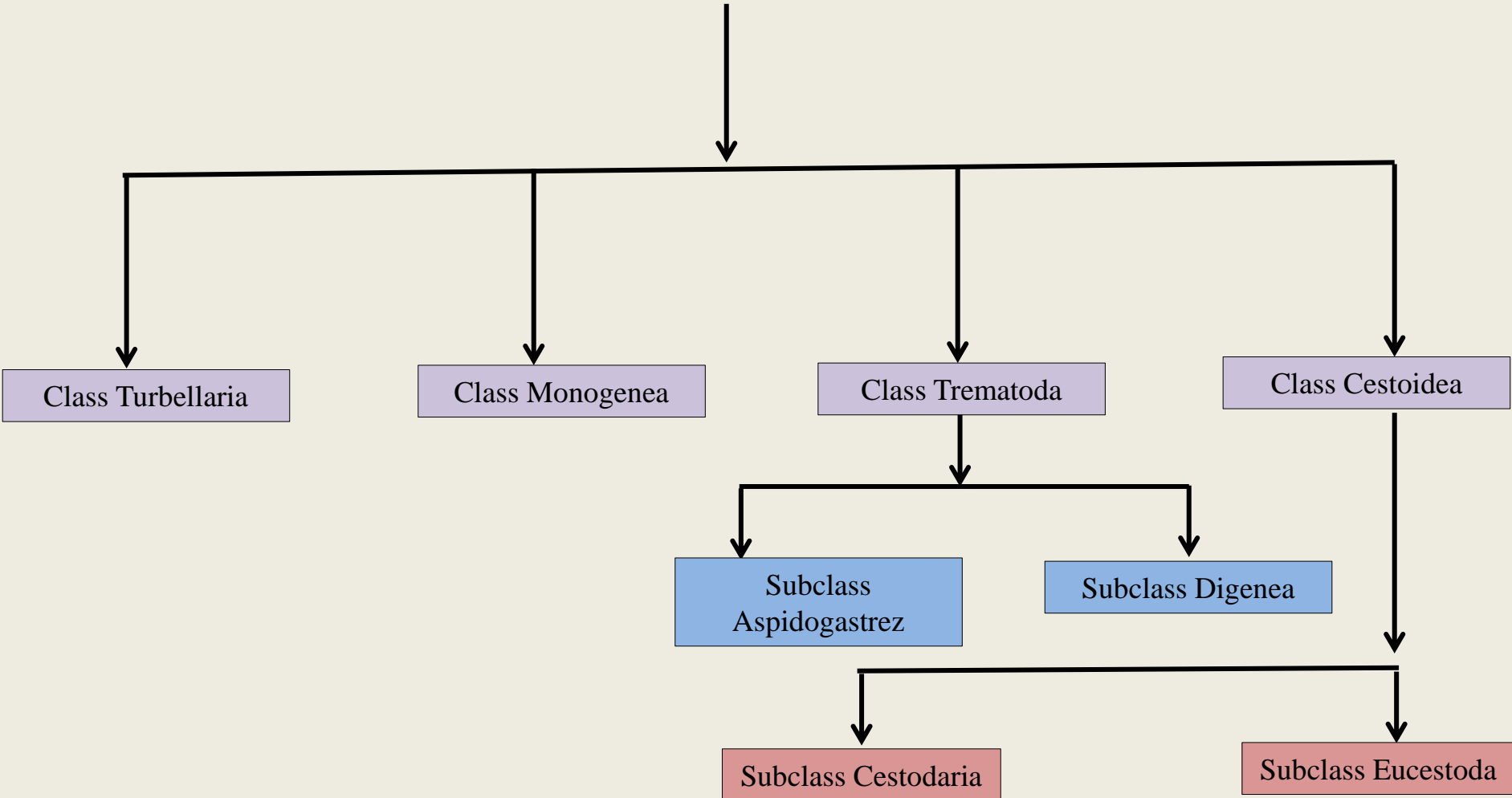


CLASSIFICATION OF PLATYHELMINTHES



Locomotion

- ✓ Turbellarians are primarily bottom dwellers.
- ✓ They move using cilia and muscular undulations.
- ✓ A sheet of mucus aids in adhesion and helps the cilia gain traction.
- ✓ The densely ciliated ventral surface and the flattened body enhance the effectiveness of locomotion.

Digestion and Nutrition

- ✓ From an evolutionary perspective, highly branched digestive systems are an advancement that results in more gastrodermis closer to the sites of digestion and absorption, reducing the distance nutrients must diffuse

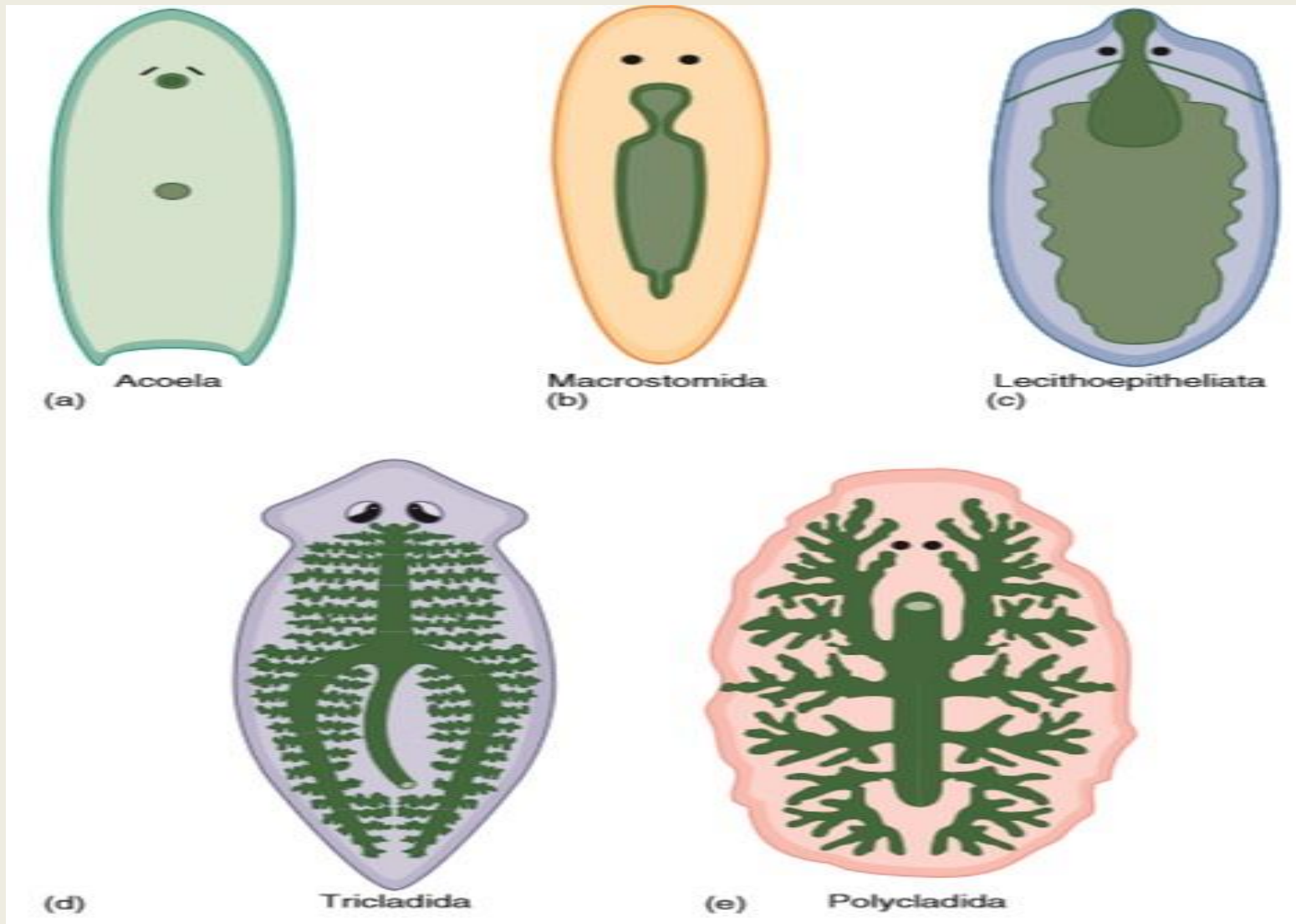


Fig: Digestive Systems in Some Orders of Turbellarians. (a) No pharynx and digestive cavity. (b) A simple pharynx and straight digestive cavity. (c) A simple pharynx and unbranched digestive cavity. (d) A branched digestive cavity. (e) An extensively branched digestive cavity in which the branches reach almost all parts of the body.

Digestion and Nutrition

- ✓ **Pharynx functions as an ingestive organ.**
- ✓ **It varies in structure from a simple, ciliated tube to a complex organ developed from the folding of muscle layers.**
- ✓ **Sensory cells (chemoreceptors) on their heads help them detect food from a considerable distance.**
- ✓ **Food digestion is partially extracellular.**
- ✓ **Pharyngeal glands help break down food into smaller units.**
- ✓ **In the digestive cavity, phagocytic cells engulf small units of food, and digestion is completed in intracellular vesicles.**

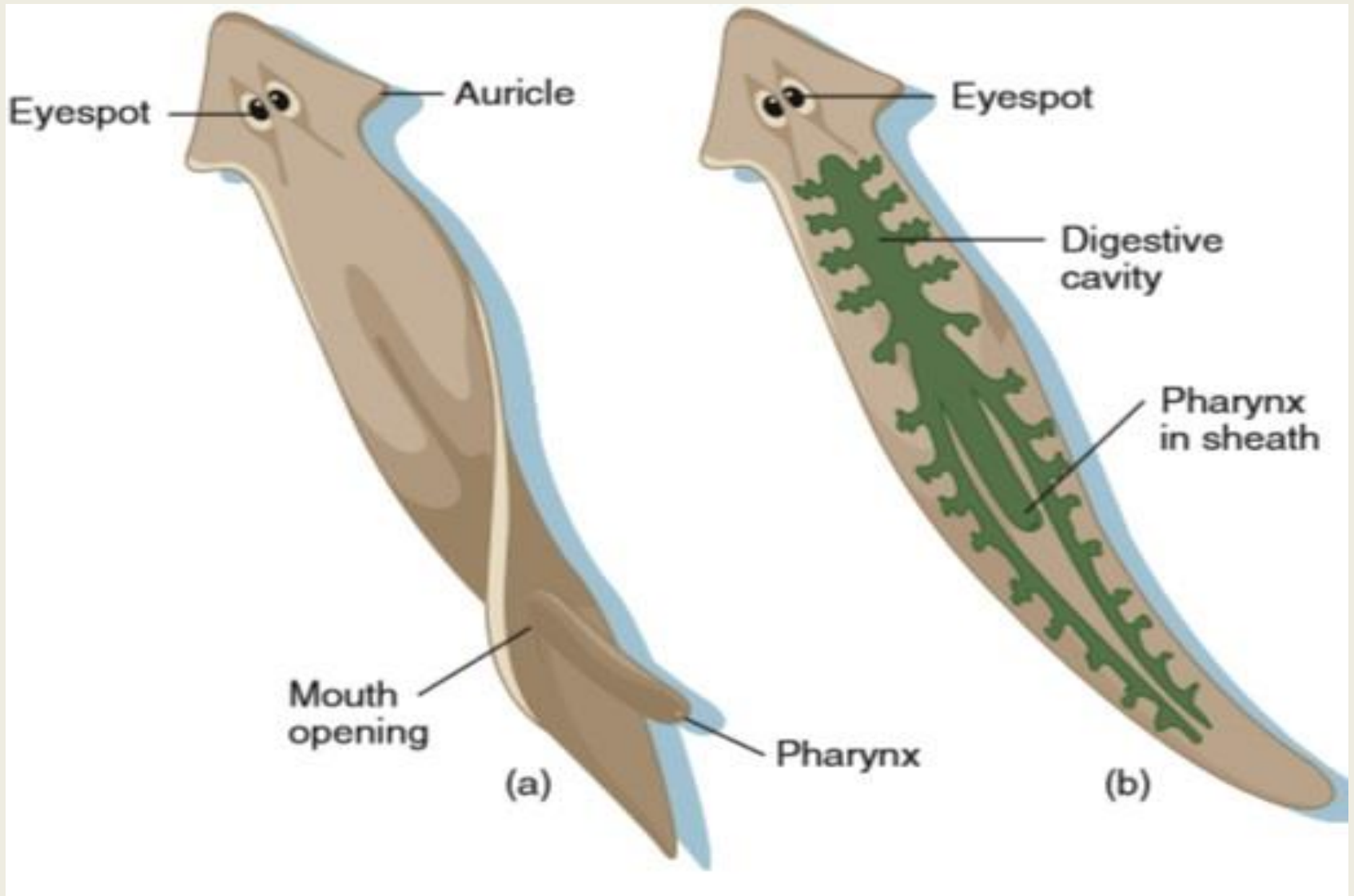


Fig: The Turbellarian Pharynx. A planarian turbellarian with its pharynx (a) extended in the feeding position and (b) retracted within the pharyngeal sheath.

Exchanges with the Environment

- ✓ Respiratory gases (CO₂ and O₂) are exchanged by diffusion.
- ✓ Most metabolic wastes (e.g., ammonia) are also removed by diffusion.
- ✓ The evolution of osmoregulatory structures in the form of protonephridia enabled turbellarians to invade freshwater.

Protonephridia

- ✓ Networks of fine tubules that run the length of the turbellarian, along each of its sides.
- ✓ Numerous, fine side branches of the tubules originate in the parenchyma as tiny enlargements called **flame cells**.
- ✓ Flame cells have numerous cilia that project into the lumen of the tubule.

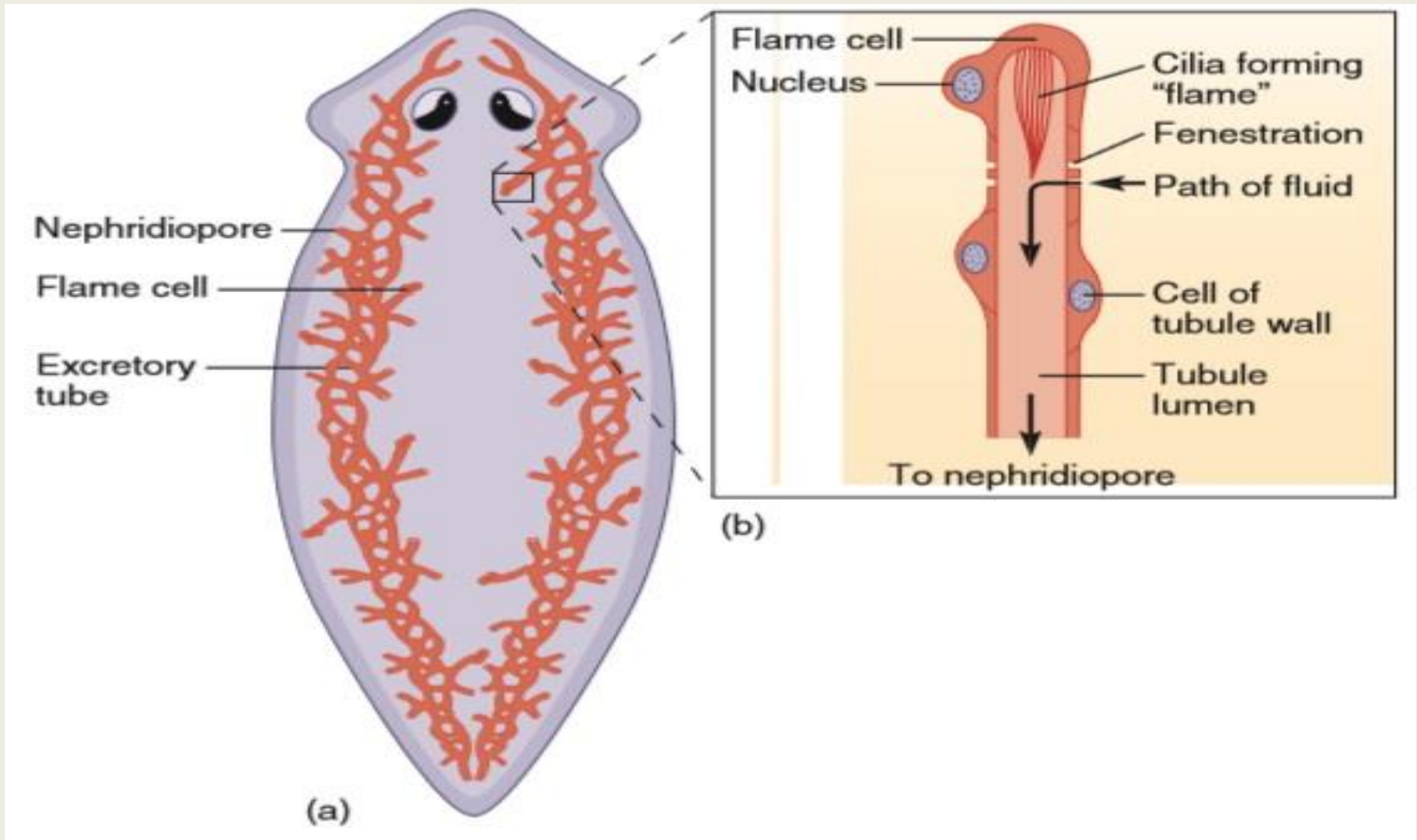


Fig: Protonephridial System in a Turbellarian. (a) The protonephridial system lies in the parenchyma and consists of a network of fine tubules that run the length of the animal on each side and open to the surface by minute nephridiopores. (b) Numerous, fine side branches from the tubules originate in the parenchyma in enlargements called flame cells. Small black arrows indicate the direction of fluid movement

Function of flam cell

➤ Slitlike fenestrations (openings) perforate the tubule wall surrounding the flame cell.



➤ The beating of the cilia drives fluid down the tubule, creating a negative pressure in the tubule.



➤ As a result, fluid from the surrounding tissue is sucked through the fenestrations into the tubule.



➤ The tubules eventually merge and open to the outside of the body wall through a minute opening called a **nephridiopore**

Nervous System and Sense Organs

- ✓ The most primitive type of flatworm nervous system, found in the order Acoela.
- ✓ A **statocyst** in the anterior end functions as a mechanoreceptor.
- ✓ Nervous system of most other turbellarians consists of a subepidermal nerve net and several pairs of long nerve cords.
- ✓ Lateral branches called **commissures** connect the nerve cords.
- ✓ Neurons are organized into **sensory**, **motor**, and **association** types
- ✓ Anteriorly, the nervous tissue concentrates into a pair of cerebral ganglia called a **primitive brain**.

Nervous System and Sense Organs

- ✓ Many tactile and sensory cells distributed over the body detect touch, water currents, and chemicals.
- ✓ **Auricles** may project from the side of the head.
- ✓ Chemoreceptors are especially dense in auricles.
- ✓ Most turbellarians have two simple eyespots called **ocelli**.
- ✓ Negatively phototactic
- ✓ Each ocellus consists of a cuplike depression lined with black pigment.
- ✓ Photoreceptor nerve endings in the cup are part of the neurons that leave the eye and connect with a cerebral ganglion.

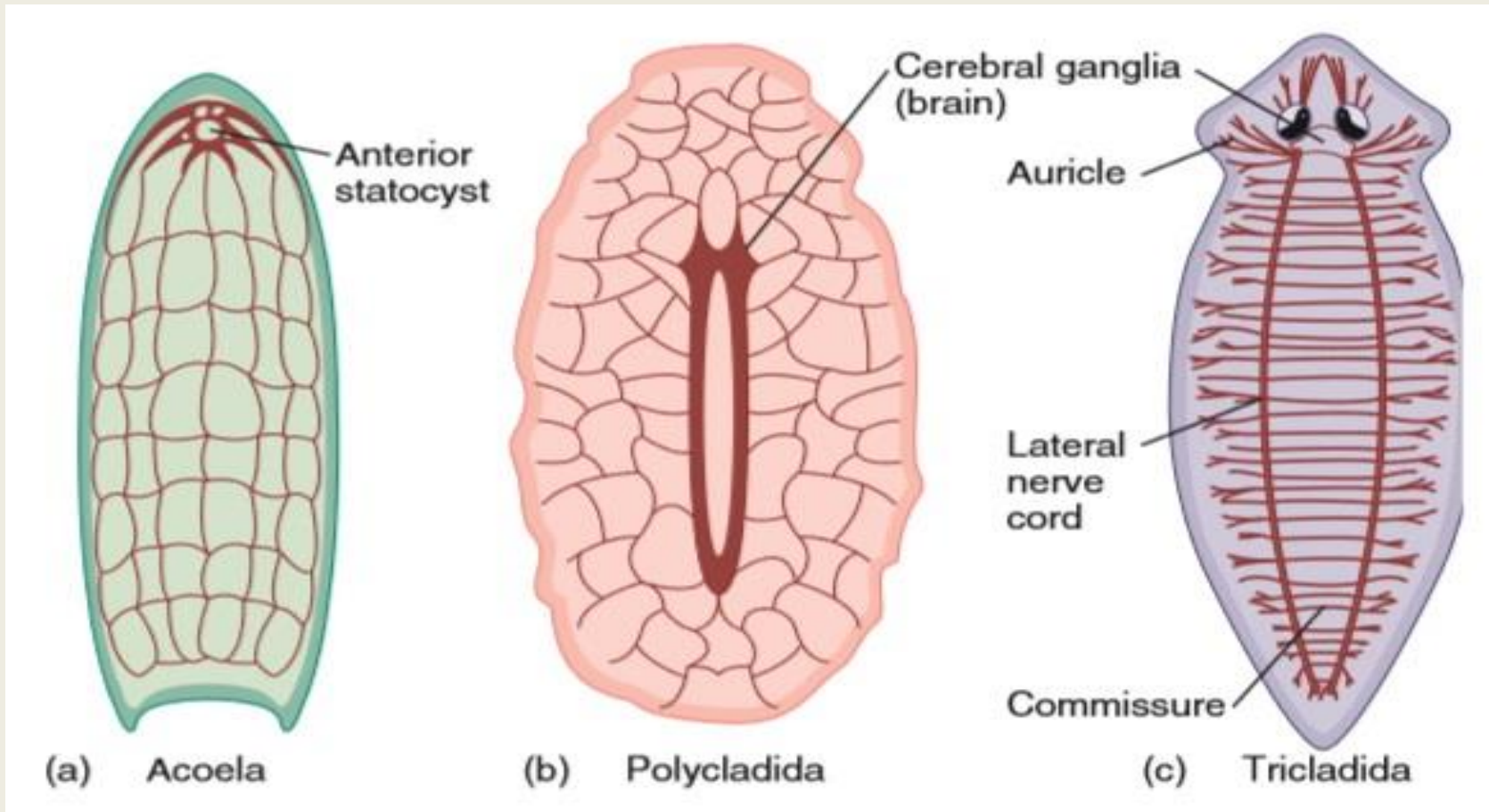


Fig: Nervous Systems in Three Orders of Turbellaria. (a) Convoluta has a nerve net with a statocyst. (b) The nerve net in a turbellarian in the order Polycladida has cerebral ganglia and two lateral nerve cords. (c) The cerebral ganglia and nerve cords in the planarian, *Dugesia*.

Reproduction and Development

- ✓ Many reproduce asexually by transverse fission.
- ✓ The two (or more) animals that result from fission are called zoids.
- ✓ monoecious
- ✓ reproductive systems arise from the mesodermal tissues in the parenchyma.
- ✓ Numerous paired testes lie along each side of the worm.
- ✓ Sperm ducts (vas deferens) lead to a seminal vesicle and a protrusible penis.
- ✓ The female system has one to many pairs of ovaries.
- ✓ Oviducts lead from the ovaries to the genital chamber, which opens to the outside through the genital pore.

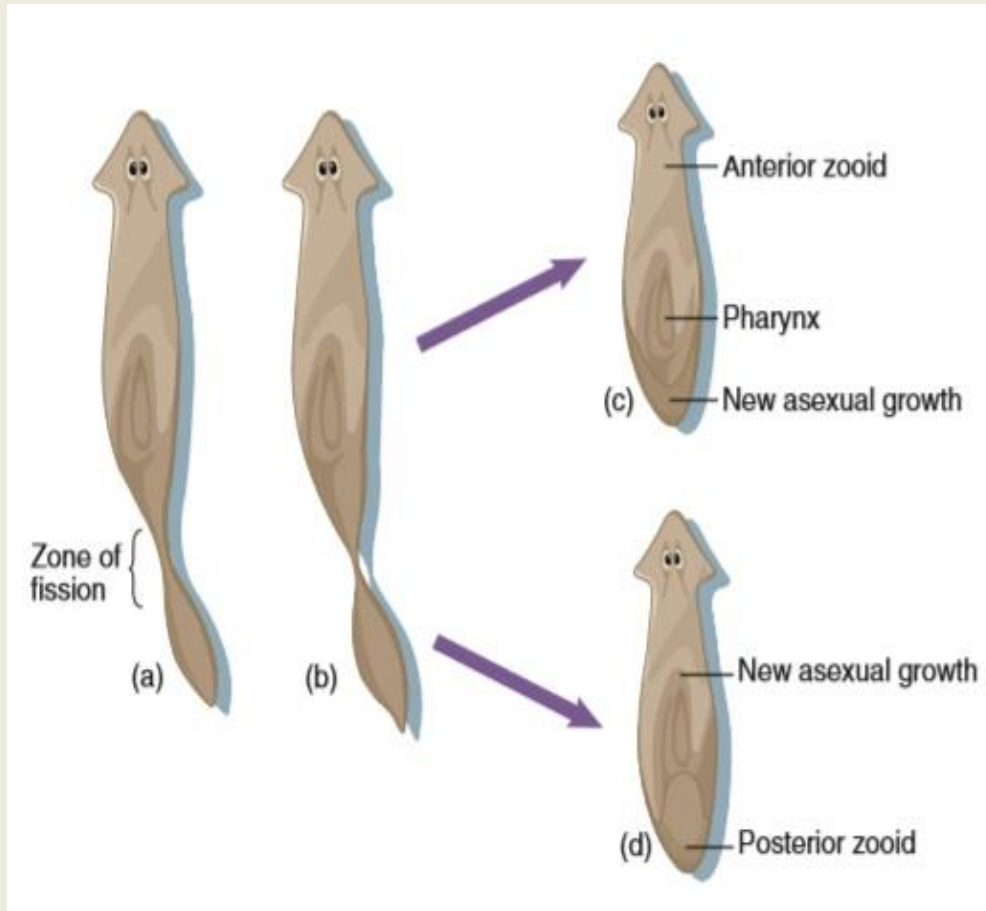


Fig: Asexual Reproduction in a Turbellarian. (a) Just before division and (b) just after. The posterior zoid soon develops a head, pharynx, and other structures. (c,d) Later development.

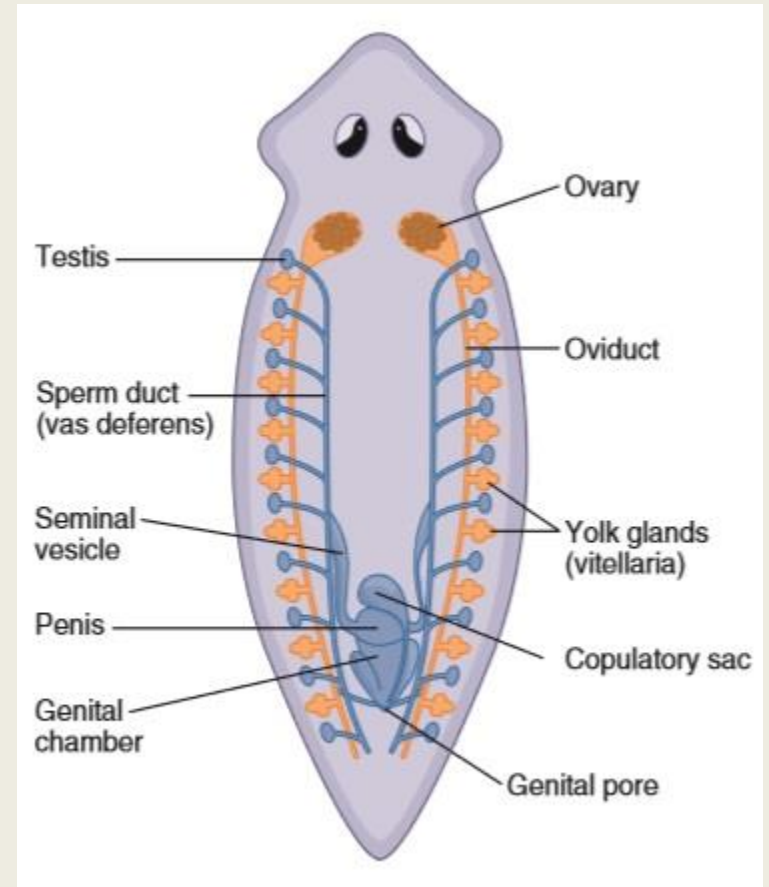


Fig: Triclad Turbellarian Reproductive System. Note that this single individual has both male and female reproductive organs.

Reproduction and Development

- ✓ **cross-fertilization** ensures greater genetic diversity than does self-fertilization.
- ✓ A hard capsule called a **cocoon** encloses many turbellarian eggs.
- ✓ Two kinds of capsules are laid. **Summer capsules** and **Autumn capsules**.
- ✓ A few turbellarians have a free-swimming stage called a **Müller's larva**.
- ✓ It has ciliated extensions for feeding and locomotion and eventually settles to the substrate and develops into a young turbellarian.