E Content for student of Patliputra University, Patna

B.Sc. Part II Paper –IV

Subject:- Zoology Hons.

Topic:- Describe the various types of vertebrate egg and comment their early cleavage

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Q. 1. Describe the various types of vertebrate eggs and comment their early cleavage.

Ans. According to the amount of yolk following types of chordate eggs have been recognised–

(i) Alecithal–Eggs having no yolk.

Ex.– mammal.

(ii) Microlecithal eggs–The croa or eggs containing small amount of yolk and other reserve food substances are called microlecithal eggs. Ex–Amphioxus.

Tunicates and Eutherian mammals.

(iii) Mpsolecithal eggs–The ova or eggs containing moderate amount of yolk are called mesolecithal eggs.

Ex.–Petromyzentia, Amphibia etc.

(iv) Macrolecithal eggs–The macrolecithal eggs contain enormous food reserves or yolk.

Ex.–myxinoid, repitles, birds and monotremata.

According to the distribution of yolk in cytoplasm, eggs are of following types–

(a) Isolecithal–In microlecitha ! eggs the amount of yolk is so little that it remains scattered eventy throughout the egg cytoplasms.

(b) Telolecithal eggs–In mesolecithal and macrolecithal eggs, the yolk, due to its gravily is concentrated moare in are hemisphere than in the other, and such kind of eggs are called elalecithal eggs.

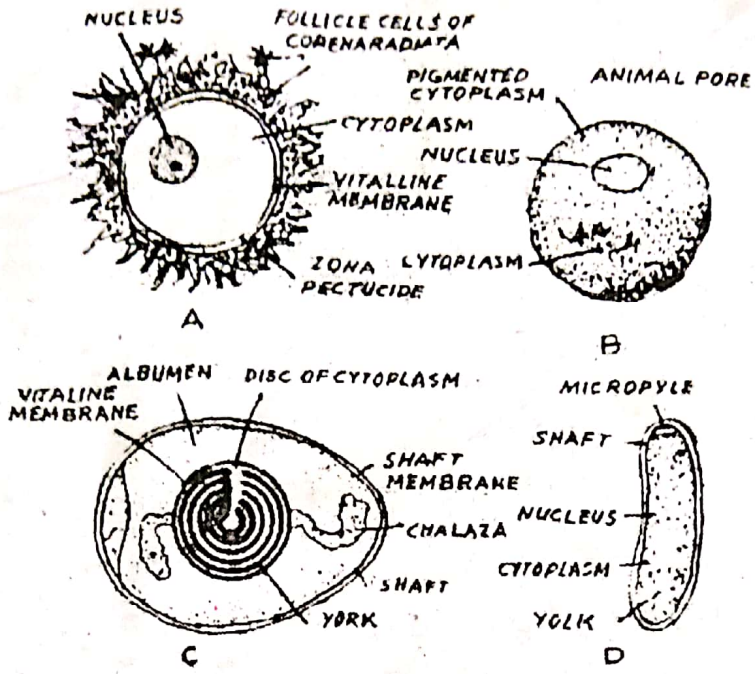
Cleavage–The division of an activated egg by a series of mitoic cell divisions into a multitude of cells which become the building units of future organism is called segmentation or cleavage.

Historical–First of old.

Swammerdan observed the first cleavage of the frog's egg in 1738. In 1780 Spallanzi described first two cleavage planes of foods the cleavage of the eggs of frog.

Rate of cleavage–The rate varies from species to species. For example in gold fish. Division follow each other continuously at regular intervals of 20 minutes. The intercleavage interval of Frog is one hour and mawse is 10 to 12 hours. The rate of cleavage is determined by the

cytoplasm rather than by the nucleus. The rate of cleavage is affected by temperature. Respiration varies with the temperature and so does cleavage rate. In the absence of oxygen or the presence of excess of CO_2 cleavage is inhibited.



The planes of cleavage–During cleavage different cleavage furrow may divide the egg from different planets. Few important cleavage following–

(i) Maridional plane of cleavage–When a furrow bisect both the poles of the egg passing through the median axis or centre of egg it is called the meriodional plane of cleavage.

Ex–Ist cleavage furrow of chick.

(ii) Vertical plane–The vertical plane of cleavage is a furrow which tends to pass in direction from the animal plate towards the vegetal pole but it does not pass the median axis of the egg.

Ex–3rd cleavage furrow of chick.

(iii) Equatorial plane of cleavage–This type of cleavage plane divides the egg halfway between the animal and vegetal planes and the line of division runs at right angle to the median axis.

Ex–Ist cleavage plane of eggs of higher mammal.

(iv) Latitudinal plane of cleavage– This is almost similar to the equatorial plane of cleavage, but the furrow runs through the cytoplasms or either side of the equatoril plane.

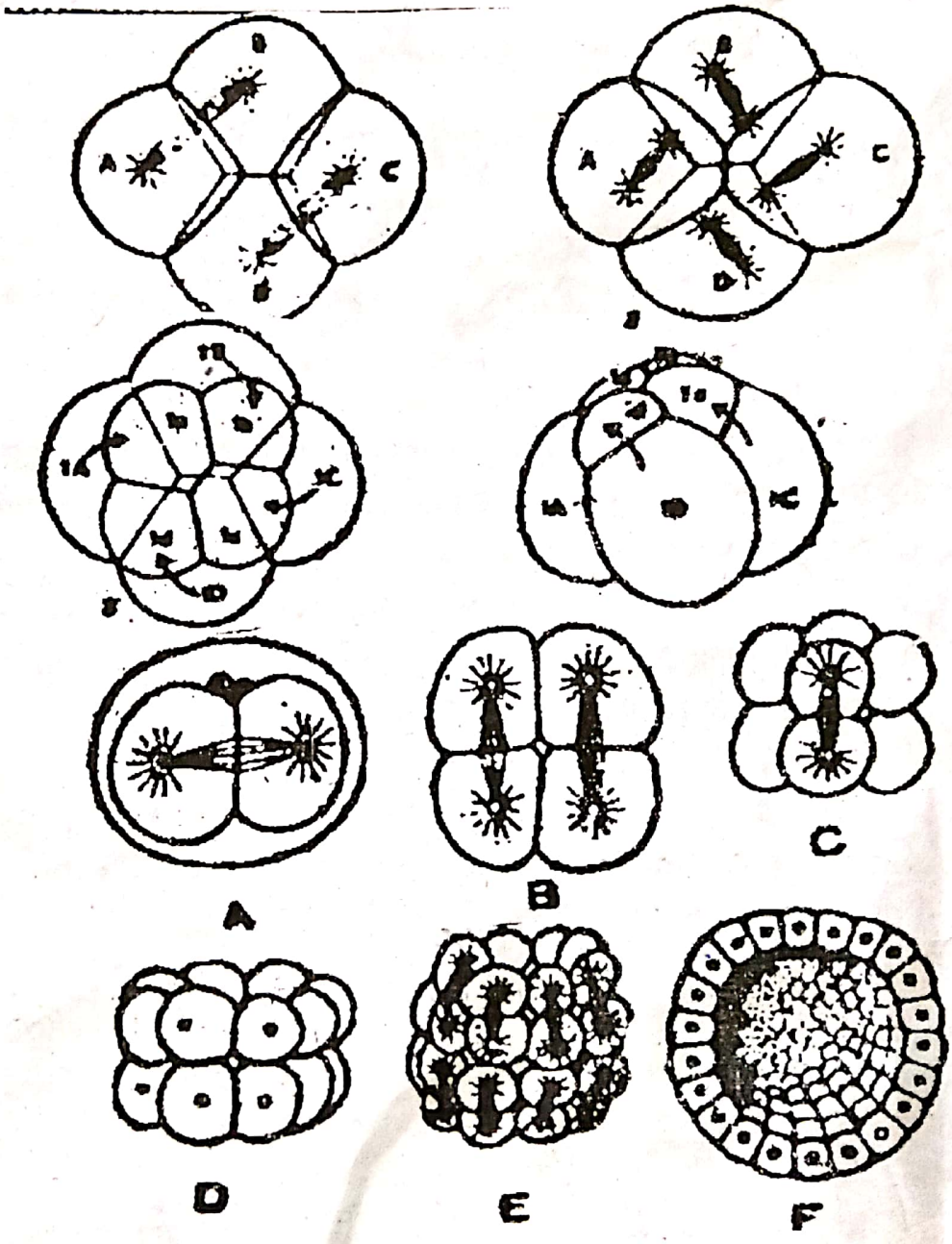
3rd cleavage plane of Amphioxus and frog.

Determination of planes of cleavage–The plane of cleavage is determined by the position of mitotic spindle of the dividing egg or blastomere. The plane of the cleavage remains always at right angles to the long axis of the spindle.

PATTERNS OF CLEAVAGE

The pattern of cleavage due to organization of egg may be of following types :

(i) Radial Cleavage–The radial cleavage occurs when the successive cleavage planes out straight through the egg at right angles to one another and resultant blastomeres become symmetrically disposed around the polar axis. e.g. – all animals having holoblastic cleavage such as synapta etc.



(ii) Biradial Cleavage–Biradial cleavage pattern arise when the three first division planes do not stand at right angles to each other. e.g. Acocla like Polychoerus.

(iii) The spiral cleavage is found in those forms in which there is a rotational movement of cells parts around the egg axis leading to a displacement of the mitotic spindle with respect to the symmetrically disposed radii.

e. g. – Annelida, Rotifera etc.

(iv) Bilateral Cleavage – In bilateral cleavage the mitotic spindles and cleavage planes remain bilaterally arranged with reference to plane of symmetry which coincides with the median plain of the embryo–e.g. – Amphioxus, Amphibia and higher mammals.

Significance of Cleavage– The significance of cleavage, morulation and blastulation compreses three aspects–

(a) Sub division of the embryonetic substrate int o a array of cells.

(b) Initiation of the process of cell differentiation.

(c) Creation of cell aggregate which through the activity of morphogenetic may be subjected to further morphological changes.