TOPIC: PLATYHELMINTHES:GENERAL CHARACTERISTICS

LECTURE NO:22
B.SC PART 1
ZOOLOGY(HONS.)-PAPER I-GROUP A
CHAPTER 7
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Objectives

Understanding the general characters of Platyhelminthes and classification up to the order level.

Study of *Taenia solium* with references to structure, reproduction and parasitic adaptations.

Introduction

The phylum Platyhelminthes was coined by Gegenbaur in 1859. It includes the simplest animals that are bilaterally symmetrical and triploblastic (composed of three fundamental cell layers). These are also known as the flatworms. Flatworms have no body cavity other than the gut and lack an anus; the same pharyngeal opening both takes in food and expels waste. Because of the lack of any other body cavity, in larger flatworms the gut is often very highly branched in order to transport food to all parts of the body. The lack of a cavity also constrains flatworms to be flat; they must respire by diffusion, and no cell can be too far from the outside, making a flattened shape necessary.

Flatworms are once divided into three groups. The free-living Turbellaria include the *planarian dugesia*, shown above; these are found in the oceans, in fresh water, and in moist terrestrial habitats, and a few are parasitic. The **Trematoda**, or flukes, are all parasitic, and have complex life cycles specialized for parasitism in animal tissues. Members of one major taxon of flukes, the Digenea -- which includes the human lung fluke which pass through a number of juvenile stages that are parasitic in one, two, or more **intermediate hosts** before reaching adulthood, at which time they parasitize a **definitive host**. The **Cestoda**, or tapeworms, are intestinal parasites in vertebrates, and they also show anatomical and life history modifications for parasitism. Platyhelminths have practically no fossil record. A few trace fossils have been reported (Alessandrello et al., 1988), and fossil trematode eggs have been found in Egyptian mummies and in the dried dung of Pleistocene ground sloth.

General Characters of Platyhelminthes

Bilaterally symmetrical with definite polarity of anterior (head) and posterior (tail) ends

Triploblastic, i.e., body derived from three embryonic germ layers; ectoderm, mesoderm and endoderm.

Dorso – ventrally flattened.

Usually with a well- defined ventral surface bearing mouth and gonophores.

Free- living commensal or parasitic forms.

Tissue- organ grade of organization, i.e., body cells aggregate into definite tissues and tissues make up organs.

Body unsegmented (except in class Cestoda).

Acoelomate, i.e., without any body cavity or true coelom.

Spaces between various organs filled with special mesodermal tissue, the mesenchyme or parenchyma.

Adhesive structures like hooks, spines and suckers, and adhesive secretions common in parasitic forms.

Epidemis cellular or syncytial, frequently ciliated. Absent in some.

Muscular system of mesodermal origin.

Longitudinal, circular and oblique muscle layers beneath epidermis.

Digestive system branched and incomplete without anus.

Altogether absent in Acoela and Cestoda.

Skeletal, respiratory and circulatory system are wanting.

Excretory system includes lateral canals and proto-nephridial (flame cells). Absent in some primitive form.

Nervous system primitive, ladder- like. Comprises a pair of anterior ganglia with longitudinal nerve cords connected by transverse nerves.

Sense organs simple. Eye- spots or photo receptors in free living forms.

Mostly monoecious (hermaphrodite) with complex reproductive system.

Well- developed gonads, gonoducts and accessory organs.

Eggs mostly devoid of yolk.

Yolk produced separately in yolk or vitelline glands.

Fertilization internal may be cross or self.

Development direct or indirect.

Usually indirect in endoparasites with a complicated life cycle involving many larvae and hosts.

Classification of Platyhelminthes

Class - Turbellaria (Gr., *Turbella*- a little stirring) - The class Turbellaria includes free-living freshwater planarians (E.g. Dugesia)**.**

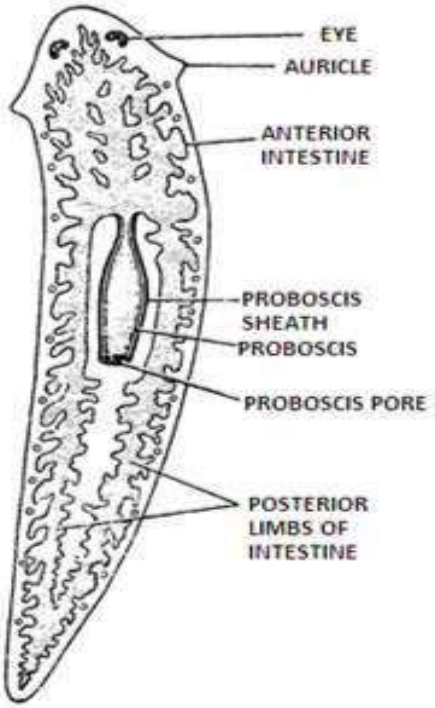

Fig.1 Dugesia

Same marine forms and a few parasite forms, whose beautiful colors serve as a warning of their toxicity to would-be predators, as well as the more drab freshwater planarians (Dugesia, Fig.-1). Some Turbellaria can swim by undulations of the body margins, but most of them glide gracefully over surfaces along a trail of mucus, pushed by **cilia** on their ventral surface.

Usually non – parasitic, free – living worms are called planarians.
Terrestrial marine or freshwater.

Body unsegmented, flattened and covered with ciliated cellular or syncytial epidermis, containing mucus secreting cells and rod-shaped bodies called rhabdites.

Mouth ventral. Intestine preceded by muscular pharynx.

5Suckers absent.

Tango, chemo and photoreceptors common in free- living Mostly hermaphroditic.

Some reproduce asexually, sexual and by regeneration.

Development usually direct.

Life cycle simple.

Class Turbellaria divided into two orders:

Order - Acoela

Minute, exclusively marine, less than 2mm.

Ventral mouth; no muscular pharynx and without intestine.

Flame cells, definite gonads, gonoducts and yolk gland wanting.

Mostly free- living, found under stones, algae or on bottom mud.

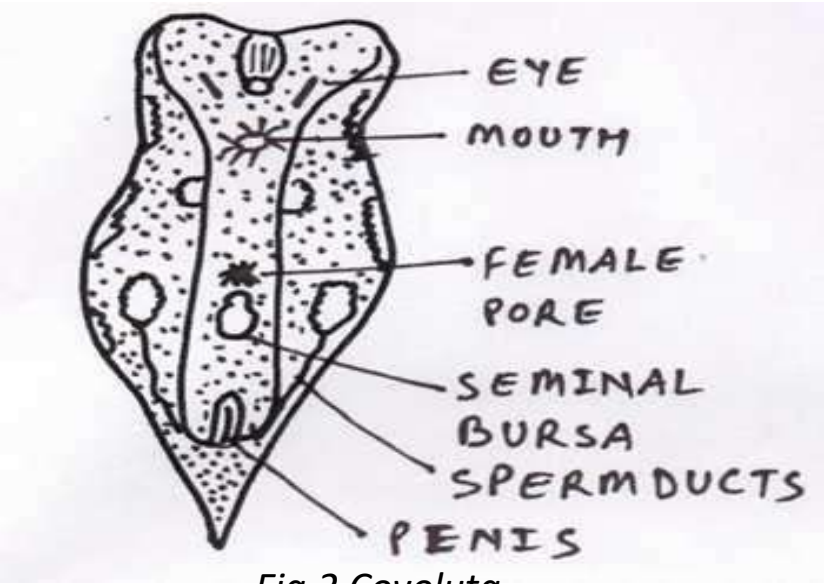

Fig.2 Covoluta

Some dwell in intestine of sea- urchins and sea-cucumbers.

Some coloured or brown by symbiotic algae.

Example: *Convoluta (Fig.2), Amphiscolops, Ectocotyle, Afronta.*