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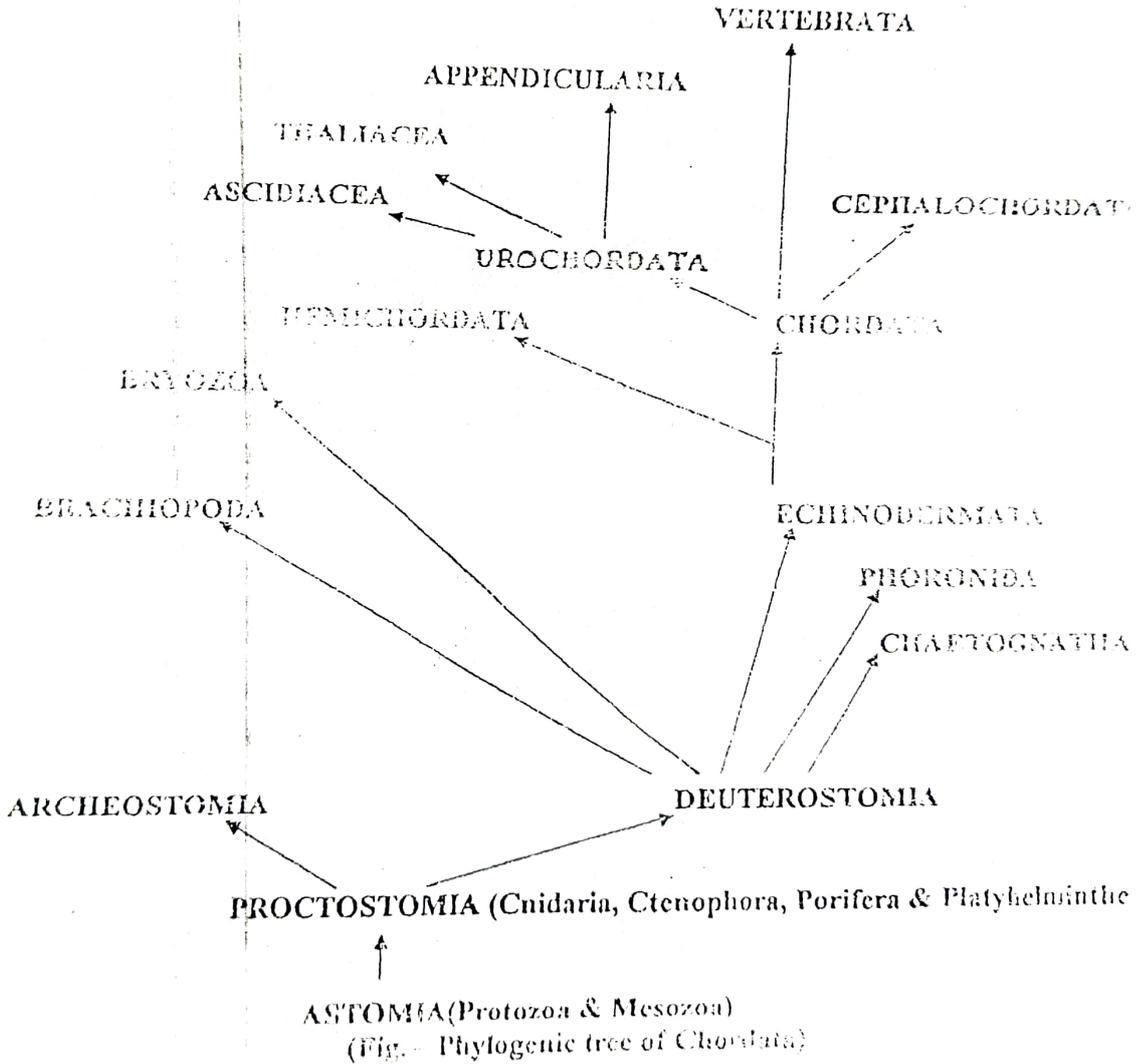
ORIGIN OF CHORDATES

On the beginning of 20th century the puzzle that zoologists were facing, was the "origin of chordates". There is no reliable evidence regarding the origin of the chordates. No fossil remains have yet been found in the Cambrian rocks, where the animal fossils were first found. The earliest chordates were probably soft bodied and without any hard skeleton. Therefore, there was a chance of their fossilization. If fossils of ancient forms of chordates were have been preserved, no uncertainty could have been eliminated.

RELATIONSHIP WITH ECHINODERMS, HEMICHORDATES AND CHORDATE

1. Serological tests have proved a closer relationship between the above groups.
2. Biochemical tests have also shown relationship between the above groups due to similarity of phosphogen, essential for muscle contraction.
 - i. Creatine and arginine are amino acids found in the labile phosphate, the phosphogen
 - ii. Creatine is present in the phosphogen of all the vertebrates and Cephalochordates
 - iii. While, arginine is present in invertebrates.
 - iv. In Hemichordates & Echinoderms both creatine & arginine are present

PHYLOGENY OF CHORDATES



- According to some zoologists, the evolution of Chordates, Protozoans and Mesozoans has taken place from Astomata.
- Astomata gave rise to Proctostomia, which includes Cnidaria, Ctenophora, Porifera and Platyhelminths having single opening of alimentary canal, which serves as both mouth and anus.
- Proctostomia gave rise to Archeostomia and Dueterostomia.
- Archeostomia includes all the important phyla with separate mouth and anus viz. Annelida, Mollusca, Arthropoda, Aschelminthes, Mollusca and few other minor phyla.
- Dueterostomia includes Echinoderms, Chordates, Hemichordates, Phoronida, Chaetognatha, Bryozoa and Brachiopoda.
- Hemichordata probably gave rise to Enteropneusta and Pterobranchia.
- Chordata, through Urochordata gave rise to Appendicularia, Thaliacea and Ascidiacea and in direct chain with the Chordata gave rise to Cephalochordata and Vertebrata.
- The three important phyla of the given tree possess the following similarities:-
 1. All have evolved from Dipleurula larva.
 2. Mesodermal skeleton.
 3. Indeterminate cleavage.
 4. Coelomic cavities-5
 5. Gut formed by invagination.
 6. Nervous system formed from nerve net.

VARIOUS THEORIES REGARDING THE ORIGIN OF CHORDATA

Numberous theories have been put forth in this regard on the basis of the resemblance between the lower Chordates and some Invertebrates. Some are as follows:

A. COELENTERATE THEORY:

- This theory claims that the Chordates have a direct origin from the most primitive Metazoa such as Coelenterates.
- There are few specialized features found in the coelenterates which might have been the origin starting a path towards the vertebrates.
- But, actually to consider Coelenterates as an ancestor of the Chordate is to be a little begging to the solution.
- There are several basic advances, which are not found in Coelenterates but are found in other Invertebrate phyla. These are:-
 - i. Development of mesoderm
 - ii. Presence of both mouth and anus in the digestive tract.

Hence the theory was not accepted.

B. ANNELID THEORY: -----

- The following similarities reveal the close relationship between Annelids and Chordates:-
 - i. Both are bilaterally symmetrical
 - ii. Segmented body with segmented excretory organs
 - iii. Well developed coelom.
 - iv. Blood vessels longitudinal.
- Some zoologists have resolved that Vertebrates are the worms up side down.
- In an inverted Annelid, nerve cord is dorsal to the digestive tract.
- The path of blood flow would resemble that of Chordates.
- But the following dissimilarities have rejected the above theory -
 - i. Nerve cord in Annelids is ventral and solid.
 - ii. Notochord -absent.
 - iii. Pharyngeal gill slits—absent.

- Thus, there are no positive reasons to believe the origin of Vertebrates from the Annelids.

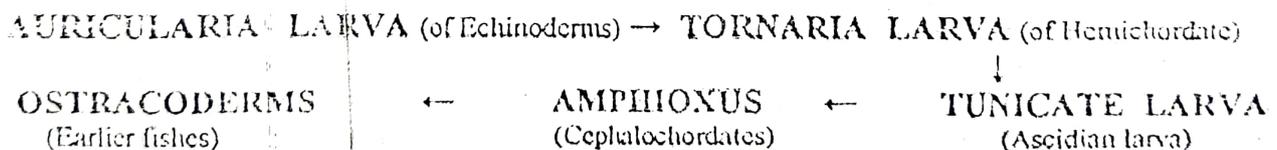
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C. ARACHNID THEORY

- Under this theory, according to some zoologists, the Palaeozoic arachnids (arthropods) and Ostracoderms (Chordates) resemble each other on the basis of armoured dorsal skeleton.
- However, the Chordates have no Arthropod like appendages.
- The nerve cord in arthropods is ventral, while in Chordates, it is dorsal.
- Further, the Arachnids lack notochord and internal gills.
- Finally, this theory was discarded.

D. ECHINODERM THEORY

- Several zoologists suggested that the vertebrates have originated directly from the Echinoderms.
- Adult Echinoderms are radially symmetrical but the larva shows bilateral symmetry
- In Branchiostoma, as well as Echinoderms, the mesoderm formation from gut pouch is similar.
- In many of the Hemichordates, there is a Tornaria larva of the same type as that of Echinoderms.
- The Tornaria larva of hemichordates and Bipinnaria larva of Echinoderms show great resemblances such as: --
 - i. Both are minute and transparent.
 - ii. Both have ciliated and coelomic cavity bands.
 - iii. Both have a dorsal pore.
- It is now believed under this theory that the Vertebrates have not been originated from modern Echinoderms.
- However, evidences suggest that kinship of the Chordates lies with the Echinoderms and definitely not with the Annelid-Arthropod stock.
- Some authors believe that the ancestral Chordates must have been a larval form.
- The hypothetical Chordate ancestry in the above light is as follow :-



CONCLUSION

However, the origin of Chordate is doubtful and so no definite conclusion up to the present time has been drawn. As such no single theory is finally accepted due to lack of fossils of ancient forms of Prechordates.