

## KEYS TO PLANKTON

The principles upon which taxonomic keys are based are discussed in Unit 2. The Keys to Plankton are artificial in that they do not reflect phylogenetic relationships. Except for the initial selection from among four choices, the Keys are fundamentally dichotomous: they consist of numbered couplets, with a choice of either a or b, that lead to an identification.

To use the Keys, you must first recognize the general appearance, shape, or outline of the specimen. Your first choice leads you to other Keys and to corresponding illustrations. The Keys to Plankton include the groups of plankton that commonly occur in coastal samples: phytoplankton, holozooplankton, and larvae of benthic invertebrates (see Fig. 8.1).

As you move through the Keys, it will become evident that various taxa have a variety of shapes and sizes. Some groups (for example, diatoms) will therefore be mentioned in more than one Key. Figure 8.2 illustrates the size ranges of the forms you are likely to encounter in your sample. Phytoplankton are usually less than 1 mm in size. Most zooplankton range from 0.3 mm to 10 mm. Refer to Figure 8.2 for help with identifications.

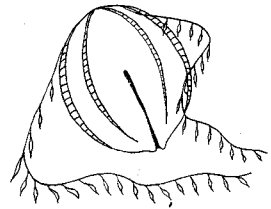
### A. Key to General Appearance

1. Spherical, globular, or round (disklike)	Key B
2. Triangular in outline, or tubular, cup, bell, or cone-shaped	Key C
3. Elliptical or ovoid in outline	Key D
4. Elongated, segmented, or chainlike; with or without an exoskeleton	Key E

### B. Key to Spherical, Globular, or Disk-shaped Plankton

1 a. Spherical or globular	2
b. Disk-shaped	6

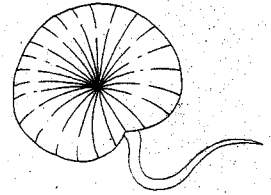
2 a. Ciliated on outer surface; cilia in conspicuous bands of plates or combs; macroscopic. *Comb jelly* (phylum Ctenophora)



b. Not ciliated

3

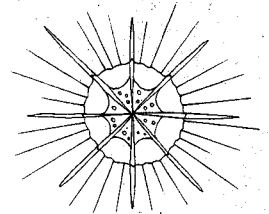
- 3 a. With a single large tentacle undulating from ventral groove.  
*Noctiluca*, a dinoflagellate (division Pyrrophyta)



b. No tentacles

4

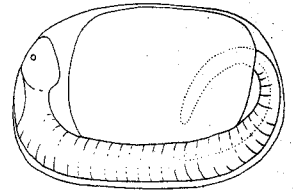
- 4 a. With spines radiating from a spherical mass.  
*Radiolarian* (kingdom Protista)



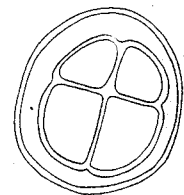
b. Without radiating spines

5

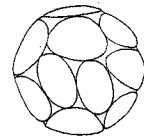
- 5 a. Transparent sphere, with oil droplet, and possibly developing embryo. *Fish egg* (phylum Chordata; class Osteichthyes)



- b. Translucent, central detail lacking; in various stages of development. *Invertebrate egg*



- c. Sphere covered by calcareous plates. *Coccolith* (Coccolithophora)



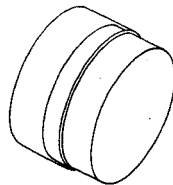
- 6 a. Disk hard; forms a shell

7

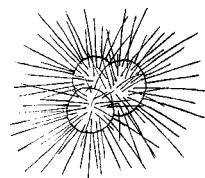
b. Disk soft

8

- 7 a. Disk siliceous, drumlike, and geometrically designed.  
*Centric Diatom* (division Chrysophyta; Bacillariophyceae)



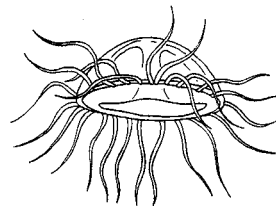
- b. Disk calcareous, compartmentalized, perforated; living forms with cytoplasmic processes extending from perforations. *Foraminiferan* (kingdom Protista)



- 8 a. Disk is flexible, thin or flattened, transparent, with one or more eggs in the center. *Snail egg* (phylum Mollusca; class Gastropoda)

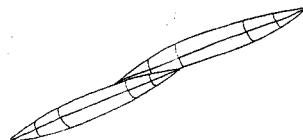


- b. Disk soft, with numerous tentacles extending from margin. *Medusa* (phylum Cnidaria)

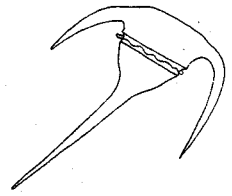


### C. Key to Triangular, Tubular, Cup- and Cone-shaped Plankton

- 1 a. Skeleton or test with geometric design; no appendages; not ciliated; microscopic; golden-brown in life 2
- b. With ciliated bands, disks, or lobes, or with conspicuous appendages or tentacles 3
- 2 a. Tapered form, golden-brown in color. *Pennate diatom* (division Chrysophyta; Bacillariophyceae)

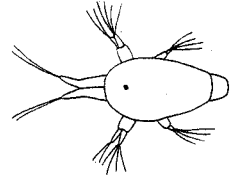


- b. Minute, blunt to sharply elongated triangular form with flagella in conspicuous central girdle; some skeletons with 3 sharp spines; slow rotation when moving. *Dinoflagellate* (division Pyrrophyta; Dinophyceae)



- 3 a. With ciliated bands, disks, or lobes, or tentacles 4

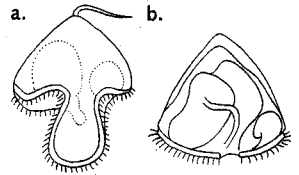
- b. Not ciliated; body shield-shaped with 3 pairs of jointed appendages. *Nauplius larva*. See also Key C, 7a. 7



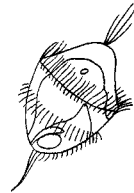
- 4 a. With ciliated bands, disks, or lobes 5

- b. Body with tentacles 6

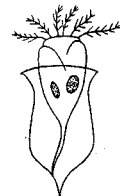
- 5 a. Cone-shaped, with paired, ciliated, lobes, or disks. a. *Pilidium larva of worm* (phylum Nemertea), b. *Cyphonautes larva* (phylum Bryozoa)



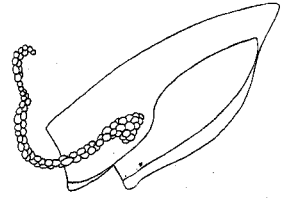
- b. Cone-shaped, with conspicuous band of elongated cilia near anterior end. *Trochophore larva of worm* (phylum Annelida; class Polychaeta)



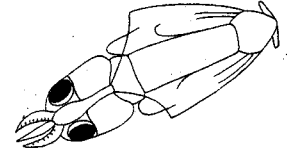
- c. Tubular; cilia encircle one end of cell in transparent tubular cone (lorica). *Tintinnid* (kingdom Protista)



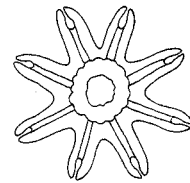
- 6 a. Cone-shaped; single tentacular appendage may be evident.  
*Siphonophore* (phylum Cnidaria)



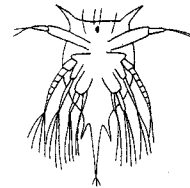
- b. Cone-shaped; 4 or more tentacles extending from conspicuous head with well-developed eyes. *Squid* (phylum Mollusca; class Cephalopoda)



- c. Bell-shaped or inverted cup-shaped with marginal tentacles. *Jellyfish*; may be *medusa* or *ephyra* stage in life cycle (phylum Cnidaria). See also Key B, 8b.



- 7 a. Shield bears "horns" projecting from the anterior corners. *Nauplius of barnacle* (phylum Arthropoda; class Crustacea; order Cirripedia)

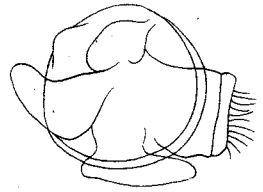


- b. No such projections of body shield. *Nauplius of copepod* (class Crustacea; order Copepoda). See Key C, 3b.

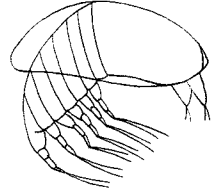
#### D. Key to Elliptical Ovoid Plankton

- |  |   |
|--|---|
| 1 a. Shell or shell-like body covering                         | 2 |
| b. Without shell or shell-like carapace                        | 9 |
| 2 a. Bivalve (2 shells) appearance; may enclose segmented body | 3 |
| b. Univalve (one shell), or body segmented                     | 4 |

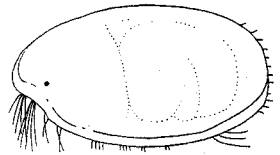
- 3 a. Clamlike; no jointed appendages; may possess ciliated bands and elongated foot. *Larval clam* or *Veliger larva of bivalve mollusk* (phylum Mollusca; class Bivalvia)



- b. Tear-drop shape; may show jointed appendages, antennae, and segmented abdomen. *Cypris larva of barnacle* (class Crustacea; order Cirripedia)

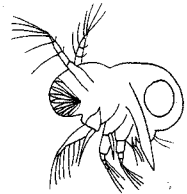


- c. Bean-shaped; appendages may extend out from beneath the shells; eggs often visible. *Ostracod* (class Crustacea; order Ostracoda)



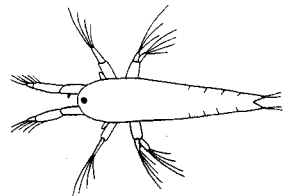
- 
- 4 a. Body segmented; jointed appendages evident (class Crustacea; several orders follow) 5
- b. Snail-like shell, coiled, or with several compartments 7

- 
- 5 a. With large, single, anterior compound eye. *Cladoceran* (class Crustacea; order Cladocera)

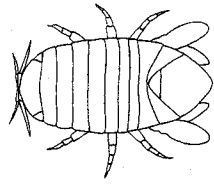


- b. Lacking such an eye 6

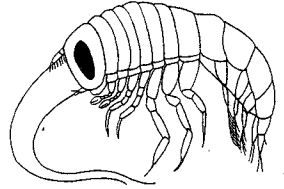
- 
- 6 a. Elliptical, or tear-drop shape; 3 pairs of appendages; segmentation may not be conspicuous. *Nauplius larva of barnacle*, *copepod*, or *copepodid of copepod*. See also Key C, 3b and 7a.



- b. Conspicuous segmentation; body flattened dorso-ventrally; several pairs of similar jointed appendages. *Isopod*, *sow bug* (class Crustacea; order Isopoda)



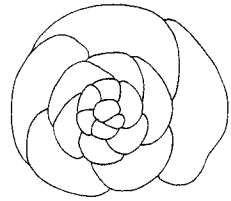
- c. Conspicuous segmentation; body laterally compressed. *Scud*, *amphipod* (class Crustacea; order Amphipoda)



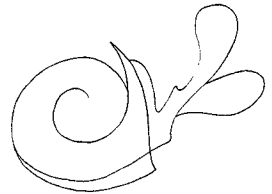
- 7 a. Internal organs evident; shell entire

8

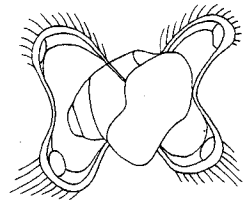
- b. Uncoiled shell with compartments, perforated, usually empty. *Foraminiferan* (kingdom Protista)



- 8 a. Foot modified to resemble paired wings. *Pteropod* (phylum Mollusca; class Gastropoda)



- b. Shell variously shaped, expanded ciliated folds on foot. *Veliger larva of snail* (phylum Mollusca; class Gastropoda)



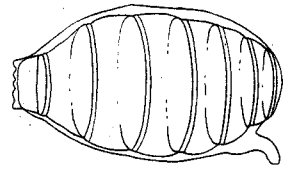
- 9 a. Barrel-shaped, with conspicuous circular bands

10

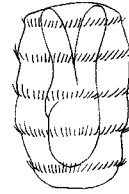
- b. Departure from barrel-shape, with external ciliated bands and evidence of internal gut

11

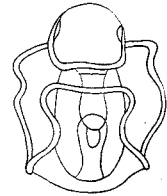
- 10 a. Transparent, tubular with circular bands of muscle. *Salp*  
(phylum Urochordata)



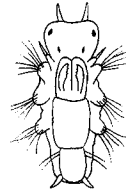
- b. Transparent, tubular with external circular bands of cilia.  
*Pentacula larva of sea cucumber* (phylum Echinodermata;  
class Holothuroidea)



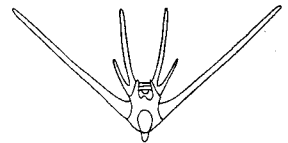
- c. Slight C-shape in lateral view, with ciliated lateral bands.  
*Bipinnaria larva of seastar*, *Auricularia larva of sea cucumber*  
(phylum Echinodermata; class Asterozoa or Holothuroidea)



- 11 a. Tapered, blunt end with ciliated band; tapered end may be segmented; setae present. *Trochophore or early larva of worm*  
(phylum Annelida; class Polychaeta)

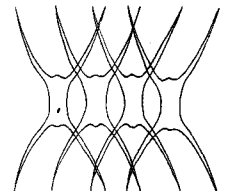


- b. Elongated ciliated "arms" or extensions radiate from central body mass. *Ophiopluteus larva of serpent star* (phylum Echinodermata; class Ophiurozoa) or *Echinopluteus of sea urchin*  
(phylum Echinodermata; class Echinozoa)



### E. Key to Elongated and Segmented Plankton

- 1 a. Chainlike repetition of geometrically shaped units, golden-brown color. *Centric diatoms* (division Chrysophyta)



- b. Body segmented

2



2 a. Bristles (setae) present. *Polychaete worm, nectochaete larvae* (phylum Annelida; class Polychaeta). See Key D, 11a.

b. No bristles or setae, or, if present, confined to anterior region of jaws 3

3 a. Exoskeleton and jointed appendages (class Crustacea; several orders) 4

b. Without jointed appendages; lacks exoskeleton 11

4 a. Shieldlike body with 3 pairs of appendages. *Nauplius or copepodid larva of copepod*. See Key C, 3b and Key D, 6a.

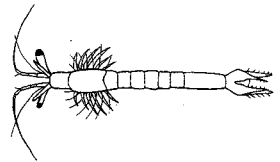
b. With more than 3 pairs of appendages 5

5 a. Shrimplike in appearance 6

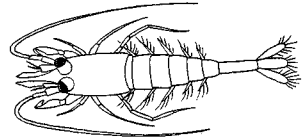
b. Not shrimplike 8

6 a. Carapace covers entire thorax 7

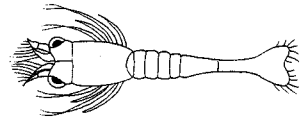
b. Carapace does not cover entire thorax; statocyst on tail-fan. *Mysid, opossum shrimp* (order Mysidacea)



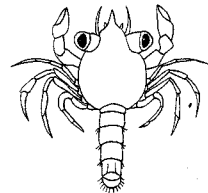
7 a. Stout abdomen with appendages; tail-fan with telson and uropods. *Shrimp, prawn* (order Caridea or Penaeidea)



b. Slender abdomen without appendages; tail-fan of telson only with terminal spines. *Zoea larva of shrimp or prawn* (order Caridea or Penaeidae)

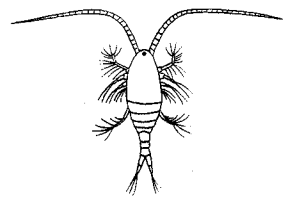


8 a. Crablike in appearance. *Megalopa larva of brachyuran crab* (order Brachyura)



b. Not crablike, but with enlarged cephalothorax 9

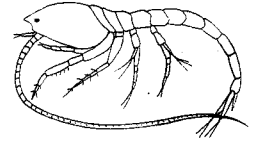
- 9 a. With single, anterior eye; paired antennae extending laterally. *Copepod* (order Copepoda)



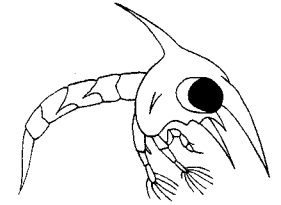
- b. Not as above

10

- 10 a. Large, bulbous thorax with elongated abdomen, void of appendages. *Cumacean* (order Cumacea)



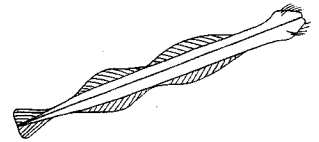
- b. Carapace with exaggerated anterior, posterior, and (in some species) dorsal spines. *Zoea larva of brachyuran crabs* (Brachyura)



- 11 a. With supporting rod (notochord) or appearance of segments along dorsal body wall

12

- b. Transparent, arrowlike, with fins; anterior jaws with chaetae. *Arrow worm* (phylum Chaetognatha)



- 12 a. With typical vertebrate structure, paired eyes, fins, yolk sac. *Fish larva* (class Osteichthyes)



- b. Enlarged head, tail-like structure with notochord, segmentation, tadpole-like. a. *Ammocoetes larva of tunicate* (Urochordata), b. *larvacean* (Urochordata)

