

# Animal Diversity & Wildlife Conservation

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Zoology Complementary Course for I Semester B.Sc. Botany  
Complementary Course 1

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# Phylum Annelida

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# Introduction

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- Annelida is a group of highly diverse animals, popularly known as "segmented or **ringed worms**" (Gk, *annulus* = ring; *eidos* = form).
- They are *bilaterally symmetrical and metamerically segmented coelomates, with dermo-muscular body wall, setae and segmentally paired metanephridia.*
- The phylum includes earthworms, leeches, nereids and a large number of marine and fresh-water species.

# Salient Features

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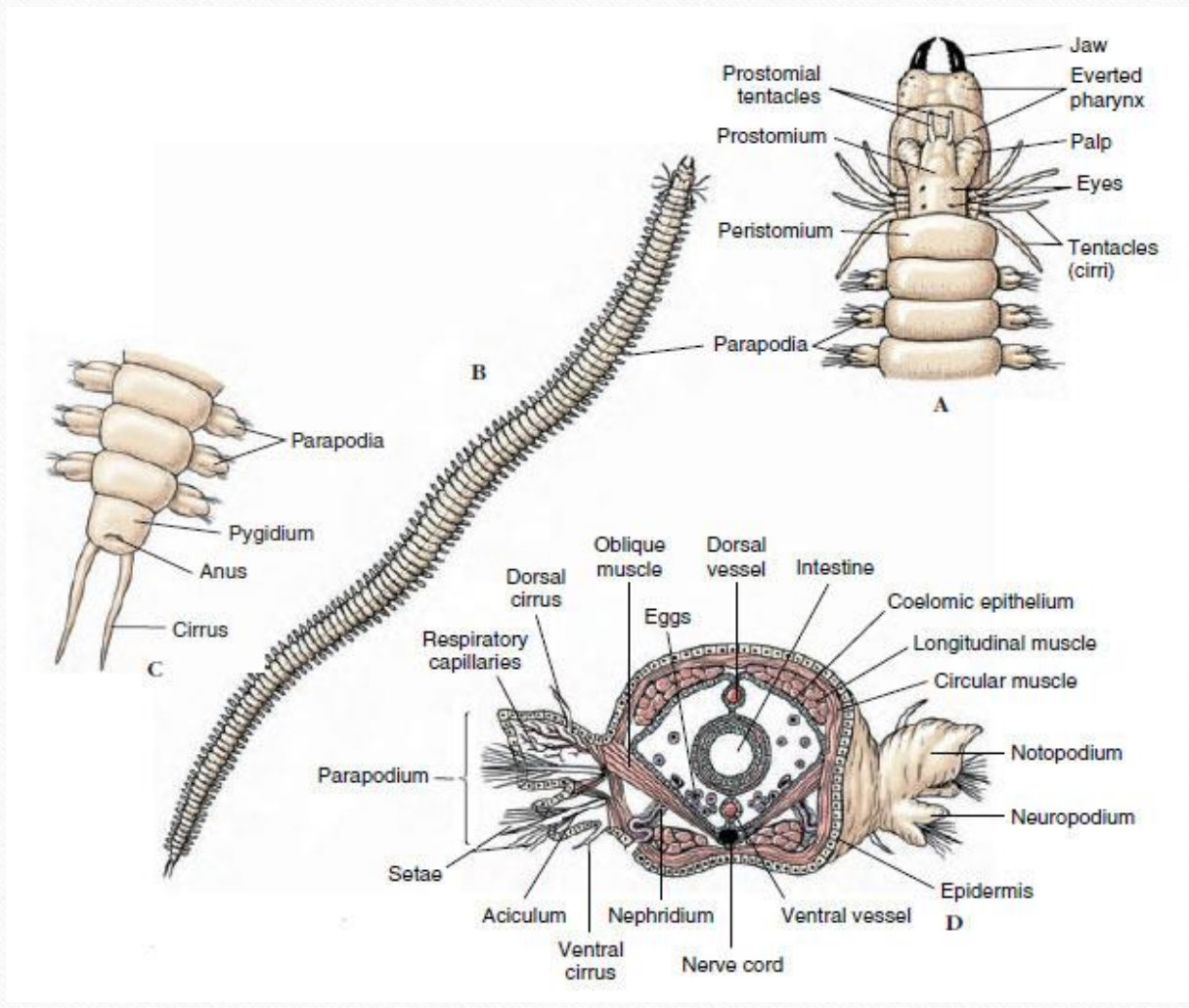
- **Bilaterally symmetrical, metamerically segmented and vermiform body:**
- The body of annelids is long, bilaterally symmetrical, segmented and cylindrical.
- Segmentation or metamerism is the division of the body into a linear series of ideally corresponding compartments, called *segments, metameres or somites*.
- The metameres of annelid body are basically similar and hence the segmentation is *homonomous*.
- Adjacent segments are separated from each other externally by *intersegmental grooves* and internally by *intersegmental septa*.

# Salient Features

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- The first segment is called *peristomium* and the last one is called *pygidium*.
- Peristomium is the oral segment and pygidium is the anal segment.
- Growth of the body involves the successive addition of new segments just in front of the pygidium.
- This kind of growth is called *teloblastic growth*.





# Salient Features

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- **Triploblastic body, cuticular covering and setae** : The body cells of annelids are arranged in three layers, namely *epidermis*, *mesodermis* and *endodermis*. The whole body surface is covered by a thin cuticle, secreted by the epidermis. Lying buried in the epidermis are chitinous rods or bristles, called *setae* or *chaetae*. In some cases, setae aid in locomotion by providing traction. Chaetae are formed of *B-chitin*



# Salient Features

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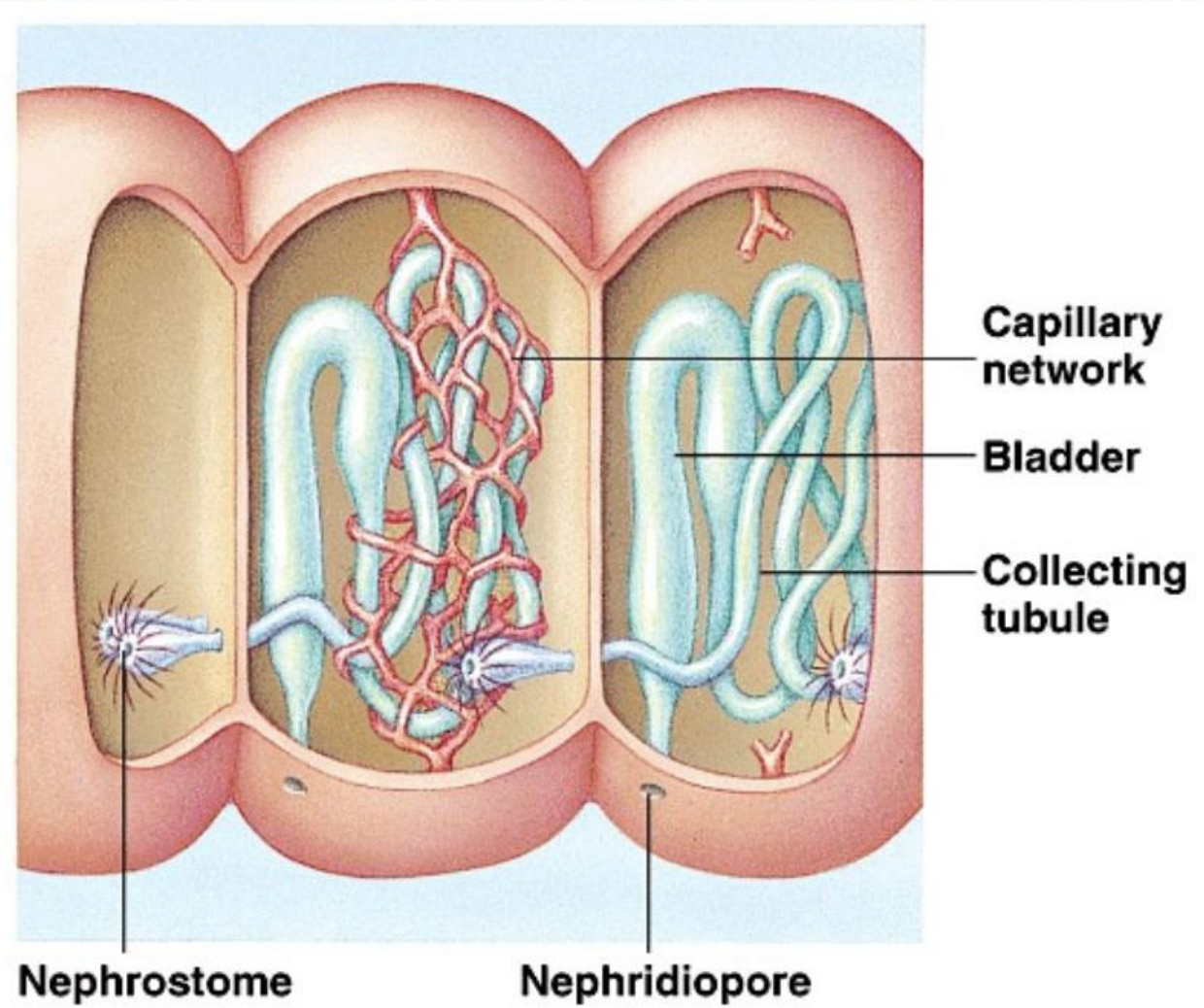
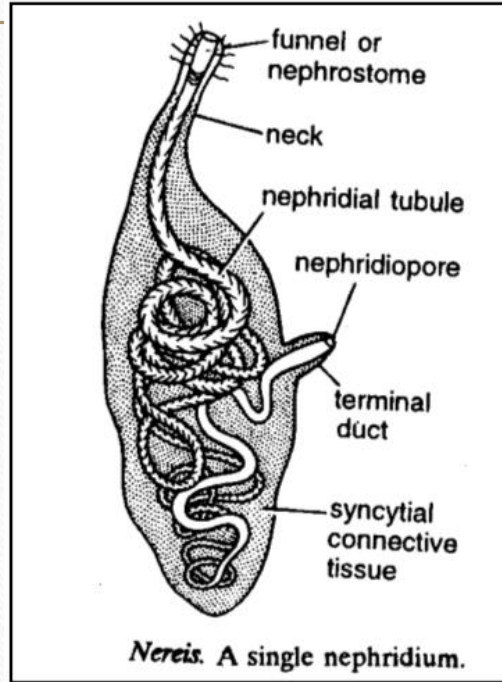
- *Dermo-muscular body wall and gut wall* : In annelids, body wall and gut wall are formed of mesodermal muscles. These muscles include circular muscles and longitudinal muscles.
- *Peri-visceral cavity is a true coelom* : The peri-visceral cavity of annelids is a true coelom. With the exception of leeches, it is spacious; in leeches coelom is much reduced. Peri-visceral coelom is seen in between the body wall and the gut wall. It is filled with coelomic fluid, and is lined internally and externally by *mesothelium*.
- The external lining is called *parietal peritoneum* (outer coelomic epithelium), and the internal one *visceral peritoneum* (inner coelomic epithelium). Coelom is not a continuous cavity. It is partitioned into successive compartments by intersegmental septa.
- The coelomic fluid serves as a circulating fluid for the transport and distribution of substances. It also serves as a hydrostatic skeleton (fluid skeleton) to support the body. It contains wandering amoeboid cells, called *coelomocytes*, which play an active role in internal defence



# Salient Features

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- *Straight and complete alimentary canal*: The digestive tract of annelids is a straight and uncoiled tube, extending from mouth to anus. It consists of ectodermal foregut and hind-gut, and endodermal mid-gut.
- *Segmentally paired metanephridia* : The excretory organs of annelids are metanephridia. Typically, they are segmentally paired, Nephridia are ectodermal tubules. Metanephridia are open type of nephridia with external and internal openings. Externally, a metanephridium opens to the outside by a *nephridiopore*, and internally it opens to the coelom by a ciliated opening called *nephrostome*

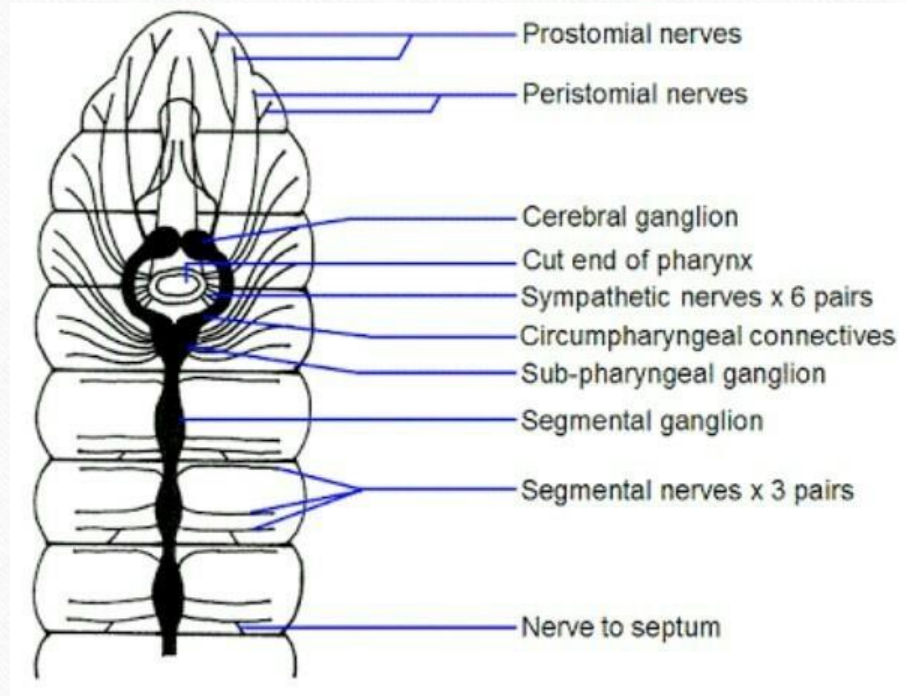




# Salient Features

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- *Closed type of blood-vascular system without specialised heart:* The blood-vascular system of annelids is of the closed type in that most of the time blood flows through closed blood vessels. A distinct heart is absent. However, blood is kept in constant circulation by the pulsation of some blood vessels. Blood is red-coloured due to the presence of *haemoglobin* in the blood plasma.
- *Circum-enteric nerve ring and segmentally ganglionated ventral nerve cords:* The nervous system of annelids consists of a circum-pharyngeal nerve ring or nerve collar and a pair of fused and segmentally ganglionated nerve cords. The nerve ring is formed of a pair of fused *supra-pharyngeal ganglia* or brain, a pair of fused *sub pharyngeal ganglia*, and a pair of circum-pharyngeal connectives between the two ganglionic masses





# Salient Features

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- *Indirect development involves trochophore larva.* Reproduction is sexual in most cases, and asexual in some. Asexual reproduction takes place by *fragmentation, budding, paratomy, stolonization, etc.* Paratomy and stolonization are variants of transverse division, similar to the strobilization of scyphozoa. Sexual forms are gonochoric or hermaphroditic, as the case may be. Development is indirect in the former, and direct in the latter. Indirect development involves a characteristic ciliated and free-swimming pelagic larva, called *trochophore*

# CLASSIFICATION OF ANNELIDA

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- Phylum Annelida is conventionally divided into three classes, namely *Polychaeta*, *Oligochaeta* and *Hirudinae* or *Hirudinomorpha*.



# Class Polychaeta

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- Polychaeta is a diverse group of mostly marine annelids, popularly known as “bristleworms”.
- Body segments are numerous and closely similar.
- In most forms, each segment bears a pair of paddle-like, flat, fleshy appendages, called *parapodia*. Parapodia are provided with bundles of setae.
- Several segments are provided with cirri, gills, etc.

# Class Polychaeta

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- An unspecialized head region may be present, provided with well developed some organs, such as eyes, sensory tentacles, sensory palps and nuchal organs
- Clitellum is altogether absent.
- Reproduction is sexual in most forms, but by asexual budding in others.
- Sexes are separate, fertilization is external, and development is indirect with characteristic larva called *trochophore*.

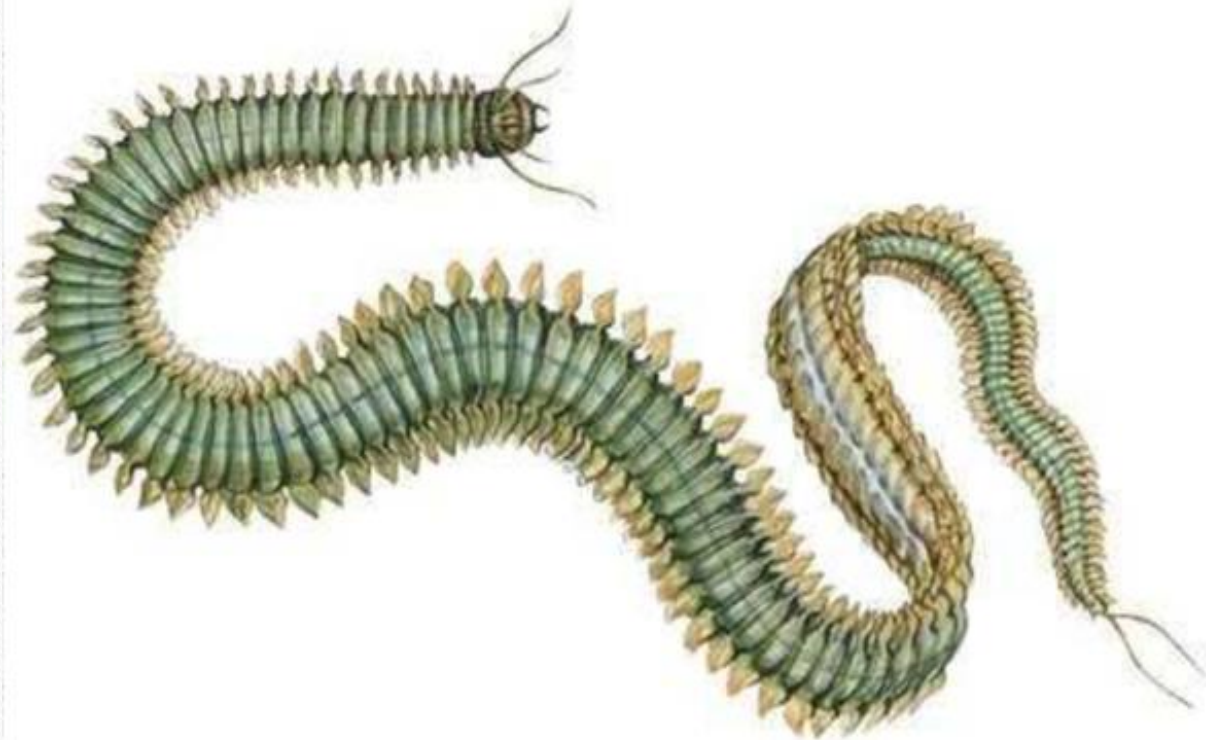


# Class Polychaeta

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- Around 8,000 species of polychaetes have been discovered.
- Most of them are marine but a few are fresh-water forms.
- Many are burrowing, some are tubicolous (tube dwelling), some others are crawling and a few are ectocommensals or ectoparasites. The group includes tubeworms, clamworms, sandworms, sea mice, etc.
- *Examples : Nereis (= Neanthes), Eunice, Polynoe, Glycera, Syllis, Tomopteris. Chaetopterus, Arenicola, Aphrodite, Sabella, Serpula, Spirorbis, Polygordius.*

## ***Nereis* or *Neanthes* (Clamworm)**





# Class Oligochaeta

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- Oligochaeta is a group of *clitellate annelids*, without head, parapodia, tentacles, cirri and palps. It includes earthworms and some marine and fresh-water species.
- Distinct head, parapodia, tentacles, cirri, palps and eyes are absent.
- Clitellum is usually present.
- Setae are unjointed, very few in number and are arranged in epidermal pits singly and not in bundles.

# Class Oligochaeta

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- Reproduction is sexual in most forms. But some species reproduce asexually by fission or fragmentation.
- Sexes are united in most species (monoeciousness or hermaphroditism). But copulation and cross fertilization is the rule.
- Sex organs are more or less permanent structures and are very few in number, usually not more than four pairs.
- Development is direct without a larval stage, and it occurs within a cocoon, secreted by the clitellum.



# Class Oligochaeta

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- All about 3,500 odd species of oligochaetes have been recognized.
- Most burrowing terrestrial forms.
- But, some are fresh-water species and a few forms, living buried in the intertidal zone of sandy sea shores.
- (a) *Terrestrial forms (earthworms): Lumbricus, Lumbriculus, Megascolex, Microscolex, Pheretima.*
- (b) *Aquatic forms: Tubifex, Dero, Chaetogaster, Slavina.*

# *Megascolex*

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# Class Hirudinomorpha (Hirudinea or Discophora)

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- Hirudinomorpha is a group of highly specialized, mostly blood-feeding, ectoparasitic annelids, popularly known as leeches.
- Body segments are fixed in number, and specific for each species.
- An imperfect and indistinct head with ocelli is present.
- Tentacles, parapodia and setae are altogether absent.
- Anterior and posterior suckers present.

# Class Hirudinomorpha

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- Mouth is ventral in the centre of the anterior sucker, and anus is dorsal and above the posterior sucker.
- Peri-visceral cavity is filled with a characteristic tissue, called *botryoidal tissue*.
- In adults, coelom is highly reduced, and is represented by certain fluid-filled spaces
- Haemocoelic system is well developed.
- Alimentary canal has a distensible region, called *crop*. It has paired lateral pouches. called *caeca or diverticula*, for storing blood.



# Class Hirudinomorpha

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- Sexes are united (hermaphroditism), fertilization is internal, and development is direct without a larval stage and it occurs in cocoons.
- Nearly 3,500 species of leeches have already been identified.
- Most of them are fresh-water forms, but some are marine and a few are terrestrial.
- *Examples: Glossiphonia, Hirudo, Hirudinaria, Haemadisa, Ozobranthus, Branchellion, Pontobdella, Pterobdella, Acanthoddella.*

# *Hirudinaria*

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THANK YOU!

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