# Stemcell or Stem cell concept

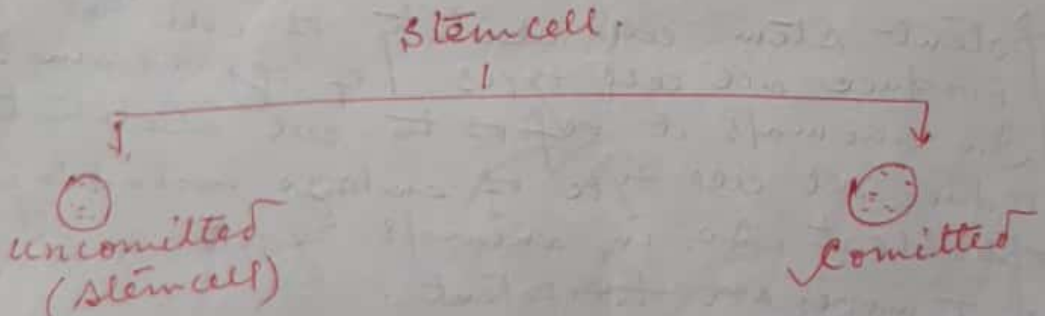
From Zygote to adult the development programme is highly controlled and co-ordenated and co-ordinated by different autonomous and external factors.

During the development some area of embryo acquire special properties called stemcellniche.

## Properties of cells present in stem cell niche :-

(a) Unlimited cell division capacity.
(b) Self renewal capacity.
(c) Remain relatively undifferenciated

When stem cell devides one daughter cell can follow any committed develop-mental programme but other daughter cell remain uncomitted.




Stem cell Potency :- is ability of a cell to Produce different cell types in all possible environments The cell fate is all different cell types produced by stem cells in a normal developmental programme in normal condition.

Normal environmental condition means developmental programme is not experimentally manipulated.

- The potency is the extrinsic property of the cell and prospective potency of a cell is either ≥ prospective fate. The fate map can be prepaired by staining the cell or, by introduction

② of reporter gene.

- In organism like Coenorhabditis elegans (nematode) the cell division is highly stereotyped and cell number in each organism is a constant so fate maps are accurate. In vertebrates cell migration and mixing is common during embryogeny so fat map is probabilistic.

Depending upon cell potency of stem cells they are classified as: —

① Totipotent: —

Example:-

a. 4-8 blastomeres.

b. Zygote.

Totipotent stem cell ability of cell to produce all cell types of organism. In animals it refers to cell ability to produce all cell type of embryo including trophoblast. So, in animals zygote & 4-8 blastomeres are totipotent.

② Pluripotent: - Example:- All cell types including inner cell mass except Trophoblast cell.

cell can produce all different cell types of embryo except trophoblast eg. inner cell mass of blastocyst of embryo.

③ Multipotent — Ability of cell to produce limited number of cell types.

eg. Adult stem cell like bone marrow cell.

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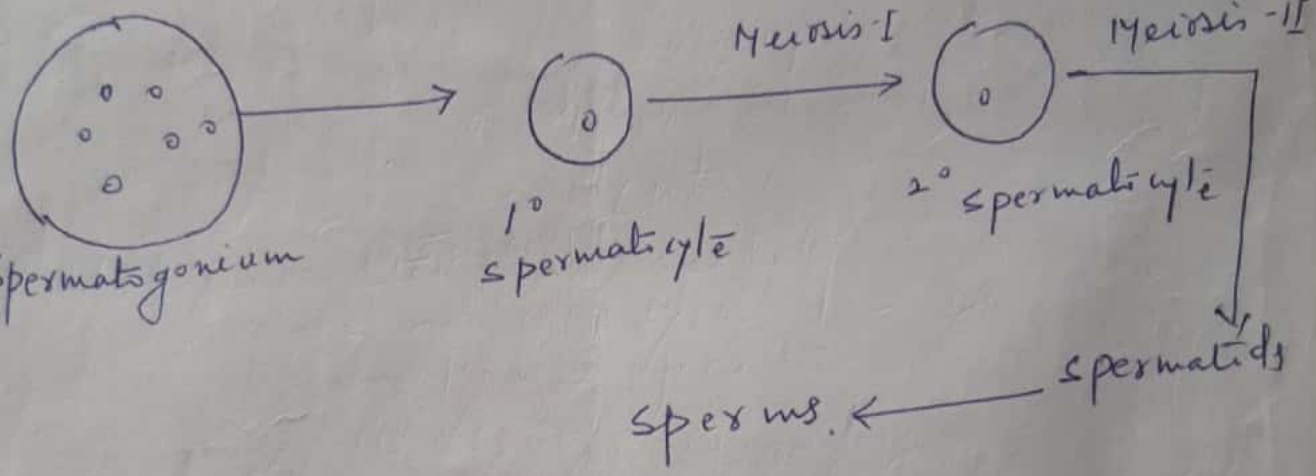
**Unipotent:-** These cells can produced single cell type. eg. cells of spermatogonia & oogonia.

Thus during animal developmental prospective potency & prospective fate of stem cells get restricted (In plants terminal differentiation never comes so every plant cell having nucleus remain totipotent)

**Progenitor cells:-**




Progenitor cell produced a particular cell type so they are similar to stem cells but differ from them with respect to:-

(a) limited number of cell division.
(b) Unability of self renewal.
(c) Thus progenitor cells are cells getting removed from stem cell niche & become committed for particular cell fate. Unipotent & multipotent stem cells also called committed stem cells.

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