NCERT/STATE BOARD

CRASH COURSE

NEET/CET 2020-21

UNIT VI

REPRODUCTION

Chapter 1 (Part I)

Reproduction in Organisation

MR. PAWAR NAYAN
BIOLOGY EXPERT

❖Reproduction is a process in which an organism produces young ones (offspring) similar to itself but not identical.

❖Reproduction is essential for the continuation & maintenance of a species in the biosphere.

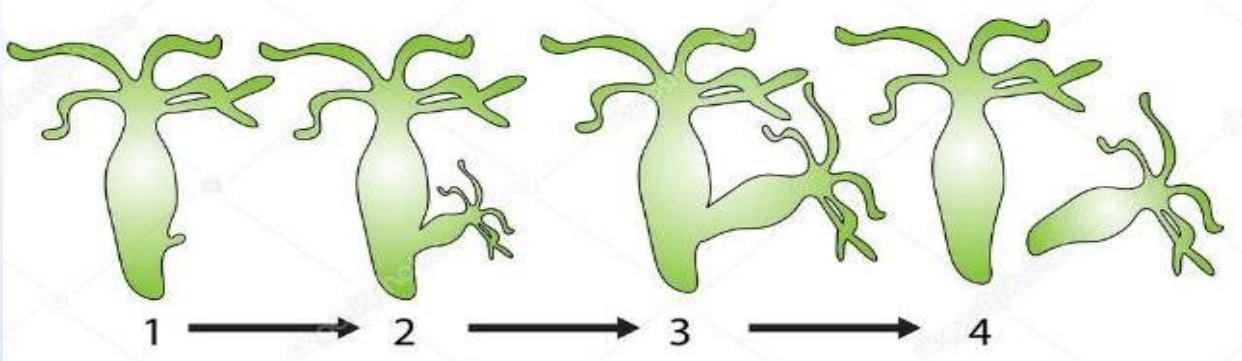
LIFE SPAN AND ITS STAGES

- THE PERIOD FROM BIRTH TO THE NATURAL DEATH OF AN ORGANISM REPRESENTS IT LIFE SPAN.
- (Butterfly 1 to 2 weeks, Banyan tree thousand of year)
- **Juvenile** – During this stage organism develops the capacity to reproduce.
- **Maturity** – Reproduction begins during this stage
- **Ageing & Senescence** – Ageing is progressive deterioration in the body of the organisms, the terminal irreversible stage of ageing is called senescence.
- **Death** – senescence finally leads to death.

PURPOSE OF REPRODUCTION

- **Continuity of species** – Reproduction maintains the continuity of species
- **Population organisations** – Reproduction maintains population of the young, adult & the aged persons.
- **Variations** – Reproduction introduces variations in the organism. useful variation are essential for adaptations & evolution.
- **Life** – Life exists on earth due to reproduction in organism.

ASEXUAL REPRODUCTION



- A <u>single parent</u> involved (<u>uniparental</u> condition)
- Gametes are not formed.
- No fertilization
- There is only mitotic cell division

- Daughter organism are genetically identical to parents. (No crossing over)
- Multiplication occurs rapidly.

TYPES OF ASEXUAL REPRODUCTION

- **Fission** – Division of the parent body into two or more daughter individuals identical to the parent.
- **Binary fission** – Division of parent into two small nearly equal sized daughter individual e.g. - Bacteria, Protozoans & Planarians/Dugesia.

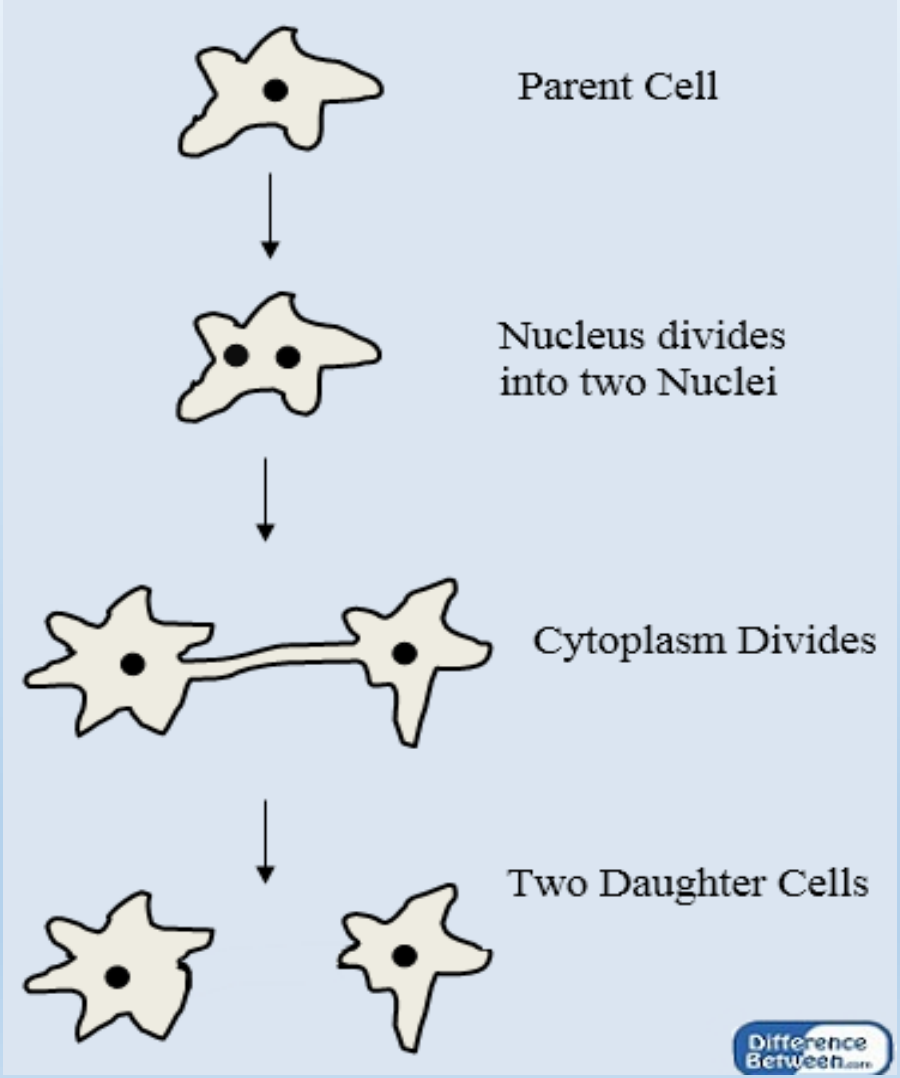


Fig. 1.6. *Amoeba* : Encystment and multiple fission.

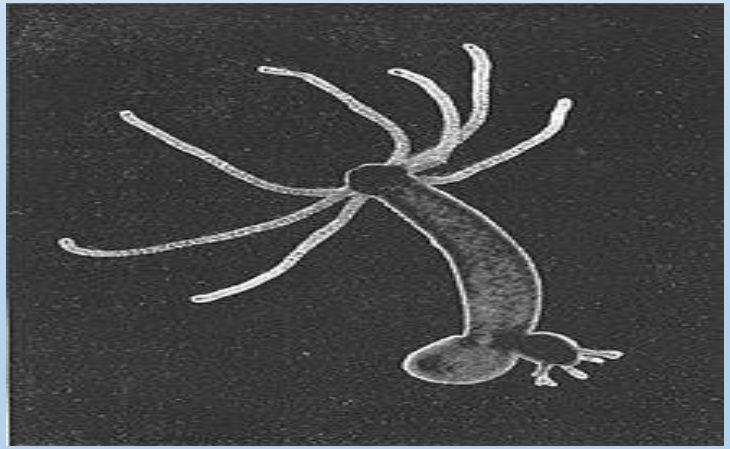
Multiple fission – Division of parent into many small daughter individuals simultaneously e.g. – Amoeba, Plasmodium

❖**Budding** – Formation of daughter individual from a small projection, the bud, arising on the parent body e.g. – Scypha, Hydra.

- Internal buds called gemmules are found in some fresh water sponges e.g. Spongilla.

SPONGILLA

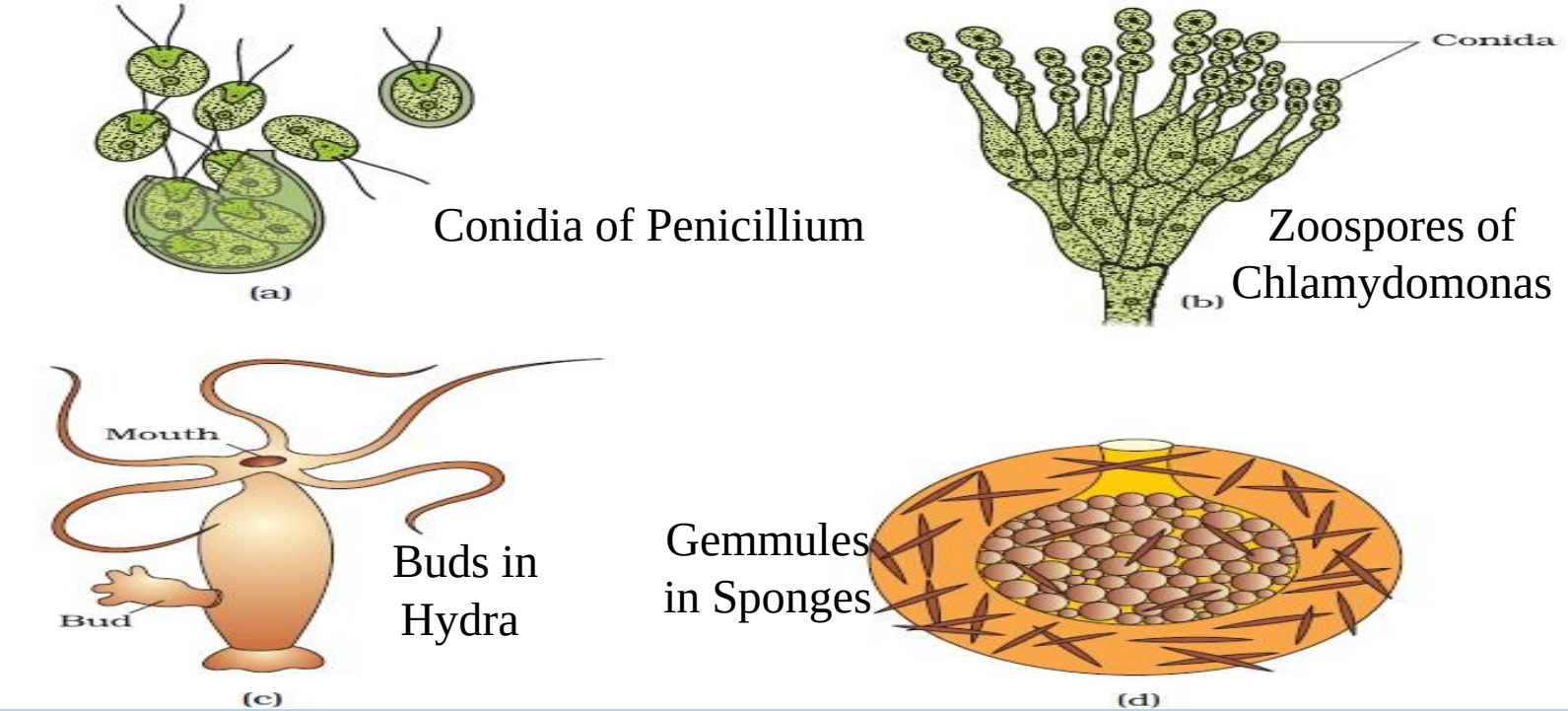
SCYPHA



HYDRA WITH BUD

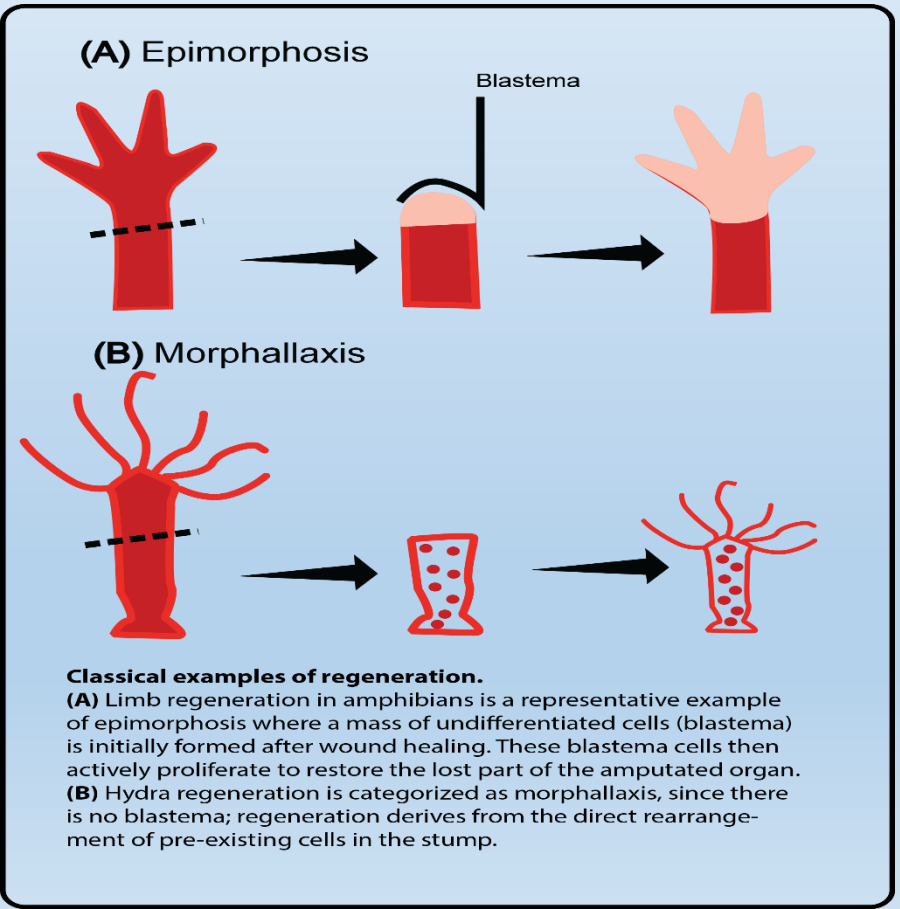
❖**Spore Formation** – Spores are propagules which germinate to produce new individuals.

- They are several kinds of spores namely, zoospores, sporangiospores, chlamydospores, oidia, conidia(Exospore).



❖**Regeneration** – Formation of the whole body of an organism from a small fragment (Morphollaxis) e.g. – Hydra, Sponges, Planaria.

- The replacement of the lost part (Epimorphis). E.g. – Broken tail of the wall lizard.



Classical examples of regeneration.
(A) Limb regeneration in amphibians is a representative example of epimorphosis where a mass of undifferentiated cells (blastema) is initially formed after wound healing. These blastema cells then actively proliferate to restore the lost part of the amputated organ. **(B)** Hydra regeneration is categorized as morphallaxis, since there is no blastema; regeneration derives from the direct rearrangement of pre-existing cells in the stump.

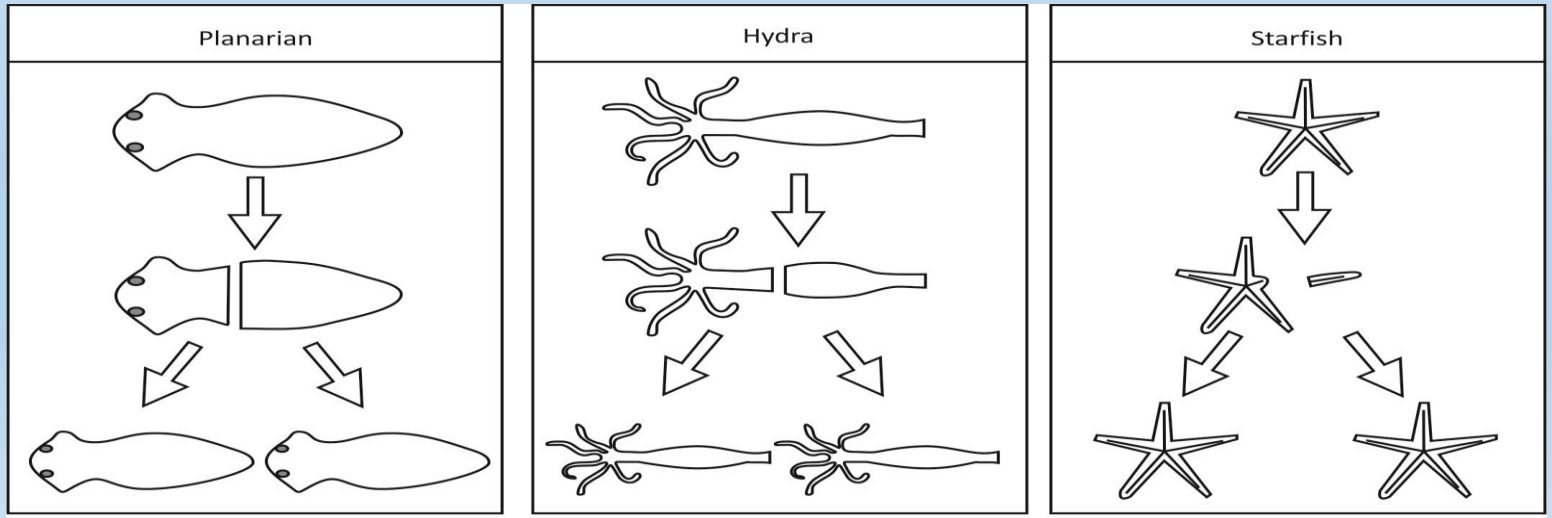


Fig. : Regeneration in (i) Planaria (ii) Hydra (iii) Star fish

NEW TERM

- Many people look older than the real age is called **GEROMORPHISM (GERATRICS – STUDY OF OLD PEOPLE (90+ AGE)**
- Longevity or lifespan of an individual is called **MACROBIOSIS (BIGLIFE)**
- An alternative term for regeneration is called **NEOGENESIS (NEWBORN)**

NCERT/STATE BOARD

CRASH COURSE

NEET/CET 2020-21

UNIT VI

REPRODUCTION

Chapter 1 (Part II)

Reproduction in Organisation

MR. PAWAR NAYAN
BIOLOGY EXPERT

VEGETATIVE REPRODUCTION

❖Vegetative propagation-

1. Formation of new plant from vegetative units or propagules.
2. **Buds, Tubers, Rhizomes etc**.
3. Produces Large number clones in shortest time.
4. Produces purity, resistance & good quality of race/variety indefinites.

TYPES OF VEGETATIVE REPRODUCTION

STEM

ROOT

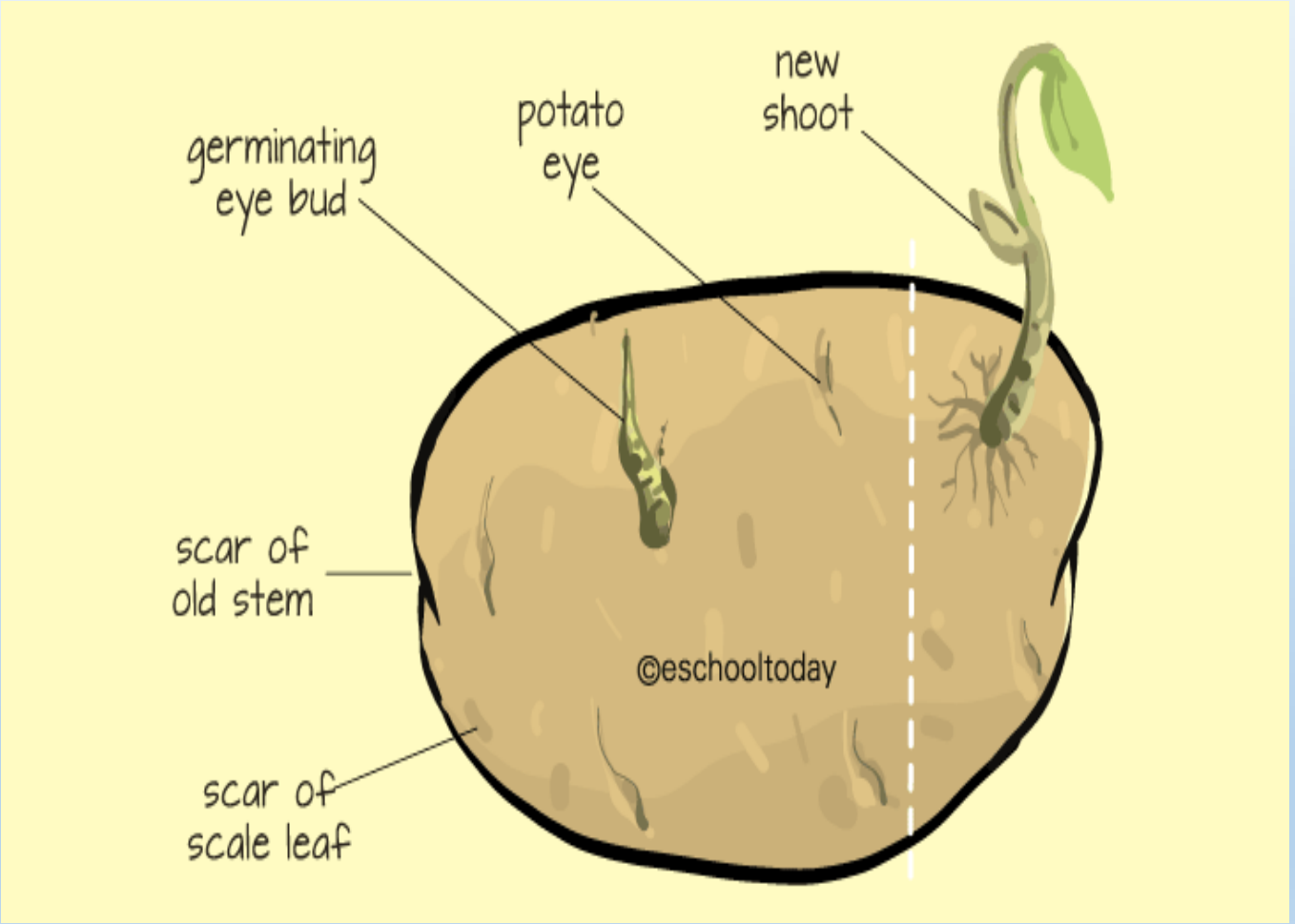
LEAF

TYPES OF VEGETATIVE REPRODUCTION

1) Stem –

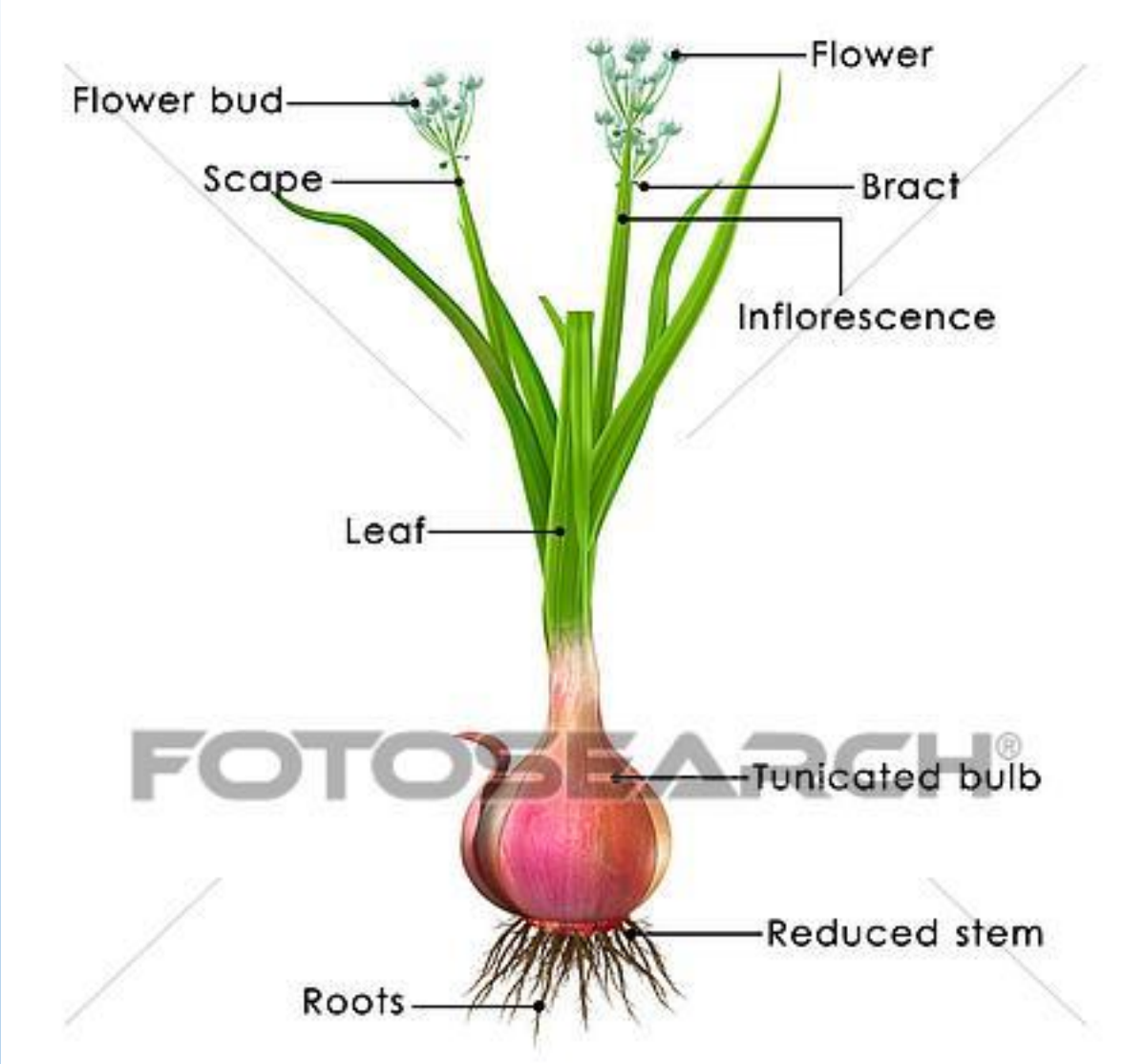
a. underground stem – Tubers,

- They have buds over their nodes or eyes.
- Buds produce new plant when placed in the soil. Example- Artichoke, Potato.



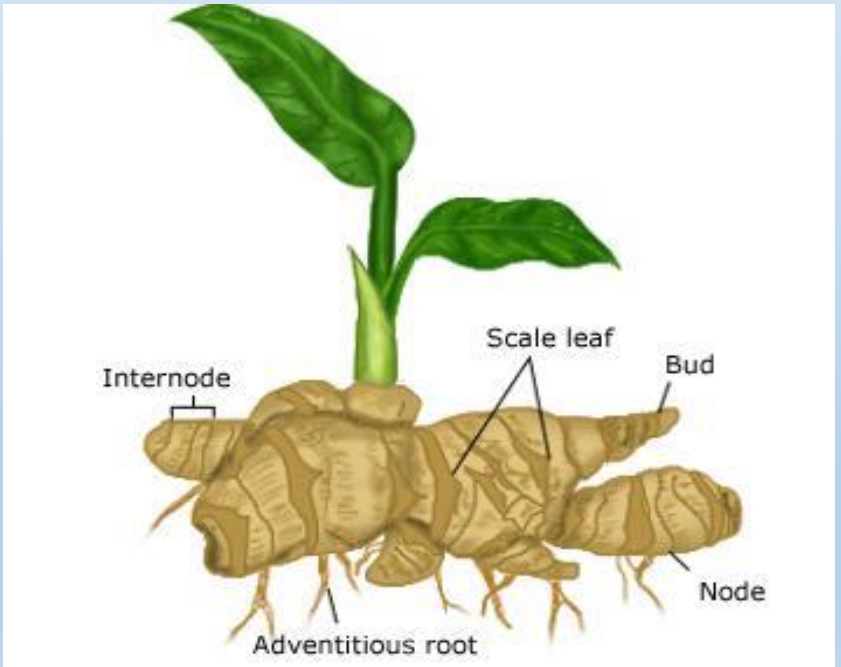
b. Underground stems – Bulbs,

- ✓Bulbs are underground condensed shoots which have one or more buds.
- ✓Buds present inside the bulb form new plants.
- ✓E.g. Garlic, Narcissus, Onion.



c. Underground stem – Corms (Vertical),

- ✓Underground swollen stem having circular nodes that have buds for growth of daughter plants.
- ✓e.g. Amorphophallus (Zaminkand), Colocasia, Crocus, Fressia.



d. Underground stems – Rhizomes,

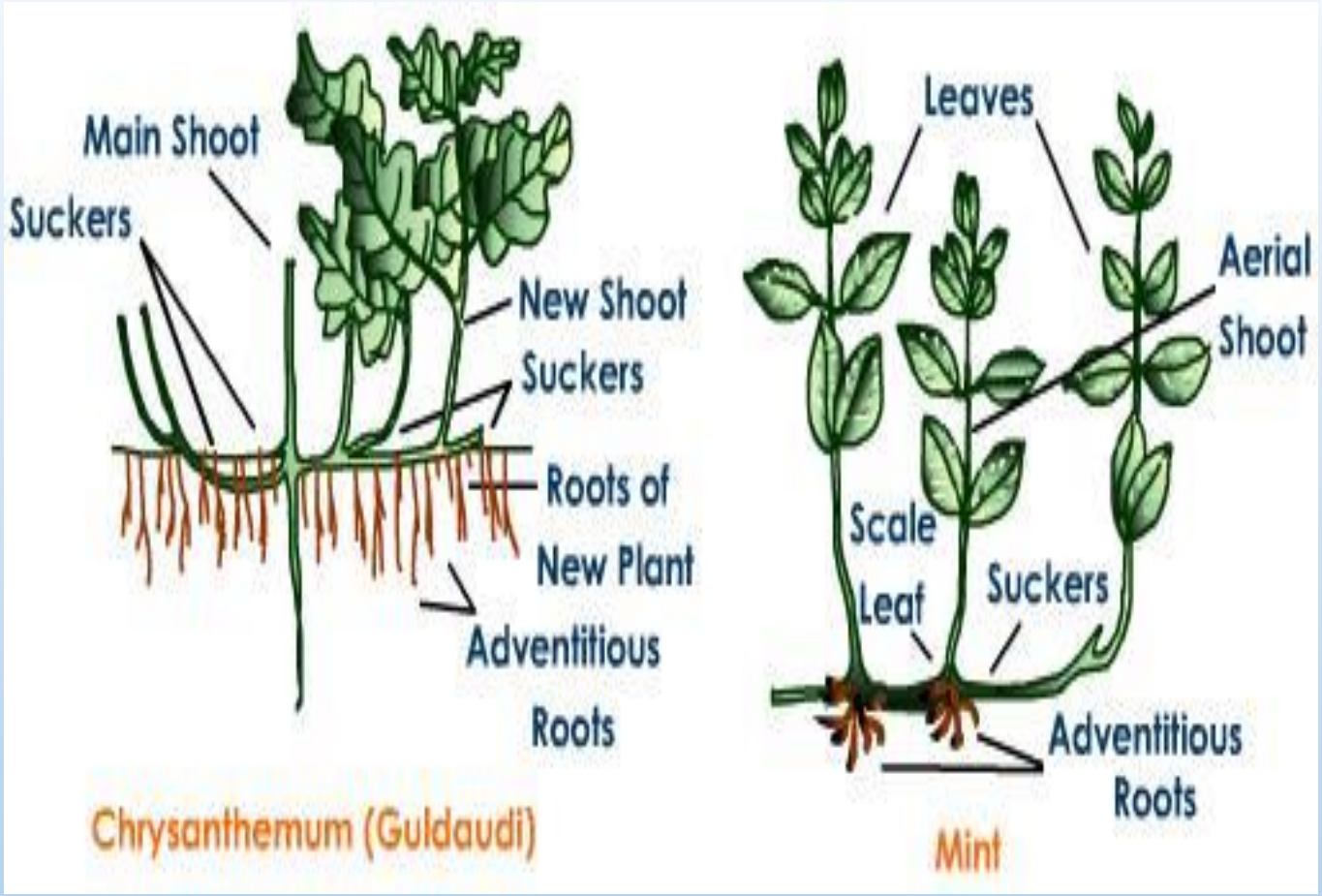
- Underground stem stores food for perennation during unfavourable conditions.
- Have buds for formation of new aerial shoots during favourable conditions. E.g. Bananas, Ginger, Turmeric, Aspidium, Adiantum.

e. Sub aerial or Creeping stems – Runners,

- Narrow, horizontal branches develops at the base of crown & root at intervals where new crown are also formed.
- E.g. Lawn grasses or Cynodon(Doob grass), Centeno, Oxalis(Wood-sorrels).

e. Underground stems – Suckers,

- Slender underground branches develops from base of aerial shoots, grow for some distance, & form a new aerial shoots or crowns.
- E.g. Mint, Chrysanthemum.



h. Sub aerial or creeping stems – Offset, There are one internode long runners that occur in some aquatic plants. Breaking of offset help in propagation. E.g. Eichhornia(Water Hyacinth), Pistia(Water lettuce).

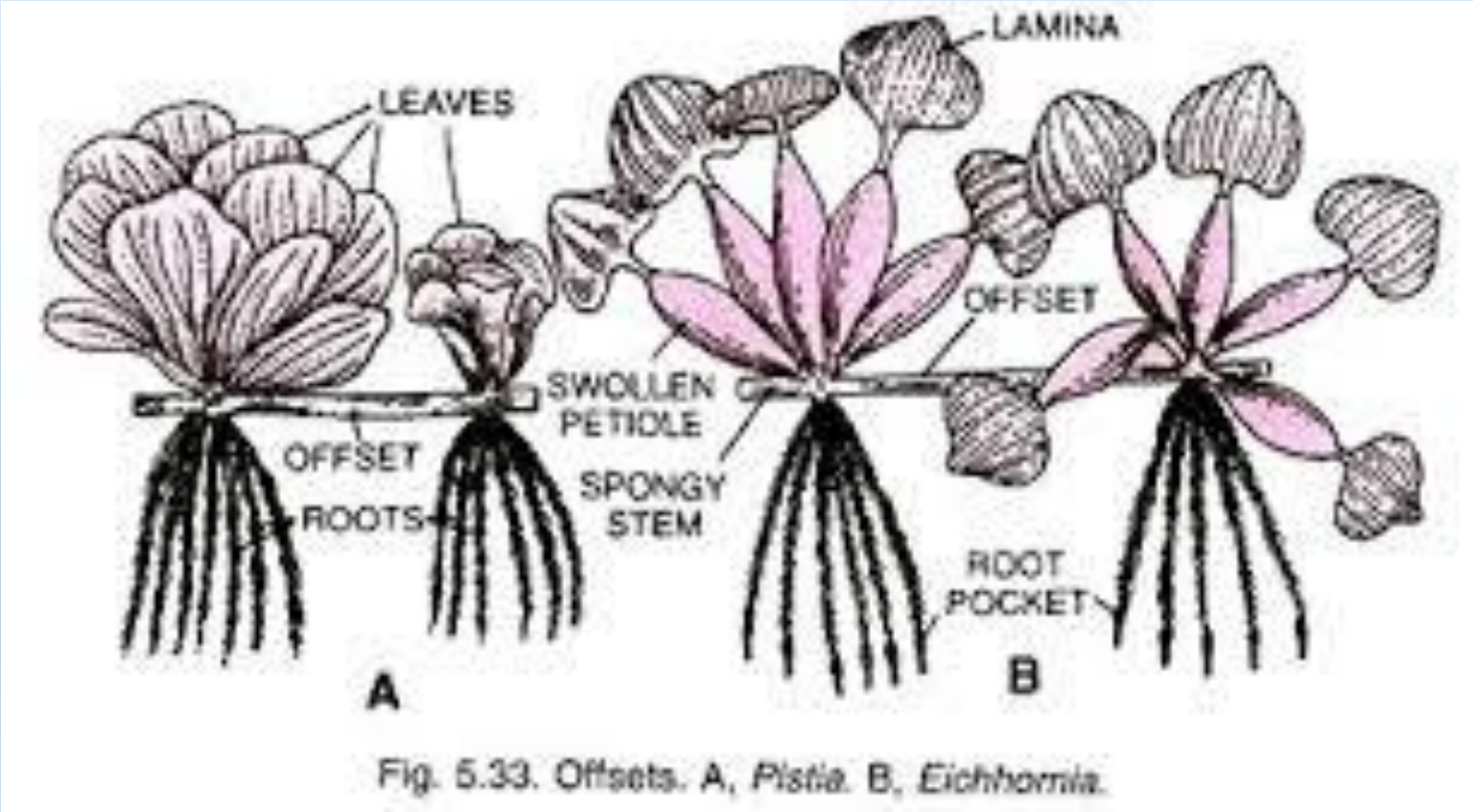
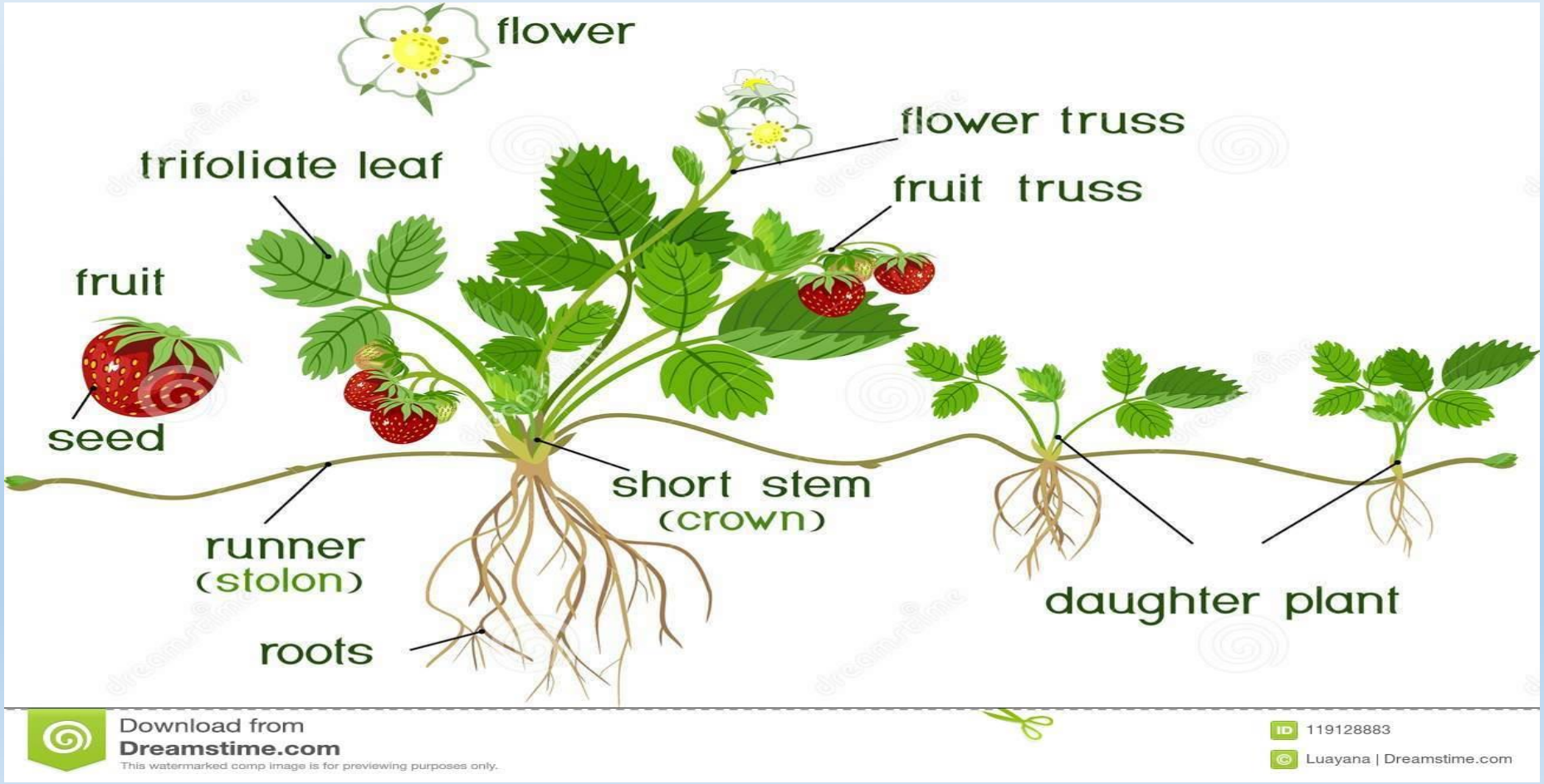


Fig. 5.33. Offsets. A, *Pistia*. B, *Eichhornia*.

g. Sub aerial or creeping stems – Stolons, Arched horizontal branches that develops at the base of a crown & help in vegetative propagation like runners. E.g. Strawberry, Vallisneria.



NCERT/STATE BOARD

CRASH COURSE

NEET/CET 2020-21

UNIT VI

REPRODUCTION

Chapter 1 (Part III)

Reproduction in Organisation

MR. PAWAR NAYAN
BIOLOGY EXPERT

ROOTS

- Roots with adventitious buds develops into new plants.
- Tap root ⟶ e.g. Dalbergia(Sheesham), Gauva, Poplar, Albizia, Murraya.
- Fleshy roots(Roots Tubers) E.g. Sweet potato, Tapioca, Dahlia, Aspara-gus.

LEAF

- Roots with adventitious buds & help in vegetative propagation.
- E.g. Begonia, Bryophyllum, Kalanchoe, Streptocorpus, Saintapaulia, Adiantum, Caudatum(Walking fern).

BULBILS

- Multicellular fleshy buds that take part in vegetative propagation.
- E.g. Oxalis, Agave, Pineapple(Anonas), Diosccorea(Yam), Lily, Chlorophyllum.
- Agave bulbils – Modified floral buds.

ADVANTAGES OF VEGETATIVE PROPAGATION

- Only method of multiplication is seedless plants, **e.g. sugarcane, Banana, Grape, Seedless Orange etc.**
- Plant can multiply indefinitely **without any change or variation**.
- **There is rapid multiplication with genetic uniformity**.
- Produce **disease free plants(Apex/Tip)**
- Good qualities of the plants can be **preserved for long time**.
- **Transgenic plants(genetically modifies plants)** can be produced used tissue culture.

DISADVANTAGES OF VEGETATIVE PROPAGATION

- Vegetative propagules get easily **decayed & are prone to viral, bacterial & fungal disease.**
- There are **no variations (Less adaptability to change environment)**
- There is **no dispersal of vegetative propagules overcrowding**

ADVANTAGES OF ASEXUAL REPRODUCTION

- It is uniparental reproduction.
- It involves simple processes of division & mitosis.
- It is quick mode of reproduction.
- A single parent may produce a large number of offspring.
- They young ones are genetically similar to their parent.

DISADVANTAGES OF ASEXUAL REPRODUCTION

- No mixing of genetic material, therefore, no variations takes place.
- No evolution due to lack of variations.
- Rapid multiplication causes overcrowding.
- The organisms produced through asexual reproduction have low adaptability to the changed environment.

NCERT/STATE BOARD

CRASH COURSE

NEET/CET 2020-21

UNIT VI

REPRODUCTION

Chapter 1 (Part IV)

Reproduction in Organisation

MR. PAWAR NAYAN
BIOLOGY EXPERT

SEXUAL REPRODUCTION

❖Development of new individual through formation & fusion of gametes. n+n = 2n

★CHARACTERISTICS OF SEXUAL REPRODUCTION★

✓It is usually biparental

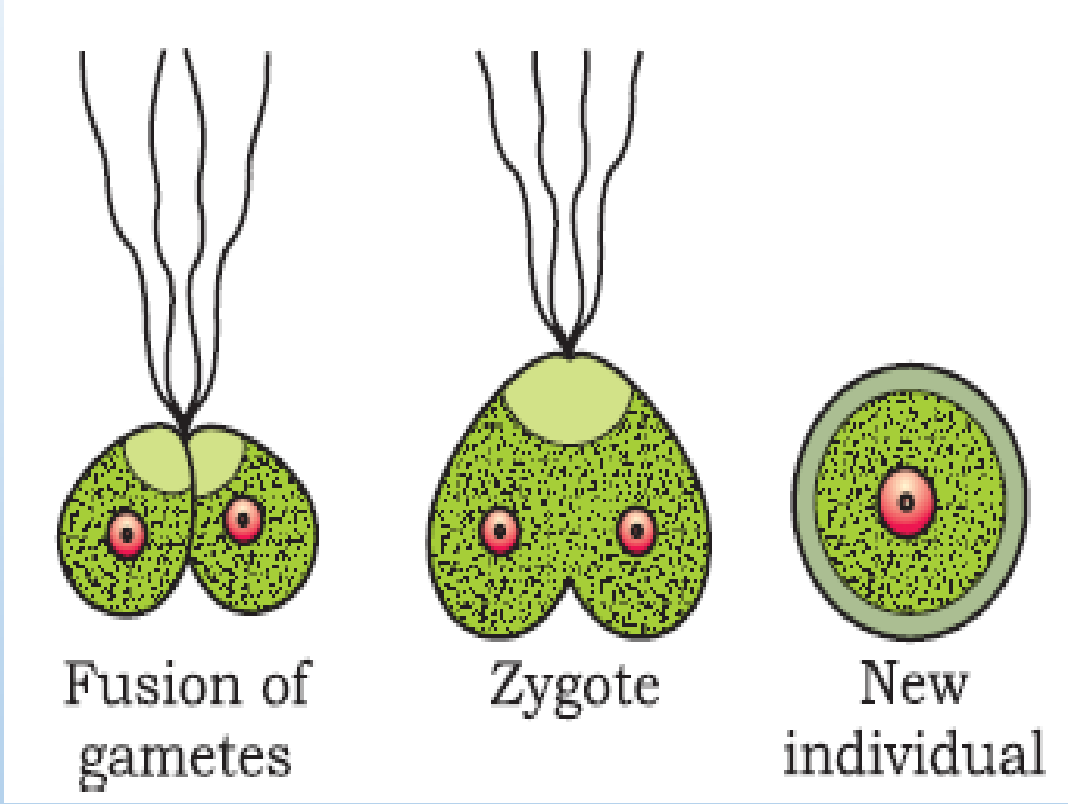
✓Gametes are always formed

✓Fertilization takes place

✓It involves both meiosis & mitosis

✓Daughter organism genetically differ from the parents

✓Multiplication is not so rapid as in asexual reproduction



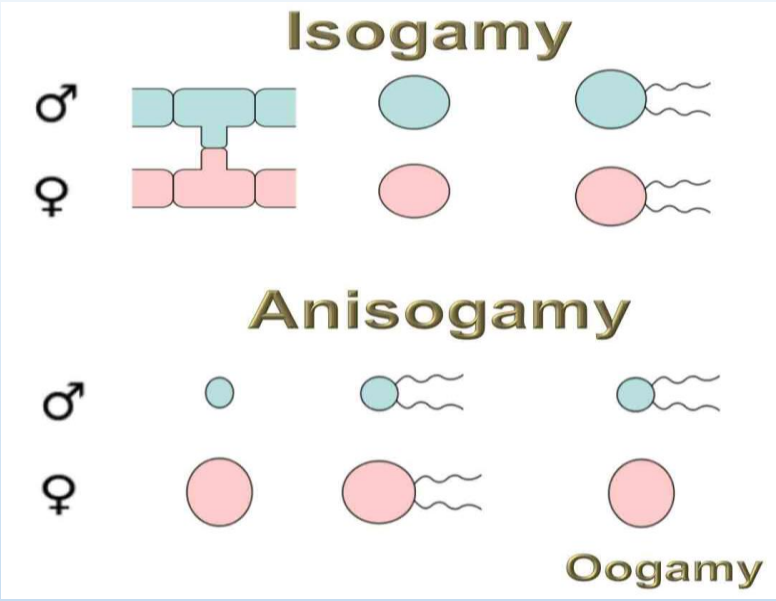
EVENTS/STAGES IN SEXUAL REPRODUCTION

- **Pre fertilisation events** – Gametogenesis, gamete transfer.

- **Fertilisation events** – fusion of gametes to form a diploid zygote, external fertilisation(water), internal fertilisation.

- **Post fertilisation events** – zygote, embryogenesis.

TYPES OF GAMETES FUSION



1) ISOGAMY –

- Fusion of morphologically similar gametes.
- Isogametes : same structure & size
- E.g. Chlamydomonas, microcystic, chladophora.

2) Anisogamy –

- Fusion of gametes which are structurally similar but <u>different in size</u>.
- E.g. Chlamydomonas braunii

3) Oogamy –

- Fusion of a large non motile female gamete & a small motile male gametes.
- E.g. Volvox, focus, most animals.

REPRODUCTIVE PHASES IN PLANTS

- **Monocarpic plant :** flower only once in their life.
- All annual – e.g. wheat, rice.

- Siroblanthus kunthiana (Neelakunnji) flowers once in 12 years.
- Found in hilly areas in kerala, Karnataka & Tamil Nadu.

- All biennial plants-
- e.g. carrot, radish

- Few perennial plants
- (e.g. Bambusa tulda) flowers once in 50-100 yrs.

✓**Polycarpic plants**: Perennial plants, flowers repeatedly at intervals every year

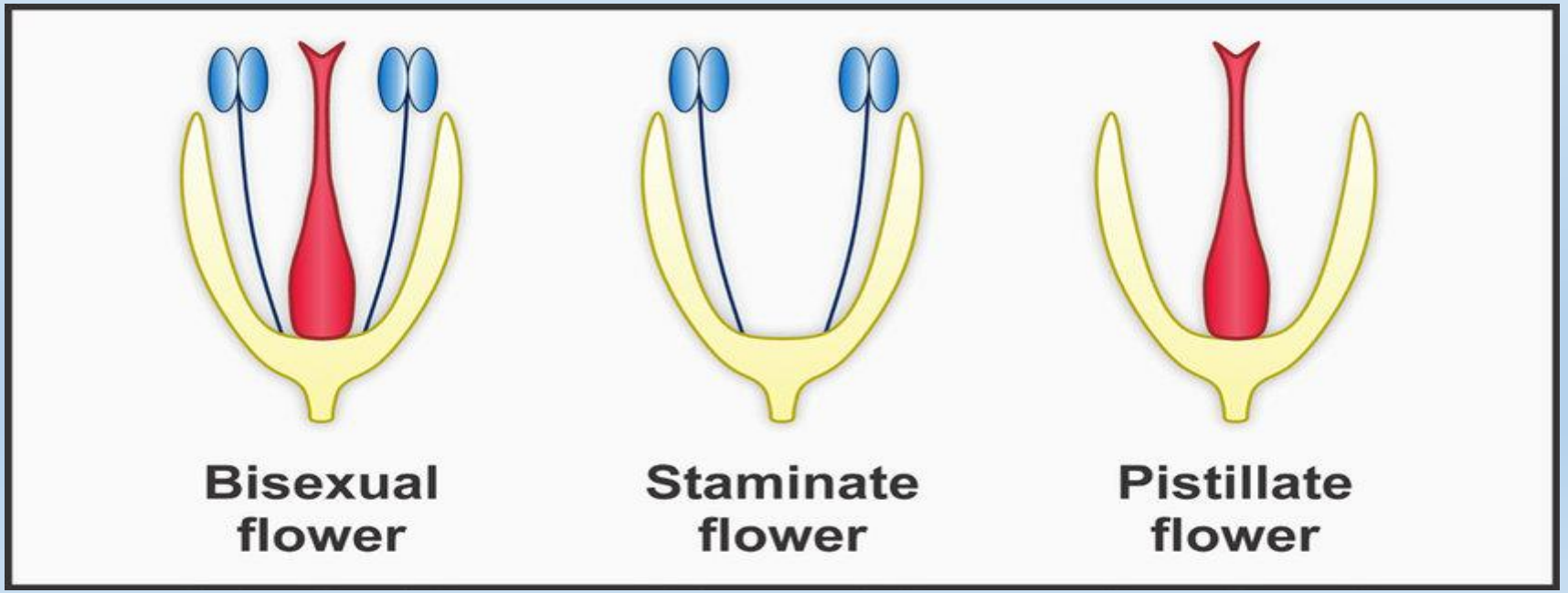
✓ Flowers throught out the year
✓ (E.g. China rose)

✓Flowers at regular intervals of the year
✓(e.g. apple, mango, orange, grapes vine)

SEXUALITY IN ORGANISMS

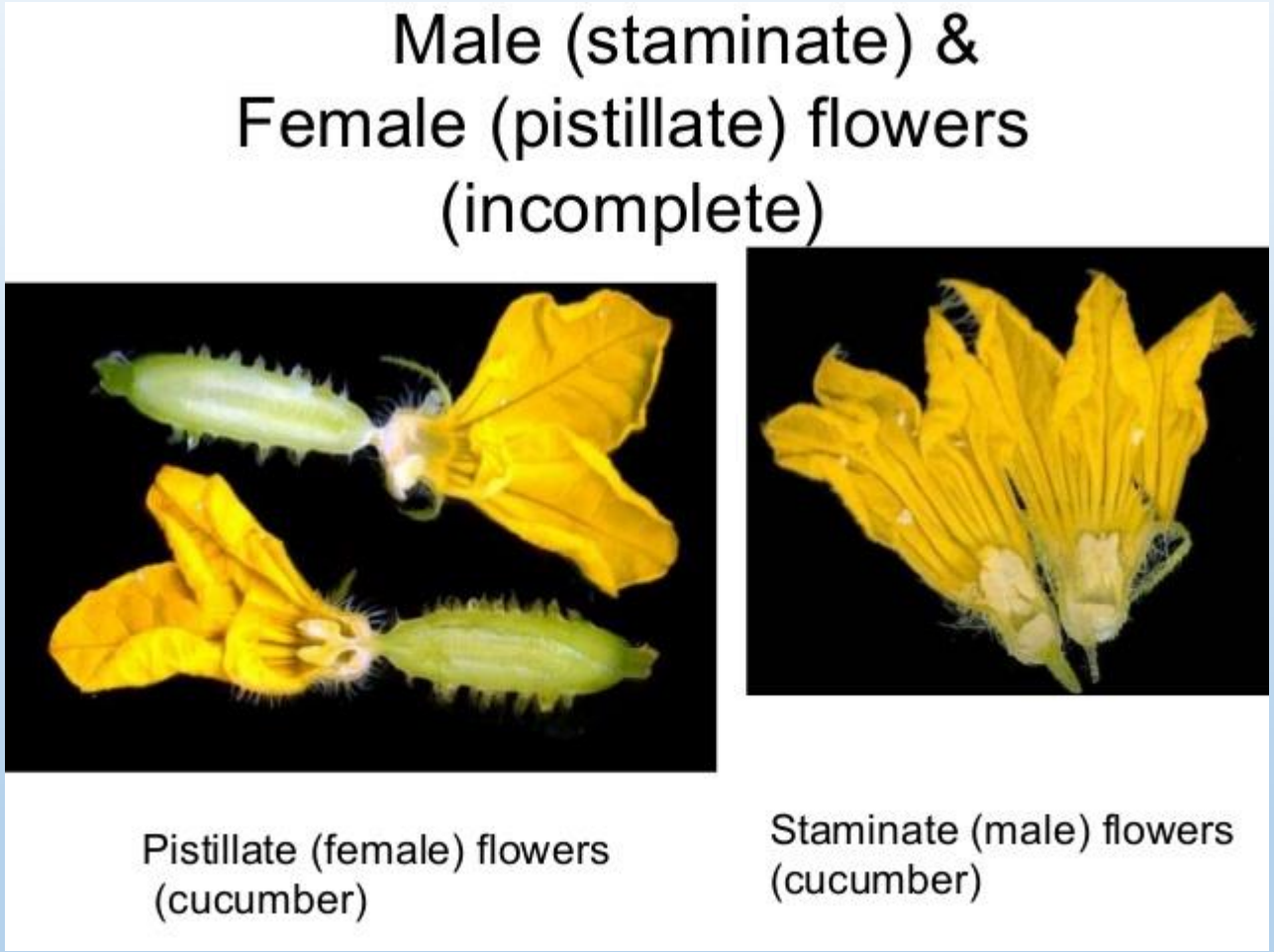
A. Dioceous (Unisexual) –

- ✓Male flowers (staminate flowers) & female flowers(Pistilate) are borne on different plants.
- ✓E.g. plants date palm, papaya, marchantia.



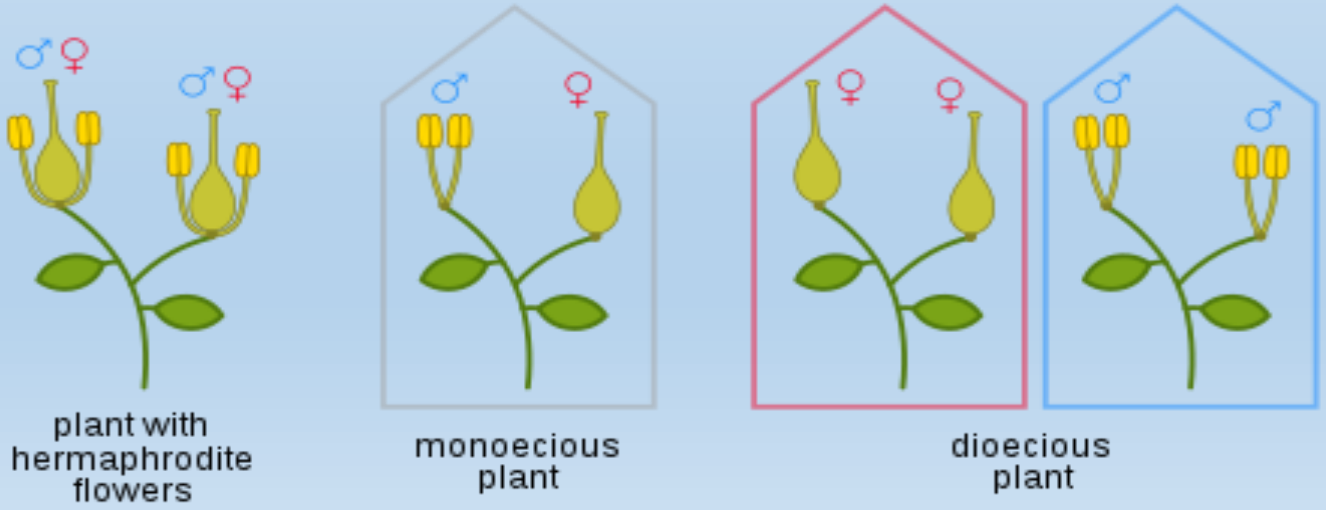
B) **Monocious (Bisexual) –**

- ✓E.g. plants sweet potato
- ✓Staminate & pistilate flowers on same plant.
- ✓E.g. maize, coconut, cuccurbits
- ✓Others plants like chara



C) DIOCEIOUS –

- ✓Organism that produces either male or female gametes.
- ✓Unisexual condition.
- ✓Heterothallic: Produces gametes with no morphological or physiological difference **e.g. Mucor**
- ✓**Cockroach, birds, mammals etc.**
- ✓2 organism with separate sexes.

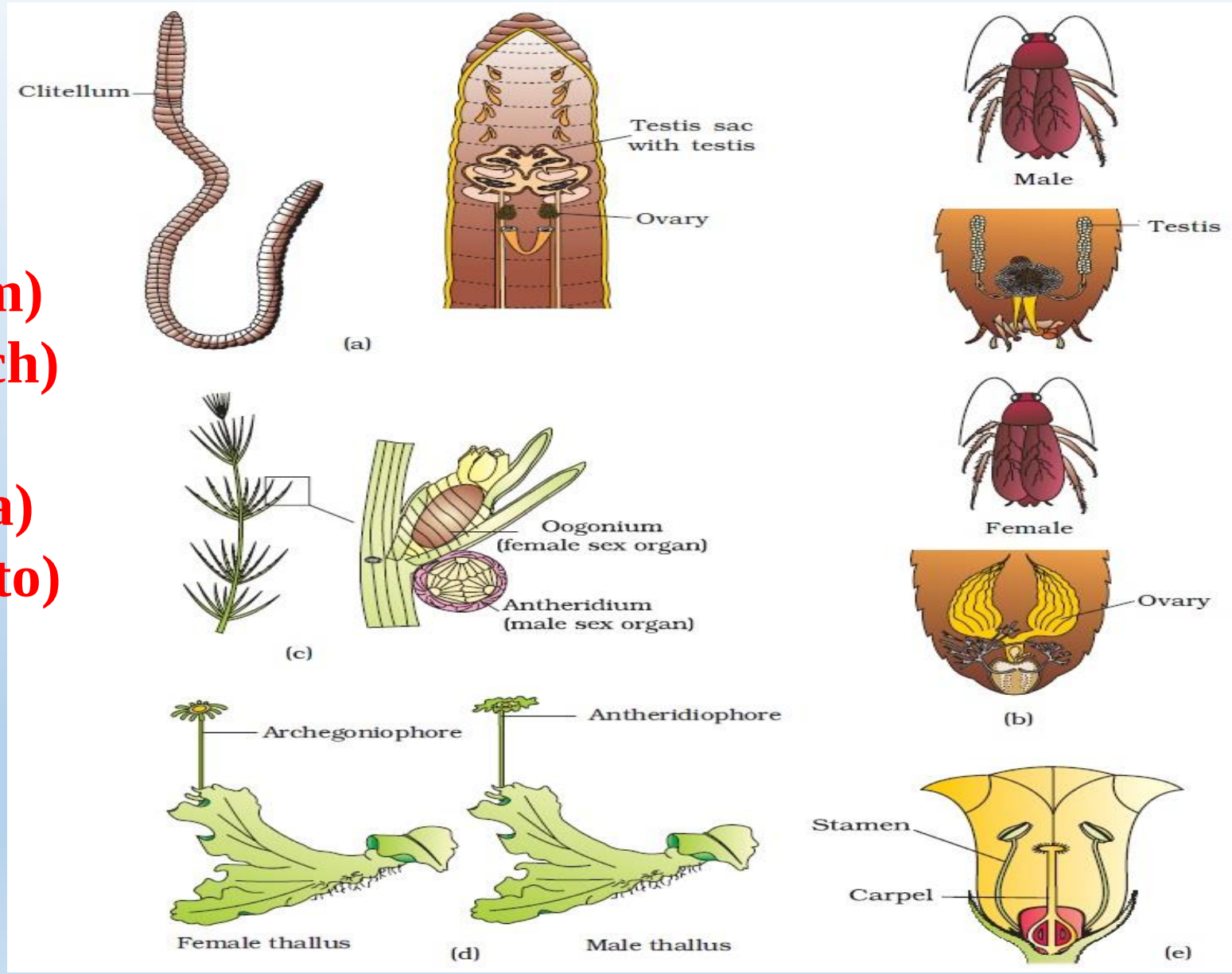


D) MONOCEIOUS –

- ✓Organism that produces both male & female gametes.
- ✓Bisexual or hermaphrodite.
- ✓Homothalic : produces gametes with morphological or physiological difference.
- ✓**E.g. Rhizopus stolonfier**
- ✓**Animals e.g. earthworms, sponge, tapeworm & leech.**
- ✓1 organism with both male & female sexes.

SEXUALITY IN ORGANISM

a) Bisexual animal (Earthworm)
b) Unisexual animal (Cockroach)
c) Monoecious plant (Chara)
d) Dioecious plant (Marchantia)
e) Bisexual flower (Sweet Potato)

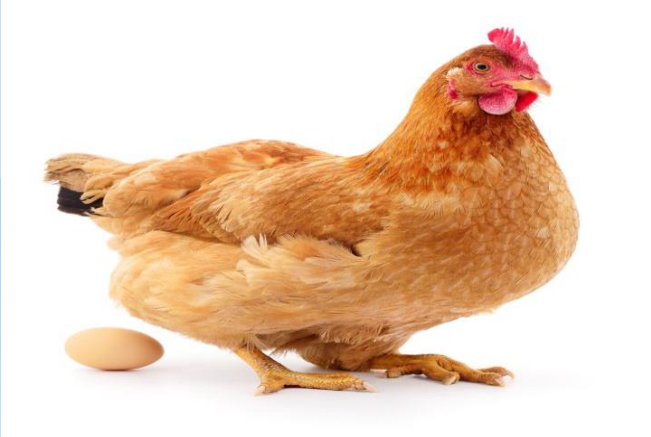


EMBRYOGENESIS

- DEVELOPMENT OF EMBRYO FROM ZYGOTE.

OVIPAROUS

- Animals lay fertilized/unfertilized egg.
- e.g. in reptiles & birds(Calcareous shell)



VIVIPAROUS

- Zygote develop into a young one inside the female body.
- e.g. most of mammals

OVOVIVIPAROUS

- Female retains the eggs but do not provide nourishment to embryo.
- The female gives birth to young ones.
- e.g. shark & rattle snakes.

LIFE SPAN

ELEPHANT	**60 – 90 years**	**PARROT**	**140 YEARS**
ROSE	**5 – 7 years**	**CROCODILE**	60 Years
DOG	**25 – 30 Years**	**HORSE**	60 Years
BUTTERFLY	**1 – 2 Weeks**	**FRUITFLY**	1 – 2 Weeks
CROW	**15 Years**	**RICE**	3 – 4 Months
BANANA	**25 – 25 Years**	**TORTOISE**	100 – 150 Years
COW	**20 – 25 Years**	**BANYAN**	200 – 300 Years

NEW TERM

1. **FLAGELLATE OR PLANOGAMETES E.G. CHLAMYDOMONAS, MICROCYSTIC.**
2. **NON-FLAGELLATE OR APLANO GAMETES E.G. SPIROGYRA.**

MCQs

1. Plants like Elm (Ulmus), Dandelion (Taraxacum) & members of rose family vegetatively reproduce by

   a)Rhizome b)Sucker c)Stolon d)Corn

2. The Vegetative propagules of Bryophylum is

   a)Bulbil b)Leaf Buds c)Rhizome d)Offset

3. Water hyacinth is one of the most invasive weeds primarily because.

   a)It gets adapted to any fresh water body easily.

   b)It produces secondly metabolites against herbivores.

   c)It can propagate vegetatively at a phenomenal rate.

   d)It is predated upon by a large number of organism.

4. Ginger is vegetatively propagated through

   a)Rhizome b)Bulbil c)Stolon d)Offset

5. The eyes of the potato tuber are

a)Flower buds b)Shoot buds c)Axillary buds d)Root buds

6. Which form of reproduction is correctly matched?

a)Euglena – treansverse binary fission

b)Paramecium – longitudinal binary fission

c)Amoeba – multiple fission

d)Plasmodium – binary fission

7. Life span of parrot is

a)140yrs b)60yrs c)80yrs d)40yrs

8. No individual is immortal except.

a)Single celled organism b)Green plants c)Sponges d)Drones

9. Find out the correct statement.

a)Life span of organism are necessarily correlated with their sizes.

b)The sizes of crows & parrot are not very different, so their life spans are almost similar.

c)A peepal tree has much shorter life span as compared to mango tree.

d)Reproduction is essential for continuity of species on the earth.

10. Which of the following is false statement?

a)All organism have evolved similar mechanisms to multiply & produce offspring.

b)Asexual reproduction is uniparental.

c)Sexual reproduction is biparental.

d)In sexual reproduction fertilization occurs.

11. Individual of a Clone.

a)Are genetically similar but morphologically different.

b)Are morphologically similar but genetically different.

c)Are morphologically & genetically similar.

d)Are genetically & phenotypically different.

12. Asexual reproduction is common

a)Among single celled organism only

b)Among plants only

c)Among single celled organisms, plants & all animals

d)Among single celled animals, plants & animals with simple organisation

13. Which of the following is not vegetative propagule?

a)Rhizome & sucker b)Tuber & offset c)Bulbil(e.g.Agave), Leafbuds, bulb d)Antherozoids

14. Isogametes are present in

a)Fucus b)Cladophora c)Frog d)Birds

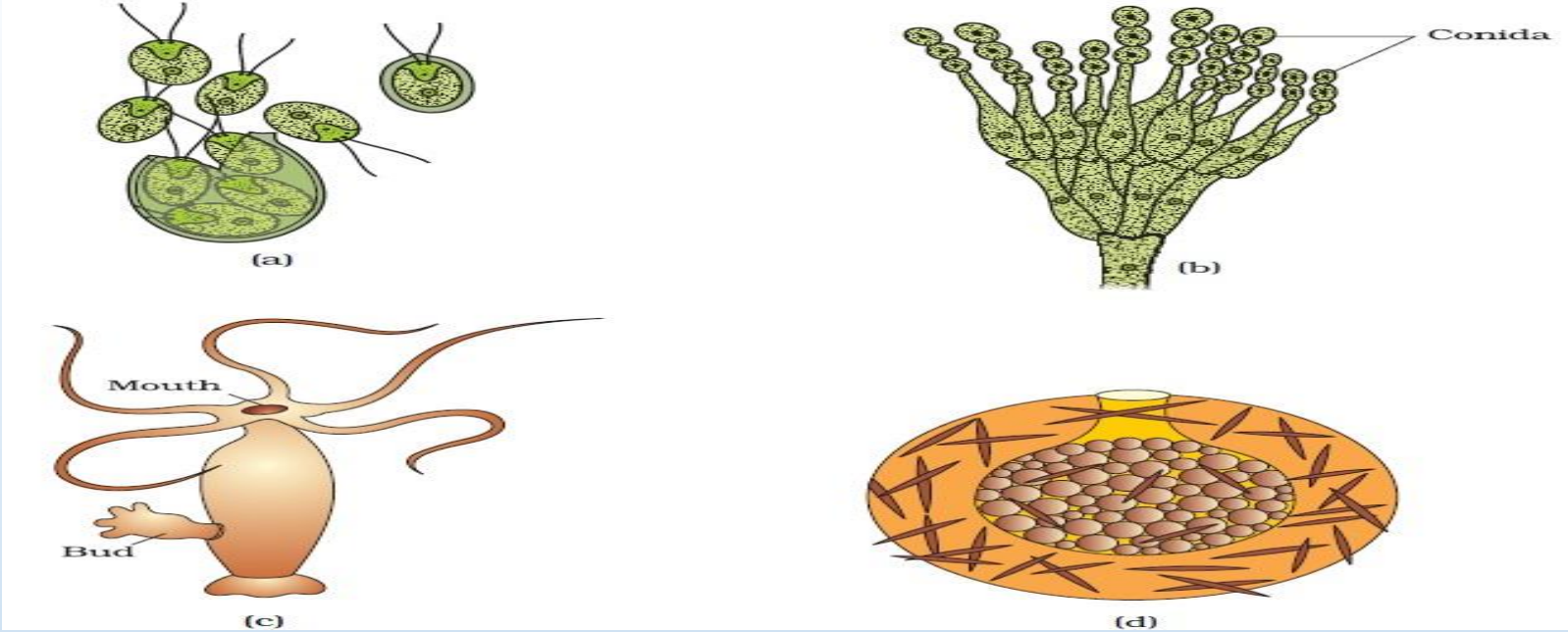
1. Identify A to D in given diagram showing asexual reproduction structure.

1. A-Zoospore, B-Bud, C-Conidia, D-Gemmule

2. A-Zoospore, B-Conidia, C-Bud, D-Gemmule

3. A-Zoospore, B-Conidiosporangium, C-Bud, D-Gemmule

4. A-Aplanospore, B-Conidia, C-Bud, D-Gemmule

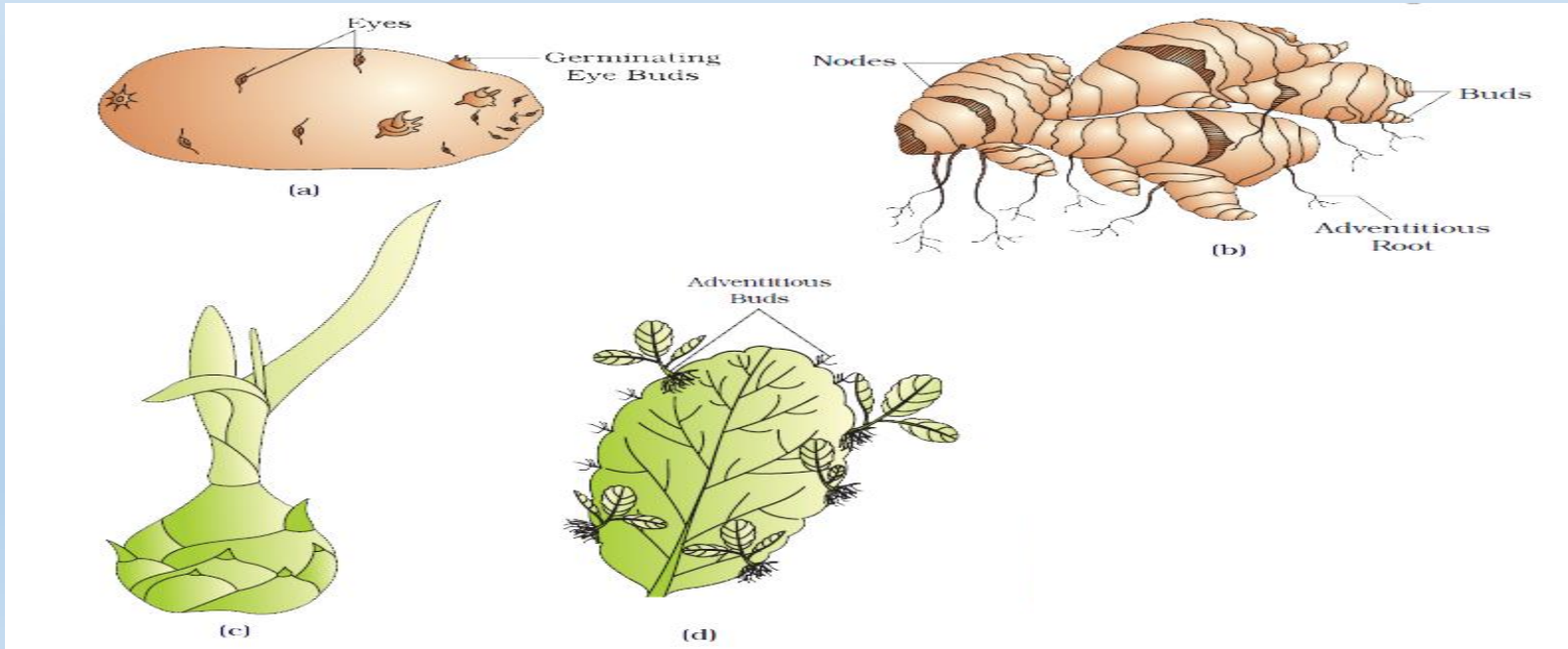


2. Examine the figure given below & select the right options out of (a-d); in which all the 4 items A,B,C & D are identified correctly:

1.A-Tuber, B-Rhizome, C-Bulb, D-Leaf buds

2. A-Offset, B-Sucker, C-Stolon, D-Leaf buds

3. A-Tuber, B-Rhizome, C-Bulbils, D-Leaf buds.



15. In which of the following organism, self fertilization is seen?

a)Fish b)Roundworm c)Earthworm d)Tapeworm

16. Monocarpic plant

a)Flowers twice in every year b)Bears only one type of flowers

c)Flower once in every year d)Dies after flowering once in its life

17. Monocoecious plant of chara shows occurrence of

a)Upper antheridium & lower oogonium on the same plant.

b)Upper oogonium & lower antheridium on the same plant.

c)Antheridiophore & archegoniophore on the same plant.

d)Stamen & carpel on the same plant.

18. When both male & female flowers are present on the same plant, then plant is said to be

a)Bisexual b)Monoecious c)Unisexual d)Dioecious

19. The most critical event in sexual reproduction is

a)Gametogenesis b)Gamete transfer c)Fertilization d)Embryogenesis.

20. Rotifers

a)Exhibit adult reproductive structures in juvenile phase b)Are plants that can be mitosis

c) Produce gametes by mitosis d)Are animals capable of reproducing by parthenogenesis

21. With respect to organism exhibiting internal fertilization organisms exhibiting external fertilization show.

a)More variation b)Great synchrony between sexes

c)Large female size than males d)Less vulnerability to predation

22. The plant part which consist of two generations, one within the other is

a)Germinated pollen grain b)Embryo c)Unfertilized ovule d)Seed

23. Select the correct sequence from the following

a)Gametogenesis – syngamy – zygote – embryogenesis

b)Gametogenesis – syngamy – embryogenesis – zygote

c)Zygote – embryogenesis – gametogenesis

d)Syngamy – gametogenesis – zygote – embryogenesis

24. Select the correct sequence from the following

a)Juvenile phase – senescent phase – reproductive phase

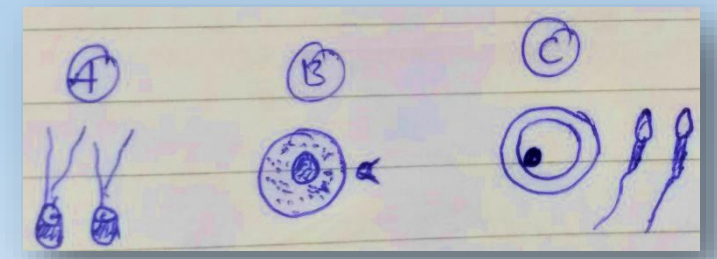
b)Juvenile phase – reproductive phase – senescent phase

c)Reproductive phase – juvenile phase – senescent phase

d)Vegetative phase – reproductive phase – senescent phase

25. Identify the gametes (A, B & C) respectively

Heterogametes	Isogametes	Homogametes	Homo/Isogametes
Isogametes	Homogametes	Isogametes	Heterogametes
Homogametes	Heterogametes	Heterogametes	Heterogametes



26. Reptiles and birds are

a)Oviparous b)Viviparous c)Ovoviviparous d)Viviparous & oviparous respectively

27. There are various types of reproduction, the type of reproduction adopted by an organism depends on.

a)The habit & morphology of the organism

b)Morphology of the organism

c)Morphology & physiology of the organism

d)The organisms habitat, physiology & genetic makeup

28. Offspring formed by sexual reproduction exhibit more variation than formed by asexual reproduction because

a)Sexual reproduction is a lengthy process

b)Gametes of parents have qualitatively different genetic composition

c)Genetic material comes from parents of two different species

d)Greater amount of DNA is involved in sexual reproduction