

Revision Notes on Reproduction in Organisms

Reproduction:

- (1) Reproduction is defined as a biological process in which every living organism give rise to new organisms similar to themselves.
- (2) Basic features of reproduction:
- (i) Replication of DNA
 - (ii) Cell division (only mitotic, or both mitotic and meiotic)
 - (iii) Formation of reproductive bodies or units.
 - (iv) Development of reproductive bodies into offsprings.

Difference between Asexual and Sexual Reproduction

S.No.	Asexual Reproduction	Sexual Reproduction
1)	Offsprings are produced by single parents.	Involvement of single or two individual.
2)	New individual develops from one cell or a vegetative body part of one parent.	New individual develops from zygote or fusion product of two gametes, which may or may not be produced by two parents.
3)	Offsprings are genetically identical to their parents.	The offsprings are not genetically identical with their parents.
4)	Involves only mitotic divisions.	Involves meiosis at one or the other stage.
5)	It does not require the formation of sex organs.	Formation of sex organs is a pre-requisite for sexual reproduction.
6)	It does not introduce variability. Hence has no evolutionary importance.	It introduces variability and is, hence of evolutionary importance.

Asexual Reproduction

Asexual reproduction in plants

In flowering plants there are two main types of asexual reproduction:

(a) Agamospermy – The formation of embryo without fertilization and meiotic division. There are three different types of agamospermy:

- (i) Diplospory
- (ii) Adventive embryony
- (iii) Apospory

(b) Vegetative propagation –

(i) Plants belonging to this category propagates by a part of their body other than a seed. The structural unit that is employed in place of seed for the propagation of new plants is called **propagule**.

(ii) In angiosperms any parts of the plants – roots, stems and leaves can be used for vegetative propagation.

(5) Following are the asexual reproductive structures:

(a) **Zoospores:** aquatic fungi, *Chlamydomonas*

(b) **Conidia:** *Penicillium*

(c) **Bud:** *Hydra*

(d) **Gemmules:** *sponges*

(6) Below given are the vegetative propagation units in plant: (Vegetative propagules)

Runner, rhizome, sucker, tuber, offset, bulb

Sexual reproduction:

Sexual reproduction involves fusion of male and female gametes by the process of fertilization.

Features of sexual reproduction:

(a) The period between birth and sexual maturity is called juvenile phase.

(b) Juvenile phase is also known as vegetative phase in plant.

(c) **Oestrus cycle:** The cyclical changes during reproduction in non-primate mammals like cows, sheep, rats, deers, dogs, tiger etc.

(d) **Menstrual cycle:** The cyclical changes during reproduction in primate mammals like monkeys, ape, and humans.

(e) **Seasonal breeders:** The reproductive cycle takes place only in favorable seasons as in wild animals.

(f) **Continuous breeders:** They are reproductively active throughout their reproductive phase.

(g) **Gametogenesis** is the process of gamete formation.

(h) **Isogametes** are one of a pair of conjugating gametes, exhibiting no differences in form, size, structure, or sex.

(i) Gametes produced of two morphologically distinct types are called heterogametes.

(j) Male gamete is called antherozoid or sperm and the female gamete is called ovum or egg.

Sexuality in organism:

(a) Plants having only one sex organ is called heterothallic or dioecious.

(b) Plants having both male and female sex organ called homothallic or monoecious.

(c) In flowering plants, the unisexual male flower is staminate (bearing stamens), while the female is pistillate (bearing pistils).

(d) Animals having one type of reproductive system are called unisexual.

(e) Animals having both male and female reproductive system are called hermaphrodite or bisexual.

Cell division during gamete formation:

(a) Gametes in all heterogametic species are of two types namely male and female.

(b) Gametes are always haploid irrespective of parent's ploidy.

(c) Gametes are produced by a haploid parent by mitotic division.

(d) Gametes are produced by a diploid parent by meiotic division.

- (e) In diploid organisms specialized cells called meiocytes undergo meiosis to produce haploid gametes.

Gamete transfer:

- (a) Male and female gamete must be physically brought together to facilitate fusion called fertilization.
- (b) In most cases female gametes are non-motile, male gametes are motile.
- (c) In case of few fungi and algae, both male and female gametes are motile.
- (d) In most cases the medium for gamete transfer is water.
- (e) Number of male gametes produced is several thousand times the number of female gametes produced to compensate the loss during transfer.

Fertilization:

- (a) The process of fusion of male and female gamete is called **fertilization or syngamy**.
- (b) The female gamete undergoes development to form new organism without fertilization. This phenomenon is called **parthenogenesis. It is a modification of sexual reproduction**.
- (c) Gametic fusion taking place outside the body i.e. water is called **external fertilization**.
- (d) There must be synchrony of gamete release. Large number of gametes is released to enhance the chance of fertilization.
- (e) A major disadvantage is that the offsprings are extremely vulnerable to predators.
- (f) Fertilization takes place inside the body is called **internal fertilization**.

Zygote:

- (a) Formation of zygote after fertilization is found in all sexually reproducing organisms.
- (b) In case of **external fertilization**, zygote is formed usually **in water**.
- (c) In case of **internal fertilization**, zygote is formed **inside the body** of the organism.
- (d) Zygote of fungi and algae develops a thick wall that is resistant to desiccation and damage.
- (e) Organism with haplontic life cycle, zygote undergoes meiosis to produce haploid spores.

Embryogenesis:

- (a) The process of development of zygote into an embryo is called **embryogenesis**.
- (b) Zygote undergoes cell division (mitosis) and cell differentiation.
- (c) Oviparous are the animals which lay eggs and development takes place inside egg.
- (d) Viviparous animals give birth to the young ones. The development takes place inside the body of the female.
- (e) In plants:
 - (i) Zygote developed into embryo.
 - (ii) Ovule developed into seed
 - (iii) Integument of the ovule developed into seed coat.
 - (iv) Ovary developed into fruit.

(v) Ovary wall developed into pericarp.

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