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Notes for B.Sc. part 2nd, paper IV(A).

Question :- Types of Vertebrate eggs
and their early cleavage pattern
Notes like :- ?

Answer :- Cleavage (embryo) :-

In embryology
cleavage is the division of
cells in the early embryo.
The process follows fertilization,
with the transfer being
triggered by the activation of
a cyclin dependant kinase complex.
The zygotes of many species
undergo rapid cell cycles with
no significant overall growth,
producing a cluster of cells the
same size as the original
zygote. The different cells derived
from cleavage are called blastome-
res and form a compact
mass called blastomeres and
form a compact mass called
the morula. Cleavage ends with
the formation of the blastula.

Mechanism :-

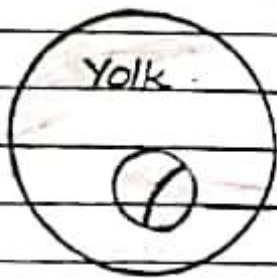
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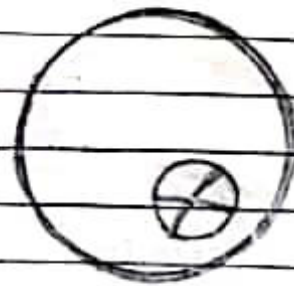
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The rapid cell cycles are facilitated by maintaining high levels of proteins that control cell cycle progression such as the cyclins and their associated cyclin-dependent kinases (cdk). The complex cyclin B / CDK1 a.k.a. MPF (maturation promoting factor) promotes entry into mitosis.

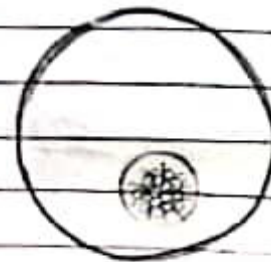
Types of Cleavage :-



2-cell stage



4-cell stage



later cleavages

Determinate :-

Determinate cleavage (also called mosaic cleavage) is in most protozoans. It results in

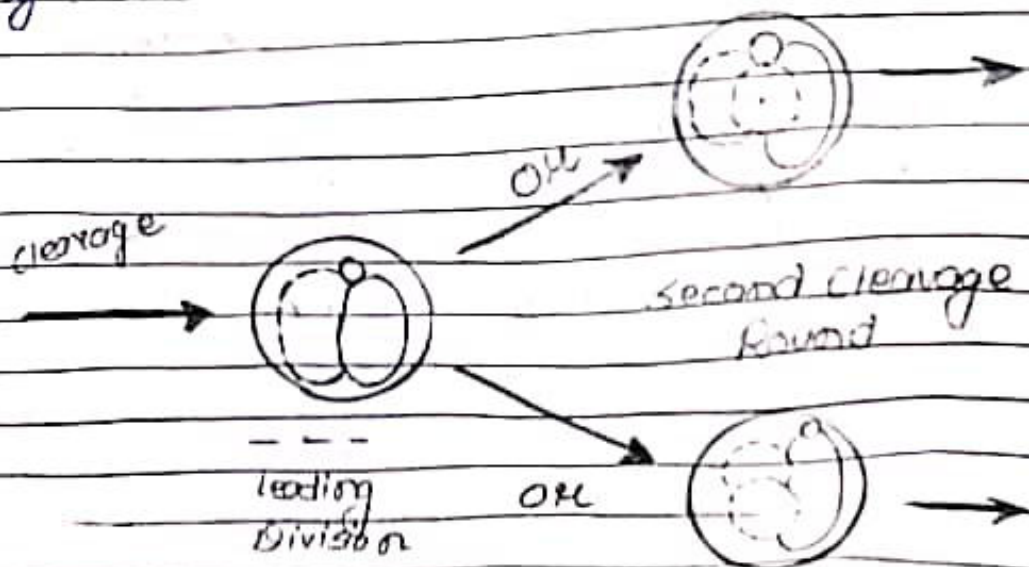
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the developmental fate of the cells being set early in the embryo development. Each blastomere produced by early embryonic cleavage does not have the capacity to develop into a complete embryo.

Indeterminate :-

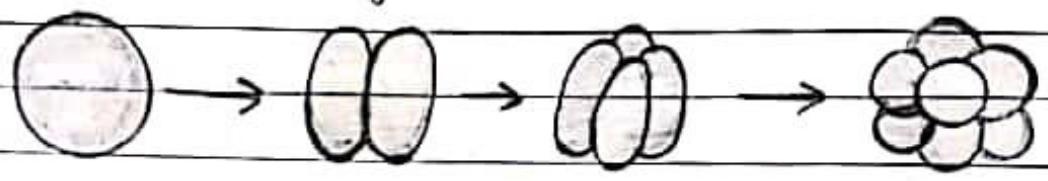
A cell can only be indeterminate (also called regulative) if it has a complete set of undisturbed animal / vegetal cytoarchitectural features. It is characteristic of deuterostomes - when the original cell in a deuterostome embryo divides, the two resulting cells can be separated, and each one can individually develop into a whole organism.



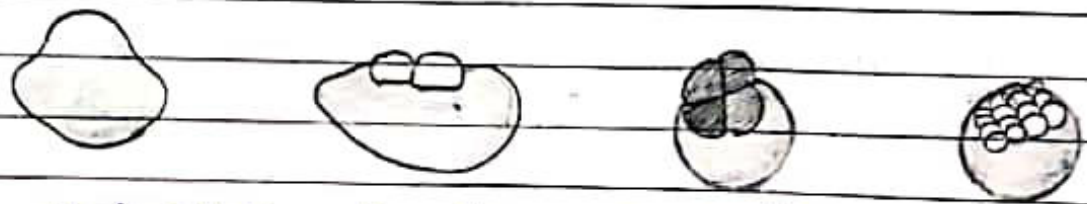
a Rotational cleavage. The first cleavage is a regular meridional ...

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Holoblastic cleavage :-



Meroblastic cleavage :-



Defination of cleavage pattern and morphogenesis

Spiral :-

Spiral cleavage is conserved between many members of lophotrochozoan taxa, referred to as spiralia. Most spiralian undergo equal spiral cleavage, although some undergo unequal cleavage (see below). This group includes can vary between species, but generally the first two cell divisions result in four macro-meres, also called blastomeres, (A, B, C, D) each representing one quarter of the embryo. Each quartet of micromeres is related relative to their parent macromere, and the chirality of this relative (to their parent)

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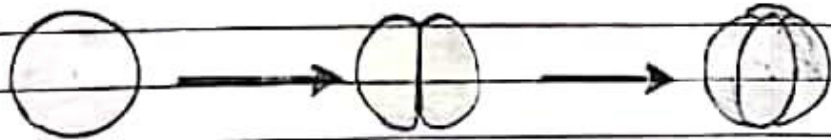
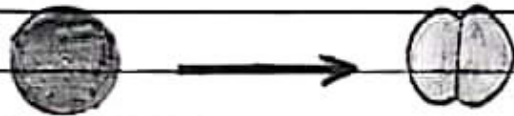
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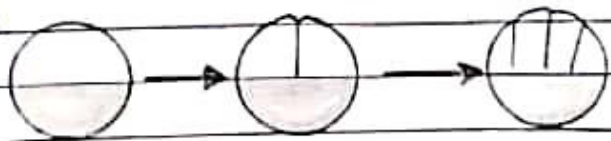
Cell Cleavage

A Fertilized egg is a zygote. The zygote splits and the resulting cells are blastomeres.

Holoblastic cleavage -
cleavage planes pass all the way through the cell.
Occurs in isolecithal and weakly telolecithal zygotes.



Morablastic cleavage -
cleavage planes do not pass through dense yolk, so blastomeres are not separated from each other.



- differs between odd and even numbered quartets, meaning that there is alternating symmetry between the odd and even quartets.