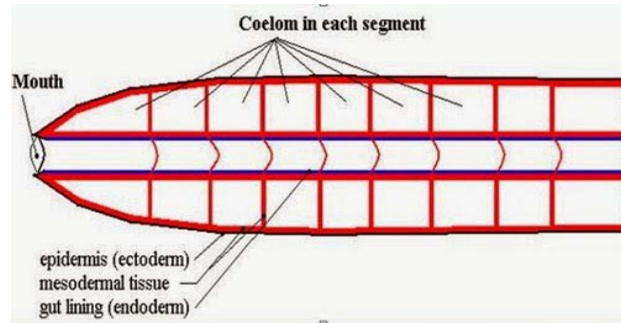


Metamerism in annelida

Earthworm



Metamerism:

Metameric segmentation or metamerism is an architectural body plan in some animals in which the similar body segments and organ systems are serially repeated one after another. The similar body segments are called metameres or somites.

The animals which exhibit such features called metamericly segmented. Structurally each meta-mere or somite is constructed on the basis of some fundamental plan and usually possesses a part of almost all the body systems.

In all respects the segments forming an individual are identical in structure and the organs they contain or in other words, the individual is formed by rhythmic repetition of segments which are similar both externally and internally. This repetition is often disturbed by simplification, by coalescence of segments or by differentiation between the segments.

- **Occurrence of Metamerism:**
- Metamerism is first seen in annelids in animal kingdom. Each segment usually contains appendages, muscles, nerves, blood vessels, excretory organs and a pair of coelomic sacs which are repeated in almost all segments. It is also seen in kinorhynchs, arthropods and most chordates.

- **Characteristic Features of Metamerism:**
- 1. Metamerism is always confined to the intermediate (trunk) segments except the anterior acron (head) and a posterior pygidium or telson.
- 2. Each metamere represents a mirror image of the other.
- 3. Segmental structures are interdependent on each other.
- 4. They are integrated into a single functional unit.
- 5. All the segments of body work in co-ordination.

1. True metamerism

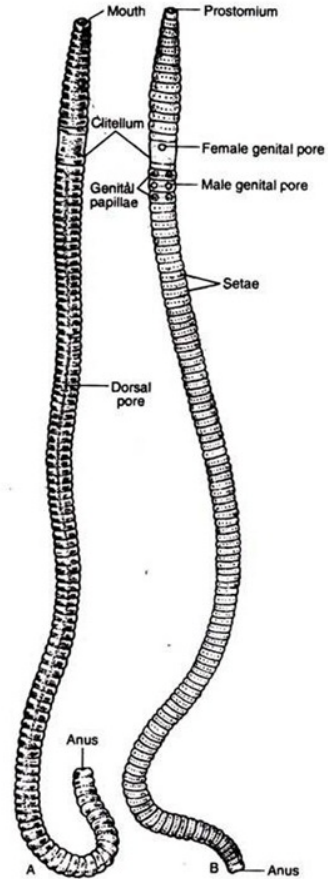


Fig. 17.14: Dorsal (A) and Ventral (B) views of earthworm (*Pheretima*).

2. Homonomous metamerism

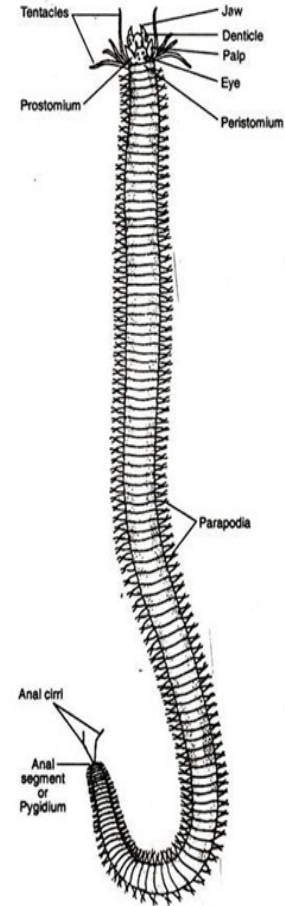


Fig. 17.2: External features of *Nereis*—dorsal view (after Bloom and Krekeler).

3. Heteronomous metamerism

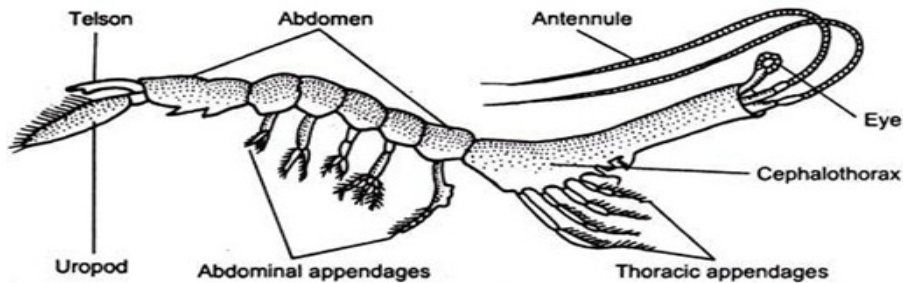
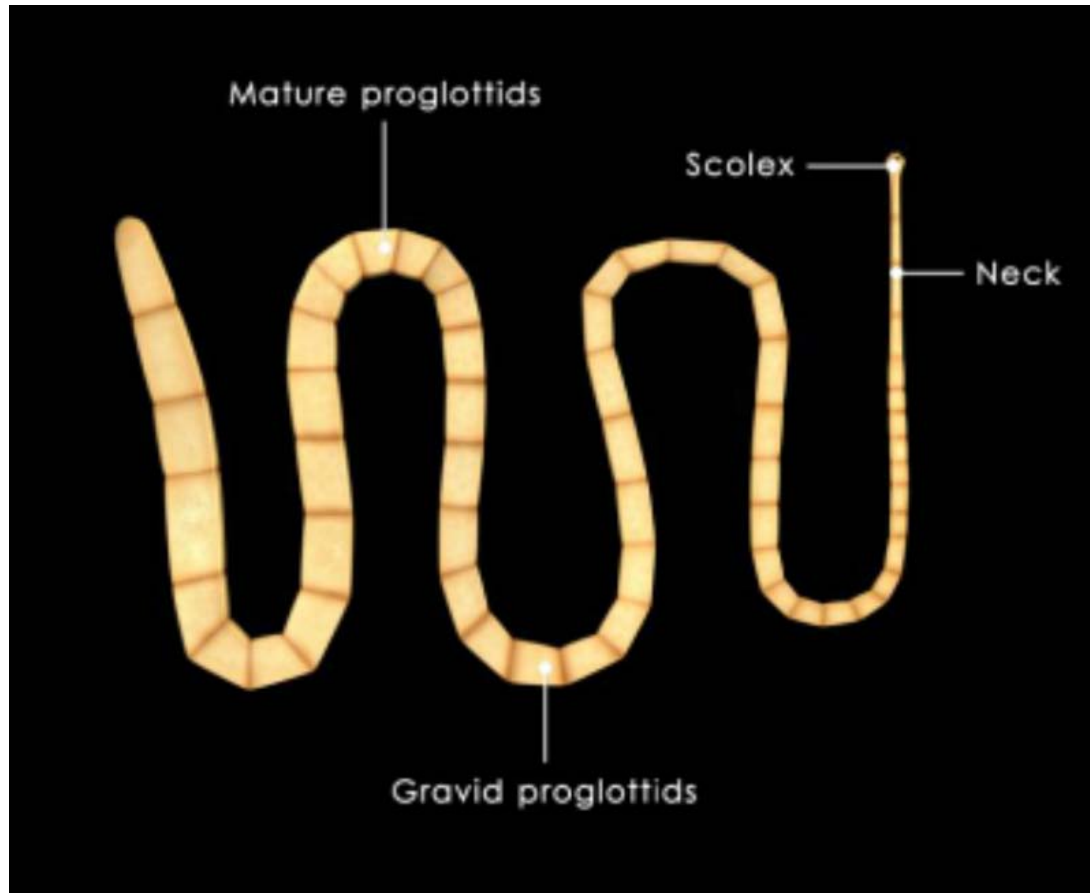


Fig. 17.49: A crustacean showing the heteronomous segmentation.

4. External metamerism-**Arthropods**
5. Internal metamerism-**Vertebrates**
6. External and internal metamerism- **Annelids**
7. Complete metamerism - **Annelids**
8. Incomplete metamerism-**Arthropods**
9. Pseudo metamerism or Strobilization - **Tapeworm**

- **Pseudo-metamerism or Strobilization:**
- In contrast to true metamerism, pseudo-metamerism or strobilization is seen in tapeworms (Platyhelminthes) where segmentation of the body takes place by the segmentation of the ectoderm. The body consists of a number of segments or proglottids which varies in different individuals of the same species.
- New segments are added to the body throughout life. The proglottids or segments differ in the degree of development. The segments or proglottids are functionally independent or self-contained units and new segments are always formed and there is no cooperation between the segments. The new segments are formed at the anterior end, just behind the scolex.

Pseudometamerism



Origin of metamerism

- 1. Pseudo-metamerism Theory
- 2. Cyclomerism Theory

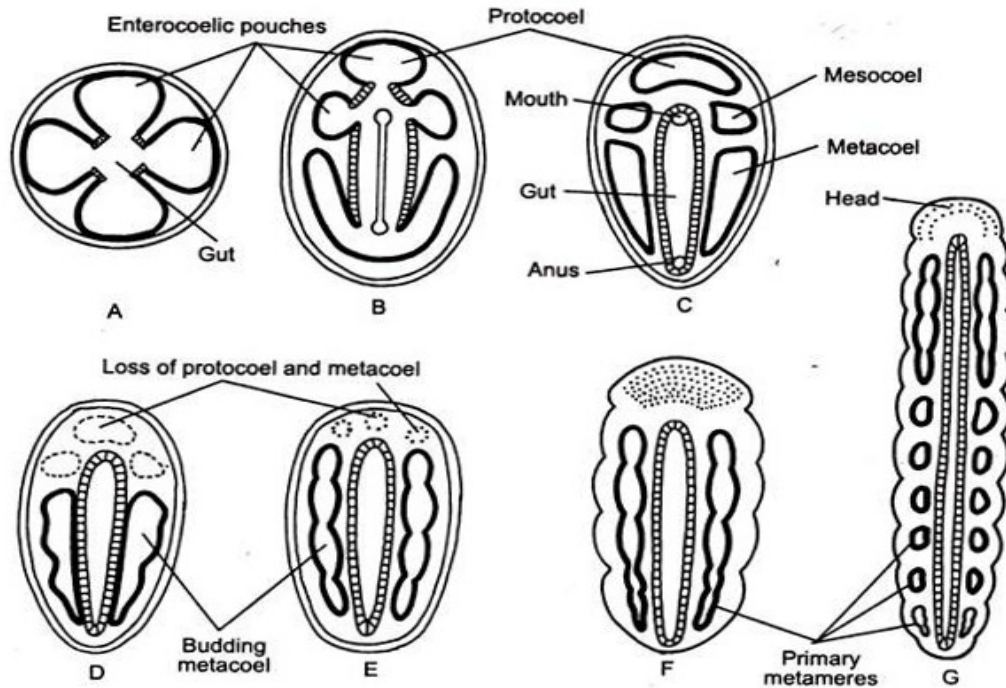


Fig. 17.50: Diagrams illustrating the cyclomerism theory of metamerism.

- **3. Corm or Fission Theory**

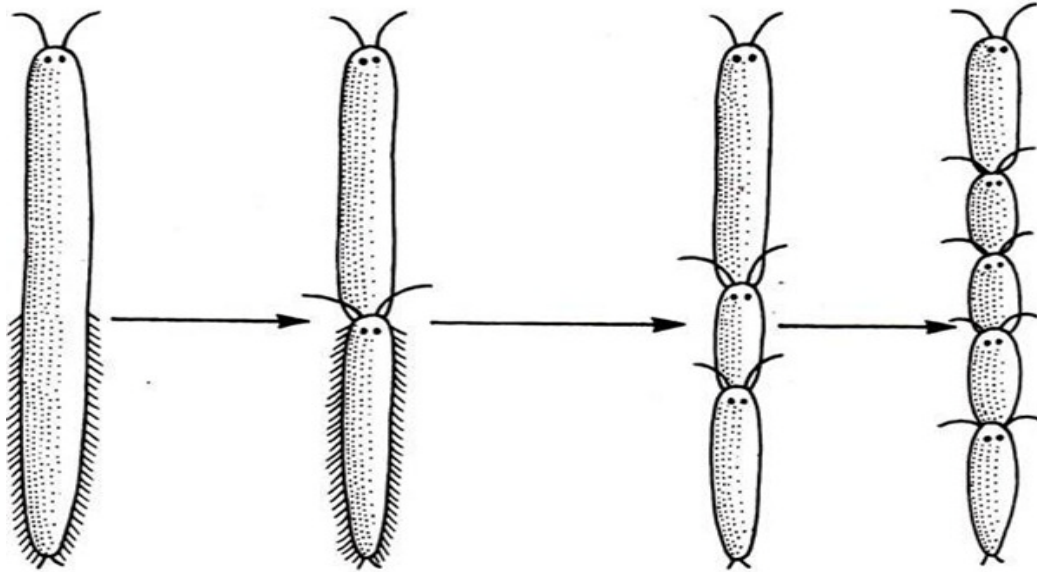


Fig. 17.51: Diagrams illustrating the origin of metamerism by fission.

- **4. Locomotion theory**

- **Significance of Metamerism:**
- 1. It helps in locomotion, not only in burrowing but in all other types of locomotion.
- 2. Metamerism offers division of labour.

Evolutionary significance

It is not quite clear that how and why metamerism has evolved or how were the ancestors benefited by it. But it is possible that metamerism/segmentation initiated from the musculature of elongated swimming worms. Due to segmentation the body gets divided into metamere which facilitates in swimming. Metamerism has helped in locomotion in many ways. The co-ordination of muscle contraction and the fluid filled coelomic cavity makes swimming and locomotion movement more efficient and it is more advanced over ciliary or creeping movement found in lower invertebrates.

The fluid filled coelomic cavities serves as a hydrostatic skeleton which helps in burrowing. Precised movement also occurs by differentiated turgor affected by the flow of body fluid from one part of the body to other.

Another advantage of metamerism or segmentation is that it provides opportunity to different segments to specialize it for different function. Thus it leads to rapid evolution of high grade of organisation. This is not clearly marked in annelids but it is well developed in arthropods. Metamerism has greatly contributed toward the greater complexity of animal body and higher grade of organisation in animals. Thus, some indication of primitiveness of an animal can be determined by the degree of segmentation it displays.