1) Reproduction in Organisms

☆ The period from Birth to natural death of an organism represents its Life Span.

☆ Life span of organisms are not necessarily correlated with their sizes; eg:- sizes of crow and parrot or Mango tree & peepal tree are similar but life span of both the pairs show a wide difference

☆ Death of every individual organism is certainty i.e. no individual is immortal except single celled organism → due to Reproduction.

☆ Reproduction is defined as the biological process in which an organism gives rise to young ones (offsprings) similar to itself.

• Basic features of Reproduction:-

1) Cell division

- Mitosis
  - Equational division
  - ↓
  - no variation, asexual reproduction
- Meiosis
  - Reductional division
  - ↓
  - Variation, Sexual Reproduction.

2) Duplication of Cellular Apparatus
↓
Replication of chromosomes (DNA)
↓
Duplicat of cell organelle
↓
Formation of RNA & proteins.

3) Reproductive units (specialised or non-specialised) are formed, which after seperation or modification form new individuals.

★ Types of Reproduction :-
1) When offspring is produced by single parent with or without involvement of gamete it is asexual reproduction.
2) When offspring is produced by participation of 2 parents of opposite sex and also involves fusion of gametes, it is sexual Reproduction.

→ Asexual Reproduction :-

→ Single individual required
→ offsprings identical to each other and also exact copies of parents. Such offsprings are termed as clones.

★ In protists and monerans, parent cell divides to form to new individuals. Cell division is mode of Reproduction.

DOMS | Page No. | Date / /

★ Binary fission :- Cell divides into 2 halves and each part grows into adult.
Egs :- Transverse binary fission :- Bacteria, Paramaecium
~~Oblique~~ " " "
Longitudinal binary fission :- Euglena
Simple " " " :- Amoeba

★ Budding :- Due to unequal division, small buds are produced, which initially are attached to parent but later they seperate to form new individuals.
Egs :- Yeast

★ Sporulation :- Some member's of Kingdom Fungi and simple plants reproduce through asexual structures like zoospores or conidia or gemmules.
Egs :- Zoospores ⟶ Chlamydomonas
Conidia ⟶ Pennicillium
Gemmules ⟶ Sponges.

★ Fragmentation :- Fragments are formed.
Egs :- Some algae (Spirogyra), fungi, hydra etc.

★ Vegetative propagation :- In plants, units of plants known as vegetative propagules are capable of giving rise to new individuals.

Egs :- 1) Stem (i) tuber - potato, (ii) rhizome of banana/ginger (iii) Bulb of onion, (iv) Offsets of Eichoria pistia (v) Suckers of pineapple & Chrysanthemum (vi) Runners → grasses (vii) Bulbils of Agave, Oxalis, Lily (viii) Aerial shoots of Sugar cane & opuntia.
2) Root's of Dahlia 3) Leaves of adiantum, Begonia, Bryophyllum, Kalanchoe.

Date / /

↳ very fast multiplication

* Water hyacinth ⟶ Scourge of water bodies
  - ↳ Terror of Bengal
  - ↳ Most invasive weed, grows in standing water
  - ↳ Drains O_2 from water & kills fishes.
  - ↳ Bought to India for Beautiful flowers & shape of leaves

→ Sexual Reproduction → involves meiosis & ~~syngamy~~

Involves fusion of male and female gametes. These fuse to form zygote which develops to form a new organism.
Slow and elaborate process. Has variations. Offsprings formed are not identical to parents or to other offsprings due to fusion of 2 gametes.

* All organisms need to reach a certain staeje of growth and maturity in their life, before they reproduce. This period of growth is Juvenile phase or Vegetative phase

* Plants - annual & biennials show clear cut vegetative, reproductive and senescent phases. It perennials it is difficult to differentiate.

* Strobilanthus kunthian (nella kuranji) → flowers once in 12 years. Mass flowering in Kerala, Karnataka, Tamil nadu.

* In animals, there are morphological & physiological changes b/w Juvenile and Reproductive stage.

★ Mammals
→ Placental mammals → females → exhibit cyclical changes in activities of ovaries and accessory ducts as well as hormones in reproductive phase.
• In non-primates such as cows, sheep, rats, deers dogs, tiger etc. these changes are called oestrus cycle.
• In primates such as monkeys, apes & humans these changes are called menstrual cycle.

Seasonal breeders are those mammals who exhibit above cycles only in favourable seasons.
Continuous breeders are those mammals which are reproductively active throughout their reproductive phase

★ Post reproductive phase is senescence or old age. This phase involves concomitant changes in body like slowing of metabolism. Old age ultimately leads to death.

→ Pre fertilisation Events

Gametogenesis :-
Gametogenesis refers to production of two types of gametes (male and female).
↳ haploid cell
Homogametes - Both male and female gametes are similar in appearance. Egs - Some algae
Heterogametes - Gametes produced are of two morphologically distinct types.
Male gamete → Antherozoid or sperm
Female gamete → Egg or ovum.

Plants, if both male & female reproductive structures on same plant then bisexual and if on different plants then unisexual.

In algae → Bisexual → homothallic or monoecious
→ Unisexual → Heterothallic or dioecious.

Plants → Unisexual male flower → staminate
→ " female flower → Pistillate.

Monoecious / Bisexual → Egs:- Cucurbits & coconuts.

Dioecious / Unisexual → Egs:- Papaya & Date palms.
↳ Egs:- Cockroach.

Animals → Unisexual → single (either male or female)
→ Bisexual → Both sex organs → Hermaphrodites
↳ Egs:- Earthworms, sponge, tapeworm, ...

Gametes are haploid.

If parent is haploid → Gametes by Mitosis.

If parent is diploid → Meiosis occurs to form haploid gametes.

● Gamete Transfer

Mostly male is motile & female is stationary.

Medium is needed like water, air.

* During transport of male gametes, a large number of them fail to reach female gametes. To compensate this loss, no. of male gametes produced is thousand times the no. of female gametes produced.

Plants, transport of gametes by pollen grain, through pollination.

→ Fertilisation :-

↳ fusion of gametes also called syngame. Results in formation of zygote.

* In most aquatic organisms such as algae, fishes & amphibians, syngamy occurs in external medium (water) i.e. out of the body of organism. This is external fertilisation. Such organisms show great synchrony and also large number of male gametes are released to enhance chances of syngamy. Disadvantage of it is that offsprings are extremely vulnerable to predators, and threatening their survival upto childhood.

* In most terrestrial organism like fungi, reptiles, birds & mammals and plants, syngamy occurs inside the body of organsim, hence called internal fertilisation.

Egg (female body) ← transported — sperm (male body)

Egg:
- Non-motile
- Less in number

sperm:
- Motile & produced in large no.
- Non motile in seeded plants where transport by pollen tube

★ Parthenogenesis:- In some organisms female gamete undergoes development directly to form new organism without fertilisation.

Egs:- Rotifers, honey bee, whiptail lizard, Aphis, Turkey (bird), wasps, Typhlina brahmina.

→ Post Fertilisation Events

● Zygote:- It is universal in all sexual reproductions Formed in external & internal media in external & internal fertilisation respectively.

★ Zygote is a vital link that ensures continuity of species between organisms of one generation and the next.

● Embryogenesis:- It refers to the process of development of embryo from the zygote.

During embryogenesis → cell undergoes cell division (mitosis) & cell differentiation.
Division → ↑ses number of cells
Differentiation → helps grp of cells to undergo modifications to form tissues & organs.

★ Oviparous animals (reptiles & birds) → fertilised egg is covered by hard calcareous shell and is laid in safe environment.
★ Viviparry:- Embryo develops to young one inside female body & later is removed at some stage of growth. Here chances of survival more bcoz of proper embryonic care & protection.