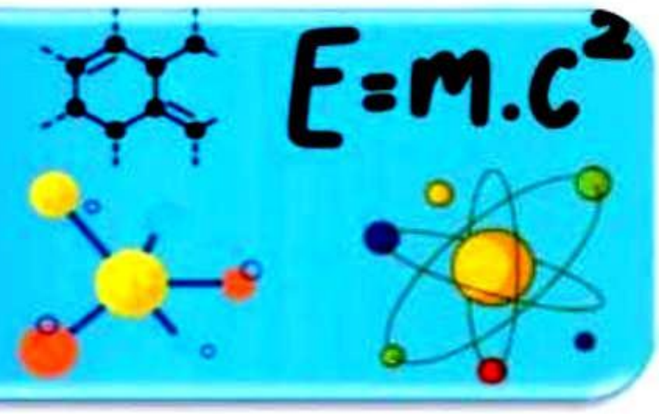
# EXPERIMENT




## AIM

**To study binary fission in Amoeba and budding in yeast and hydra with the help of prepared permanent slides.**

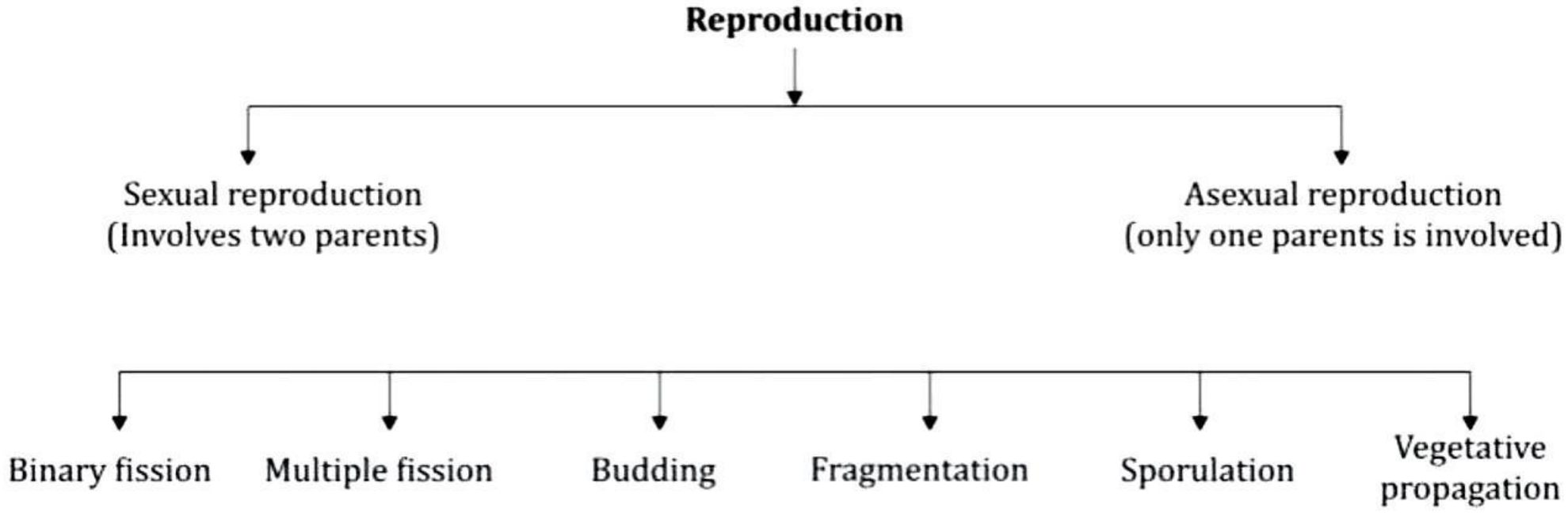
## MATERIALS REQUIRED

Permanent slides showing binary fission in Amoeba and budding in yeast, charts of binary fission and budding and a compound microscope.

## THEORY/PRINCIPLE

Reproduction is the ability of an individual to produce new generation of their own kind. This process involves the transmission of genetic material from parents to progeny which ensures that the similarities up to an extent are inherited by offspring.

Process of reproduction is of two types as shown in Fig. 1.




**Types of reproduction**

**Fig.1**

**Asexual reproduction** is the method of reproduction involving only one parent and there is no gamete formation. It is the process of rapid multiplication in which the new organisms or offspring produced are identical copies of the parent organism. These identical offspring are thus also referred to as clones. Binary fission and budding are forms of asexual reproduction commonly occurring in lower organisms like bacteria, Paramecium, Euglena, yeast, etc.

### Binary Fission

The type of asexual reproduction, in which the parent cell divides itself into two identical daughter cells by amitosis. The division of nucleus is called amitosis due to fact that the stages of a typical mitotic division are not observed in these cells. After division, the two daughter cells grow into adult cells, e.g., Amoeba.

### Budding

The type of asexual reproduction where the parent cell produces daughter cells by developing a small bud-like outgrowth. On maturation, it breaks off from the parent body by developing a separating wall between the bud and parent cell like in Hydra. If detachment does not occur, it leads to the formation of a long chain, e.g., yeast.

## PROCEDURE

**(i)** Take the permanent slides and mark them as slide 1 for Amoeba and slide 2 for yeast. Take slide 1 of Amoeba showing binary fission mode of asexual reproduction.

**(ii)** Focus the slide under low power of compound microscope.

**(iii)** Observe the slide carefully and record your observations.

**(iv)** Without removing the slide from the stage of compound microscope, the magnification or focus of the objective lens is changed from low to high.

**(v)** Observe carefully and note the stages occurring during binary fission.

**(vi)** Similarly, repeat the above steps (i to v) for slide 2 and observe the stages occurring during asexual reproduction by budding in yeast.

**(vii)** Draw well labelled diagram of different stages of binary fission in Amoeba and budding in yeast.

**(viii)** Compare the features with established characteristics of both types of asexual reproduction in the given organism.

## OBSERVATIONS

### 1. Binary Fission in Amoeba

**(i)** This is a type of asexual reproduction in which two daughter cells (or two individuals) are formed from a single parent.

**(ii)** Parent cell becomes elongated.

**(iii)** Nucleus divides first and then the cytoplasm divides.

**(iv)** At the point of fission, constriction appears and deepens to divide the cell into two daughter cells.

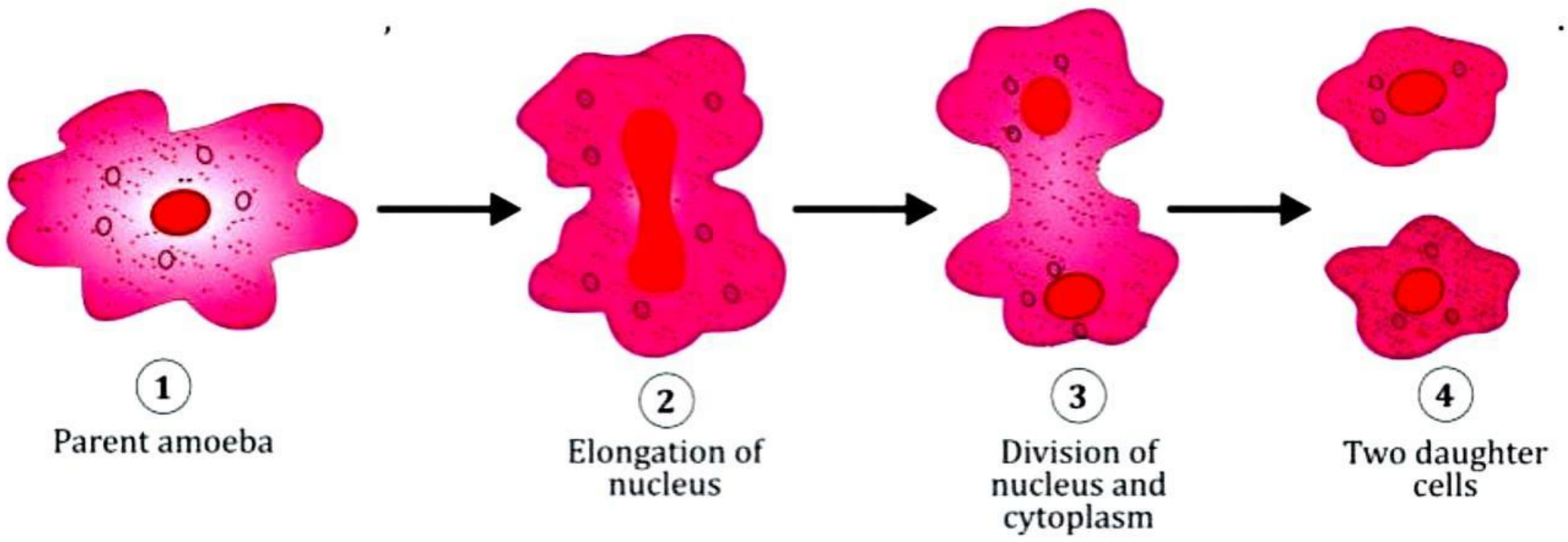



Fig.2

### 2. Budding in Yeast

**(i)** In this type of asexual reproduction, a small protuberance or outgrowth arises from the parent body called bud.

**(ii)** Nucleus divides to form two daughter nuclei, of which one passes into the bud.

**(iii)** The bud now detaches from the parent body and grows independently as a new individual or may remain attached to parent body, forming chain of cells.

**(iv)** Parental identity is not lost.

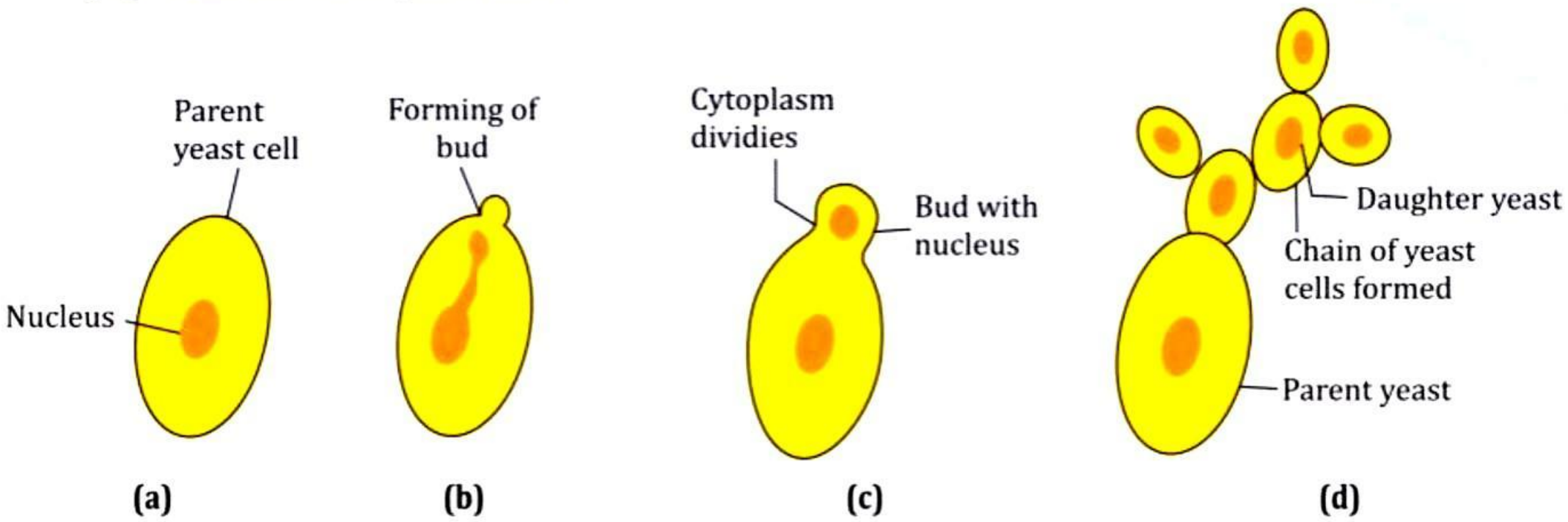



Fig.3

## 3. Budding in hydra

Hydra is a freshwater organism having different species.

**(i)** It is very small, just a half centimetre long.

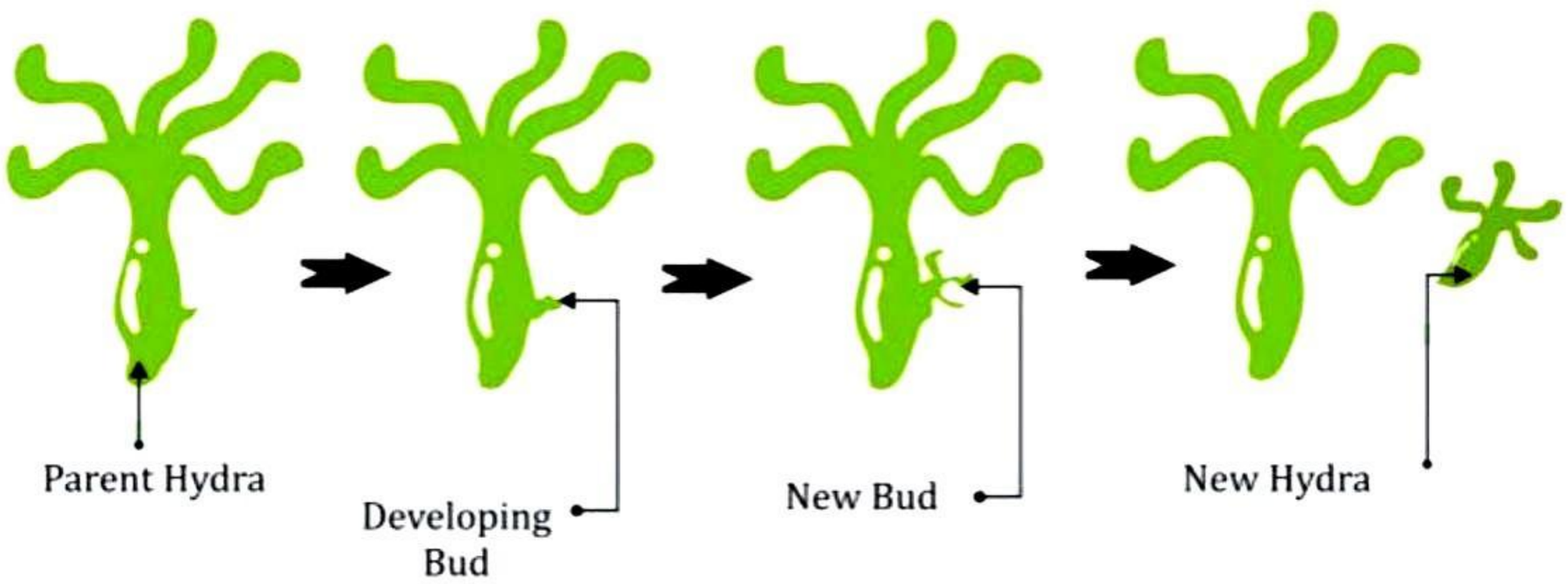
**(ii)** It has a tubular body which is composed of a head, distal end and a food at the end.

**(iii)** Budding in hydra involves a small bud which is developed from its parent hydra through the repeated mitotic division of its cells.

**(iv)** The small bud then receives its nutrition from the parent hydra and grows healthy.

**(v)** Growth starts by developing small tentacles and the mouth.

**(vi)** Finally, the small newly produced hydra gets separate from its parent hydra and becomes an independent organism.




## RESULT

**Slide 1 (Amoeba)**

The binary fission method of asexual reproduction in Amoeba is observed.

**Slide 2 (Yeast)**

The budding method of asexual reproduction in yeast is observed.

## PRECAUTIONS

**(i)** Slides should be handled carefully.

**(ii)** Clean the stage of microscope before and after the use.

**(iii)** Do not tilt the microscope and hold it vertically.

**(iv)** Slide should be firmly clipped on the stage.

**(v)** Focus the slides properly.

**(vi)** First observe under low power of objective and then change to high power lens for better and detailed study.

**(vii)** Keep microscope in box carefully when not in use.

## VIVA VOCE

**Q 1. What is reproduction?**

**Ans.** Reproduction is the process by which individuals produce offspring of their own species.

**Q 2. Out of sexual and asexual reproduction, which one leads to more variations among offspring. Why?**

**Ans.** Sexual reproduction leads to variations as it involves fusion of gametes and crossing over of chromosomes during gamete formation.

**Q 3. How is binary fission different from multiple fission?**

**Ans.** In binary fission, one cell divides to form two daughter cells, whereas in multiple fission, one cell forms several daughter cells.

**Q 4. Distinguish between budding in yeast and budding in Hydra.**

**Ans.** Yeast is a unicellular fungus. The bud formed is unicellular and may remain attached to parent cell, whereas bud in Hydra is multicellular and appears as branch. This branch separates from parent body and grows as separate individual.

**Q 5. Offspring formed by asexual reproduction are called clones. What are clones?**

**Ans.** All individuals which are morphologically and genetically similar to each other and are derived from a single parent are called clone.

**Q 6. What is vegetative propagation?**

**Ans.** It is a method of asexual reproduction in which a vegetative part of plant is used to produce new individual.

**Q 7. Amoeba is immortal. Comment.**

**Ans.** Amoeba divides into two by binary fission, each grows to live, and no dead body is left.

**Q 8. Why do we classify budding, fission or fragmentation as a type of asexual reproduction?**

**Ans.** All these are categorized as types of asexual reproduction as they all involve one single parent, and no gamete formation takes place.

**Q 9. Which type of cell division is involved in binary fission?**

**Ans.** Mitosis.

**Q 10. How many daughter cells are formed in binary fission?**

**Ans.** Each binary fission produces two daughter cells.

**Q 11. Why binary fission and budding are included under asexual reproduction?**

**Ans.** In both these processes, only one parent is involved in reproduction process. There is no formation and fusion of male and female gametes.