PHYLUM NEMERTEA (RHYNCHOCEOLA)

Nemertean worms are almost always easily recognized as such by their soft, elongated, narrow, highly contractile, unsegmented bodies, lacking setae and covered by cilia. A few species are common in the Woods Hole region, but about 30 may occur. The group is excellently discussed in Coe's "Biology of the Nemertean of the Atlantic Coast of North America" (1943), which anyone making a serious study of the group must have at hand. However, identification by the beginner attempting to use the extensive keys in Coe's work is made difficult by the fact that the division of nemerteans into orders is based in part upon such internal features as the arrangement of muscle layers in the body wall. The general descriptive features below may be useful in deciding the probable order in which to place an unknown specimen. Figure references on nemerteans are to Plate 5.

Class ANOPLA: Mouth posterior to brain; proboscis not armed with stylets.

Order Paleonemertea. In general, paleonemerteans are slender, soft, and extensile, heads somewhat blunt, bodies not much flattened; ocelli and longitudinal cephalic slits are lacking.

Order Heteronemertea. Heads characteristically rather snakelike, with marked lateral slits (figs. 7, 12), but Parapola and Zygeupolia are exceptions. A small caudal cirrus (fig. 12) is found in Cerebratulus, Micrura, and Zygeupolia.

Class ENOPLA: Mouth anterior to brain; proboscis armed with one or more stylets (figs. 8-10) except in Bdellonemertea.

Order Hoplonemertea. The stylets are diagnostic (flatten animals cautiously beneath cover slip or between microscope slides and examine by transmitted light).

Order Bdellonemertea. One species, commensal in mantle cavities of bivalve molluscs. Does not much resemble a nemertean, but has a leech-like form with posterior sucker (fig. 11).

KEY TO THE MORE COMMON NEMERTEANS OF THE WOODS HOLE REGION

1. Free-living .................................................. 3
   1. In mantle cavity of bivalves or in egg mass or gills of crabs .......... 2

2. In mantle cavity of bivalves; intestine convoluted and without diverticula; stylet apparatus absent; mouth and proboscis opening united; posterior sucking disk present (fig. 11); uncommon: Order BDELLONEMERTEA ........................................ Malacobdella grossa
   2. Among eggs or gills of crabs; proboscis rudimentary, with no accessory stylets ........................................ Carcinonemertes carcinophilus

3. In marine or brackish waters ........................................ 4
   3. In fresh water; with 4 or 6 ocelli; color reddish or pinkish; length up to 20 mm .................................................. Prostoma rubrum

4. Generally small worms, with blunt, flattened heads; usually oblique cephalic grooves mark rear corners of head; ocelli usually obvious (4 or numerous); presence of proboscis stylets diagnostic .................................................. Order HOPLOEMERTEA 5
   (Note: Prostoma and Carcinonemertes, keyed out above, are also in this order)
   4. Not referable to Hoplonemertea ........................................ 15
5. Ocelli 4, set as corners of a square; small worm, often colorful .......................................................... 6
5. Ocelli otherwise ........................................................................................................................................ 11

6. Body of slender cylindrical form; of firmer consistency than other nemerteans of similar small size (10-20 mm); color varies; head not demarcated from body; 4 ocelli in a square ............................................. Cerstidea dorsalis

6. Body of short, flattened form; head demarcated by inconspicuous transverse grooves; 4 large, occasionally fragmented, ocelli; worms small and variously colored. ........... Tetrastemma 7

7. Body usually with more or less conspicuous longitudinal stripes ......................................................................................................................... 8
7. Body lacking well defined longitudinal stripes ......................................................................................... 9

8. Body rather slender, yellow, with 2 broad longitudinal brown stripes .................................................. Tetrastemma elegans
8. Body short and broad; usually green, with one or 2 longitudinal yellow stripes and 6 green stripes near tip of head ................................................................. Tetrastemma vittatum

9. White or translucent with superficial flecks of white ................................................................. Tetrastemma wilsoni
9. Yellow, rosy, red, or green ......................................................................................................................... 10

10. Pale green or yellowish, head white or cream colored ........................................................ Tetrastemma candidum
10. Yellow or rosy, often spotted with brown; with band of dark pigment connecting the 2 ocelli on the same side of the head ........................................................................ Tetrastemma vermiculus

11. Ocelli extend posteriorly along lateral nerve cords beyond brain; basis of central stylet cylindrical and sharply truncated or concave at posterior end (fig. 9) ............................................ Zygonemertes virescens
11. Ocelli do not extend posteriorly beyond brain; basis of central stylet truncate-conical or pear shaped and usually rounded at posterior end ........................................................................ 12

12. Only one pair of ocelli, situated near tip of head; color of body orange-red ........................................ Amphiporus bioculatus
12. Ocelli 6 to 12 on each side of head ....................................................................................................... 13

13. Ocelli in a single row along each side of head (fig. 10); blood vessels bright red, and conspicuous in life; color of body usually pale yellow or rosy ................................................ Amphiporus cruentatus
13. Ocelli in an irregular double row on each side or scattered .................................................................. 14

14. Epidermis very thick and soft, secreting much viscid mucus when stimulated; movements of body often leech-like ........................................................... Amphiporus griseus
14. Epidermis thin and firm, secreting but little mucus when stimulated; moves by creeping ................................................................. Amphiporus ochraceus

Note: The following dichotomy involves separating the orders PALEONEMERTEA and HETERONEMERTEA. The mouth in both is posterior to brain; proboscis styles are absent.

15. Not possessing ocelli, or longitudinal cephalic grooves, or caudal cirrus; worms slender and not over 150 mm long ................................................................................................................................. 16

15. Any large local nemerteans; any nemerteans with deep longitudinal cephalic slits, or with a caudal cirrus (but this is often broken off) or with ocelli but without styles ................................................................................................................................. 18
16. Bodies filiform (lengths up to 150 mm, diameter up to one mm)............. 17
   Body much flattened in posterior region (width 2-5 mm);
   head changeable in shape, broader than adjacent body, flat,
   rounded or margined anteriorly; color pale reddish or yel-
   lowish .................. Carinoma tremophorus

17. Very slender, filiform body; head broad; mature worms up
   to 25 mm long; color whitish; forms delicate mucoid tubes
   ............................................................................................................ Tubulanus pellucidus

17. Very slender, filiform body; head long, pointed; mouth far
   back of brain; length up to 100 mm; characteristically coils
   body into a close spiral .................................. Procephalothrix spiralis

   (Note: A worm of similar appearance, but not tending to con-
   tract into a spiral, is Cephalothrix linearia, not reported
   south of Cape Cod).

18. Without longitudinal cephalic grooves ..................................... 19
18. With longitudinal cephalic grooves ....................................... 20

19. Caudal cirrus present; head narrow, without oblique ceph-
   alic grooves .................................................. Zygeupolia rubens
19. Caudal cirrus absent; head broad; with oblique cephalic
   grooves .................................................. Parapodia aurantiaca

20. Caudal cirrus absent; body long and slender, filiform in
    some species, rounded or flattened in others, very contrac-
    tile; ocelli present in most species .......................... Lineus 21
20. Caudal cirrus present; body not very slender, ocelli pre-
    sent or absent .............................................. 23

21. With conspicuous median dorsal stripe, but without trans-
    verse markings; reddish brown or olive, with median dorsal
    stripe of white or yellow extending whole length of body
    and head (fig. 7) ........................................ Lineus bicolor
21. Without conspicuous median dorsal stripe .................................. 22

22. Head rather broad, cephalic grooves short; body contracts
    by shortening and thickening -- not by coiling in spiral .... Lineus ruber
22. Head narrow, cephalic grooves long; body contracts by
    coiling in spiral ........................................ Lineus socialis

23. Body firm, long and ribbon-like, sometimes very large; much
    flattened in intestinal region, with thin lateral margins
    and well adapted for swimming; body less contractile than in
    other genera; mouth large and elongated, ocelli absent (fig.
    12) .......................................................... Cerebratulus lacteus
23. Body slender, flattened in intestinal region, but with lateral
    margins not thin; incapable of swimming; mouth small and round;
    ocelli present or absent .......... Micrura 24

24. Head with a row of 4-6 ocelli on each side .................. Micrura affinis
24. Head without ocelli ........................................... 25

25. Color of body red or reddish .......................................... 26
25. Color of body whitish or pale yellowish; may show a tinge of
    red or orange anteriorly .................................. Micrura albida

26. Deep red or purplish red; common .................................. Micrura leidyi
26. Pale red, yellowish-red, or brownish-red .......................... Micrura caeca
Nemertea

ANNOTATED LIST OF NEMERTEANS

CLASS ANOPLA

Order Paleonemertea

Carinoma tremorphoros Thompson, 1900. Common in sand, clay, mud, or under stones.
Cephalothrix linearis (Rathke, 1799). Not reported south of Cape Cod.
Procephalothrix spiralis (Coe, 1930). Common.
Tubulanus pellucidus (Coe, 1895). Not very common.

Order Heteronemertea

Cerebratulus lacteus (Leidy, 1851). The commonest large nemertean; classical embryological material.
Lineus bicolor Verrill, 1892. Common; usually subtidal.
Lineus ruber (O. F. Müller, 1771). Often in low or variable salinity; color varies.
Lineus socialis (Leidy, 1855). Common; often gregarious.
Micrura affinis (Girard, 1853). A northern species; below 10 m off Martha's Vineyard.
Micrura albida Verrill, 1879. Not reported south of Cape Cod.
Micrura caeca Verrill, 1895. Under stones or in sand.
Micrura leidyi (Verrill, 1892). Common in protected bays.
Parapalia aurantiaca Coe, 1895.
Syneupella rubens (Coe, 1895). Abundant in sand in bays and estuaries.

CLASS ENOPLA

Order Hoplonemertea

Amphiporus bioculatus McIntosh, 1873. Common, subtidally in Vineyard Sound.
Amphiporus cruentatus Verrill, 1879. Common locally in Woods Hole area.
Amphiporus griseus (Stimpson, 1857). Occasional at Woods Hole.
Amphiporus ochraceus (Verrill, 1873). Common in Woods Hole area.
Carinonemertes carcinophila (Kolliker, 1845).
Oerstedia dorsalis (Abildgaard,1806). Locally abundant, among growth on rocks and pilings.
Ontyphlymonemertes pellucida Coe, 1943. A minute form. Not in key. The genus is unique in possessing statocysts.
Prostoma rubrum (Leidy, 1850). In fresh water swamps and ponds. Coe reports a green variety in a cedar swamp near Woods Hole.
Tetrastremma candidum (Müller, 1874). Common.
Tetrastremma elegans (Girard, 1852). Occasional.
Tetrastremma vermiculus (Quatrefages, 1846). Common.
Tetrastremma vittatum Verrill, 1874. Occasional, in protected muddy situations.
Tetrastremma wilsoni Coe, 1943. Among Bryozoa, sponges, etc. on pilings.
Zygionemertes virescens (Verrill, 1879). Common.

Order Bdellonemertea

Malacobdella grossa (O. F. Müller, 1776). In mantle cavity of Mya, Mercenaria, Ostrea and other bivalves. Not common around Woods Hole. M. obesa and M. mercenaria of Verrill are synonyms.

REFERENCES

Plate 5

VARIOUS UNSEGMENTED WORMS

Polycladida (figs. 1-6), Nemertea (figs. 7-12), Sipunculoidea (figs. 13, 14), Nematomorpha (figs. 15-18). Figs. 11, 12, 15 by Mrs. Emily Reid; figs. 13, 14, 16-18 by Bruce Shearer. Scales various.

Fig. 1. *Prostheceraeus maculatus*, outline to show marginal tentacles; note cerebral and tentacular eyes.

2. *Gnesioceros floridana*, simplified after Hyman (1939) to show body outline, cerebral and tentacular eyes.

3. *Stylochus ellipticus*, simplified, showing tentacles and eyes.

4. *Stylochus ellipticus*, viewed from side to show dorsal tentacles, and marginal, tentacular, and cerebral eyes.

5. *Euplana gracilis*, from life, showing pattern of cerebral and "tentacular" eyes. Note that actual tentacles are absent.


7. *Lineus bicolor* (Heteronemertea), head in dorsal view, from life, showing left cephalic slit and eyes.

8. *Amphiporus ochraceus* (Hoplonemertea), proboscis stylets as seen in a worm flattened on a slide; central stylet on pear shaped basis and accessory stylets in 2 lateral pouches. Drawn from a photo taken by Dr. W. E. McCaul.


12. *Cerebratulus lacteus* (Heteronemertea), whole animal with head in ventral view, showing mouth, left cephalic slit, proboscis pore anteriorly, and caudal cirrus. After Verrill.

13. *Golfingia gouldi*, from life; one with extended introvert showing tentacles, other with introvert withdrawn; about half natural size.

14. *Phascolion strombi*, with extended introvert; much enlarged (scale bar equals one mm).


17. *Nectonema acutum*, anterior end of relaxed, living specimen, prior to shedding of eggs.

18. *Nectonema acutum*, posterior end of the above specimen.