REPRODUCTIVE SYSTEM

1. Pheretima is bisexual having both male and female reproductive organs.
2. Earthworm is protandrous. The male sex organs mature earlier to female sex organs.

MALE REPRODUCTIVE SYSTEM

1. Two pairs of testes arc present in the 10th and 11 th segments attached to anterior septa.
2. Testes produce the spermatogonia.
3. Two testes sacs arc present in 10"' and I 1"' segments.
4. The testes sac of 10^{th} segment encloses the testis and spermiducal funnel.
5. The testis sac of 11"'segment encloses testis, spermiducal funnel and seminal vesicle.
6. Two pairs of seminal vesicles or septal pouches are present in 11th and 12th segments attached to anterior septa. The seminal vesicles receive the spermatogonia and change them into sperms
7. Seminal vcsicles release the spermatozoa into the testis saes.
8. Two pairs of spermidueal funnels are present in 10 th and 11th segments.
9. The two vasdeferentia of same side unite in 18th segment and open out by male genital opening.
10. A pair of prostrate or spermidueal glands oeeupy 17th to 21st segments.
2. The secretion of prostrate glands help in the formation of spcrmatophores in other earthworms, (not in Pherctima)
3. Two pairs of accessory glands arc present in 17th and 19th segments.
4. The secretions of accessory glands help in attachment of the two earthworms during copulation.

FEMALE REPRODUCTIVE SYSTEM

1. A pair of ovaries are present in 13th segment attached to the anterior septa.
2. A pair of oviducal funnels in 13th segment receive ova from coclom
3. A pair of oviducts arising from oviducal funnels in 13th segment unite in 14th segment to form common oviduct and opens out by female gcnilalpore
4. Single female genital aperture is present on ventral side of 14tlf segment.
5. 4 pairs of spermathecac are present in 6. 7, 8, 9 segments.
6. Each spermathecac has one ampulla and one diverticulum.
7. Sperms received IVom another earthworm arc stored in diverticulum and ampulla help in nourishment.
8. Spcrmathecal openings are present ventrolatcrally in inter segmental grooves between 5/6, 6/7, 7/8 and 8/9.

COPULATION AND FERTILIZATION

1. In earthworm self fertilization is prevented by protandry, so cross fertilization is common.
1. Copulation between two earthworms takcsplace in night during rainy season.
2. The secretions of accessory glands and copulatory papillae assist in copulation.
3. At the time of copulation the earthworms attach on ventral side in opposite direction.
4. Copulation results in exchange of spermatozoa and last about an hour.
5. Cocoon a membranous girdle is formed by secretion of clitellar glands.
6. The cocoon first receives ova, then sperms and albumen from the glands of anterior segments.
7. Fertilization of eggs and entire development takcsplace in the cocoon.
8. In the cocoon only one egg develops into earthworm.
9. In Pheretima the cocoons arc spherical in form and are olive or light yellow in colour filled with albumin.
10. Cocoons are laid after monsoon season (August to October).
11. Many cocoons are formed in succession after each mating.

DEVELOPMENT

1. Development is direct and no larval stage.
2. After fertilization polar bodies arc extruded.
3. The cleavage is holoblastic and unequal.
4. Hollow ball like embryo is called blastula.
5. The cavity of blastula is called blastocoel or segmentation cavity.
6. The smaller upper micromercs form the ectoderm.
7. The lower mcgamcrs or macromeres form the cndodcrm.
8. The pole cell or mesoblast is cutoff from mac ro mere.
9. The pole cell divides into two and lie at the equator of blastula as mcsomcres.
10. By invagination blastula is converted into 2 layered gastrula.
11. The gaslrula encloses the cavity archcnteron or primitive gut
12. The archcnteron opens out by blastopore.
13. The blastopore transforms into mouth hence earthworm protoslomous animal.
5. The mcsomcres form the mesoderm of embryo.
6. The ectoderm gives rise to the epidermis, nervous system, the parts of ncphridia and setal sacs.
7. The mesoderm gives rise to (he muscles, coelomic cpilhelia, intersegmental septa, the blood. vessels and reproductive organs

g **Hermaphrodite**

Male reproductive system of Hirudinea posses copulatory structure called **- Penis (Cirrus)**

Fertilization - **Internal**

Development - **Direct**

Development is completed in - **Cocoon**

Eg: **Indian Cattle Leech (HIRUDINARIA)**
British Leech (HIRUDO MEDICENALIS)
Land Leech (HAEMADIPSA)
Skate Sucker (PONTOBDELLA)

According to different authors Botryoidal tissue is either excretory or nutrient storing tissue

At present Annelida is calssified into two taxa - Polychatea and Clitellata (girdle worms).

Clitellatta includes Oligochaeta and Hirudinea.