Animal Diversity and Ecology

(MZO501)

PART I

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Evolution

Evolution is the change in the characteristics of a species over several generations and relies on the process of natural selection. The **theory of evolution** is based on the idea that all species are related and gradually change over time.

Evolutionarily Significant Specimens: These are those specimens which are considered distinct and important for the purpose of conservation. This specimens can include any species, sub-species, population or geographic race.

Connecting Link

Connecting link is an organism having characteristics of two different group of organisms.

Example- Duck Billed Platypus.

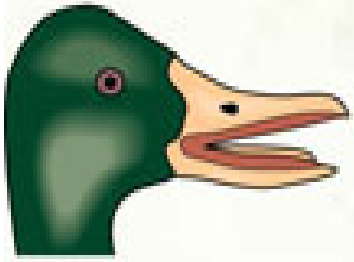
It is a connecting link between reptiles (lays hard shelled eggs with large amount of yolk) and mammals (has mammary glands to feed it's young ones).

Beak Diversity in Birds

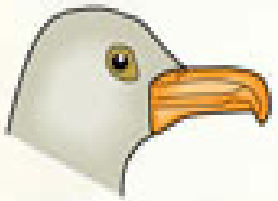
It has long been known that diversity of form and function in birds' specialized beaks is abundant. Not only can two very different beaks share the same developmental pathway (Darwin's finches) but two very different developmental pathways can produce exactly the same shaped beak.

This diversity is majorly controlled by different feeding habits but also controlled by genetics and developmental histories.

BIRD BEAKS

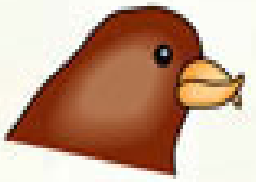


duck



gull

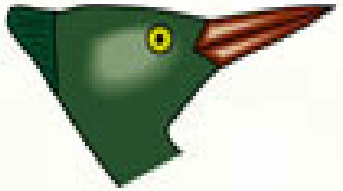
eagle



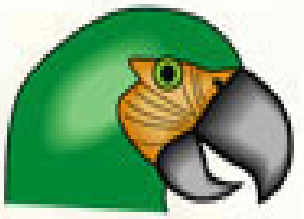
cross bill

night hawk

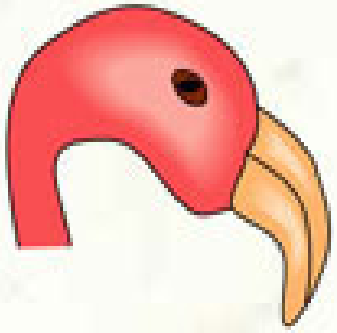
avocet



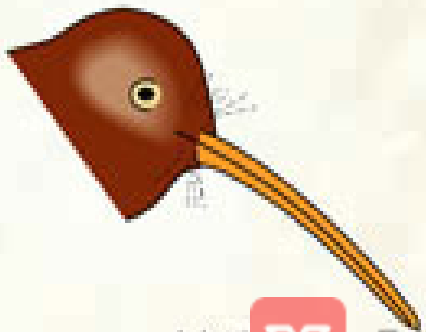
wood pecker



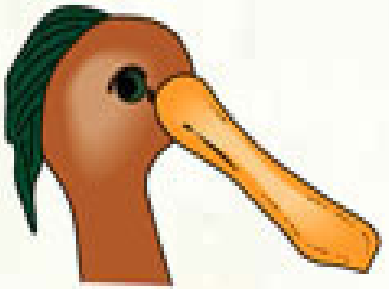
parrot



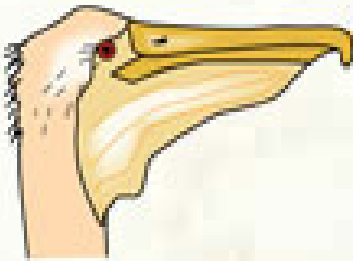
flamingo



kiwi



spoon bill

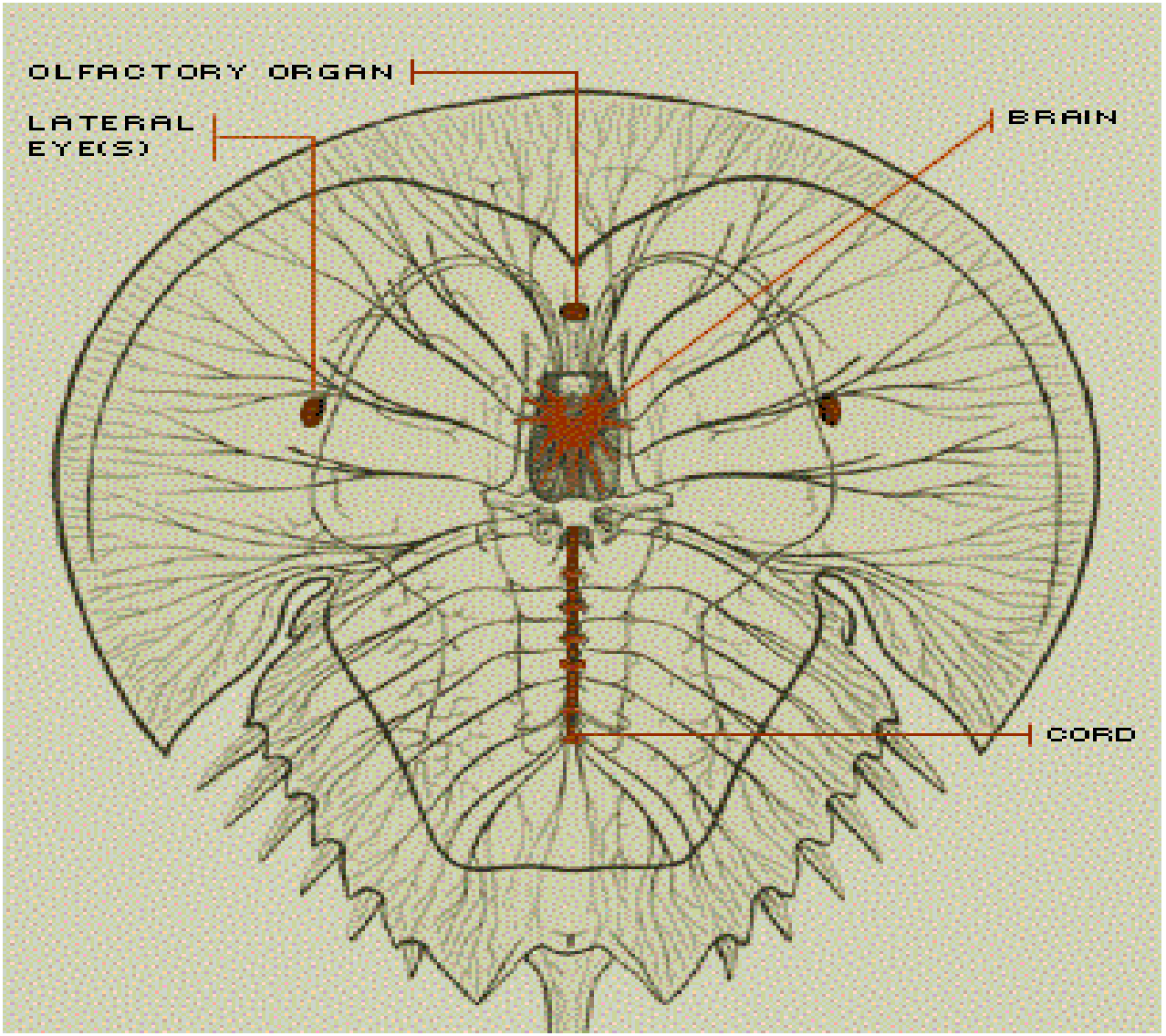


pelican

Nervous System in Crab

(refer diagram in the next slide)

- Like humans, crab uses a system of specialized nerves that extend from the brain throughout the body.
- There are several large nerves, that supply the crab with information.
- From the anterior portion of the brain, a pair of **optic nerves** runs directly to the two lateral eyes.
- There are also 8 pairs of **haemal nerves** that extend into the body of the crab. These contain motor and sensory fibers and are distributed mainly to the membrane and other tissues.
- The sixth pair sends branches to the heart and intestine.
- All of the haemal nerves are essentially the same, except the first one, the **lateral line nerve**.
- It runs close to the surface, just outside the bases of the appendages, begins to branch at the base of the 6th leg.
- It extends the whole length of the branchial chamber, sending one small branch to the base of each of the five gills.
- It is a purely sensory nerve and supplies the skin lining the channel along which water is carried to the gills.

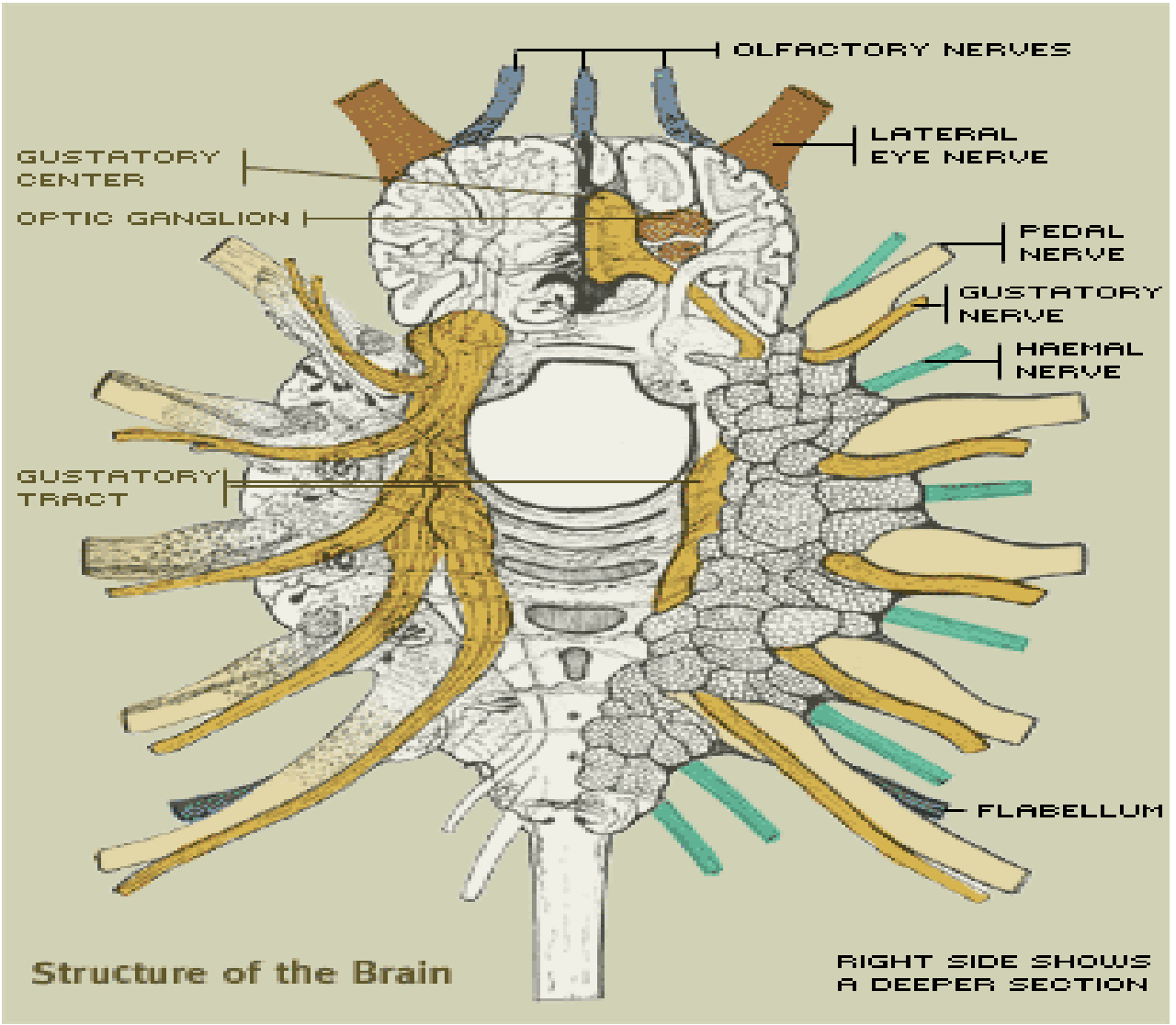


Overview of Crab Nervous System

Structure of the Brain

(refer diagram on next slide)

- At the top of the brain are three **olfactory nerves** (shown in blue) that lead to the horseshoe's olfactory sense organ.
- Immediately following these are the **lateral eye nerves** that connect to the crab's two lateral eyes.
- The five pairs of **pedal nerves** (highlighted in tan) are large and complex bundles of fiber.
- One of the most striking features of the brain are the large nerve roots (shown in yellow).
- These are the **gustatory nerves** and supply the taste organs in the coxal spurs, located on the appendages.
- The gustatory organs are widely distributed over the neural surface of the head, but they are most widely developed in the appendages that come in frequent contact with the food.
- The sixth nerve of this type (shown in blue) leads to the **flabellum**, which is a large spatulate organ that forms part of the crab's "pusher leg" .
- The function of the flabellum is to test the composition of the water passing to the gill chamber.
- The **haemal nerves**, in green, contain motor and sensory fibers and are distributed mainly to the membrane and other tissues.

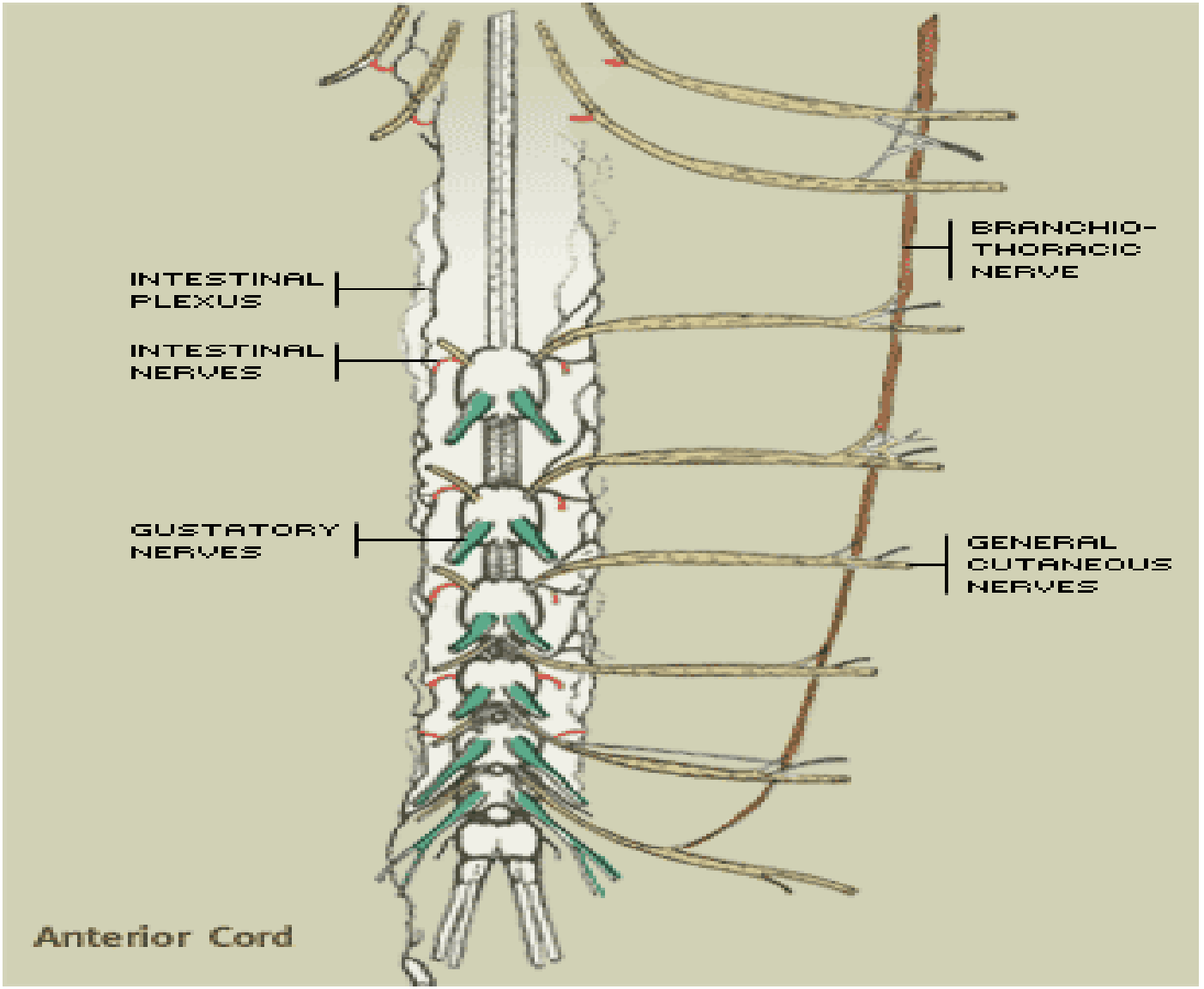


Structure of Crab Brain

Structure of the Cord

(refer diagram on the next slide)

- A closer view of the anterior cord of the horseshoe crab shows two main pairs of peripheral nerves- the **cutaneous** and **gustatory nerves**.
- The anterior pair (the cutaneous, shown in yellow) is the more complex; it is a non-ganglionated nerve and contains general cutaneous, somatic motor, cardiac, and viceral or intestinal elements.
- The posterior (gustatory) nerve is larger, but less complex. It supplies the gill muscles and sense organs of the corresponding appendage.
- Most of its elements are sensory. It is a neural ganglionated nerve, comparable with the ganglionated root of a vertebrate spinal nerve.



Structure of Crab Cord

Reproductive System of Grasshopper

- They are among what is probably the most ancient living group of chewing herbivorous insects, dating back to the early Triassic around 250 million years ago.
- Grasshoppers are typically ground-dwelling insects with powerful hind legs which allow them to escape from threats by leaping vigorously.
- Grasshoppers are plant-eaters, with a few species at times becoming serious pests of cereals, vegetables and pasture, especially when they swarm in their millions as locusts and destroy crops over wide areas.
- They protect themselves from predators by camouflage; when detected, many species attempt to startle the predator with a brilliantly-coloured wing-flash while jumping and (if adult) launching themselves into the air, usually flying for only a short distance.

Male Reproductive System of Grasshopper

The male reproductive system of grasshopper (Fig. 50B) consists of a pair of testes, a pair of vasa deferentia, an ejaculatory duct, a copulatory organ, accessory glands and a genital opening.

1. The testes in grasshopper are a pair of almost oval bodies, situated on either side of the body and each is formed of testicular follicles, where the spermatozoa are formed. The testes are held together by terminal filaments.

2. From the two testes come out two sperm ducts or vasa deferentia.

3. The two vasa deferentia unite to form a short but broad ejaculatory duct which opens on the terminal segment of the abdomen.

4. A thick conical penis or copulatory organ is situated between the anus and the external genital opening.

5. Accessory glands are present at the anterior end of the ejaculatory duct in between the vasa deferentia. These apparently secrete a fluid that aids in the transfer of spermatozoa to the female.

Female Reproductive System of Grasshopper

The female reproductive system of grasshopper consists of a pair of ovaries, a pair of oviducts, a vagina, a spermatheca, certain accessory structures and a genital opening.

1. The female grasshopper has a pair of slightly elongated ovaries each of which is composed of a number of egg tubules or ovarioles held together by terminal filaments. The ovarioles are devoid of lumen, contain oogonia and oocytes arranged in a linear series with nurse cells, and other tissue cells.

2. The oocytes grow in course of their way down.

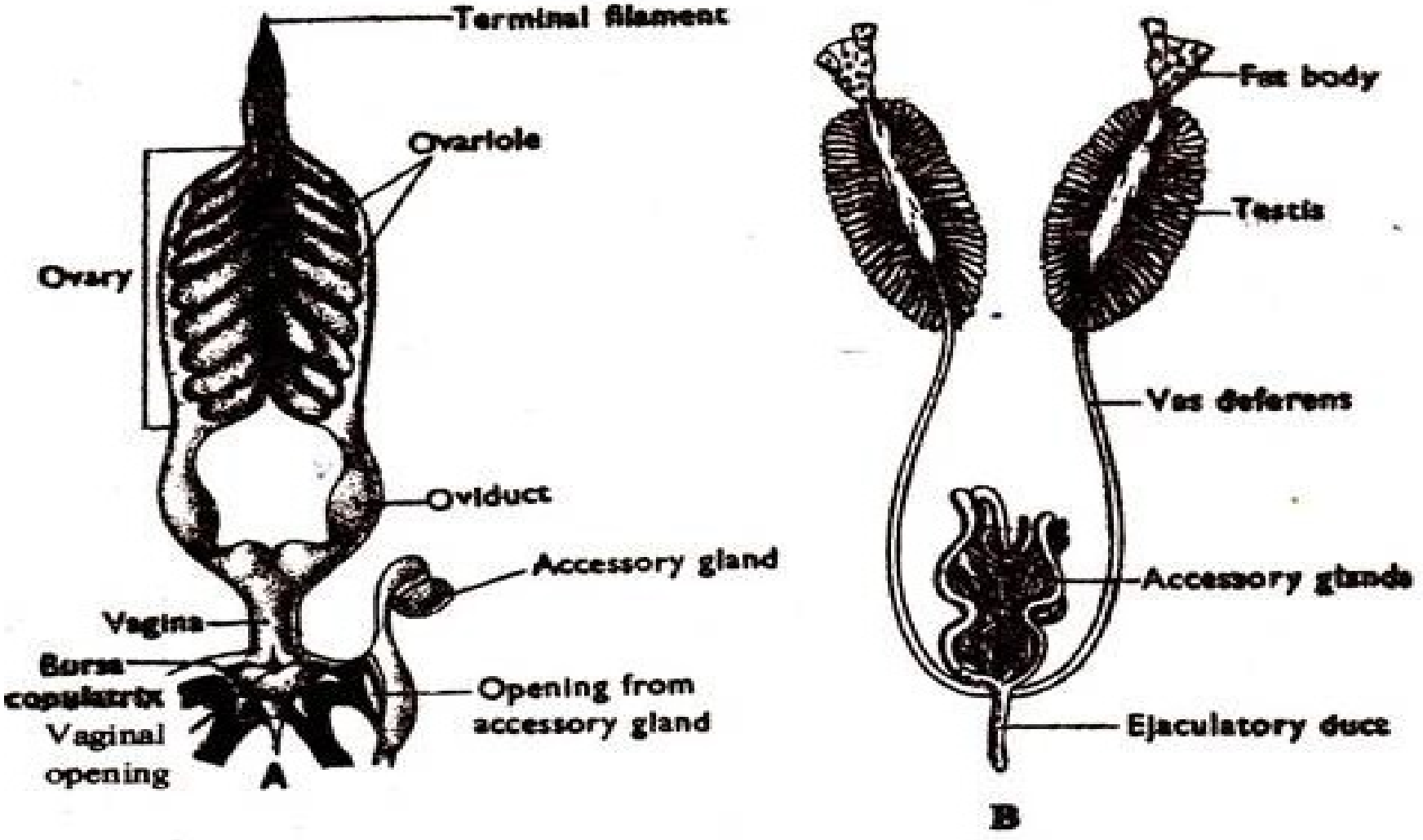
3. The ovaries are connected with a pair of oviducts. They are swollen at the middle and unite to form a vagina posteriorly, which opens into a genital chamber, situated between the plates of the ovipositor, the organ for digging holes to place the fertilized eggs.

4. A tubular seminal receptacle or spermatheca opens dorsal to the vaginal pore, that receives spermatozoa and releases them when the eggs are fertilized.

5- There is a small pore, the micropyle, which acts as the passage for the entrance of spermatozoon.

6. The eggs after being matured, escape from the ovariole and pass down the oviducts. Yolk is deposited and the shell is secreted around the fertilised egg during this period.

7. The egg is surrounded by a delicate vitelline membrane and a brownish flexible



FEMALE

MALE

Reproductive System of Grasshopper