

Q1- What is cleavage? Give an account of various types of early cleavage found in vertebrate.

The zygote which is formed by the fertilization of an ovum by a sperm undergoes a process of repeated mitotic division and results in the formation of either a solid mass of smaller cells or a hollow sphere of smaller cells. The resulting smaller cells are known as blastomeres and the solid mass of blastomeres is known as morula whereas the hollow sphere formed by the small cells is known as blastula.

This sequence of repeated mitotic division which occurs in the zygote is known as cleavage or segmentation.

So we can define the cleavage as a modified form of mitotic division which occurs in the zygote. It differs from the simple mitotic division occurring in other adult somatic cells in following respects:—

- i) The resultant smaller cells i.e. blastomeres formed as a result of cleavage possess only half size of their parent cells as they do not increase in size whereas in the case of simple mitotic division resultant daughter cells acquire the same size as the parent cells by adopting the process of growth.
- ii) Though there is no increase in size yet synthetic processes are at peak which provide comparatively larger nuclei to the blastomeres

in respect to the nuclei of the somatic cells. Finally it leads to an increase in the nuclear cytoplasmic ratio.

(iii) The achievement of larger nuclei is made possible by an increase in the chromosomal material by duplication. DNA duplicates during S-period of the interphase of cleavage. Synthesis of the ribosomal RNA remains restricted or stopped because it will lead to an increase in the volume of the cytoplasm being one of the main constituents of the ribosomes. However messenger and Transfer RNAs are synthesized which help in the synthesis of proteins and enzymes such as histone, tubulin, DNA polymerase as there are in requisition during the duplication of DNA.

(iv) Blastomeres remain adhered together after cleavage.

(v) Enormous amount of ATP is synthesized by oxidation of yolk, glycogen and other nutrients in order to provide energy for the completion of the cleavage.

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