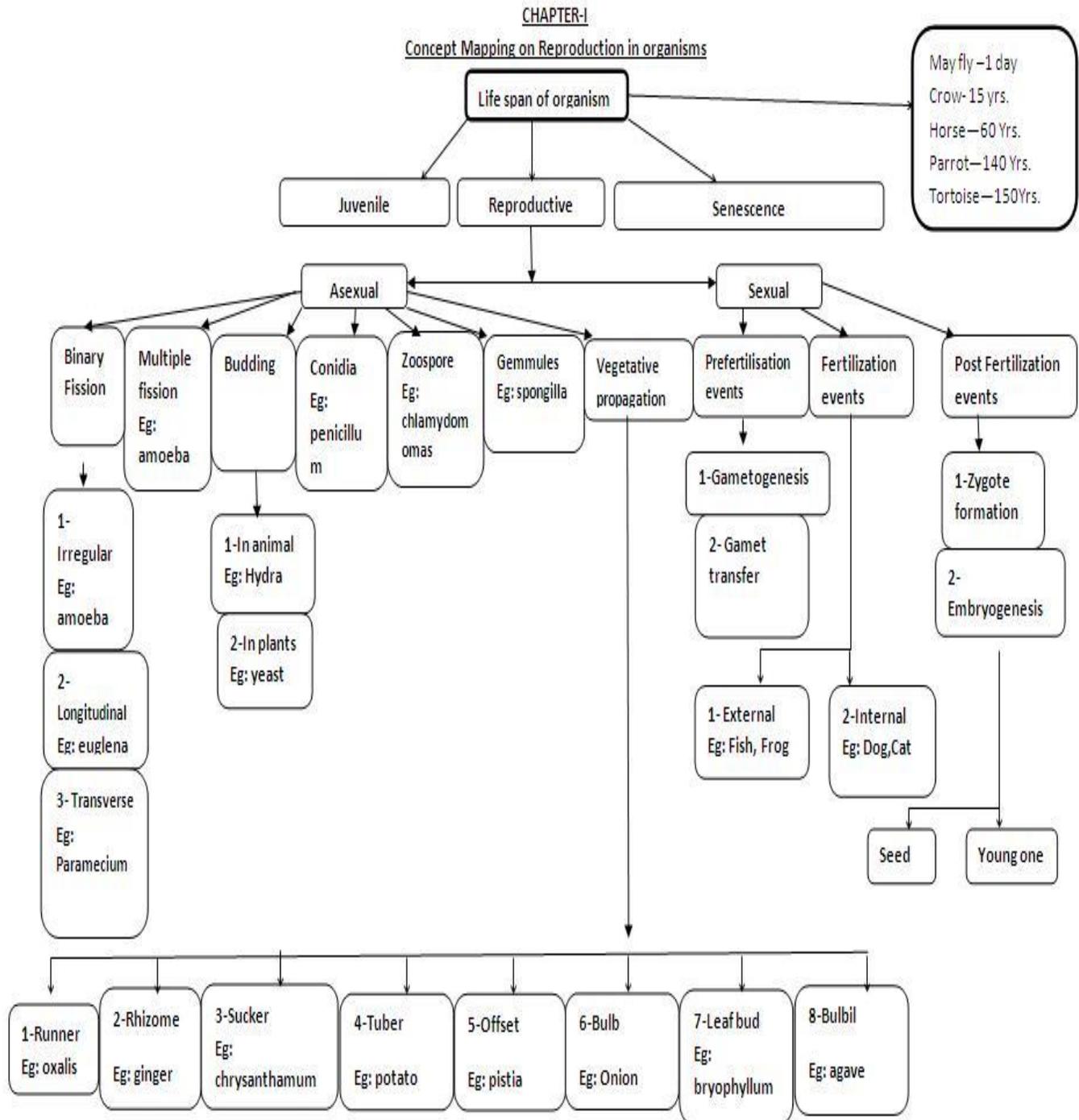


CHAPTER 1
REPRODUCTION IN ORGANISMS

TEACHING HOURS -05

WEIGHTAGE OF MARKS – 05



ONE MARK QUESTIONS

1. What is life span?

Life span is the period from birth to natural death of an organism.

2. Write the life span of the following organism/s.

ORGANISM	LIFE SPAN
Elephant	65 – 90 years
Lion	25 years
Horse	30-40 years
Dog	20-30 years
Cow	20 – 25 years
Crocodile	60 years
Tortoise	100 – 150 years
Crow	15 years
Parrot	140 - 150 years
Butter fly	1 - 2 weeks
Fruit fly	20 – 30 days
Ostrich	50 years
Banyan tree	More than 700 years
Banana plant	2 – 3 years
Rice plant	3 – 7 months

3. Define clone.

The individuals that are morphologically and genetically similar to the parent are called clone.

4. Mention the different means/ methods of asexual reproduction with example.

- Cell division - Protista, Monera
- Binary fission – Amoeba, Paramecium
- Budding – Yeast
- Zoospores (microscopic motile endogenous spores) – aquatic fungi, chlamydomonas
- Conidia (microscopic immotile exogenous spores)- penicillium
- External buds – hydra
- Internal buds like gemmules – sponges (spongilla)

5. Unicellular organisms are immortal. Justify.

Single celled organisms like amoeba & bacteria reproduce by cell division and there is no natural death for them. Hence they are considered as immortal.

6. How vegetative reproduction does take place in Bryophyllum?

The adventitious buds or epiphyllous buds arise from the notches present at the margin of leaves grow into independent plants.

7. Name the mode of reproduction that ensures creation of new variants.

Sexual reproduction.

8. How does the progeny formed from asexual reproduction differ from those formed by sexual reproduction?

The progeny formed from asexual reproduction are genetically similar to the parents, but offsprings formed by sexual reproduction show genetic variations due to genetic recombination occurred during gamete formation and random fertilization.

9. Name the species of plant that flowers once in life time.

Bamboo species flowers only once in life time generally after 50 – 100 years.

10. Between an annual and a perennial plant, which one has shorter juvenile phase? Give reason.

An annual has a shorter juvenile phase as its entire life cycle has to be completed in one growing season within a year.

11. Name the plant that flowers once in 12 years.

Strobilanthus kunthiana (Neelakuranji). It flowered during September – October 2006 which made the hilly areas of Karnataka, Kerala & Tamil Nadu appear as blue stretches.

12. In haploid organisms that undergo sexual reproduction, name the stage in the lifecycle when meiosis occurs?

Meiosis occurs during its post zygotic stage. As the organism is haploid meiosis cannot occur during gametogenesis.

13. A haploid organism produces gametes by mitosis. Does it mean that meiosis never occurs in such organisms

In haploid organisms meiosis occurs during the germination of zygote because the zygote is the only diploid cell in the life cycle of such organisms.

14. Write the chromosome number in meiocytes (2n) and gametes (n) for the following organisms.

Name of organism	Chromosome number in meiocytes(2n)	Chromosome number in gametes (n)
Human beings	46	23
House fly	12	6
Rat	42	21
Dog	78	39
Cat	38	19
Fruit fly	8	4
Butter fly	380	190
Ophioglossum(fern)	1260	630
Apple	34	17
Rice	24	12
Maize	20	10
Potato	48	24
onion	32	16

15. All papaya plants bear flowers but fruits are seen only in some. Why?

Papaya is a dioecious plant. Only female plants produce fruits.

16. Why is fertilization in bryophytes and pteridophytes considered as internal fertilization?

The fertilization occurs inside the archegonium of these plants.

17. Why are meiosis & gametogenesis always interlinked?

The diploid organisms have to produce haploid gametes by meiosis to maintain diploidy through generations. So they are always interlinked.

TWO MARKS QUESTIONS

1. Is there a relationship between the size of an organism and its life span? Justify your answer with two examples.

There is no relationship between the size and lifespan of an organism.

Eg: The size of crow and parrot is almost same but the life span is 15years and 150 years respectively.

The Mango tree has a shorter life span compare to a Peepal tree though both are of the same size.

2. Define reproduction. What is its significance?

Reproduction is a biological process in which an organism gives rise to young ones (off springs) of its own kind.

It enables the continuity of the species generation after generation. Thus ensures the continuity of every organism.

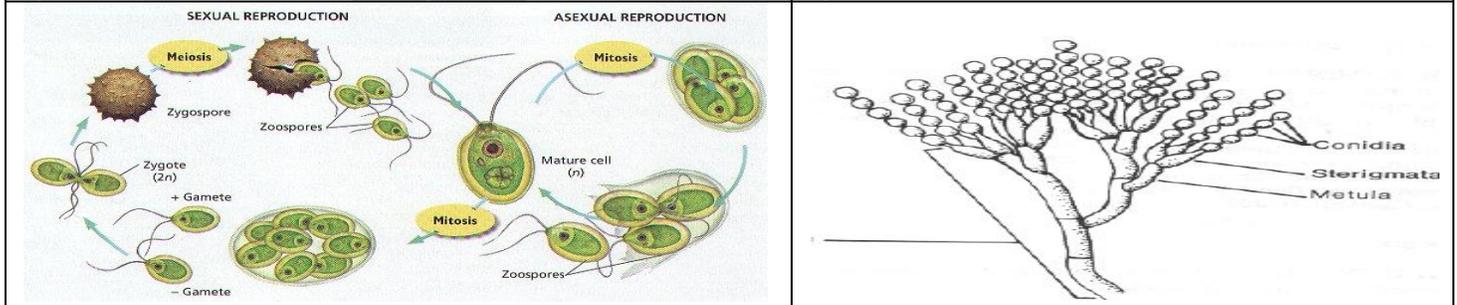
3. What is asexual reproduction? Mention its features.

It is a type of reproduction in which offspring are produced from a single parent without the involvement of the formation and fusion gametes. The features are

1. Uniparental
2. Somatic cells are involved
3. It involves the production of asexual spores
4. Offsprings are genetically similar to parents
5. The rate of reproduction is faster

4. What are the differences between Zoospore & Conidium?

ZOOSPORE	CONIDIUM
1. Flagellated	Non – flagellated
2. Motile spores	Non – motile spores
3. Formed inside sporangium (Endogenous)	Formed at the tip of conidiophores.
Eg: Chlamydomonas	Eg: Pencillium



5. What is regeneration? Give example.

Regeneration is a process in which the animal regrows or repairs its lost or damaged body parts.

Eg: Planaria, Star fish.

6. What is vegetative propagation? Why is it called asexual reproduction?

Vegetative propagation is a type of asexual reproduction in plants in which the somatic cells or vegetative parts give rise to new individuals. It is not biparental and does not involve the formation of gametes. So it is also called asexual reproduction.

7. What are vegetative propagules? Mention them with examples.

The somatic structures of plants involved in vegetative propagation are called vegetative propagules.

Vegetative propagules	Examples
Runner	Grass, Gladiolus, oxalis
Rhizome	Ginger, Banana
Sucker	Chrysanthemum
Tuber (eyes)	Potato
Offset	Water hyacinth(Eichhornia),Pistia
Bulb	Onion
Bulbils	Agave
Epiphyllous buds	Bryophyllum
Stolon	Marsilea
Adventitious tuberous roots	Dahlia
Stem cutting	Sugarcane

8. Although potato tuber is an underground part. It is considered as a stem. Give two reasons.

1. Potato tuber has nodes & internodes
2. Leafy shoots appear from the nodes

9. Which is a better mode of reproduction, sexual or asexual? Why?

Sexual reproduction is the better mode of reproduction, because the better offspring are produced with genetic variations. Such variations enable the organisms to survive in unfavorable conditions or adapt to changing environmental conditions.

10. Define the following with examples

a) Oestrus cycle : The cyclical changes in the activities of ovaries & accessory ducts as well as hormones secretion during the reproductive phase of non-primate mammals like cows, sheep, rats, deers, dogs, tigers etc., is called Oestrus cycle.

Monoestrus animal: Single oestrus cycle in a year. Eg: Deer.

Dioestrus animal: Two oestrus cycle a year. Eg: Dog.

Polyoestrus animal: Many oestrus cycles in a year. Eg: Mouse.

b) Menstrual cycle: The cyclical changes in the activities of ovaries & accessory ducts as well as hormones secretion during the reproductive phase of primate mammals like monkeys, apes & humans is called Menstrual cycle.

c) Seasonal breeders: These are the organisms that reproduce only in some favorable seasons.

Eg: Mammals living in natural & wild conditions.

d) Continuous breeders: These are the organisms that are reproductively active throughout their reproductive phase are called continuous breeders.

Eg: Human beings.

11. The cell division involved in gamete formation is not of the same type in different organisms. Justify.

In haploid organisms showing haplontic life cycle, gamete formation involves only mitosis. In these diploid zygote undergoes meiosis to produce haploid organisms.

In diploid organisms showing diplontic or haplo-diplontic life cycle, gamete formation involves meiosis. In these the zygote undergoes mitosis to produce diploid organisms.

12. Fertilization is not an obligatory event for fruit production in certain plants. Explain the statement.

Some fruits are developed from unfertilized ovary called **parthenocarpic fruits**. These are seedless fruits. Parthenocarpy can be induced by spraying growth hormones. So fertilization is not an obligatory event for fruit production. Example: grapes, pomegranate etc.

13. Define the following with examples

a) Bisexual animals or Hermaphrodites: The animals which possess both male and female reproductive organs in the same body. Eg: Tape worm, earth worm, leech, sponges etc.,

b) Unisexual animals or homophrodites: The animals which possess male or female reproductive organs. Eg: Cockroach, round worm, human. These exhibit sexual dimorphism.

c) Homothallic plants or bisexual or monoecious: The plant body having both male and female reproductive structures. Eg: Fungi, Hibiscus, cucurbita, coconut, chara, sweet potato.

d) Heterothallic plants or unisexual or dioecious: The plant body having either male or female reproductive structures. Eg: Papaya, Date palm, Marchantia

- The flowers with only stamens are called male flowers or staminate flowers.
- The flowers with only pistil are called female flowers or pistillate flowers.

14. The probability of fruit set in a self pollinated bisexual flower of a plant is far greater than dioecious plant.

Why?

In bisexual flowers, the anther and stigma lie close to each other and when the anther dehisce the pollen grains fall on stigma and pollination is effected even in the absence of pollinator. But in dioecious plants pollinator is necessary to bring about effective pollination.

15. Which of the following are monoecious and dioecious?

Earthworm – monoecious/hermaphrodite

Chara – monoecious

Marchantia – dioecious

Cockroach – dioecious/homophrodites

16. Both coconut and date palm produce staminate flowers. One is monoecious & the other is dioecious. Write the difference.

Coconut palm is monoecious. It bears staminate and pistillate flowers in the same plant.

Date palm is dioecious. It bears staminate flowers in one plant & pistillate flowers in another.

17. What are the differences between Zoospore & Zygote?

ZOOSPORE	ZYGOTE
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1. It is a microscopic haploid spore produced in sporangia.	It is a diploid cell formed by the fusion of male & female gametes.
2. It is motile having flagella.	It is non – motile, does not have flagella.
Eg: Phycomycetes, Green algae, Brown algae	Eg: Sexually reproducing plants & animals.

18. Identify each part in a flowering plant & write whether it is haploid or diploid or triploid.

- Ovary – diploid
- Anther – diploid
- Egg cell – haploid
- Pollen – haploid
- Male gamete – haploid
- Zygote – diploid
- Endosperm - triploid
- Embryo sac (female gametophyte) – haploid

19. What is parthenogenesis? Name an animal that shows parthenogenesis.

The process of development of unfertilized egg into an individual is called parthenogenesis.

Eg: Formation of drones (male bees) in honey bee colony.

20. Suggest a possible explanation why the seeds in pea pod are arranged in a row whereas those in tomato are scattered in the juicy pulp.

The pea pod is derived from a monocarpellary unilocular ovary with marginal placentation. So seeds are borne in rows along the junction of two margins of pod.

Tomato fruit is developed from bicarpellary ovary with axile placentation. So the seeds are embedded in the juicy pulp.

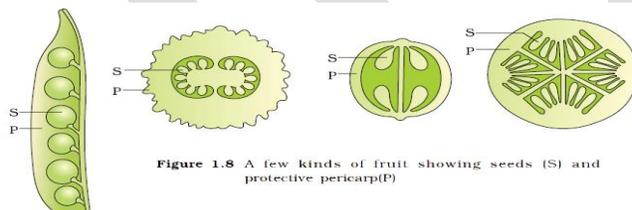


Figure 1.8 A few kinds of fruit showing seeds (S) and protective pericarp(P)

THREE MARKS QUESTIONS

1. What is sexual reproduction? Mention its features.

Sexual reproduction is a type of reproduction in which the offspring develop from the zygote which is formed by the fusion of male and female gametes of the same individual (bisexual) or different individuals of the opposite sex (unisexual). The features of sexual reproduction are

- Uniparental or biparental
- Formation and fusion of gametes takes place
- Offsprings are not identical to parents
- Offsprings show variations due to genetic recombination
- Offsprings have better chance of survival
- Rate of reproduction is slow

2. Distinguish between asexual and sexual reproduction.

Asexual reproduction	Sexual reproduction
1. Uniparental	Uniparental or biparental
2. Somatic cells are involved	Germ cells are involved
3. It involves the production of asexual spores	It involves the formation & fusion of gametes
4. Offsprings are genetically similar to parents	Offsprings are genetically dissimilar to parents
5. The rate of reproduction is faster	The rate of reproduction is slower

3. Define the following. / Explain the different stages of life cycle of living organisms.

a) Juvenile phase: It is a period of growth of organism before they can reproduce sexually.

It is followed by the reproductive phase. It is called vegetative phase in plants.

b) Reproductive phase: It is a period of growth of an organisms after juvenile phase, during which the organism undergoes morphological and physiological changes to attain sexual maturity and capable of producing gametes.

In angiosperms, flowering marks the beginning of reproductive phase.

c) Senescent phase or old age: It is the end of reproductive phase of an organism characterized by slowed metabolism and ultimately leads to death.

The transition of these three phases is regulated by hormones and environmental conditions.

4. Higher organisms have resorted to sexual reproduction in spite of its complexity. Why?

Higher organisms have resorted to sexual reproduction

- To ensure healthy progeny
- To produce genetically varied off springs that adapt to changes in environment & survive in all climatic conditions.
- As it ensures the genetic recombination that results in variation which are food for evolution.

5. What are the differences between menstrual cycle & oestrus cycle?

MENSTRUAL CYCLE	OESTRUS CYCLE
1. The cyclical changes in the activities of ovaries & accessory ducts as well as hormones during the reproductive phase of primate mammals is called Menstrual cycle.	The cyclical changes in the activities of ovaries & accessory ducts as well as hormones during the reproductive phase of non-primate mammals is called Oestrus cycle.
2. Females do not show irresistible sexual urge.	Females show strong irresistible sexual urge.
3. The shedding of endometrium & bleeding occurs.	Do not occur.
4. There is no heat period & copulation occurs during any part of the cycle.	There is estrus/heat production at the time of ovulation & copulation occurs only at that period.
Eg: monkeys, apes & humans	Eg: cows, sheep, rats, deers, dogs, tigers etc.,

6. Write the differences between Gametogenesis & Embryogenesis.

GAMETOGENESIS	EMBRYOGENESIS
1. It is the process of formation of gametes	It is the development of embryo from zygote.
2. It includes both meiosis & mitosis.	Zygotes undergo mitotic cell division & differentiation.
3. Gametes are haploid	The embryos are usually diploid.

7. What are the differences between external fertilization & internal fertilization?

EXTERNAL FERTILIZATION	INTERNAL FERTILIZATION
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1. The fertilization occurs outside the body of parents in water medium.	The fertilization occurs inside the body of female in body fluid.
2. The chances of fertilization are less.	The chances of fertilization are more.
3. More number of male and female gametes are formed.	More number of male gametes & less number of female gametes are formed.
4. offsprings are vulnerable to predators.	Offsprings are highly protected.
Eg: Bony fishes, frogs & algae.	Eg: members of Plantae, reptiles, birds & mammals.

8. Write the differences between oviparous & viviparous animals.

OVIPAROUS ANIMALS	VIVIPAROUS ANIMALS
1. These lay eggs	These give birth to young ones.
2. The eggs are covered by hard calcareous shell.	ovum are not covered by calcareous shell
3. After a period of incubation, the young ones hatch out.	The zygote develops into young ones inside the body of female.
4. The chances of survival of young ones are less due to predation & unfavorable environmental conditions.	The chances of survival of young ones is more because of proper embryonic care & protection by the mother.
Eg: Reptiles, birds.	Eg: Human beings.

9. What is bisexual flower? Write common & scientific names of any one bisexual flowers.

The flower having both androecium & gynoecium is called bisexual flower.

COMMON NAME	SCIENTIFIC NAME
1. Shoe flower	<i>Hibiscus rosasinensis</i>
2. Lady's finger	<i>Abelmoschus esculentus</i>
3. Castor	<i>Ricinus communis</i>
4. Brinjal	<i>Solanum melongena</i>
5. tomato	<i>Lycopersicon esculentum</i>

10. What is a seed? Name the plants having the largest and smallest seed.

Seed is a matured, fertilized ovule that possesses embryonic axis, cotyledon, seed coat & maybe endosperm.

Lodoicea (double coconut) is largest seed. **Orchid seed** is smallest seed.

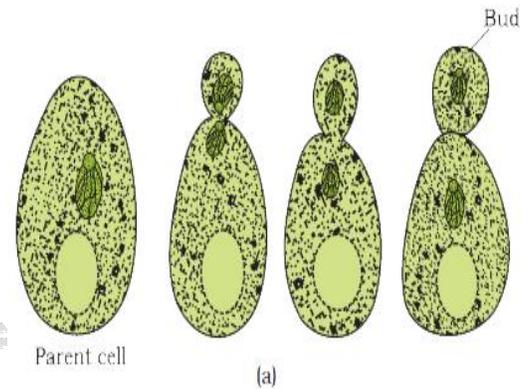
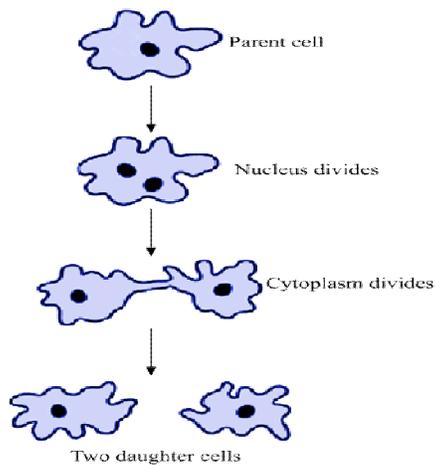
FIVE MARKS QUESTIONS

1. Explain the process of asexual reproduction in amoeba and yeast cells with the help of diagrams.

Asexual reproduction in amoeba takes place by binary fission. It is the division of parental cell into two equal halves and each half grows into an adult.

In amoeba the nucleus of the cell elongates and divides into two. This is followed by the division of cytoplasm resulting in two equal sized daughter cells.

In yeast, the cell division is unequal and small buds are formed. They remain attached initially to the parental cell and eventually get separated and mature into new yeast cells.



2. Explain the events of sexual reproduction.

The events of sexual reproduction are grouped under 3 distinct stages as follows:

i) Pre-fertilization events: These are the events prior to the fusion of gametes.

They are gametogenesis & gamete transfer.

a) Gametogenesis: It is the process of formation of haploid male and female gametes.

The shape and size of the gametes vary in different organisms.

- In algae like *Chlamydomonas* & *Cladophora* the male & female gametes are similar in their shape & size called **homogametes or isogametes**.
- The majority of sexually reproducing organisms produce two morphologically dissimilar gametes called **heterogametes**.

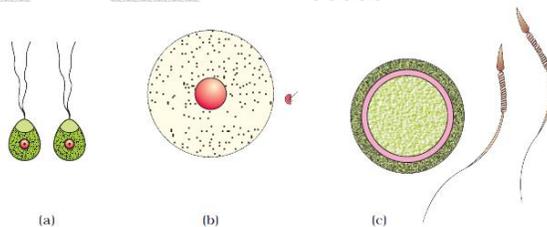


Figure 1.5 Types of gametes: (a) Isogametes of *Cladophora* (an alga); (b) Heterogametes of *Fucus* (an alga); (c) Heterogametes of *Homo Sapiens* (Human beings)

- Male gamete is called **sperm or antherozoid** & female gamete is called **ovum or egg**.
The type of cell division differs during gamete formation.
- The haploid parents produce haploid gametes by mitosis.
Eg: Monera, algae, fungi & bryophytes.
- The diploid parents produce haploid gametes by meiosis.
Eg: Pteridophytes, Gymnosperms, Angiosperms & human beings.
- The diploid organisms have specialized diploid gamete producing cells called **meiocytes or gamete mother cells** which undergo meiosis to produce haploid gametes.

b) Gamete transfer:

- In most of the organisms male gamete is motile & female gamete is stationary.
- But in some fungi & algae both are motile.
- In algae, bryophytes & Pteridophytes, the gamete transfer takes place through water.

- In seed producing plants pollen grains carry male gametes & ovules carry egg cell. The pollen grains are transferred to stigma called pollination.
- The dioecious animals have evolved some mechanisms and structures to transfer gametes for successful sexual reproduction.

ii) Fertilization events: Fertilization is a process of fusion haploid male gamete with haploid female gamete to produce a diploid zygote. It is also called **syngamy**.

There are two types of fertilization based on fertilization medium. They are,

a) External fertilization: The syngamy occurs outside the body of the parents in water medium.

Eg. Algae, fish, amphibians

b) Internal fertilization: The syngamy occurs inside the body of the female in body fluid.

Eg. Fungi, bryophytes, Pteridophytes, gymnosperms, angiosperms, cartilaginous fish, reptiles, birds and mammals

- In animals, the motile male gametes reach the egg in accessory reproductive structures.
- In flowering plants, the non-motile male gametes are carried to egg cell by pollen tube.

iii) Post fertilization events: The events in sexual reproduction after the formation of zygote are called post fertilization events.

a) The growth of the zygote differs in different individuals as follows.

- In algae and fungi, the zygote develops a thick wall which is resistant to desiccation and damage. It undergoes a period of rest before germination
- In the organisms of haplontic life cycle, the diploid zygote divides meiotically to produce haploid spores which grow into haploid individuals. Eg. Volvox, Spirogyra
- In the organisms of diplontic life cycle, the diploid zygote directly develops into a diploid individual. Eg. Gymnosperms, Angiosperms

b) Embryogenesis: It is the development of the embryo from the zygote. During this, zygote divides mitotically to produce a mass of cells which on differentiation forms specialized tissues and organs to form an organism.

In flowering plants, the post fertilization events include the development of

- Zygote into embryo
- Primary endosperm cell into endosperm
- Ovules into seeds
- Ovary into fruit with a thick fruit wall called pericarp
- Sepals, petals and stamens fall off
- Antipodals and synergids disappear
- Seeds after dispersal germinate into new plants under favorable conditions

OR

Changes occur in flowering plants:

Sepal	Fall off
Petal	Fall off
Stamen	Fall off
Zygote	Embryo
Primary endosperm nucleus	Endosperm (3 N)
Synergid	Disintegrate
Antipodals	Disintegrate
Ovary	Fruit
Ovule	Seed
Ovary wall	Pericarp (epicarp + mesocarp + endocarp)
Integument	Seed coat (testa + tegmen)

3. Fertilization leads to the formation of embryos.

a) Give the technical term for the development of embryo.

Embryogenesis.

b) What are the events that occur during embryo development?

Cell division & cell differentiation.

c) The development of the zygote depends on two factors. What are they?

Type of life cycle & environment.

d) How will you categorize animals based on the development of zygote outside or inside the female body?

Oviparous animals, Viviparous animals

e) How does zygote in fungi & algae overcome desiccation?

Zygote develops thick wall which is resistant to desiccation and damage. It undergoes a period of rest before germination.