REGENERATION CAPACITY OF EARTHWORM

Regeneration is the power of producing the lost body parts. Earthworms have remarkable power of regeneration. They can regenerate segments lost by accident. If a worm is cut into two parts, the anterior part will regenerate the entire posterior part but the posterior part cannot develop the anterior part, though it can produce a limited number of segments at the anterior end. It is important to note that the reproductive organs are not regenerated.

ADAPTATIONS OF EARTHWORM

Earthworms are well adapted for a subterranean or fossorial mode of life. The following are the adaptations which help earthworm to lead its life,

Elongated, slender and streamlined body which is much helpful in burrowing habitat
Presence of setae and musculature which help it in locomotion and also for anchorage
Secretion of mucous to plaster the internal walls of the burrow
Coelomic fluid oozing through dorsal pores keeps skin moist.
And this moist skin is also helpful in gaseous exchange in the absence of specialized respiratory organs
Amoebocytes of the coelomic fluid kill harmful bacteria and other parasites. Thus protecting the worm
The nocturnal and burrowing habits of the earthworms also protect them from predators.
Due to its fossorial mode of life special sensory organs like eyes and ears are absent
Hermaphroditism and regeneration capability ensures continuity of species against all odds of the life
Copulation followed by the formation of cocoon for fertilization and development are adaptations for reproduction on dry land.

ECONOMIC IMPORTANCE OF EARTHWORM

Earthworms are of great economic importance to man. They play an important role in agriculture and are the best friends of farmers as they are continuously ploughing and manuring the soil. However, a few species of earthworms are harmful.

Earthworms in Agriculture: Earthworms make burrows and hence aerate the soil. They continually bring the lower soil and deposit it on the surface. It is said that in a time of ten years, they can fill the whole surface of earth up to 5 cm. The earth worms have been ploughing the land long before man. Their habit of burrowing and soil feeding makes the soil loose and porous. Their burrows permit the penetration of air and moisture in the porous soil, improve drainage and make the downward growth of roots easier.

The faeces of the worms make good manure. By burying the dead and decayed matter, they enrich the soil. The excretory wastes and other secretions of the worms also enrich the soil by adding nitrogenous matters that form important plant food. The

faeces of earthworm contain nitrate, calcium, phosphorus, potassium and magnesium which constitute an important component of the humus essential for plant growth. They also reduce the alkalinity and acidity of the soil.

Earthworm as Bait and Food: Earthworms are used as baits for fishing in many parts of the world. They are used as food by large number of animals like frogs, moles, lizards, small snakes, centipedes and also some birds. In many parts of the world uncivilized people use the earthworms as food. The earthworms make the best food of fish aquarium and small animals in laboratory.

Earthworms in Medicines: Ayurveda and Unani system of therapy suggests that earthworms are used for reducing the size and finally removing bladder stones, jaundice, piles, diarrhea, weakness after pregnancy, sexual impotency and gout. Today they are used in India, China and Japan in various fancy medicines.

Earthworms in laboratories: Earthworms are universally used for dissection in zoological laboratories, as they are easily obtained.

Harmful Earthworms

A few species of earthworms may cause harm to man in various ways:

Their burrows may cause loss of water by seepage from ditches, canals and irrigated lands. Their casting on sloppy lands easily gets washed away by rain and thus contributes to soil erosion.

Some species bury in the carcasses of animals, and bring disease germs to the surface, which infect others. While a few species live as ectoparasite on frogs and man. They also act as intermediate host of some parasites like the tapeworm (Amoebotaenia sphenoides) of chicken and the lung nematode (Metastrongylus elongatus) of pig. Pheretima elongata damages the roots of betel vine, Malabaria podudicola and Aphanascus oryzivorus damage roots of paddy.

Modes of life of Polychaetes

Introduction

Polychaeta is the largest class of phylum Annelida. This class shows greatest diversity in Phylum Annelida. Majority of the 5000 species of polychaetes are marine and exhibit a variety of habits and habitats. And accordingly they show great adaptive diversity. The following is the discussion of the adaptive diversity of polychaetes,

Adaptive diversity according to habitat

Crawling polychaetes: These are marine, freely moving animals that crawl on sea bottom. Head bears sense organs such as eyes, tentacles, antennae, cirri and palps. Locomotory organs or parapodia are large, they bear setae which can be retracted and protruded out in various directions for crawling among rocks and stones.

Parapodia help in crawling and swimming. Sense organs on prostomium and peristomium are well developed due to the free swimming and crawling habit. Body segments are generally similar

Ex: Nereis, Phyllodoce, Colycera

Pelagic polychaetes: They are also known as planktonic polychaetes. These kinds of polychaetes are adapted to live in open sea and are semi-transparent in appearance. They swim near the surface of the sea where the danger of predators and solar radiation is excessive.

Hence, their semitransparent body that imparts them near invisibility and thus protects them from predators. Some have large eyes while others have none. Parapodia are small and locomotion is by lateral undulation of body. Cirri are generally longer and carry tango receptors which help in locating food.

Ex: Vanadis, Tomopteris

Burrowing polychaetes: These polychaetes are adapted for burrowing in sand. Their body is elongated, prostomium is reduced or absent. Eyes, tentacles and palps are also usually absent. Parapodia are reduced as they do not find any use.

They move through the substratum by their peristaltic contraction movements. Circular muscles of these animals are well developed to assist in locomotion. Effective septa compartment the coelomic fluid which has skeletal role in locomotion. Setae help to anchor against the burrow wall. These animals spend most of their time inside the burrows and come out only to catch the prey.

Ex: Arenicola, Glycera, Amphitrite and Terebella

Tubicolous polychaetes: These are tube dwelling polychaetes. They live in temporary or permanent self-secreted tubes. These tubes act as protective covering. The tubes of various species vary greatly in form and construction.

Based on the form and construction the tubicolous burrows are of following types:

Mucus lined burrows- Some errant polychaetes make mucus-lined burrows in sand and mud. These polychaetes have well developed prostomium sense organs and parapodia. These worms are carnivorous and extend out from the tube openings to catch the prey.
Ex: Eunice, Perinereis

Shell and sand grain tubes- These kinds of tubes are usually straight, built vertically in sand or mud. These tubes are composed of sand grains and shell pieces cemented together with mucus.
Ex: Pectenaria, Owenia, Diopatra, Clymenella

Parchment tubes- These kinds of tubes are membranous, usually U-shaped. These tubes may measure about 70 cm long and 2.5 cm in diameter. Sometimes these tubes may be covered by sand grains and shells
Ex: Chaetopterus, Platynereis

Calcareous tubes- These tubes are made up of calcium. The two large glands under the collar fold secrete calcium carbonate which forms the tube. Sometimes these tubes may be covered by sand grains and shells
Ex: Sabella, Serpula

Adaptive diversity according to Nutrition
Raptorial feeders: They are also known as carnivorous feeders. They include most crawling, burrowing and tubicolous and all pelagic polychaetes. They feed on small invertebrates including other polychaetes. They capture the food by means of an eversible pharynx or proboscis.
Ex: Nereis, Nephthys

Detritus feeders: The shallow sea bottom is a source of food of great nutritional value as it contains bacteria, diatoms and other dead organic matter. The sedentary polychaete species rely on this food source. Detritus feeders may be of two types,

Direct deposit feeders- Some of the polychaetes obtain their food by directly swallowing sand and mud as they burrow through it. The organic matter contained in the sand and mud is digested while the sand itself is egested as castings. Direct deposit feeders include burrowing and tube-dwelling species.
Ex: Ophellids, Maldanids

Indirect deposit feeders- These animals lack proboscis instead they are provided with highly extensile ciliated grooved tentacles, secreting mucous. Small food particles moving down the groove by ciliary action accumulate at the base of tentacles. These food particles reach the mouth by wiping the tentacles across the lips. These feeders not only feed on the bottom deposits but also use palps to collect the suspended detritus.
Ex: Terebella, Pectinaria

Filter feeders: Most of the sedentary and tubicolous polychaetes are filter feeders. They do not have a proboscis. Their head is provided with long bipinnate filaments called radides with a ciliated groove running along the oral surface. Radides are used in food collection.

Chaetopterus which lives in U-shaped parchment tube has a unique method of food selection. The notopodia of particular segments of the body form fans. The beating of these fans produces water current which enters the tube from the anterior end and flows out of the posterior end. The food particles in this water current are filtered out into the mucous bag formed by ciliated glandular epithelium. This mucus bag ends in a ciliated food cup where the food is rolled up into a ball and passed forward to the mouth along the ciliary groove.

Arenicola excavates L-shaped burrows. It periodically ingests sand with the help of its simple proboscis. This causes the sand to cave in forming a funnel-shaped depression at the surface. These sand filters suspend food particles from the water percolating down the funnel. This organically rich sand is then ingested by the worm.