UNIT I

Chapter -1

REPRODUCTION IN ORGANISMS

MUST KNOW DEFINITIONS

Asexual reproduction	:	Reproduction by single parent involving amitotic or mitotic divisions only.
Sexual reproduction	:	Participation of two individuals and involves formation of male and female gamete.
Fission	:	Division of parent body into two or more identical Daughter individuals.
Binary fission	:	Parent organism divides into two daughter cells.
Multiple fission	:	Parent body divides into many similar daughter cells.
Strobilation	:	A special type of transverse fission giving rise to number of individuals.
Budding	:	Parent body produces one or more buds which separate from the parent and lead an independent life
Gemmule	:	Internal buds formed is sponge which can tolerate adverse conditions and are a means of asexual reproduction.
Apolysis	:	Separation of gravid proglottids from the body of a tape worm.
Regeneration	:	Regrowth in the injured region.
External fertilization	:	Fusion of male & female gametes takes place outside the body of the female organism.
Internal fertilization	:	Fusion of male and female gametes takes place within the body of the female organism.
Fertilization	:	Fusion of male & female gametes.
Conjugation	:	Type of sexual reproduction between two individuals, where certain amount of nuclear material exchange takes place after which they separate.
Parthenogenesis	:	Development of an egg into a complete individual without fertilization.
Oviparous condition	:	Young ones hatch from eggs laid outside the mother's body.
Viviparous condition	:	Animals give birth to young ones.
Ovoviviparous conditions	:	Embryo develops inside the eggs and remains in the mother's body until they are ready to hatch.

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Public Exam Frequently Asked Questions

Choose the Correct Answer — 1 Mark

1. In which type of parthenogenesis are only males produced? *[QY-2019; FRT & July-'22]*

(a) Arrhenotoky (b) Thelytoky
(c) Amphitoky (d) Both a and b

[Ans. (a) Arrhenotoky]

2. The mode of sexual reproduction in bacteria is by *[Aug-2021]*

(a) Formation of gametes
(b) Endospore formation
(c) Conjugation (d) Zoospore formation

[Ans. (c) Conjugation]

3. In which mode of reproduction variations are seen *[FRT & May-'22]*

(a) Asexual (b) Parthenogenesis
(c) Sexual (d) Both a and b

[Ans. (c) Sexual]

4. What is Parthenogenesis? Give two examples from animals. *[QY-2019; Aug-2021; FRT & May-'22]*

Ans. ***(i)*** Development of an egg into a complete individual without fertilization is known as parthenogenesis.

(ii) Parthenogenesis is of two main types namely, **Natural Parthenogenesis** and **Artificial Parthenogenesis**.

(iii) **Natural Parthenogenesis - Ex:** Honey bees, Gall fly

(iv) **Artificial Parthenogenesis - Ex:** Annelid, Seaurchin

5. Which among the following animals exhibit ovoviviparity? *[Govt.MQP-2019]*

(a) frog (b) shark
(c) sheep (d) hen

[Ans. (b) shark]

6. *Plasmotomy* means *[PTA-2]*

(a) Mononucleated parent divides into two mononucleated individuals.
(b) Multinucleated parent divides into two mononucleated invividuals.
(c) Multinucleated parent divides into many mononucleated individuals.
(d) Multinucleated parent divides into many multinucleated daughter individuals.

[Ans. (d) Multinucleated parent divides into many multinucleated daughter individuals]

7. Human beings are unisexual animals, the type of syngamy in human beings is *[PTA-3]*

(a) autogamy (b) exogamy
(c) hologamy (d) paedogamy

[Ans. (b) exogamy]

8. In hydra, the buds develop from *[PTA-4]*

(a) ectoderm layer only
(b) ectoderm and endoderm layers
(c) ectoderm, mesoderm and endoderm layers
(d) ectoderm and mesoderm layers

[Ans. (b) ectoderm and endoderm layers]

9. The primary and secondary hosts of Tape worm are respectively. *[PTA-5]*

(a) Mosquito and man
(b) Man and housefly
(c) Cattle and man
(d) Man and pig **[Ans. (d) Man and pig]**

10. Which one of the following is an example for exogamy? *[FRT-'22]*

(a) Actinosphaerium (b) Paramecium
(c) Trichonympha (d) Human

[Ans. (d) Human]

Very Short Answers — 2 Marks

1. Which type of reproduction is effective -Asexual or sexual and why? (OR) Why sexual method of reproduction is better than asexual reproduction? *[PTA-5]*

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Ans. ***(i)*** In asexual reproduction, single parent give rise to an individual. The chances of inducing variation in progeny and its environmental adaptability is low as the genetic material is its exact copy.

(ii) In sexual reproduction, fusion of male and female gametes takes place. Thus, the offspring shows greater variation and can withstand in any environment due to the variation occurs during Meiosis cell division & crossing over.

Hence, sexual mode of reproduction is more effective.

2. What are known as conjugants? *[FRT-'22]*

Ans. **Conjugation** is the temporary union of the two individuals of the same species. During their union both individuals, called the conjugants exchange certain amount of nuclear material (DNA) and then get separated. **E.g.** *Paramecium.*

3. Zygote is not formed during the conjugation of *Paramecia*, but we call it as sexual reproduction why? *[PTA-2]*

Ans. ***(i)*** *Paramecium* reproduces both sexually and asexually.

(ii) In *Paramecium*, conjugation is a form of sexual reproduction. It is a temporary union of two individuals of same species for mutual exchanges of genetic materials.

(iii) It can also multiply during nuclear organizations.

Various process of *Paramecium* reproduction listed below:

(i) Transverse binary fission - Asexual reproduction.

(ii) Conjugation - Sexual reproduction by cross fertilization.

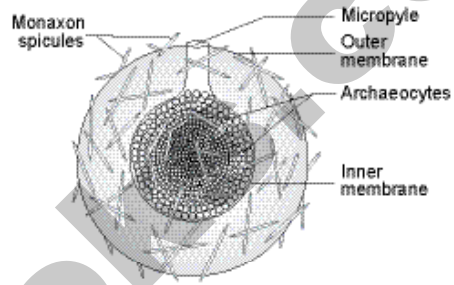
4. Why do we call parthenogenesis as a special type of sexual reproduction in animals? *[PTA-4]*

Ans. ***(i)*** Development of an egg into a complete individual without fertilization is known as parthenogenesis.

(ii) Parthenogenesis is the special type of sexual reproduction seen in animals. It is of two main types namely natural parthenogenesis and artificial parthenogenesis.

5. Draw the diagram of a gemmule and label the parts. *[PTA-3]*

Ans.



Gemmule in sponges

Short Answers — 3 Marks

1. Meiosis cell division does not take place during the gametes formation of drone bees. Give reason. *[PTA-2]*

Ans. ***(i)*** Drones are produced by parthenogenesis, unfertilized eggs develop into drone bees (males).

(ii) Males have the half the number of chromosomes (haploid). Thus meiosis cell division does not take place during the gametes formation of drone bees.

2. How is Juvenile phase different from reproductive phase? *[FRT-'22]*

Ans.

Juvenile phase	Reproductive phase
Juvenile phase/ vegetative phase is the period of growth between the birth of the individual upto reproductive maturity.	During reproductive phase/ maturity phase the organisms reproduce and their offsprings reach maturity period.

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3. Write the differences between multiple fission and sporulation in *Amoeba*. *[PTA-6]*

Ans.

	Multiple fission	Sporulation
1.	The parent body divides into many similar daughter cells simultaneously.	During unfavourable conditions *Amoeba* multiplies by sporulation without encystment.
2.	Nucleus divides repeatedly without the division of the cytoplasm, later the cytoplasm divides into many parts as that of nuclei.	Nucleus breaks into several small fragments or chromatin blocks.
3.	Each cytoplasmic part encircles one daughter nucleus.	Each fragment develops a nuclear membrane, becomes surrounded by cytoplasm and develops a spore-case around it .
4.	This results in the formation of many smaller individuals from a single parent organism.	When conditions become favourable, the parent body disintegrates and the spores are liberated, each hatching into a young amoeba.

4. Give reasons for the following: *[Sep-2020]*

(a) Some organisms like honey bees are called parthenogenetic animals.

(b) A male honey bee has 16 chromosomes where as its female has 32 chromosomes.

Ans. ***(a)*** Development of an egg into a complete individual without fertilization is known as parthenogenesis. It is of two types.

(i) In certain animals, parthenogenesis occurs regularly, constantly and naturally in their life cycle and is known as natural parthenogenesis.

(ii) Artificially it can be induced in animals by physical or chemical stimuli which is called artificial parthenogenesis.

(b) In honey bees, both sexual reproduction and parthenogenesis occurs, and it is described as incomplete parthenogenesis.

During sexual reproduction, the fertilized eggs (zygotes) develop into queen bee and workers (females). The unfertilized eggs develop into drones (males). Thus honey bees are called parthenogenetic animals.

In honey bees, the normal chromosomal number in a cell is $2n = 32$. Gametes (sperms & egg) will have only $n = 16$ chromosomes since they are haploid.

The female bees are formed by fertilization of gametes.

$$\text{sperm } (n) + \text{egg } (n) = 2n$$

Therefore they have 32 chromosomes. Since the drones (males) are formed from unfertilized eggs(n) they have only 16 chromosomes.

5. Explain the different kinds of syngamy in living organisms. *[FRT-'22]*

Ans. Different kinds of syngamy (fertilization) are prevalent among living organisms.

(a) **Autogamy** - The male and female gametes are produced by the same cell or same organism and both the gametes fuse together to form a zygote. **e.g.** *Actinosphaerium* and *Paramecium*.

(b) **Exogamy** - The male and female gametes are produced by different parents and they fuse to form a zygote. So it is biparental. **e.g.** Human beings – dioecious or unisexual animal.

(c) **Hologamy** - Lower organisms, sometimes the entire mature organisms do not form gametes but they themselves behave as gametes and the fusion of such mature individuals is known as hologamy **e.g.** *Trichonympha*.

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(d) **Paedogamy** - It is the sexual union of young individuals produced immediately after the division of the adult parent cell by mitosis. **e.g.** *Actinophrys.*

(e) **Merogamy** - The fusion of small sized and morphologically different gametes (merogametes) takes place. **e.g.** *Protozoa.*

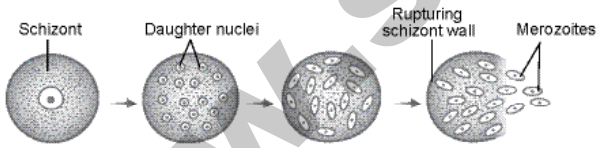
(f) **Isogamy** - The fusion of morphological and physiological identical gametes (isogametes) is called isogamy. **e.g.** *Monocystis.*

(g) **Anisogamy** - The fusion of dissimilar gametes is called anisogamy (Gr. An-without; iso-equal; *gam*-marriage). Anisogamy occurs in higher animals but it is customary to use the term fertilization instead of anisogamy or syngamy. **e.g.** higher invertebrates and all vertebrates.

1. Explain multiple fission in *Plasmodium* with a diagram. *[Govt.MQP-2019]*

Ans. *(i)* In *Plasmodium*, multiple fission occurs in the schizont and in the oocyte stages. When multiple fission occurs in the schizont, the process is called schizogony and the daughter individuals are called **merozoites**.

(ii) When multiple fission occurs in the oocyte, it is called sporogony and the daughter individuals are called **sporozoites**.



Multiple Fission in *Plasmodium*

2. Explain the types of fertilization depending on the place of occurrence. *[Aug-2021]*

Ans. Depending upon the place where the fertilization takes place, it is of two types.

(i) **External fertilization:** In external fertilization, the fusion of male and female gametes takes place outside the body of female organisms in the water medium. **E.g.** sponges, fishes and amphibians.

(ii) **Internal fertilization:** In internal fertilization, the fusion of male and female gametes takes place within the body of female organisms. **E.g.** reptiles, aves and mammals.

3. Write a note on regeneration. *[Mar-2020]*

Ans. Regeneration is regrowth in the injured region. Regeneration was first studied in *Hydra* by Abraham Trembley in 1740. Regeneration is of two types, *(i)* **morphallaxis** and *(ii)* **epimorphosis**.

(i) **Morphallaxis:** The whole body grows from a small fragment. **E.g.** *Hydra* and *Planaria*.

(a) When *Hydra* is accidentally cut into several pieces, each piece can regenerate the lost parts and develop into a whole new individual.

(b) The parts usually retain their original polarity, with oral ends, by developing tentacles and aboral ends, by producing basal discs.

(ii) **Epimorphosis:** It is the replacement of lost body parts. It is of two types, **reparative** and **restorative** regeneration.

(a) **Reparative regeneration:** Only certain damaged tissue can be regenerated.

(b) **Restorative regeneration:** Several body parts can develop. **E.g.** star fish, tail of wall lizard.

4. Write the basic features of reproduction.

Ans. *(i)* Replication of DNA *[July-'22]*
(ii) Synthesis of RNA
(iii) Synthesis of Proteins
(iv) Cell division
(v) Growth
(vi) Formation of Reproductive Units
(vii) Fertilization

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