisted, close-set chains. Intercalary bands numerous, collar-like or with wedge-shaped ends. Valves circular, surface flat, with an asymmetrical lateral rudimentary tooth at valve margin. Chromatophores numerous, roundish, more or less lobed.

Gyrosigma Hassall - Plate II, Fig. 6a

Valve lanceolate, sigmoid, axial area very narrow, central area small; transverse and longitudinal striae punctate.

Hemiaulus Ehrenberg - Plate I, Fig. 22

Cells solitary or in chains. Valves elliptical, with two narrow, pointed, rather long processes at ends of apical axis and parallel to perivalvar axis. One or more hyaline claws on the end of the processes. Intercalary bands indistinct or absent, without septa. Valve strongly or weakly siliceous, finely or coarsely areolate or punctate. Chromatophores numerous.

Lauderia Cleve - Plate II, Fig. 8

Cells cylindrical. Valves rounded. Cells united in straight chains by very fine gelatinous threads; cells touching or separated. An unpaired, oblique outwardly-directed apicule on each valve; numerous very small spinulae or slime canals at margin and over most of surface. Center of valve slightly concave. Intercalary bands numerous; chromatophores numerous small plates. Valve surface radially striated, mantle surface of intercalary bands delicately areolate.

Leptocylindrus Cleve - Plate I, Fig. 14

Cells long, cylindrical, united into chains by whole valve surface. Valves flat, without spines or processes. Intercalary bands present but seen with difficulty. Cells thin-walled, hyaline, without visible sculpturing. Chromatophores one or many roundish plates or granules.

Lichmophora Agardh - Plate II, Fig. 12

Frustules wedge-shaped, joined together into fan-shaped stipitate fascicles. Valve cuneate, rounded at both ends, septate. An epiphyte, attached to substrate by gelatinous threads, but often found in plankton.

Lithodesmium Ehrenberg - Plate I, Fig. 7

Cells united in usually long, straight chains with concealed apertures. Valves triangular, with marginal perivalvar-directed membrane by which adjacent cells are joined. Long, thin, hollow spine in center of valve. Intercalary bands present, collar-like. Chromatophores numerous, small.

Melosira Agardh - Plate I, Fig. 20

Frustules globose, ellipsoidal or cylindrical, concatenate, closely joined together. Valve either simply punctate or areolate. Cell wall constricted, forming a furrow between edge of valve and girdle.

Navicula Bory - Plate II, Fig. 13

Valve linear to elliptical; ends acute, rounded, rostrate, capitate or truncate; axial area usually distinct, rounded, or rarely extended into a

transverse fascia; striae transverse or radiate, punctate.

Nitzschia Hassall - Plate II, Fig. 14

Frustules usually free, sometimes enclosed in tubes or united into a filament. Valves keeled, keels of two valves diametrically opposed; keel punctae short or prolonged.

Planktoniella Schutt - Plate I, Fig. 4

Cells solitary, disk-shaped, with a hyaline alate expansion on circumference consisting of extra-cellular chambers strengthened by radial rays. Alate expansion weakly siliceous. Valves areolate; chromatophores numerous small plates lying along valve surface.

Pleurosigma Wm. Smith - Plate II, Fig. 6b

Valve lanceolate, sigmoid; axial area very narrow, central area small; transverse and oblique striae punctate.

Rhabdonema Kützing - Plate I, Fig. 16

Frustules quadrangular, concatenate, composed of numerous septate partitions with transverse costae or rows of punctae. Valves elliptical, with a pseudoraphe and transverse apparent costae and punctate lines, partitions with one or several foramina.

Rhizosolenia (Ehrenberg) Brightwell - Plate I, Fig. 17

Cells cylindrical with greatly elongated perivalvar axis; solitary or in chains. Cells usually straight or more rarely curved, forming spirally twisted chains. Cross-section elliptical or circular. Intercalary bands usually very numerous, obscure in some species. Valves may be almost flat or symmetrically conical but are usually eccentric, sharp, or hood-shaped; valves may bear processes of various kinds or may be drawn out to form a process. Chromatophores usually small, numerous, distributed on entire cell wall, but especially massed in girdle zone about the nucleus.

Schroderella Pavillard - Plate II, Fig. 3

Cells cylindrical with slightly convex valves, somewhat concave in center; form

straight chains but sometimes solitary. Distinct spine in central depression of valve is joined by spine belonging to adjacent cell. Margin surrounded by a row of small spinulae from each of which arise two gelatinous threads which diverge and join the corresponding thread of the next cell, thus forming a characteristic zigzag. Threads sometimes straight or appearing so. Intercalary bands numerous, forming incomplete hoops, with minute punctae. Chromatophores small, strongly slit plates, usually with four straight ends.

Skeletonema Greville - Plate II, Fig. 4

Cells circular, lens-shaped, oblong, or cylindrical. Valves circular, somewhat arched, lacking distinct structures, with a row of fine spines at edge of valve parallel to longitudinal, perivalvar axis. Spines interlocking midway between adjacent cells and uniting into chains. Chromatophores one or two per cell.

Stephanopyxis Ehrenberg - Plate I, Fig. 5

Cells oblong, oval, or nearly circular, with hexagonal areolations. Usually in short chains. Margins rounded, with a crown of stout spines or hollow needles, nearly parallel with perivalvar axis. Intercalary bands absent. Chromatophores numerous, small rounded.

Streptotheca Shrubsole - Plate II, Fig 2.

Cells extremely flat. outline square, sometimes triangular; united by valve faces, leaving very little, if any aperture. Cell wall weakly siliceous. Chains strongly twisted. Valves narrowly elliptical, with a rudimentary central knob. Chromatophores numerous small granules.

Thalassionema Grunow - Plate II, Fig. 10

Cells forming zigzag bands or star-shaped colonies, adjacent cells united to each other by small gelatinous cushions on one cell end. In girdle view, linear. Intercalary bands and septae absent. Valve linear to narrow-lanceolate. Valve with numerous tiny marginal spines placed at regular intervals. Cell wall otherwise structureless.

Thalassiosira Cleve - Plate I, Fig. 12

Cells usually drum- or disk-shaped, united in flexible chains by a cytoplasmic or gelatinous thread, living in formless gelatinous masses, or sometimes solitary. Valve with one or more intercalary bands and with areolate or delicate radial rows of punctae. Marginal spinulae or little spines present.

Thalassiothrix Cleve and Grunow - Plate II, Fig. 10

Cells living singly or forming star-shaped colonies, zigzag bands, or bunches, united to one another by a gelatinous cushion on the end of the cell. In girdle view linear or slightly lanceolate, ends unlike. Valve borders often with small spines. Valve surface with short marginal striae or structureless.

Triceratium Ehrenberg - Plate I, Fig. 15

Cells typically box-shaped, perivalvar axis shorter or longer due to connecting bands. Valvar plane with 2-4 corners, in some variation bipolar, rarely circular. Valve edges with humps, lacking special terminal claws. Cell wall strongly siliceous. Delicate punctae next to very large areolae, pore canals passing through costae next to fine pores in shallow cavities. Structure of hump generally differs from that of remainder of valve. Chromatophores numerous, small.

Tropidoneis Cleve - Plate II, Fig. 18

Frustule oblong, constricted medially; keel not sigmoid. Axial area not evident. Striae very fine. punctate, in longitudinal lines.

GLOSSARY

Alate - wing-like

Annulus - a ring-like part

Apical axis - longitudinal axis of the valve

Apicule - single large marginal nodule penetrated by a pore channel

Areolate - having polygonal or rounded areas or cavities

Bifurcate - forked, having two branches

Bilaterally symmetrical - capable of being halved in one, and only one, plane in such a way that the two halves are mirror images of each other

Boss-like - short, squat

Capitate - enlarged at the tip

Chromatophore - a cytoplasmic inclusion containing chlorophyll and other pigments; may appear yellow, golden brown, or greenish brown.

Clavate - club-shaped

Concatenate - linked together or united as in chains

Concentric - having a common center, as circles and spheres

Contiguous - adjoining or nearly so

Cornutate - horned

Corona - crown-like structure

Costa - conspicuous rib on the valve

Cuneate - wedge-shaped

Fascia - a band or flat strip

Foramen (pl. foramina) - a small opening

Frustule - individual diatom cell

Girdle - connection point or overlap of two valves

Gonoid - round, not disced

Hyaline - transparent, glassy, or translucent

Intercalary band - a ring-like or scale-like intermediate band between valve and connecting band

Keel - plate-like projection of valve face, usually lateral

Lanceolate - narrow and tapering, like the head of a lance

Loculus - small cavity, cell or chamber

Mucro - an abrupt point, tip or process

Nodule - small internal thickening of a rounded or conical shape, generally containing a cavity

Ocellus - a small rounded thickening or "little eye"

Peripheral - outer or external

Pervalvar axis - cell axis through the center point of adjoining valves

Pseudoraphe - a narrow hyaline axial area without a central nodule or striae

Puncta - a small cavity situated within ridges of walls

Raphe - longitudinal slit in valve, varying in form and structure

Rostrate - having a beak-like process

Septa - ingrowths of the intercalary bands, more or less perforated; and nearly parallel to valve face

Seta - a fine bristle or hair

Sigmoid - S-shaped

Siliceous - composed of silica

Stellate - star-shaped, coming out like rays from the center

Stipitate - growing on a stalk

Striae - prolonged furrows closed to the outside and open on the inside

Sublunate - curved, tending toward, but not, crescent-shaped

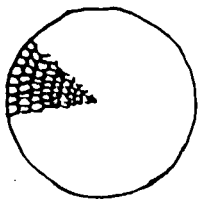
Transapical axis - transverse axis of a valve

Umbilicus - a navel-like depression

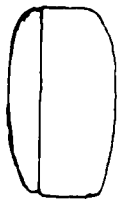
Valve - one of the two largest segments of the frustule

Plate I

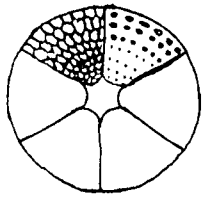
1. Coscinodiscus Ehrenberg
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19. Chaetoceros Ehrenberg
20. Melosira Agardh
21. Dactyliosolen Castracane
22. Hemiaulus Ehrenberg



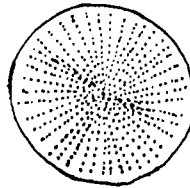
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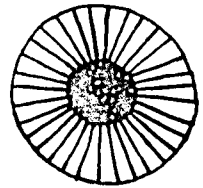
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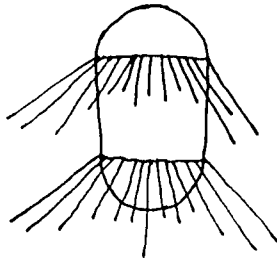
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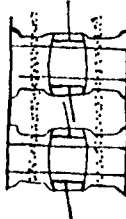
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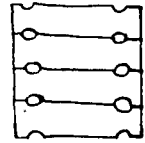
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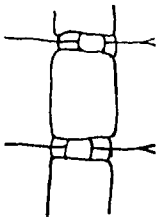
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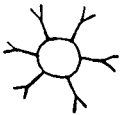
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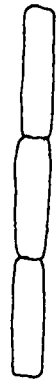
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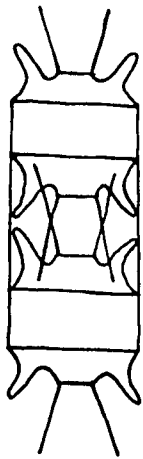
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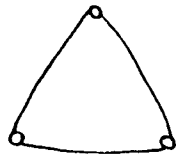
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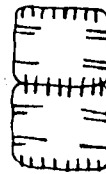
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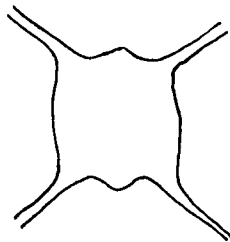
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15



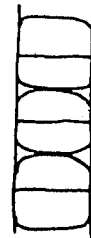
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19



20



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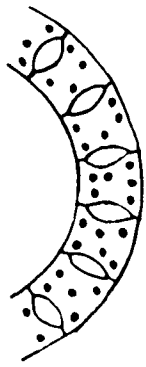


22



Plate II

1. Eucampia Ehrenberg
2. Streptotheca Schrubsole
3. Schroderella Pavillard
4. Skeletonema Greville
5. Climacodium Grunow
- 6a. Gyrosigma Hassall
- b. Pleurosigma Wm. Smith
7. Grammatophora Ehrenberg
8. Lauderia Cleve
9. Coscinosira Gran
10. Thalassionema Grunow
 Thalassiothrix Cleve and Grunow
11. Cocconeis Ehrenberg
12. Licmophora Agardh
13. Navicula Bory
 Achnanthes Bory
 Fragilaria Lyngbye
14. Nitzschia Hassall
15. Asterionella Hassall
16. Amphora Ehrenberg
17. Amhiprora Ehrenberg
18. Tropidoneis Cleve



1



2



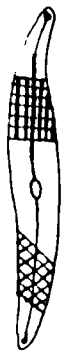
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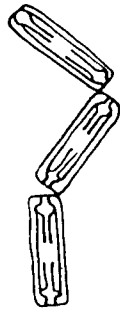


5



6 a

6 b



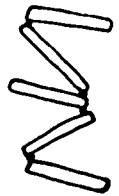
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8



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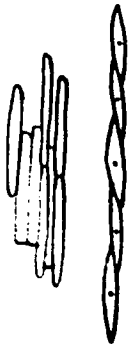
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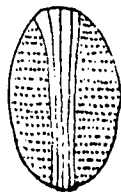
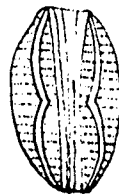
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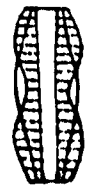
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16



17



18

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