

BIOL 160 INVERTEBRATE SYSTEMICS

LESSON 6: PHYLUM NIMERTINI

- GENERAL CHARACTERISTICS
- CLASSIFICATION
- ECONOMIC IMPORTANCE

- m. a. arkoh



CHARACTERISTICS

- Nemertini shows the most advanced development of all the acoelomate phyla.
- They are also referred to as the Rhynchocoela, Nemertinea, Nemertina or Nemertea.
- Although most are less than 20 centimetres long, one specimen has been estimated at 54 metres which make it the longest animal ever found.



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- They are mostly marine worms.
- Not all Nemerteans are long thin marine worms, some live in freshwater like the *Potamonemertes* sp. and *Dichonemertes* sp.,
- Few are even terrestrial; found in damp habitats *Geonemertes* sp., while others are quite chubby, *Dinonemertes investigatoris* can reach 5.6cm in width.
- Many have patterns of yellow, orange, red and green coloration.



Potamonemertes sp.



Parborlasia corrugatus



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- 1) Bilaterally symmetrical and dorso-ventrally flattened.
- 2) Body has more than two layers of cells with tissues and organs.
- 3) Body has a through gut with a mouth and anus.
- 4) Body has no body cavity.
- 5) Has a blood system with blood vessels.



- 6) Has a well developed nervous system and a brain.
- 7) Has an eversible and retractable ectodermal proboscis.
- 8) Reproduction is by asexual fragmentation, or sexual, when it is normally **gonochoristic**.
- 9) Most species are carnivorous and predatory.
- 10) Most are aquatic and marine, there are some terrestrial and freshwater

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- Most Nemerteans are dioecious (having two separate sexes) free living organisms that like to spend much of their time beneath rocks or thick algal growth or else burrowing into soft mud or sand.
- 4 species in the Genus *Malacobdella* live commensally in the mantle cavity of bivalve molluscs, they do not feed on mollusc tissue but as far as is known the molluscs gain no advantage from the Nemerteans presence.



- 5 species in the genus *Carcinonemertes* are parasitic on crabs, usually female crabs.
- Otherwise Nemerteans are mostly carnivores or scavengers on recently dead animal remains.
- Typical examples are *Lineus corrugatus*, *Paranemertes peregrina*, *Geonemertes*,



- Nemerteanans have a muscular body wall that includes both circular and longitudinal muscles. These muscles may be arranged so that there is one layer of each with the circular muscles outside the longitudinal ones, or there may be two layers of circular muscles sandwiching a layer of longitudinal muscle or there may be two layers of longitudinal muscle sandwiching a single layer of circular muscle.

- The foregut, stomach and intestine run a little below the midline of the body, the anus is at the tip of the tail, and the mouth is under the front.
- A little above the gut is the **rhynchocoel**, a cavity which mostly runs above the midline and ends a little short of the rear of the body.

- All species have a proboscis which lies in the rhynchocoel when inactive but everts to emerge just above the mouth and capture the animal's prey with venom.
- A very stretchy muscle in the back of the rhynchocoel pulls the proboscis in when an attack ends.



Basiodiscus mexicanus



- Nemerteans are distinguished by there having a long protrusible proboscis that is housed in a separate fluid filled cavity called the **rhynchocoele**, this proboscis may be coiled within the rhynchocoele and be longer than the animals body.
- The rhynchocoele is generally as long as the body and leads anteriorly to a short passage called the **rhynchodaeum** which open via the proboscis pore at the front end of the body.

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- In most species the proboscis pore is completely separate from the animals mouth and digestive tract which opens some way back on the body.
- In some species however the proboscis and the digestive tract share a common opening.
- The proboscis itself can be either armed with spines or unarmed.



- Nemerteans have a well developed nervous system with cephalic ganglia and a nerve network connecting various sensory organs. *Usually there are a pair of cerebral ganglia, a pair of large ganglionated nerve cords as well as main nerve net.
- Many Nemerteans possess eyes, from two to two hundred per individual, they are located towards the front of the animals body near the cephalic ganglia.

CLASSIFICATION

- Phylum Nemertini has 2 classes, 4 orders and 2 suborders.
- Class (2) : Enopla and Anopla
- Orders (2) : Haplonemertea,
Bdellonemertea
Paleonemertea,
Heteronemertea

Order haplonemertea has two suborders.

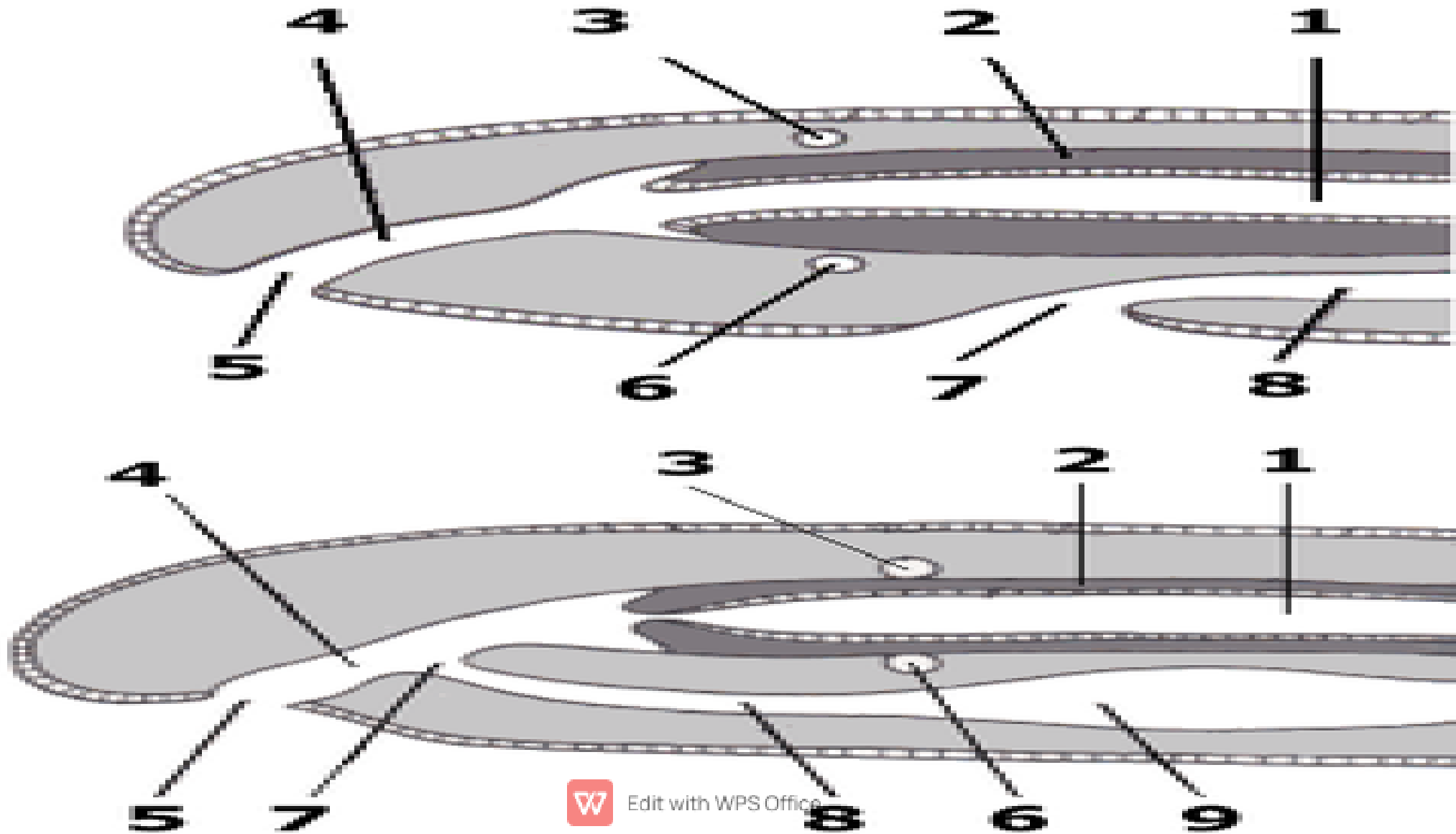
Suborders (2) : Monostilifera , Polystilifera



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- The phylum has 2 Classes; Enopla (armed) and Anopla (unarmed).
- The **Anopla** organisms includes animals with proboscis without stylet, and a mouth underneath and behind the brain.
- The **Enopla** organisms have stylets except order Bdellonemertea. Their mouth is located underneath and ahead of the brain. Their main nerve cords run inside body-wall muscles

1. proboscis, 2. rhynchocoel, 3. dorsal brain, 4. rhynchodeum, 5. proboscis pore, 6. ventral brain, 7. mouth, 8. foregut, 9. stomach. ANOPLA (at top)



1. Class Anopla

- This has 2 orders; Paleonemertea and Heteronemertea
- **Order Paleonemertea**; Comprises 100 marine species. Their body wall has outer circular and inner length-wise muscles.
- In addition, *Carinoma tremaphoros* has circular and inner length-wise muscles in the epidermis; the extra muscle layers seem to be needed for

- **Order Heteronemertea**; Comprises about 400 species. The majority are marine, but three are freshwater. Their body-wall muscles are disposed in four layers, alternately circular and length-wise starting from the outermost layer.
- The order includes the strongest swimmers. Two genera have

2. Class Enopla

- The armed organisms have 2 orders. Bdellonemertea and Hoplonemertea.

ORDER BDELLONEMERTEA;

Comprises 650 species. They live in benthic and pelagic sea water, in freshwater and on land. They feed by commensalism and parasitism, and are armed with stylet(s).



- Includes seven species, of which six live as commensals in the mantle of large clams and one in that of a freshwater snail.
- The hosts filter feed and all the hosts steal food from them.
- These nemertean have short, wide bodies and have no stylets but have a sucking pharynx and a posterior sucker.

- **Hoplonemertea** has 2 suborders
- Suborder **Monostilifera**; includes 500 species with a single central stylet. Some use the stylet for locomotion as well as for capturing prey.

Suborder **Polystilifera**; includes about 100 pelagic and 50 benthic species. Their heads bear many tiny stylets.

- **Order Bdellonemertea;**
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- The hosts filter feed and all the hosts steal food from them.
- These nemerteans have short, wide bodies and have no stylets but have a sucking pharynx and a posterior sucker.

Ecological importance

Most of them are marine animals that burrow in sediments.

Others lurk in crevices between shells,

Some on stones or the holdfasts of algae or sessile animals.

Some live deep in the open oceans, and have gelatinous bodies.

Others build semi-permanent burrows lined with mucus or produce cellophane-like tubes.



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- Mainly in the tropics and subtropics, about 12 species appear in freshwater,
- and about a dozen species live on land in cool, damp places, eg. under rotting logs.
- The terrestrial *Argonemertes dendyi* lives in a lava tube caves. They build a cocoon, which allows it to avoid desiccation while being transported.
- Most are carnivores, feeding on annelids, clams and crustaceans, and may kill annelids of about their own size.



- They sometimes take fish, both living and dead.
- Insects and myriapods are the only known prey of the two terrestrial species of *Argonemertes*.
- A few nemerteans are scavengers, and these generally have good distance chemoreception ("smell") and are not selective about their prey.

- A few species live commensally inside the mantle cavity of molluscs and feed on micro-organisms filtered out by the host.
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- some nemerteans' skins secrete toxins that deter many predators.
- Other examples are *Cerbratulus lacteus* and the South African *Polybrachiorhynchus dayi*.