ANIMAL DIVERSITY & WILDLIFE CONSERVATION

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

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PHYLUM PLATYHELMINTHES

INTRODUCTION

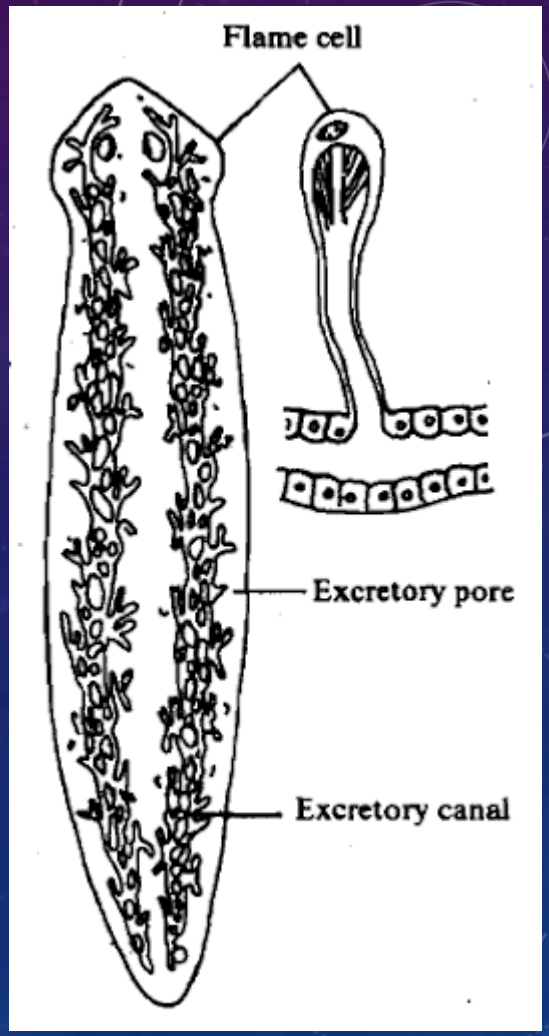
- Platyhelminthes comprises of the animals, commonly called flatworms.
- They triploblastic, bilaterally symmetrical, dorso-ventrally flattened and unsegmented acoelomates, with protonephridial excretory system and a mesenchymatous tissue that fills the interior.

DIAGNOSTIC FEATURES

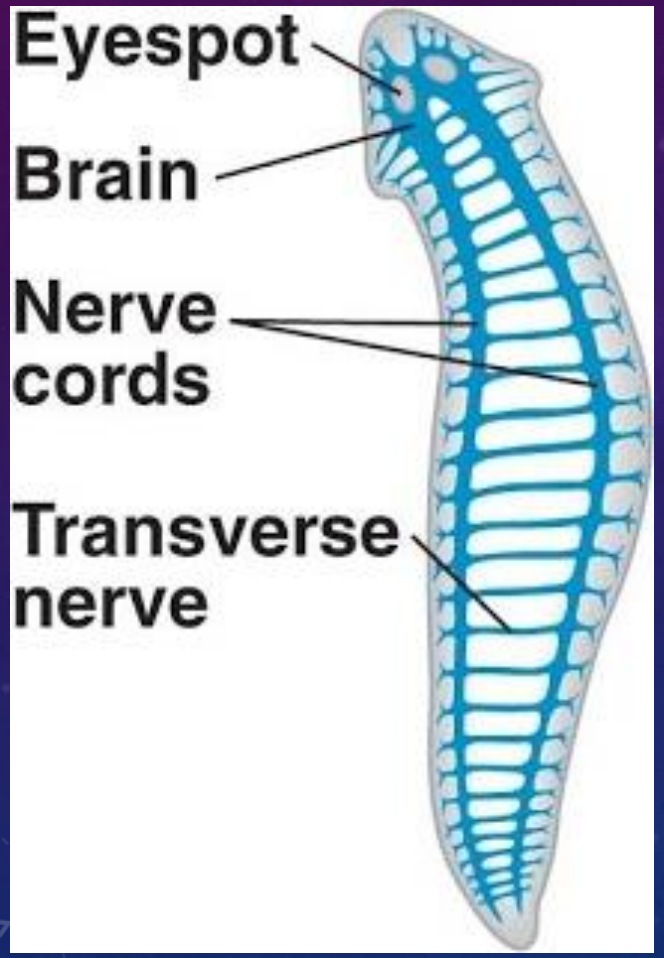
- Soft, flat, bilaterally symmetrical and unsegmented body : The body of flatworms is flat and unsegmented (segmented in some tapeworms), with definite dorsal and ventral surfaces, anterior and posterior ends, and right and left halves
- Triploblastic body : In flatworms, there are three basic cell layers, namely outer epidermis, middle mesodermis and inner endodermis. Epidermis is well developed. It may be soft and ciliated, or covered by tegument or cuticle.
- Presence of adhesive organs : Flatworms have spines, hooks, bothria and bothridia for attachment.

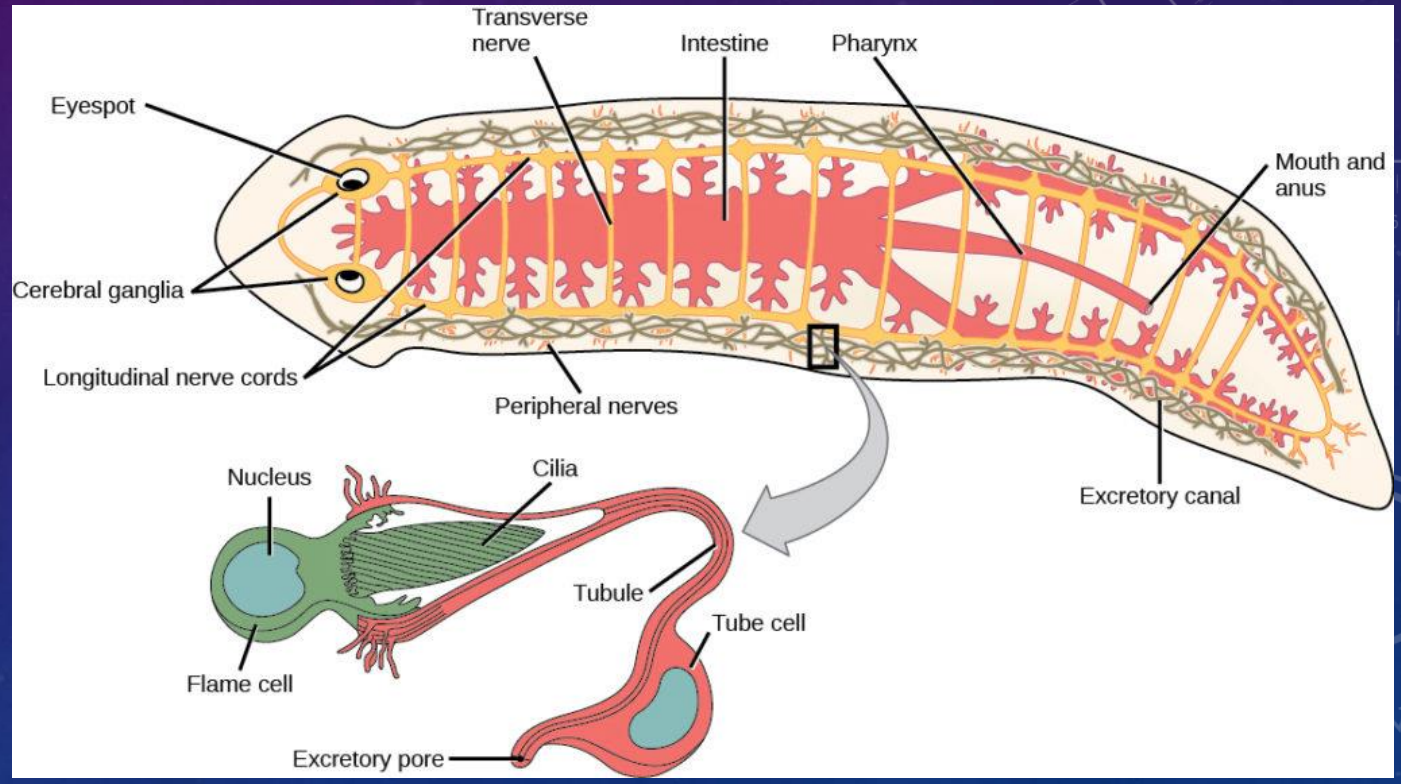
DIAGNOSTIC FEATURES

- Parenchyma fills the interior: Peri-visceral cavity is absent and the interior of the body is filled with a mesodermal tissue, known as parenchyma or mesenchyme.
- Branching alimentary canal without anus: Alimentary canal is usually branched. It opens out only by mouth; anus is absent.
- Protonephridia with flame cells: Excretory system consists of branching tubules, known as protonephridia (closed type of nephridia without internal openings). These are provided with certain characteristic excretory cells, known as flame cells.
- Ladder-like nervous system: Nervous system is ladder-like, with an unspecialized brain.



LADDER LIKE NERVOUS SYSTEM





Branching alimentary canal

DIAGNOSTIC FEATURES

- Complex reproductive system : Reproductive organs are highly complex. In most forms, male and female sex organs are seen in the same individual (sexes united). This condition is known as hermaphroditism (monoeciousness or bisexuality). In others, male and female organs are seen in separate individuals (sexes separate). This condition is known as gonochorism (dioeciousness or unisexuality).
- Internal fertilization : Fertilization takes place inside the body. In some cases, development is indirect, with one or more larval stages.
- Absence of locomotor, circulatory and respiratory organs.

CLASSIFICATION

- Many flatworms are parasites. But, some are free-living in fresh water, salt water, moist soil, etc.
- Flatworms are highly diverse in their mode of life, functional biology and evolutionary status.
- They exhibit high degree of evolutionary transition from free-living to marvelously adapted parasitic forms.
- The group is represented by more than 20,000 species, which include the free-living flatworms and the parasitic flukes and tapeworms.

CLASSIFICATION

- Phylum platyhelminthes is divided into three classes
  - Turbellaria
  - Trematoda
  - Cestoda

CLASS TURBELLARIA

- Turbellaria is a group of mostly free-living flatworms (temnocephalids are exclusively commensals or parasites), inhabiting terrestrial, fresh-water and marine habitats.
- Most of them are large and visible to the naked eye.

CLASS TURBELLARIA - SALIENT FEATURES

- Unsegmented body, without cuticular covering.
- Single-layered and ciliated epidermis and rod-shaped sub-epidermal bodies, called rhabdites or rhabdoids.
- Adhesive structures include glandular and glandulo-muscular cells.
- Complex musculature, consisting of girdle-like outer circular and inner longitudinal muscles. In some species, diagonal muscles are also present
- Blindly ending digestive tract, which is lumenless in some (e.g., Acoela), saccular in some others (e.g., Rhabdocoela), trifid with lateral branches in still others (e.g., Tricladida), and highly branched in yet others (e.g., Polycladida)

CLASS TURBELLARIA - SALIENT FEATURES

- Excretory and osmoregulatory organs are protonephridia with flame cells.
- Simple nervous system with an unspecialized brain and two or more longitudinal nerve cords.
- Sense organs include photoreceptors, tangoreceptors, chemoreceptors and mechanoreceptors.
- Reproduction is asexual as well as sexual. Asexual reproduction is by fission, fragmentation, or budding and it is associated with high regenerative powers. Sexual individuals are mostly hermaphrodites.
- Development, in general, is direct. But, in some polyclads it is indirect with uniformly ciliated, planktotrophic (plankton-feeding) larvae, such as four-armed Goette's larvae and eight-armed Muller's larvae.
- Turbellaria comprises more than 3000 species.
- Examples are Convoluta, Dugesia, Microstomum, Votoplana, Bipalium, Thysanozoon, Temnocephala.

DUGESIA

BIPALIUM

CLASS TREMATODA (DIGENOIDEA)

- Trematoda is a group of parasitic flatworms, commonly called flukes.
- Flat, leaf-like and unsegmented adult body, without ciliary covering.
- Body is covered by a non-cellular living layer, called tegument, which is a dense mass of cytoplasm.
- Adhesive organs include oral and ventral suckers and, in some cases, hooks also.
- Epidermis does not exist as a discrete cellular layer in the adult.
- Blindly ending alimentary canal, with bifid and branched intestine.
- Excretory and osmoregulatory organs are protonephridia with flame cells.
- Reproduction is exclusively sexual. Most members are hermaphrodites.

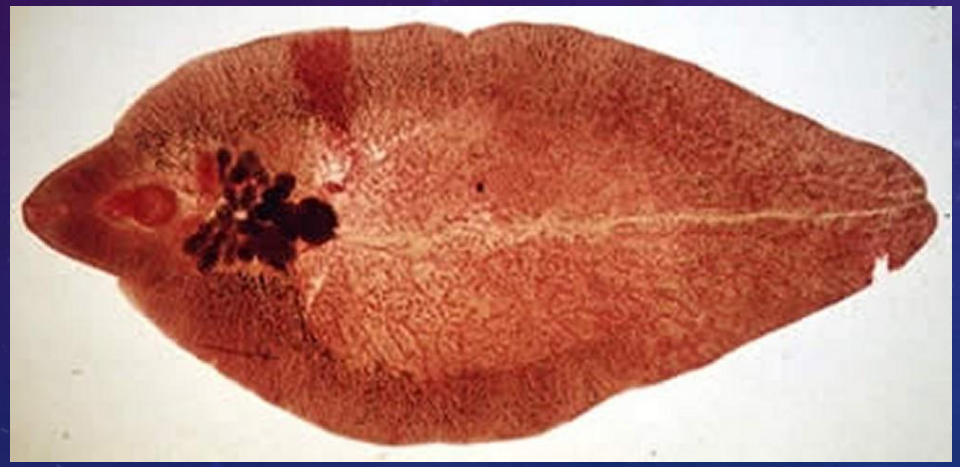
CLASS TREMATODA (DIGENOIDEA)

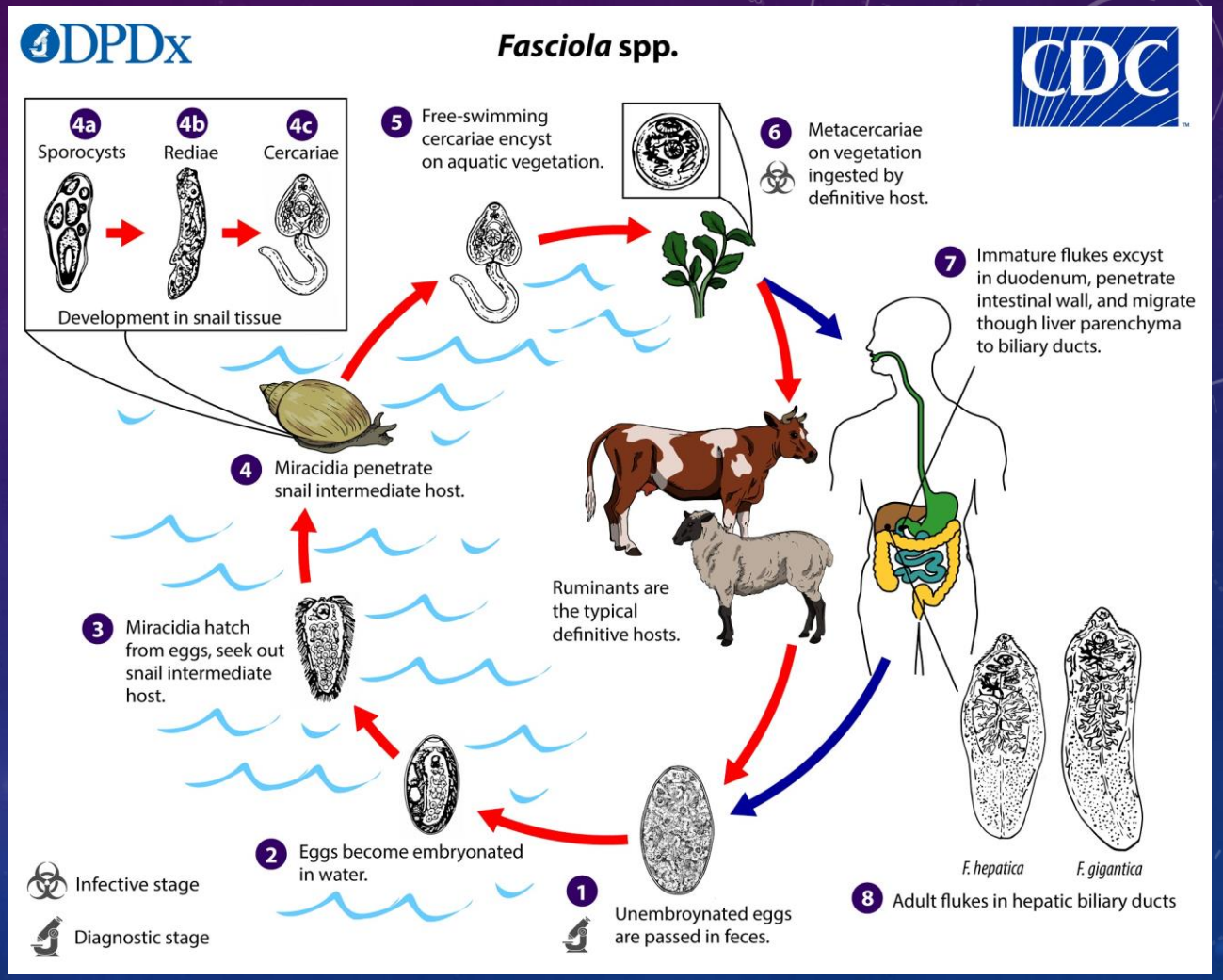
- Highly organized reproductive system with a common genital atrium and a common gonopore.
- Male system consists of two or more testes and their ducts and an eversible cirrus or penis. Female system consists of an ovary (germarium), numerous vitelline glands (vitellaria) and several shell glands or Mehlis' glands.
- Life cycle is simple or complex. Complex life cycle involves several larval stages and one or more intermediate hosts.

CLASS TREMATODA (DIGENOIDEA)

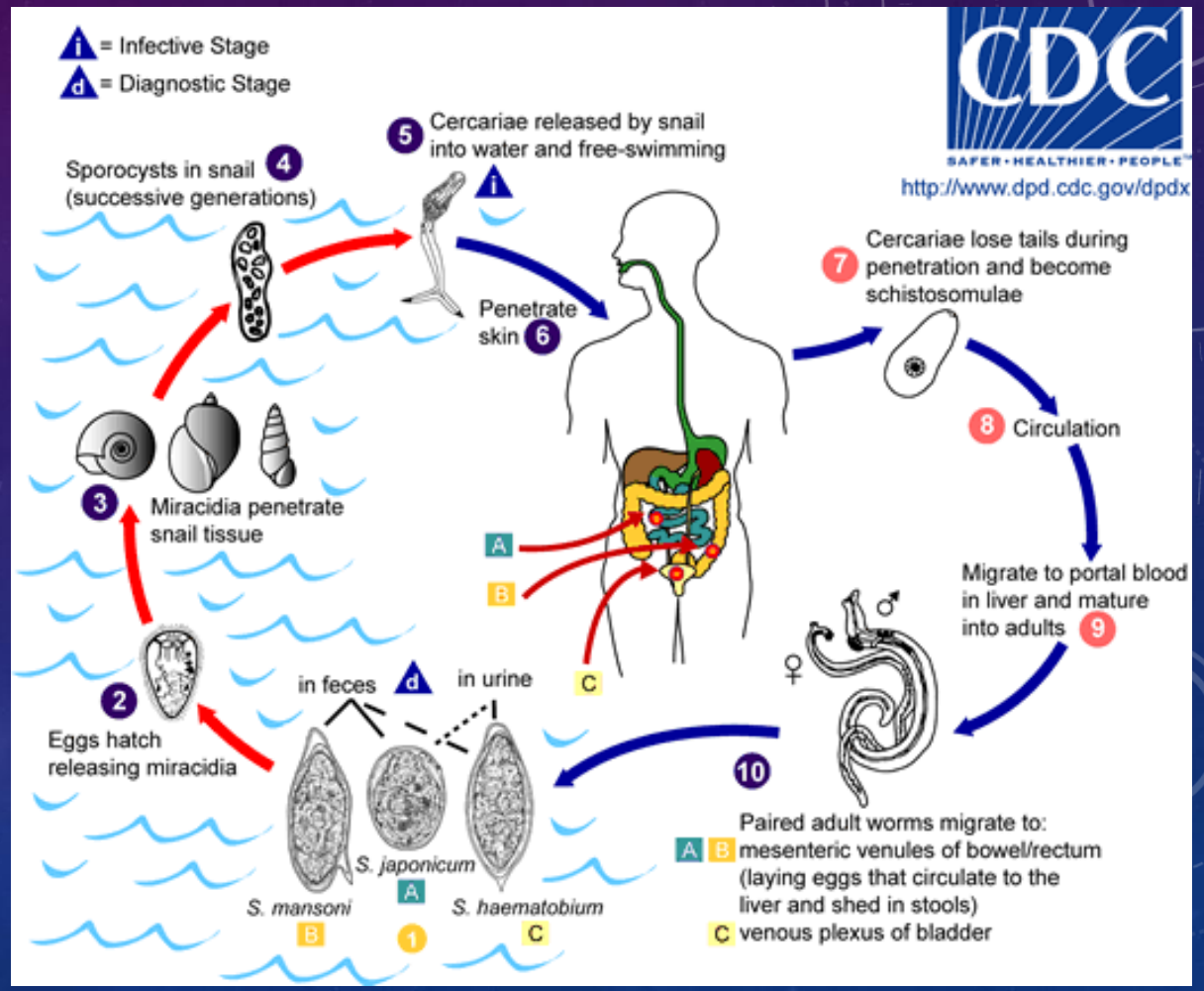
- Nearly 12,000 species of trematods have been recognized.
- They belong to two groups, namely Monogenea and Digenea.
- The former includes mostly the ectoparasites of vertebrates, where as the latter comprises mostly the endoparasites of vertebrates and invertebrates.
- Diplocoon, Polystoma, Polystomoidella, Benedenia, Dactylogyrus, Gyrodactylus, etc. are monogeneans.
- Fasciola, Schistosoma, Opisthochorchis, Gigantocotyle (formerly called Paramphistomum), etc. are digeneans.

FASCIOLA HEPATICA





SCHISTOSOMA HAEMATOBIUM



CLASS CESTODA

- Cestoda is a group of endoparasitic flatworms, commonly called the tapeworms. They are intestinal parasites in vertebrates.
- Cestodes are the most highly evolved of all flatworms and they have extreme Adaptations for a parasitic mode of life.
- In most cases, adult body is flat, segmented and ribbon-like or tape-like, and composed of a few to many segments, called proglottides.
- Body is divisible into three regions, namely scolex, neck, and strobila. Scolex is unsegmented "head" region, specialized for attachment. Strobila is the segmented body proper. Neck is the narrow region in between scolex and strobila. Body segments are constantly budded out from it.

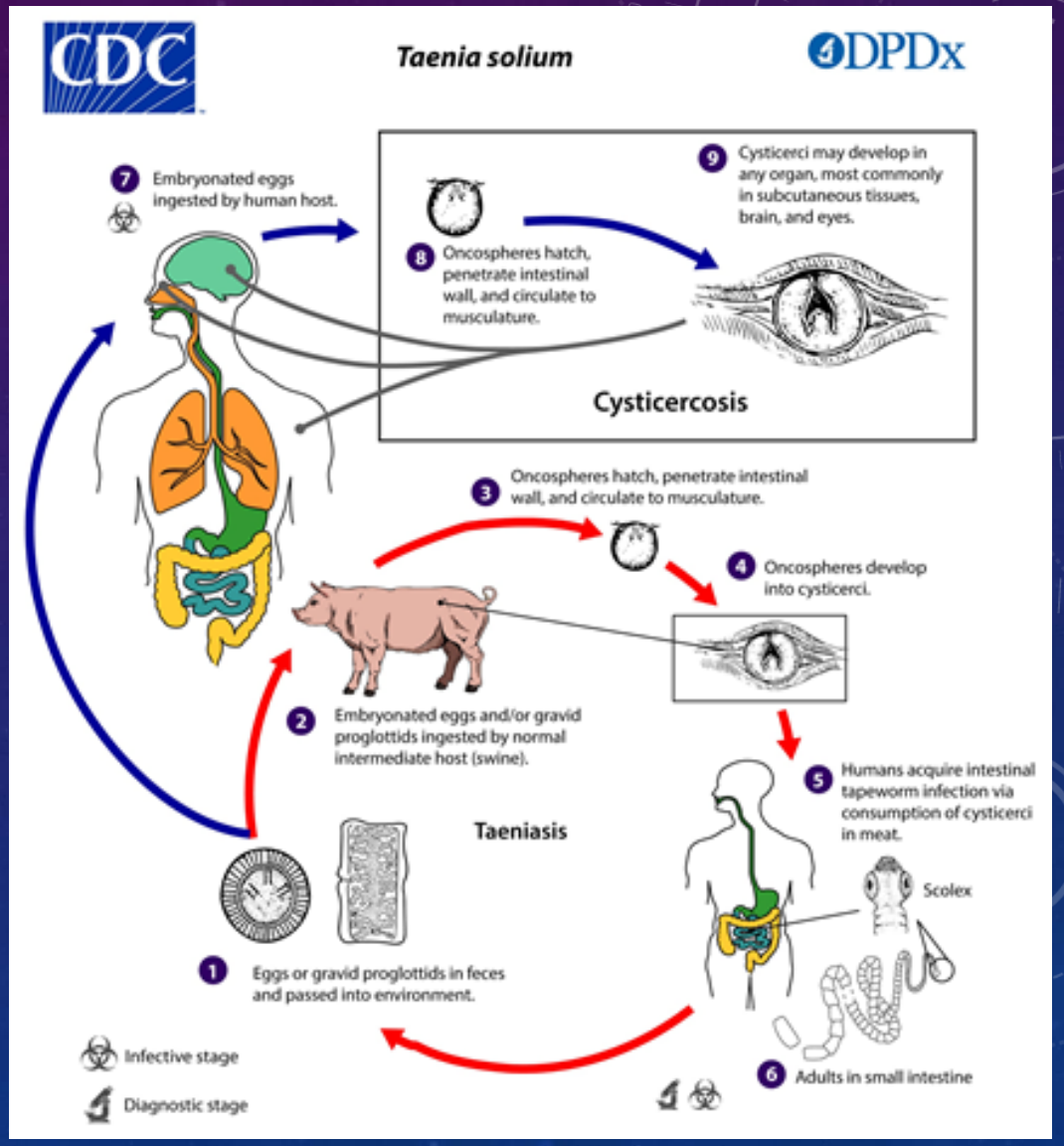
CLASS CESTODA

- Adhesive organs are of wide occurrence. They include hooks, suckers, bothria (sucking grooves), bothridia (cup-shaped muscular outgrowth), etc.
- Body is covered by a non-cellular protoplasmic layer, called tegument, which is very important in protection, absorption, gas exchange and excretion
- Absence of a discrete epidermal layer in the adult.
- Absence of locomotor, digestive, circulatory, respiratory and sensory organs as an adaptation to an endoparasitic mode of life.

CLASS CESTODA

- Excretory organs are protonephridia with flame cells.
- Reproduction is sexual. All cestodes are hermaphrodites. In segmented forms, each mature segment may contain a complete set of male and female organs.
- Life cycle is complex with a hooked embryo, a definitive vertebrate host and one or more intermediate invertebrate hosts.
- Cestoda comprises nearly 5000 species.
- Examples: Taenia, Echinococcus Echinobothrium, Diphyllobothrium (Dibothriocephalus), Gyrocotyle, Dipylidium Cotugnia, etc.

TAENIA SOLIUM



THANK YOU !