

2170

Zooplankton
Sheet 108

FORAMINIFERA

Families: Globigerinidae and
Globorotalidae

(By A.W.H. BE*)

1967

FICHES D'IDENTIFICATION DU ZOOPLANKTON
CONSEIL PERMANENT INTERNATIONAL POUR L'EXPLORATION DE LA MER
CHARLOTTEHUND SLOT, DANEMARK

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PLANKTONIC FORAMINIFERA

There are about 30 described species of planktonic Foraminifera living in the world oceans. They occur primarily in the euphotic zone. The few deep water-species probably spend their earlier stages in near-surface waters. Most of the species (22) are tropical-subtropical; five are cold-temperate or subpolar species. Three species are found in Antarctic waters and of these one is also present in the Arctic Ocean. The Indo-Pacific fauna except for its greater species diversity, is essentially similar to that of the Atlantic.

The classification and key used here agrees in most respects with that of PARKER (1962). The presence or absence of spines is a major criterion in distinguishing the two families. The morphological terms in this key have been defined in a publication by BOLL, LOBBICH, and TAPPAN (1957).

Order FORAMINIFERIDA

Family Globigerinidae CARPENTER, PARKER and JONES, 1862

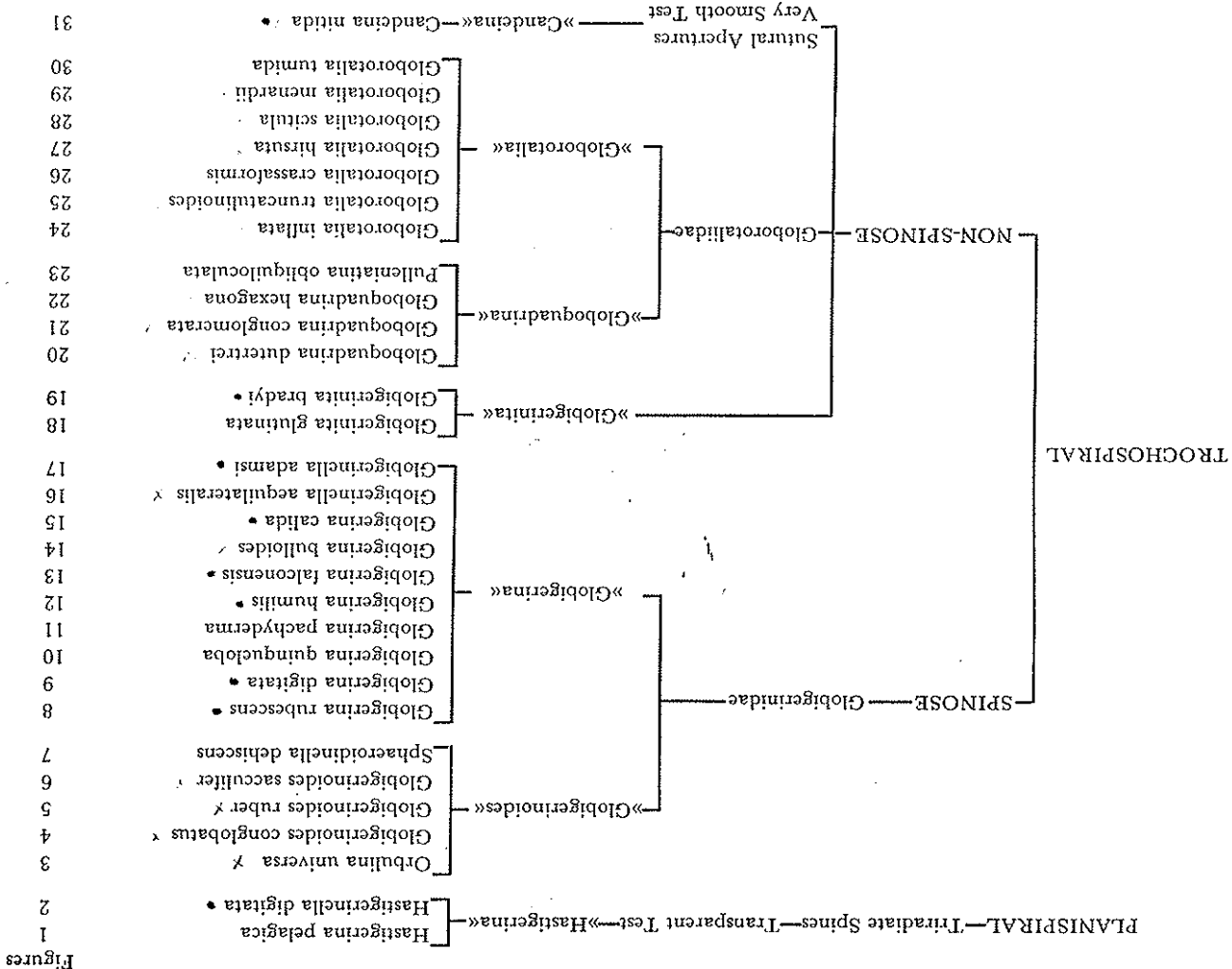
Description (after PARKER, 1962): Test trochospiral in the adult or in ontogeny; chambers spherical, or globular; chambers spherical, ovate or clavate; wall calcareous, perforate, radial in structure, hispid, spinose when living either in the adult or in ontogeny; primary aperture umbilical, umbilical-extraumbilical, equatorial or spiroumbilical; may have secondary apertures; may have bullae with accessory infralaminar apertures.

Description (emended from that of PARKER, 1962): Coiling of test trochospiral; chambers angular to ovate or spherical; may have a keel; wall calcareous, perforate, radial in structure, smooth, pitted; non-spinose when living both in the adult and in ontogeny; primary aperture ex-traumbilical-umbilical or umbilical; no secondary apertures.

Family Globorotaliidae CUSHMAN, 1927

KEY TO GENERA

1. Trochospiral test (spines simple, if present)..... 2
1. Planispiral test with triradial spines (gerontic stage streptospiral)..... *Haasigerina*
2. Primary aperture (and, if present, secondary apertures)..... 3
2. Sutural apertures, smooth surface..... *Candina*
3. Non-spinose tests..... 3
3. Spinose tests..... 3
4. Test with spherical or hemispherical chambers, umbilical aperture and rounded periphery..... 4-6 Family *Globorotaliidae*
4. Test with angular to ovate chambers; spiral side flat or gently curved; peripheral keel may be present; aperture a narrow slit from umbilicus to periphery..... *Globorotalia*
5. Trochospiral coiling throughout life..... 5
5. Streptospiral coiling in adult..... *Pullenatina*
6. Hemispherical chambers with umbilical aperture; coarsely pitted surface texture; umbilical tooth..... *Globogadatina*
6. Spherical chambers and umbilical aperture frequently covered by bulla with infralaminar apertures; smooth surface texture *Globigerinita*
7. Primary aperture only..... 8
7. Primary aperture and one or more secondary apertures..... 8
8. Aperture umbilical, chambers spherical to ovate..... *Globigerina*
8. Aperture from umbilicus to periphery; trochospiral in ontogeny becoming nearly planispiral in adult..... *Globigerinella*
9. Multi-chambered test..... 10
9. One-chambered spherical test (juvenile stage is multi-chambered with secondary apertures)..... *Orbulina*
10. Cancellate, honeycomb-like surface..... *Globigerinoides*
10. Fitted to smooth, translucent texture; chamber flanges..... *Sphaeroidinella*



In the Key overleaf species marked ** are commonly found in the northeastern Atlantic between 40°N and 65°N lat. and between 25°W long. and Western Europe. Species marked * occur less commonly in this area.

Each species in the Key and in the diagram above is given a number and the same number is used in the figures, different views of the same species being lettered a, b, c.

Unless otherwise marked all the bar scales (placed underneath the middle specimen) are 500 μ.

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Key to Species

Species	Test				Chambers		Apertures		Spines	Diagnostic Characters	Distribution	Figs.
	Outline	Dom- nant Coiling Direc- tion (spiral side)	Texture	Maxi- mum length	Number per whorl	Shape	Primary aperture position	Secondary apertures per chamber				
X <i>Hastigerina delatca</i> (d'Orbigny) <i>Hastigerina digitata</i> (Rumohr)	Planispiral Strophospiral		Smooth	> 1 mm Up to 5 mm	4 in juvenile; 6 in adult	Spherical Bifurcate or trifurcate in adult	Equatorial becoming spiroumbil- ical		Triradial spines Triradial spines	Transparent test, triradial spines horn-like chambers	Subtropical, tropical Subtropical, tropical below 500 m depth	1 2
X <i>*Orbulina universa</i> (d'Orbigny)	Trochospiral in juvenile; spherical in adult		Spinose	~ 1 mm	4-5 in juve- nile; 1 in adult	Spherical	Umbilical in juvenile; none in adult	One (in earlier stages only)	Spinose	Single spherical chamber	Tropical, subtropical	3
X <i>Globigerinoides congo- latus</i> (Brady)	Trochospiral nearly spherical	Left+Right	Coarsely spinose	~ 1 mm	5-6 in juvenile; 4 in adult	Spherical becoming compressed	Umbilical	Two	Spinose	Two secondary apertures per chamber; primary aperture over 3 chambers; round outline	Tropical, subtropical surface waters	4
X <i>Globigerinoides ruber</i> (d'Orbigny)	Trochospiral	Left+Right	Coarsely Spinose	~ 0.6 mm	5 in juvenile; 3 in adult	Spherical	Umbilical	Two	Spinose	Pink to red pigment; two secondary apertures per chamber; primary aperture over two chambers	Tropical, subtropical surface waters	5
X <i>Globigerinoides saculifer</i> (Brady) [= <i>Globigerina- des trilobus</i> (Reuss)]	Trochospiral ovate	Left+Right	Spinose, honeycomb texture	~ 1.3 mm	6-7 in juvenile; 4 in adult	Spherical; last chamber often elongate and compressed	Umbilical	One	Spinose	Sec-like final chamber (if present); one secondary and one primary aperture per chamber; honeycomb texture; primary aperture over three chambers	Dominant species in tropical surface water; common also in subtropi- cal regions	6
» <i>Sphaeroidinella delticans</i> (Parker and Jones)« a terminal form of <i>Globigerinoides saculifer</i> (Brady)	Trochospiral ovate	Left+Right	Smooth to pitted	~ 1.3 mm	4 in adult	Spherical with chamber flanges	Umbilical (obscured)	One (concealed)	Spinose in juvenile; non- spinose in adult	Great wall thickening producing smooth, glassy layer; chamber flanges coalesce and obscure apertures	Tropical, subtropical below 500 m depth	7
<i>Globigerina rubescens</i> Hofker	Trochospiral	Left+Right	Spinose Hispid	~ 0.25 mm	5 in juvenile; 4 in adult	Spherical	Umbilical		Spinose	Light orange-pink pigment in test	Tropical, subtropical surface waters	8
<i>Globigerina digitata</i> Brady	Trochospiral	Left+Right	Spinose Hispid	~ 0.65 mm	4-5 in juvenile; 4-6 in adult	Spherical in juvenile; digitate in adult	Umbilical spiro- umbilical in adult		Spinose	Digitate final chamber(s)	Tropical, subtropical	9
** <i>Globigerina quinqueloba</i> Nataland	Trochospiral compressed	Left+Right	Spinose; smooth	~ 0.27 mm	5-6 in juvenile and adult	Hemispher- ical to ovate flap-like final chamber	Umbilical; sometimes modified into intra- laminal apertures		Spinose	Final chamber a lobed extension over umbilicus, but not always present	Subarctic and subarctic arctic cold-temperate sur- face waters; left-coiling population in colder waters	10
** <i>Globigerina pachyderma</i> (Ehrenberg)	Trochospiral compact	Left+Right	Coarse	~ 0.47 mm	5 in juvenile; 4 in adult	Spherical becoming subquadrate	Umbilical becoming extra-umbilical; distinct lip		May be present in juvenile; absent in adult	Subquadrate, coarse-crystalline compact test; aperture is a narrow slit with distinct lip	Left-coiling in sub-polar; right-coiling in cold- temperate waters	11

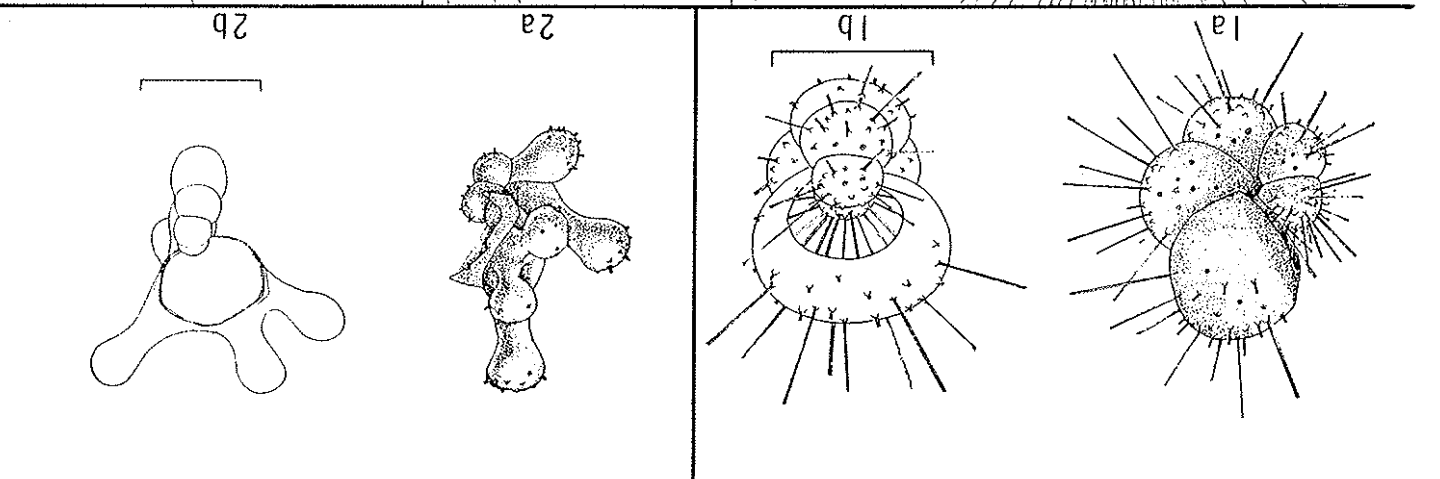
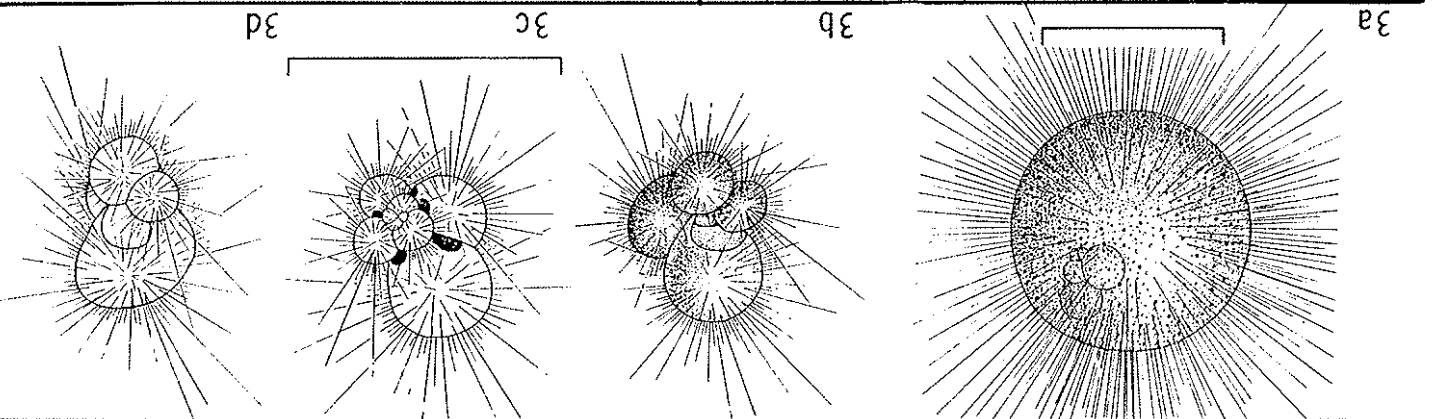
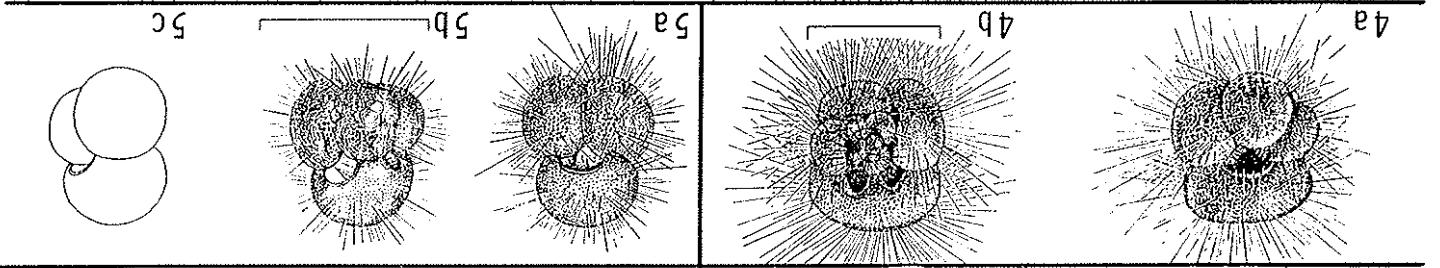
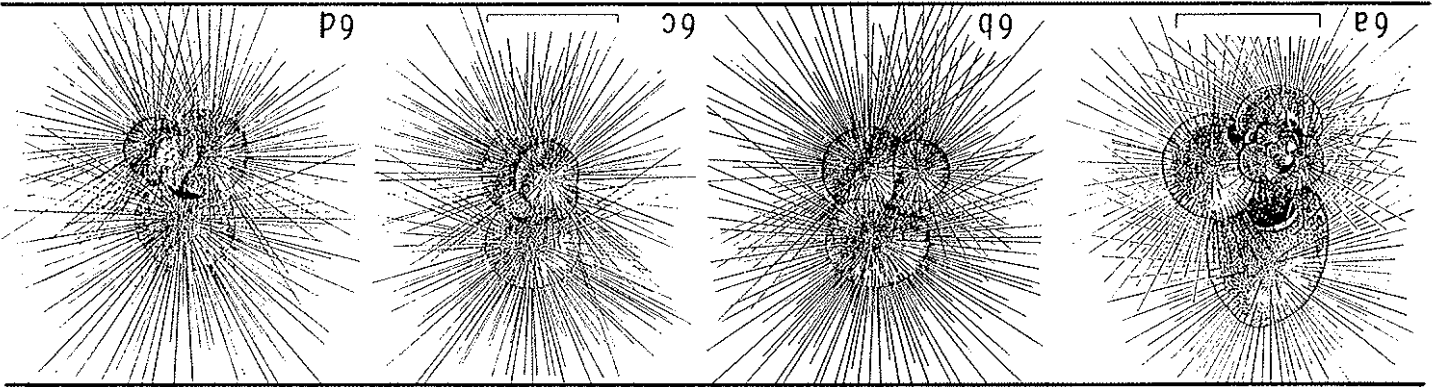
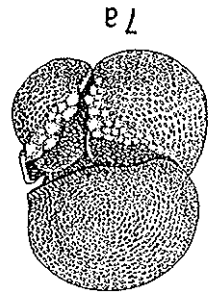
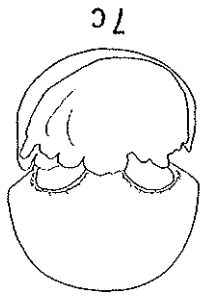
<i>Globigerina humilis</i> (Brady)	Trochospiral compressed	Left+Right	Spinose smooth	~0.21 mm	5-6 in juvenile; 6-8 in adult	Hemispherical to ovate; flap-like final chamber	Umbilical; sometimes modified into intralaminar apertures	Spinose	Six to eight chambers per whorl and bulla-like final chamber	Subtropical to subpolar	12
<i>Globigerina falconensis</i> Blow	Trochospiral	Left+Right	Spinose hispid	~0.43 mm	5 in juvenile; 4 in adult	Spherical to ovate	Umbilical with lip	Spinose	Resembles <i>Globigerina bulloides</i> but has more elongate chambers, low arched aperture with lip and smaller test	Cold-temperate and subtropical	13
X <i>Globigerina bulloides</i> d'Orbigny	Trochospiral	Left+Right	Spinose hispid	~0.8 mm	5 in juvenile; 4 in adult	Spherical	Umbilical	Spinose	Large, high-arched aperture	Subpolar cold-temperate	14
<i>Globigerina calida</i> Parker	Trochospiral	Left+Right	Spinose hispid	~0.8 mm	5 in juvenile; 4-6 in adult	Spherical becoming elongate	Umbilical becoming extra-umbilical	Spinose	Elongate final chambers, highly arched aperture, intergrades with <i>Globigerina bulloides</i> and <i>Globigerinella aequilateralis</i>	Subtropical, tropical	15
X <i>Globigerinella aequilateralis</i> (Brady) [= <i>Globigerinella sphaerifera</i> (d'Orbigny)]	Trochospiral becoming nearly planispiral	Left+Right	Spinose hispid	~0.9 mm	5 in juvenile; 5-6 in adult	Spherical	Equatorial, intero-marginal arch	Spinose	Nearly planispiral test	Subtropical, tropical	16
X <i>Globigerinella adamsi</i> (Banner and Blow)	Trochospiral becoming nearly planispiral	Left+Right	Spinose hispid	~1.48 mm	5 in juvenile; 5-7 in adult	Spherical becoming radially elongate	Umbilical becoming intero-marginal equatorial	Spinose	Radially elongate, pointed final chambers	Subtropical, tropical in Indian and Pacific Oceans only	17
* <i>Globigerinita glutinata</i> (Egger)	Trochospiral	Left+Right	Smooth finely hispid	~0.48 mm	5 in juvenile; 4 in adult	Spherical	Umbilical, sometimes modified into intralaminar apertures		Bulla and intralaminar apertures; smooth test	Subpolar to tropical	18
<i>Globigerinita bradyi</i> Wiener [= <i>Globigerinita wula</i> (Ehrenberg)]	Trochospiral	Left+Right	Smooth finely hispid	~0.19 mm	5 in juvenile; 4 in adult	Spherical	Umbilical sometimes modified into intralaminar apertures		Bulla and intralaminar apertures; high spire and numerous chambers	Subpolar and cold-temperate	19
X <i>Globogadrina dateri</i> (d'Orbigny) (= <i>Globigerina egeri</i> Kuhnle)	Trochospiral	Right mostly	Coarse pitted	~0.68 mm	5 or 6 in juvenile; 4-6 in adult	Hemispherical	Umbilical with umbilical tooth		Non-spinose, pitted wall; umbilical tooth; predominantly right-coiling	Tropical, subtropical	20
<i>Globogadrina conglomata</i> (Schwager)	Trochospiral	Left+Right	Coarse, pitted	~0.86 mm	6 in juvenile; 4 in adult	Hemispherical	Umbilical with umbilical tooth		Non-spinose, pitted wall; umbilical tooth; 4 chambers in last whorl of adult	Tropical Pacific and Indian Oceans only	21
X <i>Globogadrina hexagona</i> (Valand)	Compressed trochospiral becoming nearly planispiral	Left+Right	Coarse, pitted	~0.58 mm	5 in juvenile; 5-6 in adult	Hemispherical	Umbilical becoming extra-umbilical with tooth		Non-spinose, pitted wall; umbilical tooth; compressed test with apertural and spiral sides depressed	Tropical, subtropical in Pacific and Indian Oceans only	22
<i>Pallanina obliquicollata</i> (Parker and Jones)	Trochospiral becoming streptospiral	Right mostly	Pitted in juvenile; very smooth in adult	~0.8 mm	4-5 in juvenile; 3½ in adult	Hemispherical, later overlapping earlier chambers	Umbilical becoming extra-umbilical		Streptospiral, right-coiling; highly polished test with extra-umbilical aperture; juvenile resembles <i>Globogadrina dateri</i>	Tropical, subtropical; abundant in November in subtropical North Atlantic	23

Karl is absent in all species listed on these two pages.

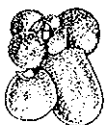
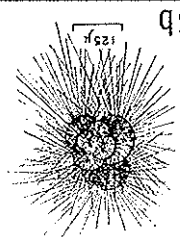
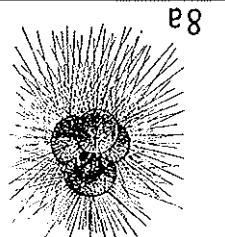
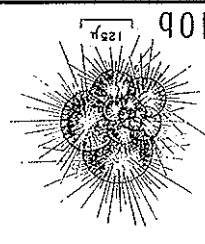
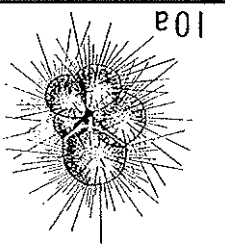
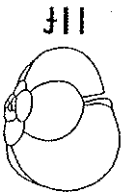
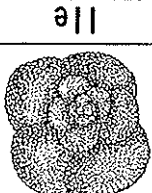
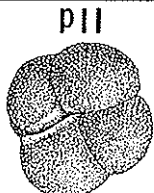
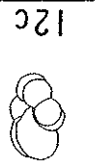
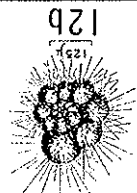
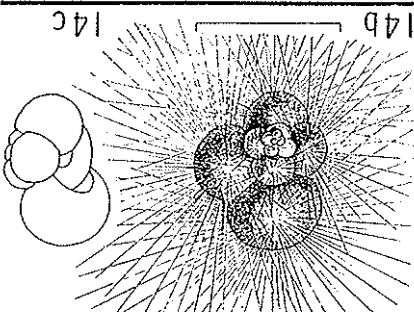
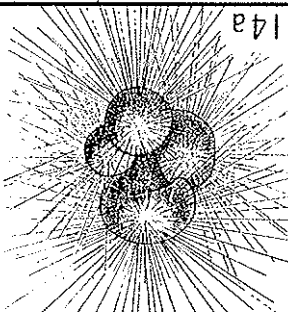
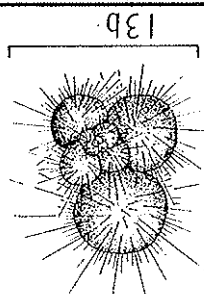
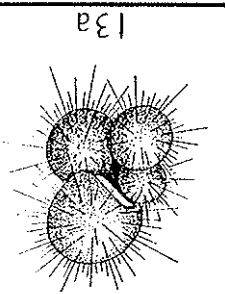
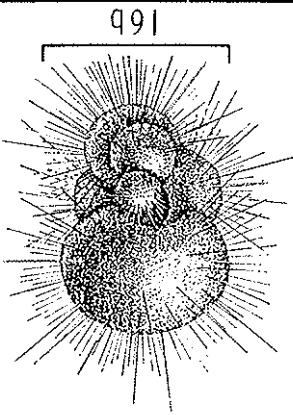
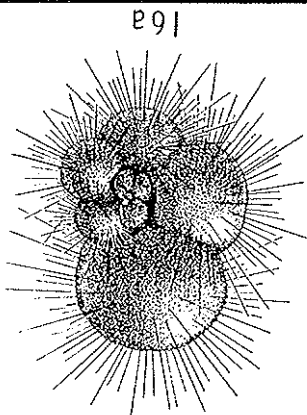
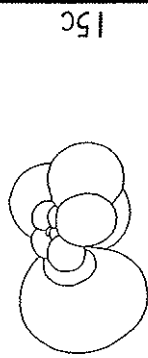
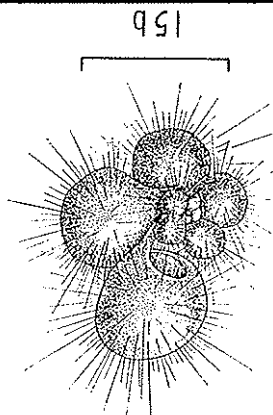
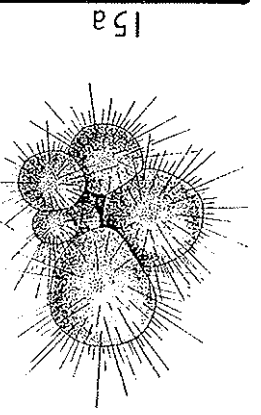
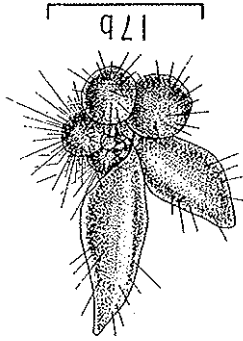
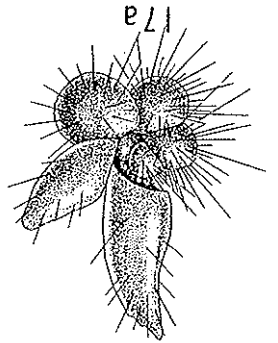
Key to Species

Species	Test				Chambers		Apertures		Keel	Diagnostic Characters	Distribution	Figs.
	Outline	Dominant Coiling Direction (spiral side)	Texture	Maximum length	Number per whorl	Shape	Primary aperture position	Secondary apertures per chamber				
X ** <i>Globorotalia inflata</i> (d'Orbigny)	Trochospiral; flat spiral side; inflated apertural side	Left mostly	Smooth; crystalline at apertural base	~0.65 mm	5 in juvenile; 4 in adult	Inflated, hemispherical	Large; umbilical to extra umbilical		Well-developed keel	Large aperture, rounded periphery; left-coiling and smooth test	Cold-temperate regions between subtropical and subtropical; in winter in subtropics	24
X * <i>Globorotalia truncatulinoides</i> (d'Orbigny)	Trochospiral conical	Left+Right	Smooth to hispid	~0.9 mm	6 in juvenile; 5-6 in adult	Angular conical	Elongate from umbilicus to periphery, with lip		Well-developed keel	Conical test	Subtropical, especially abundant between December and March in Sargasso Sea; distinct provinces of left- and right-coiling populations in Atlantic and Pacific	25
X <i>Globorotalia crassiformis</i> (Galloway and Wissler) [= <i>Globorotalia punctulata</i> (d'Orbigny)]	Trochospiral planiconvex	Left mostly	Smooth to hispid	~0.65 mm	5-6 in juvenile; 4-5 in adult	Angular conical	Elongate from umbilicus to periphery, with lip		Obscure, thin keel	Differs from <i>Globorotalia inflata</i> in its slit-like aperture and angular periphery; differs from <i>Globorotalia hiruta</i> in its convex apertural side and flat spiral side	Subtropical, often below 300 m	26
X <i>Globorotalia hiruta</i> (d'Orbigny)	Compressed trochospiral; biconvex or apertural side flat	Right mostly	Coarsely hispid	~1.0 mm	4-5 in adult	Angular rhomboid	Elongate from umbilicus to periphery, with lip		Obscure in juvenile; thin in adult	More lobulate periphery and fewer chambers than <i>Globorotalia scitula</i> ; right-coiling mostly	Subtropical, especially in winter	27
X <i>Globorotalia scitula</i> (Brady)	Compressed trochospiral biconvex	Left+Right	Smooth in juvenile, becoming hispid	~0.66 mm	5-6 in juvenile and adult	Angular rhomboid	Elongate from umbilicus to periphery, with lip		Absent or obscure	More rounded periphery and smoother test than <i>Globorotalia hiruta</i>	Subpolar to equatorial especially below 500 m	28
X <i>Globorotalia menardi</i> (d'Orbigny) [= <i>Globorotalia cultrata</i> (d'Orbigny)]	Compressed trochospiral subcircular outline	Left mostly	Smooth in juvenile; coarsely crystalline in adult	~1.5 mm	5-6 in adult	Angular rhomboid	Elongate from umbilicus to periphery, with lip		Well-developed keel	Rounded, moderately lobulate periphery; differs from <i>Globorotalia humida</i> in flatter and subcircular, thinner test	Tropical, subtropical	29
<i>Globorotalia humida</i> (Brady)	Compressed trochospiral elongate oval outline	Left mostly	Smooth in juvenile; coarsely crystalline in adult	~1.4 mm	5-6 in adult	Angular rhomboid	Elongate from umbilicus to periphery, with lip		Well-developed keel	Elongate oval outline and higher spine than <i>Globorotalia menardi</i> ; test often greatly thickened	Tropical, subtropical	30
<i>Candinea nitida</i> (d'Orbigny)	Trochospiral	Right mostly	Very smooth	~0.76 mm	4 in juvenile; 3 in adult	Spherical	Umbilical but absent in adult	Sutural apertures		Multiple sutural apertures between all chambers; very smooth globular test	Tropical, subtropical surface waters	31

Spines are absent in all species listed on this page.

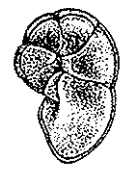


Unless otherwise marked, all the bar scales (placed underneath the middle specimen) are 50µ.





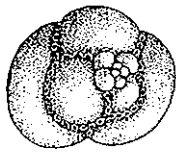
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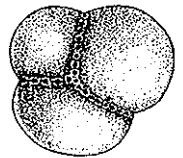
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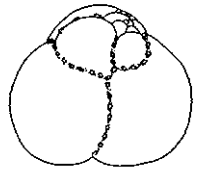
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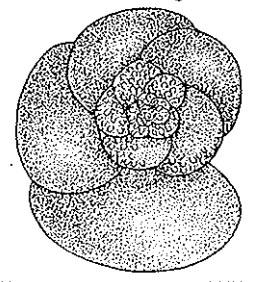
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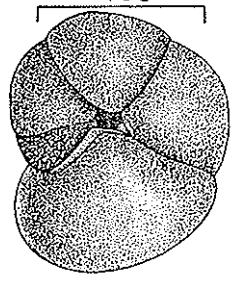
31b



31c

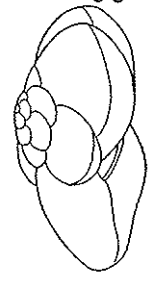


28a

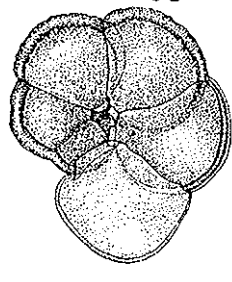


28b

scitula



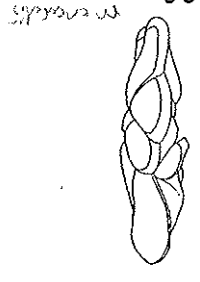
28c



29a

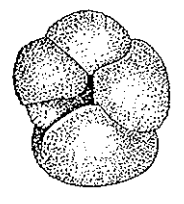


29b

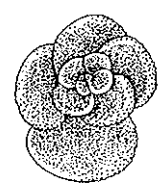


29c

m. cordata



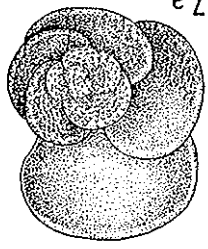
26a



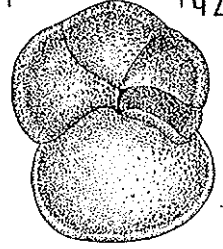
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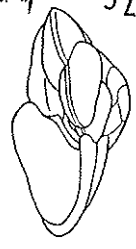
26c



27a

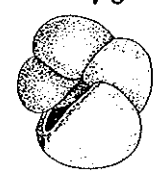


27b

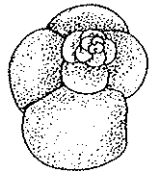


27c

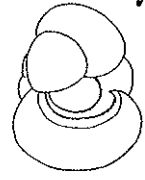
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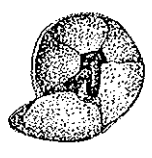
24a



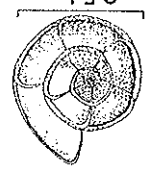
24b



24c



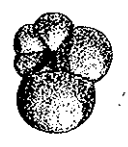
25a



25b



25c



22a



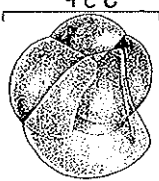
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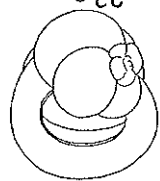
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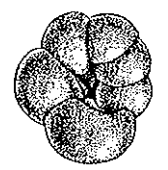
23a



23b



23c



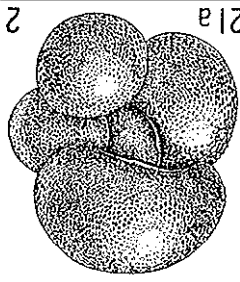
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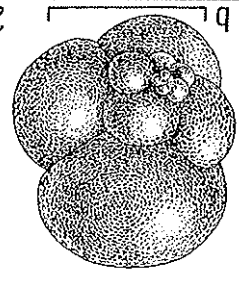
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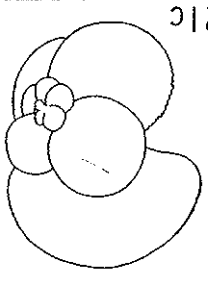
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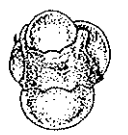
21a



21b



21c



18a



18b



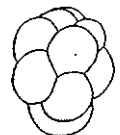
18c



19a



19b



19c