

Reproduction in plants and animals as well as their vegetative Reproduction, Budding, Fragmentation etc.

REPRODUCTION IN PLANTS AND ANIMALS

Reproduction is a biological process in which organisms produce offsprings. It is essential for the continuity of species in all living organisms. Broadly, the process of reproduction can be divided into following two types

1. Reproduction in Plants

The plants can reproduce by both ways, i.e. asexually and sexually.

Asexual Reproduction in Plants

The asexual reproduction in plants takes place by the following methods.

(i) Vegetative Propagation

- New plants are produced from vegetative parts of the plants.
- Vegetative parts include roots, stems, leaves, etc.
- The vegetative units are called propagules.

Vegetative Propagule	Examples
Stems (by cutting)	Rose, sugarcane, cacti
Stems (by layering)	<i>Jasmine</i>
Leaves	<i>Bryophyllum</i>
Buds (eye)	Potato, ginger
Roots	Sweet potato, <i>Dahlia</i>

(ii) Budding

- New individual is formed from a small projection on parent body and forms bud.
- The bud grows and gets detached from the parent body.
- The detached part further grows, matures and forms new daughter cells, e.g. yeast.

(iii) Fragmentation

- The body of the parent breaks into small pieces called fragments. Each fragment grows up to become a new plant, e.g. Some algae (*Spirogyra*)

(iv) Spore Formation

The spores are asexual reproductive bodies where, under favourable conditions, spores germinate and develop a new individual, e.g. mosses, ferns, bread moulds, etc.

Sexual Reproduction in Plants

- **Flowers** are the reproductive part of a plant. They are considered as modified shoots.
- **Stamens** are the male reproductive organ. It is made up of filament and anther.
- **Anther** contains pollen grains that contain male sex cells (male gamete).
- **Pistil** is the female reproductive part of flower. It is made up of three parts-stigma (top), style (middle) and ovary (lower).
- **Ovary** makes ovules that contain female sex cells (egg cells).

Types of Flower

On the basis of the type of reproductive organs present in a flower, the flowers are of following types

- **Unisexual flower** The flower which contains only one reproductive organ (i.e. either male or female) is called unisexual flower. This is also called as incomplete flower, e.g. papaya, watermelon, cucumber, etc.
- **Bisexual flower** The flower that contains both reproductive parts (i.e. male and female) in a single flower is called a bisexual flower. This is also termed as hermaphrodite or complete flower, e.g. rose, mustard, *Hibiscus*, etc.

Various events occurring in plants during sexual reproduction are described below

Pollination

- The transfer of pollen grains from the anther of a stamen to the stigma of a pistil is called pollination.
- The process of pollination is carried out by external agencies like wind, water, insects, etc.
- Pollination takes place in two different ways
 - (i) **Self-Pollination** The pollen grain from the anther of one flower reaches to the stigma of the same flower. It generally occurs in a bisexual flower.
 - (ii) **Cross-Pollination** The pollen grains from the anther of a flower or of a plant are transferred to the stigma of a flower of the same plant or that of a different plant of the same kind. This transfer to another plant is mediated by insects, wind, water, animals, birds, etc.

Fertilisation

- The process in which the male gamete fuses with female gamete to form a new cell (called zygote) is called fertilisation.
- The zygote inside the ovary derives its food from the ovule.
- After the fertilisation, the ovary grows into the fruit and the ovule develops into the seeds.
- The seed contains an embryo enclosed by protective seed coat.

2. Sexual Reproduction In Animals

In animals, males and females have different reproductive parts or organs.

- (i) **The male reproductive organs** These organs include a pair of testis, two sperm ducts and a penis (external genital organ).
- (ii) **The female reproductive organs** These organs are a pair of ovaries, oviducts (Fallopian tube) and the uterus. Ovaries produce the female gamete called ova (or egg).

Fertilisation

The male and female gametes fuse to form a new cell called zygote.

- After fertilisation, the zygote begins to develop into an embryo. The embryo gets embedded in the walls of the uterus for further development.
- Various body parts begin to develop due to repeated divisions of cells.
- The stage of embryo in which all the body parts can be identified is called a **foetus**.
- When foetus develops completely, mother gives birth to the baby.

Types of Fertilisation

These are as follows

Internal Fertilisation

- The process of fusion of gametes taking place inside the female body is called internal fertilisation.
- It occurs in humans, cows, dogs, etc. Internal fertilisation takes place in hens also but hens do not give birth to babies like human beings and cows.

External Fertilisation

- The process of fusion of male and female gametes takes place outside the body of a female is called external fertilisation.
- It is commonly found in aquatic animals like frog, fish, starfish, etc.

Development of Embryo

- Fertilisation results in the formation of zygote which begins to develop into an embryo.
- The embryo continues to develop in the uterus.
- The stages of the embryo in which all the body parts can be identified is called a foetus.
- When the development of the foetus is complete, the mother gives birth to the baby.

Test Tube Baby

- In such cases, doctors collect freshly released egg and sperms and keep them together for a few hours for IVF or In Vitro Fertilisation (fertilisation outside the body). In case fertilisation occurs, the zygote is allowed to develop for about a week and then it is placed in mother's uterus. Babies born through this technique are called test tube babies.

Dolly, the Clone

- Cloning is the production of an exact copy of a cell, any other living part, or a complete organism. Cloning of an animal was successfully performed for the first time by Ian Wilmut and his colleagues at the Roslin Institute in Edinburgh, Scotland. They successfully cloned a sheep named Dolly. (Dolly was born on 5th July 1996 and was the first mammal to be cloned.)

Viviparous and Oviparous Animals

- The animals in which females give birth to young ones are called **viviparous animals**, e.g. humans, cows, cats, etc.
- The animals in which females lay eggs are called **oviparous animals**, e.g. frogs, hens, etc.
- The new individuals which are born or hatched from the eggs continue to grow till they become adults.
- In some animals, the young ones may look very different from the adults, e.g. the life cycle of the silkworm
Egg → Larva or caterpillar → Pupa → Adult
- The process of transformation of larva to an adult through a series of drastic changes is referred to as **metamorphosis** such as in frog, silkworm, butterfly, etc.

Reaching the Age of Adolescence

- The stage of growth of a baby from birth to about 2 years of age is called **infancy**. During this period, a baby learns to sit, stand, walk, etc. The stage of growth of a child from 2-12 years of age is called **childhood**.
- On crossing the age of 11-12, there is a sudden increase in growth which becomes noticeable.

This period of transition from childhood to adulthood is called **adolescence**.

- In this period of life, the body undergoes changes leading to **reproductive maturity**.
- Growth of the body is an important character during puberty. The rapid growth is due to the two main types of hormones, i.e. **sex hormones** and **growth hormones**.
- Some of the conspicuous changes which take place during puberty are given below:
 1. Increase in height.
 2. Change in voice of boys.
 3. Increased activity of sweat and sebaceous glands.
 4. Attainment of mental, intellectual and emotional maturity.
 5. Development of secondary sexual characters in boys and girls.

- The male hormone (testosterone) and female hormones (oestrogen) play important role in the puberty and adolescence. The maturation of sex organs and appearance of secondary sexual characters in both (boys and girls) occur under the influence of these sex hormones.

Role of Hormones in Completing the Life History of Insects and Frogs

- We have studied the life cycle of a silk moth and the frog. The caterpillar has to go through various stages to become an adult. Similarly, the tadpole passes through certain stages to become a frog. These changes from larva to adult is called **metamorphosis**. The process of metamorphosis in insects is controlled by **insect hormones**.
- In a frog, the process is regulated by **thyroxine** hormone produced by **thyroid** gland. A tadpole cannot become an adult if there is deficiency of iodine in the water where it is growing.

PRACTICE EXERCISE

1. Reproduction is
 - (a) biological process of producing young ones
 - (b) non-biological process of producing young ones
 - (c) biological process of producing mature ones
 - (d) None of the above
2. Asexual reproduction is common in
 - (a) single-celled organisms
 - (b) plants with relatively simple organisation
 - (c) animals with relatively simple organisation
 - (d) All of the above
3. Which type of reproduction amongst the following involves single parent?
 - (a) Sexual reproduction
 - (b) Asexual reproduction
 - (c) Both (a) and (b)
 - (d) None of the above
4. The production of an exact copy of an animal by asexual reproduction is known as

(a) budding	(b) mating
(c) cloning	(d) hatching
5. Onion is propagated through its

(a) tubers	(b) bulbs
(c) seeds	(d) rhizomes
6. The eyes of potato are

(a) flower buds	(b) shoot buds
(c) vegetative structure	(d) None of these
7. Layering is the most common method of reproduction in which of the following plants?

(a) <i>Jasmine</i>	(b) Rose
(c) Guava	(d) None of these

8. Examples of vegetative propagation are
(a) rhizome (b) tuber
(c) offset (d) All of these
9. The reproduction in *Bryophyllum* takes place
(a) buds on leaves (b) buds on stem
(c) roots (d) flower
10. The vegetative reproduction in rose takes place by
(a) eyes (b) cutting
(c) leaves (d) grafting
11. Which amongst the following is the reproductive part of the plant?
(a) Leaf (b) Flower
(c) Stem (d) Root
12. Pollen grains are found in
(a) carpel (b) stigma
(c) anther (d) None of these
13. Male gametes are also called
(a) antherozoid (b) sperm
(c) egg (d) Both (a) and (b)
14. Female gametes are also called
(a) egg (b) ovum
(c) Both (a) and (b) (d) antherozoid
15. The reproductive part of a plant is the
(a) leaf (b) stem
(c) root (d) flower
16. Pollen grains are
(a) male reproductive structure
(b) spore mother cell
(c) male sperm cell
(d) female structure
17. In human beings, the correct sequence of events during reproduction is
(a) gamete formation, fertilisation, zygote formation, embryo
(b) embryo, zygote formation, fertilisation, gamete formation
(c) fertilisation, gamete formation, embryo, zygote formation
(d) gamete formation, fertilisation, embryo, zygote formation
18. In the list of animals given below, hen is the odd one out.
Human being, cow, dog, hen. The reason for this is
(a) it undergoes internal fertilisation
(b) it is oviparous
(c) it is viviparous
(d) it undergoes external fertilisation
19. Which of the following is not a part of the human male reproductive system?
(a) Testes (b) Oviducts
(c) Seminal vesicles (d) Epididymis
20. After fertilisation, the resulting cell which gives rise to a new individual is the
(a) embryo (b) ovum
(c) foetus (d) zygote
21. The egg laying mammals are
(a) Platypus
(b) Echidna
(c) Both (a) and (b)
(d) None of the above
22. The belief that the mother is completely responsible for the sex of the child is wrong because the child
(a) gets sex chromosome only from the mother
(b) develops in the body of the mother
(c) gets one sex chromosome from the mother and the other from the father
(d) gets sex chromosome only from the father
23. The faulty functioning of an endocrine gland can make a person very short or very tall. This gland is
(a) thyroid (b) pituitary
(c) adrenal (d) pancreas
24. The beginning of menstruation at puberty is called
(a) ovulation (b) menstruation
(c) menarche (d) menopause
25. The male hormone is
(a) oestrogen (b) progesterone
(c) testosterone (d) All of these

- 26.** The most conspicuous visible change that occurs in boys during puberty is
 (a) development in voice box
 (b) increase in height
 (c) production of sperms
 (d) increased sweating
- 27.** Given below are events that lead to pregnancy and development of embryo.
 (i) Fertilisation of egg
 (ii) Maturation of egg
 (iii) Release of egg
 (iv) Embedding of embryo in uterus
 Which of the following options gives the correct order of sequence in which they occur?
 (a) (i), (ii), (iii), (iv)
 (b) (ii), (i), (iii), (iv)
 (c) (i), (iv), (ii), (iii)
 (d) (ii), (iii), (i), (iv)
- 28.** The dramatic changes in body features associated with puberty are mainly because of the secretions of
 (i) Thyroxine (ii) Oestrogen
 (iii) Adrenaline (iv) Testosterone
 (a) (i) and (ii) (b) (ii) and (iii)
 (c) (i) and (iii) (d) (ii) and (iv)
- 29.** Pimples and acne are formed due to the increased activity of
 (i) Adrenal glands (ii) Sebaceous glands
 (iii) Thyroid gland (iv) Sweat glands
 (a) (i) and (ii) (b) (ii) and (iii)
 (c) (i) and (iii) (d) (ii) and (iv)
- 30.** Adolescents should be careful about what they eat, because
 (a) proper diet develops their brains
 (b) proper diet is needed for the rapid growth taking place in their body
 (c) adolescents feel hungry all the time
 (d) taste buds are well-developed in teenagers

Answers

1	(a)	2	(d)	3	(b)	4	(c)	5	(b)	6	(c)	7	(a)	8	(d)	9	(a)	10	(b)
11	(b)	12	(c)	13	(d)	14	(c)	15	(d)	16	(a)	17	(a)	18	(b)	19	(b)	20	(d)
21	(c)	22	(c)	23	(b)	24	(c)	25	(c)	26	(a)	27	(d)	28	(d)	29	(d)	30	(b)