

Phylum Mesozoa

The phylum Mesozoa includes some small, slender and organized parasitic animals, with the simplest structure of any metazoan but having complex life cycles. The hosts of all are marine invertebrates. They have offered a great taxonomic puzzle ever since their discovery in 1929. Vair Beneden (1877) regarded them as intermediate in structure between Protozoa and Metazoa and called them Mesozoa. Hatschek (1888) named them Planuloidea due to their resemblance to the planula larva of Coelenterata. Hartmann proposed the term Moruloidea due to their structural resemblance to morula stage in embryonic development. Most zoologists regard them as degenerate flatworms and hence append the Mesozoa to the phylum Platyhelminthes. Characters and classification

General Characters:

1. Simplest, multicellular, acoelomate animals, living as endoparasite in the internal spaces and tissues of squids, flatworms, sea stars, annelids and other invertebrates.
2. Body small, slender, worm-like and solid, consisting of an outer layer of ciliated cells, called somatoderm. Enclosing one or more reproductive cells.
3. Endoderm, mesogloea and digestive tract are absent.
4. Life cycle is complicated by an alternation of sexual and asexual generations.

Classification

The Mesozoa are grouped under two orders as follows

Order 1. Dicyemida

1. Common endoparasites in the nephridia of various cephalopods.
2. Usual adult form (nematogen) up 8 mm. long.
3. A single multinucleate internal or axial cell.
4. Ova develop parthenogenetically into dimorphic embryos.

Examples: Dicyema, Pseudicyema, Dicyemeneia.

Order-2. Orthonectida

1. Rare endoparasites of various invertebrates, such as flatworms, nemertean, brittle stars, annelids, and a clam.
2. Body slightly ringed and sexual forms less than 1 m. long.
3. An inner cell mass present, among which ova and spermatozoa appear.
4. Sexes are separate and dimorphic.

Examples: Rhopalura, Staecharthrum.

Mesozoa constitute a small but well-defined group which have offered a great taxonomic puzzle ever since their discovery in 1869. Mesozoa has following affinity

1. Affinities with protozoa:

The simplicity and primitiveness of Mesozoa can be interpreted by their resemblance to some colonial Protozoa in the following characteristics (1) Occurrence of external cilia through much of the life cycle. (2) Differentiation of cells into somatic and reproductive cells only, as in Volvox. (3)

Endogenous or internal position of sex cells, as in volvox. (4) Power of intracellular digestion by the surface cells. (5) Complicated life cycle with alternation of asexual and sexual phases, as in Sporozoa.

2. Affinities with coelenterata:

By some, the Mesozoa are considered to be degenerate coelenterates due to the following reasons:

(1) The adult Mesozoan structure compares with that of the planula larva. (2) In the development of the dicyemids, the covering over of one cell by the others is similar to epibolic gastrulation found in the coelenterates. Such embryos are regarded by others to remain at a stereoblastula stage. (3) In the development of the orthonectids, sexual adults are formed by a process identical with endoderm formation by secondary delamination. As the interior cells never differentiate into functional endoderm, the Mesozoa can be regarded to have remained at the morula or stereoblastula stage. However, the structure and life history of the Mesozoa lend very little support to the idea of their coelenterate affinities.

3. Affinities with platyhelminthes:

The view that the Mesozoa are degenerate flatworms rests on the following resemblances:

(1) The complicated life cycle including a ciliated larva and simplified vermiform stages reproducing asexually, as in the digenetic trematodes. (2) Adult is vermiform, solid and turbellaria-like. But an adult trematode and the miracidium larva do not bear any structural resemblance to the orthonectid sexual adult and the infusiform larva. Also the miracidium comes from a fertilized egg while the infusiform larva from an agamate.

4. Affinities with echiuroidea: Lameere(1922) asserts in vain that the Mesozoa are degenerate Echiuroidea. He mentions similarity in the occurrence of small ciliated males in the echiuroid *Bonellia* and the like position of the female genital opening in echiuroids and orthonectids. It is clear that the Mesozoa are unlike the typical Metazoa. They have no internal digestive tract and their two-cell layers are not comparable with the ectoderm and endoderm of typical metazoan animals. Taken at their face value they are of a grade of construction lower than that of coelenterates. Hence, they have been placed in an isolated position between Protozoa and Porifera. The name Mesozoa implies they are intermediate between the Protozoa and Metazoa.

References:

1. Minor phyla by R.L. Kotpal
2. An introduction to Minor Phyla by Sandhu and Bhaskar
3. Modern textbook of Zoology Invertebrates by R.L. Kotpal