

Chaetognatha

Introduction

The Chaetognatha are an enigmatic group of transparent planktonic invertebrates. Their elongated bodies have led to the common name of “arrow worm”. They were classically considered deuterostomes, due to their embryonic development. They have radial cleavage and the blastopore becomes the anus. They have three coelomic cavities that form by enterocoely. However, molecular phylogenetic evidence suggested that they had protostome affinities and current 18S rDNA phylogenies suggest that they are members of ecdysozoa. In spite of this evidence, many people still erroneously classify them as deuterostomes. Reexamination of chaetognath development as a member of the ecdysozoa shows that they have some remarkable affiliations with nematodes, including early segregation of germ cell plasma.

There are only about 60 described species, which are classified into 5 families in the class Sagittoidea. The second class, Archisagittoidea, has only one extinct species (David, 1963). The adults are crystal clear and have three distinct body parts, the head, the trunk and the tail. The head is armed with one or two rows of teeth and two small pigmented eyes. There are fins elaborated in some species. Most of the described species are planktonic, but a few are benthic.

Reproduction

All chaetognaths are hermaphrodites, producing both eggs and sperm. There is still a debate about whether they can self-fertilize or not. Ghirardelli (1968) describes a very complex mating behavior that suggests that normally chaetognaths outcross by

exchanging spermatophores. Sperm tails show an unusual deviation from the normal “9+2” flagella. They have either a “9+4” or “10+4” arrangement.

Fertilization and development

Fertilization is internal, so eggs are laid as fertilized zygotes, After fertilization, germ cell determinants are moved to the future posterior of the embryo, where they are then partitioned into a single cell at the 64 cell stage. The first cleavage is in an animal to vegetal direction and cleavage is radial. Gastrulation begins by the ingression of the endodermal cells at the vegetal pole of the embryo.

Larval Development

The larva forms within the egg membrane, and is curled around with its head tucked in the center. Hatching is usually from 1-3 days after egg laying. *Spadella* larvae do not swim about, but immediately attach themselves to the substrate where the eggs were laid by adhesive projections on the side of the head. Three to four days after hatching, the primordial germ cells migrate across the trunk cavities to the body wall. When this migration occurs, a trunk-septum is laid down, leaving half of the germ cells in the trunk cavity and half in the caudal region. The ovaries arise from the germ cells in the trunk cavity and the testes develop from the germ cells in the caudal region.

References

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