3055 BA SANGAM COLLEGE

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WORKSHEET 19

School: Ba Sangam College **Year:** 12
Subject: Biology **Name:**

Strand	**1 – Structure and Life Processes**
Sub strand	**1.4 – Comparative Form and Function in Plants and Animals**
Content Learning Outcome	**-Discuss asexual and sexual reproduction, external and internal fertilization, development and the factors that contribute to reproductive success in different organisms.**

REPRODUCTION

Purpose of Reproduction:

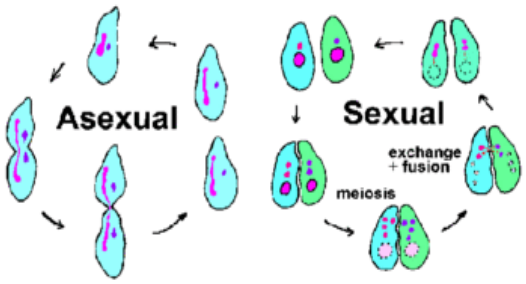
-To survive and continue their species.
-To pass on the genes to the next generation

Evolutionary Trends in Reproductive Strategies

- From haploid stage to diploid stage
- **Plants**- produced many spores with no food reserve to less seeds with food reserves and seed dispersal mechanisms.
- **Animals-** produced many offspring which are not provided with parental care to few offspring which are provided with parental care.

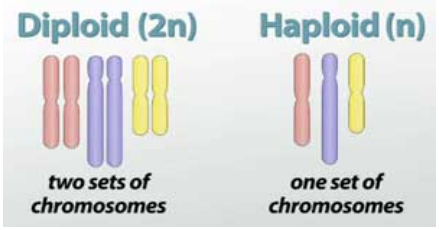
1. Types of Reproduction

ASEXUAL	SEXUAL
A single parent is involved.	Two parents (a male and a female)
No formation or fusion of gametes	Formation and fusion of gametes
Involves mitotic division	Involves meiosis
Individuals are genetically identical i.e. clone	Individuals show variation i.e. offspring



2. Diploid and Haploid Stages

Diploids consist of two chromosome sets in their somatic cells	Haploids consist of a single chromosome set in their somatic cells
Mitosis maintains the 2n cells while increasing the cell number	Gametes are produced by meiosis of 2n cells
Diploid somatic cells consist of 46 chromosomes in each	Haploid somatic cells consist of 23 chromosomes in each
Animals, plants, fungi are examples	Green growth, parasites and ants are examples



3. Reproduction on Land vs. Water

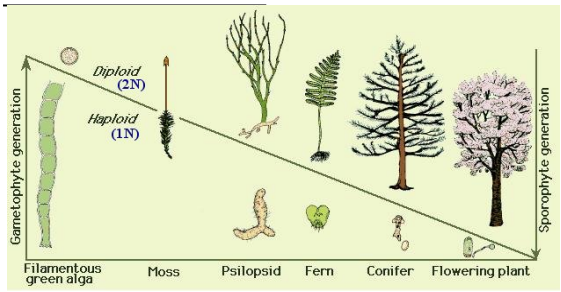
-Life began in the sea.
-Eventually, when the oceans became crowded with competing organisms, natural selection began to favour organisms that could adapt to a land environment.
-However, terrestrial life required new adaptations for reproductions.
-On dry land, sperm cannot swim to eggs and embryos need protections from dehydrations.
-Adaptations for reproductions on dry land evolved as terrestrial organisms evolved.

4. Parental Investment in Offspring

-The more offspring an organism has the less energy it can invest in each.
-Generally, the more offspring an organism has, the lower the chances are for the offspring's survival.

-Natural selections favour organisms that produce the highest number of surviving offspring.
-The most recently evolved groups of organisms, the mammals and birds, invest more energy in each offspring. They have very few offspring compared to other animals, but their offspring have a high survival rate.

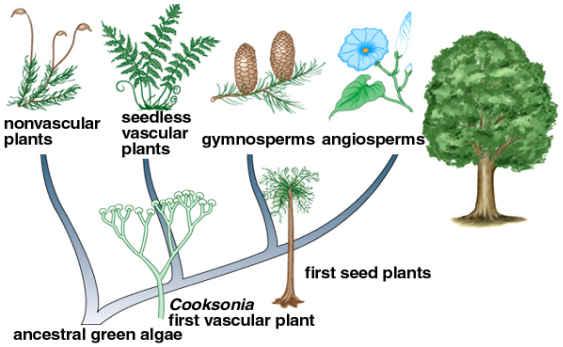
PLANTS: EVOLUNTIONARY TRENDS IN REPRODUCTION



- In plant evolution, **three** trends observed are:

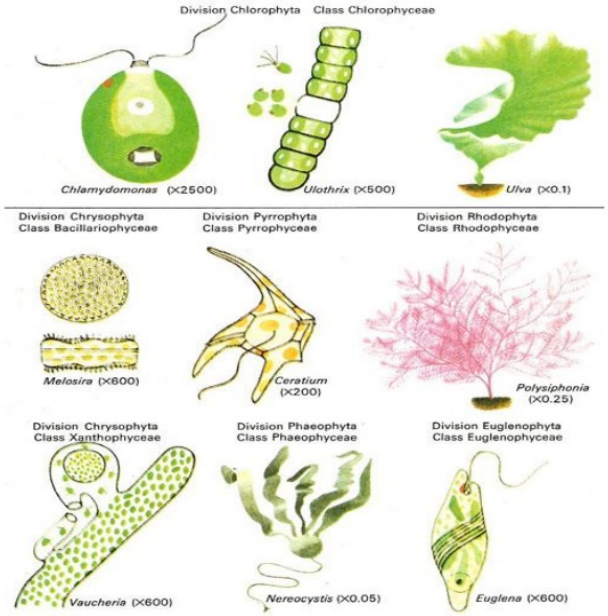
1. Sexual reproduction rather than asexual.
2. Diploid stages of life dominant rather than haploid.
3. Adaptations for terrestrial reproduction such as non-swimming sperm and protected embryos.

- Sporophyte = diploid (2n); Example: leaves, roots, stems
- Gametophyte = haploid (n); Example: ovules, eggs, sperms and pollen
- N = # of chromosomes



1. ALGAE

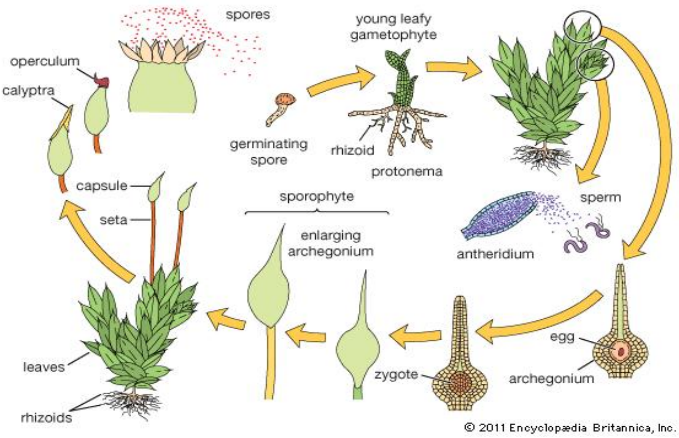
- Most reproduce asexually by divide in half via mitosis to produce new algae plants.
- Some capable of both asexual and sexual.
- Such algae spend the greater part of their lives in a haploid stage as gametophytes.



2. BRYOPHYTES (Greek: bryo= moss; phyta= algae)

- First terrestrial plants.
- Lack true roots, stem and leaves.
- No vascular tissues (xylem and phloem)- restricted to moist habitats-for reproduction.
- Male gametophyte ------ **antheridia** ------- produces male gametes (sperms)
- Female gametophyte ------- **archegonia**------ produces female gametes (eggs).
- Male gametes require water to swim to female gametes.
- The **dominant** stage in a bryophyte is the **gametophyte**, that is, most of its life is spent in haploid stage.
- Examples: Mosses, Liverworts and Hornworts

Moss Life Cycle



STEPS:

1. The haploid reproductive cells divide by

mitosis to produce gametes.
2. Male gametes swim to female gametes.
3. Fertilisation forms a diploid zygote which grows into a sporophyte.The sporophyte lives on the leafy gametophyte.
4. Cells inside the sporophytes divide by meiosis to produce haploid spores.
5. Wind scatters the spores, which will grow into new haploid moss plants.

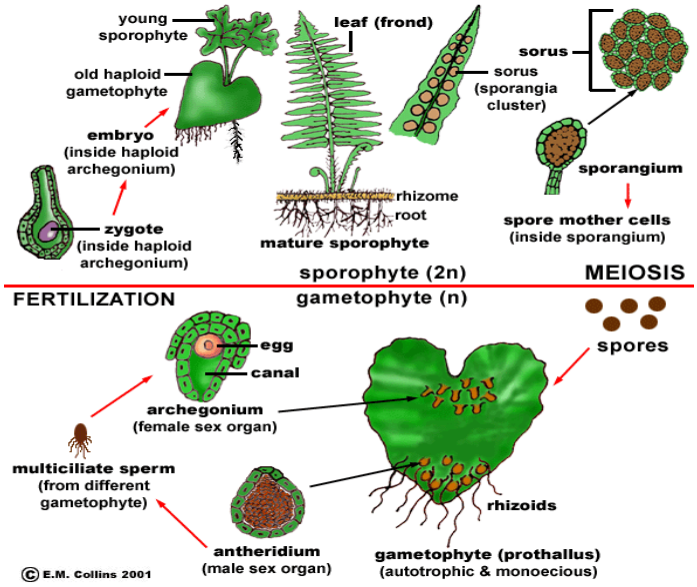
What is the difference between a spore and a seed?

Spores	Seed
1. Unicellular	1. Multicellular
2. Haploid	2. Diploid
3. Asexual reproduction	3. Sexual reproduction
4. First cell of gametophyte	4. Part of the Sporophyte generation
5. Formed by meiosis (usually)	5. Formed by fertilization after mitosis

3. FERNS

- Vascular plants- have xylem tissue for water transport and phloem for food transport.
- Seedless, reproduction using spores.
- Lack true roots, stem and leaves.
- Male gametophyte- **antheridia**; Female gametophyte- **archegonia**.
- Water/moisture still required for the male gametes to swim to the female gametes; therefore ferns grow in shady areas.
- Dominant stage is the sporophyte, that is, most of the life spent in diploid state.

Ferns Lifecycle



STEPS:

1. Ferns produce haploid spores by meiosis.
2. Wind scatters the spores.
3. Under the right conditions, a spore divides mitotically to form a tiny, heart-shaped gametophyte.
4. The gametophytes produce eggs and sperms.
5. Fertilisation produces a diploid zygote that grows into an adult sporophyte fern, beginning the cycle again.

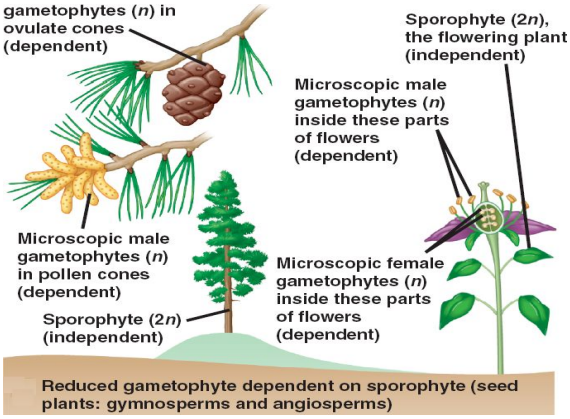
SEED PLANTS

- Seed plants do not require water for the sperm/pollen/male gametes to travel to the egg/ovule/female gametes.
- Seed plants spend their entire life in a sporophyte stage.
- Gametophyte stage is the sperm and eggs which are haploid.

Gymnosperms and **Angiosperms**

4. GYMNOSPERMS (Latin: Gymno= naked; Sperms= Seeds)

- Have vascular tissues (xylem and phloem).
- Produce 'naked seeds'– seeds not enclosed in a fruit.
- Seeds produced on cones and lay open on the scales of female cone.
- Small male cones produce many haploid pollen grains.
- Dispersal of pollen is via wind.
- When pollens reach the ovules at the tips of the scales of female cones, fertilization occurs.
- Fertilisation forms diploid seeds.
- Seed coats protect the embryos.
- Tissues of the female gametophyte nourish them.
- When seed falls onto warm, moist ground, it grows into a diploid (sporophyte) adult.
- The sporophyte, when mature, makes gametophyte producing cones and repeats the cycle.
- Examples: Conifers (Pines, Christmas trees); Cycads (Sago palms: Local Name: Sago, Sogo, Seko); Ginkgo

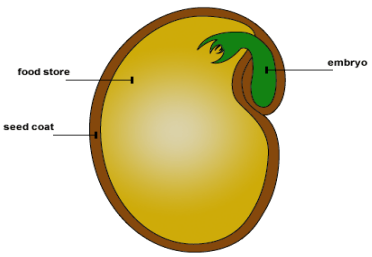


5. ANGIOSPERMS (Greek: Angion = vessels; Sperms= Seeds)

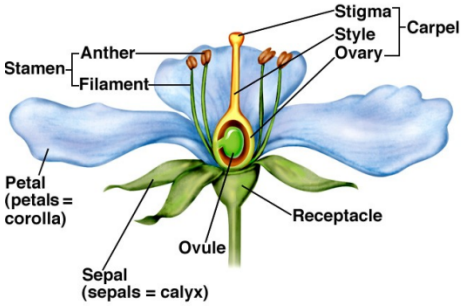
- Most successful of all terrestrial plants
- Have vascular tissues (xylem and phloem).

Adaptations which make angiosperms so successful.

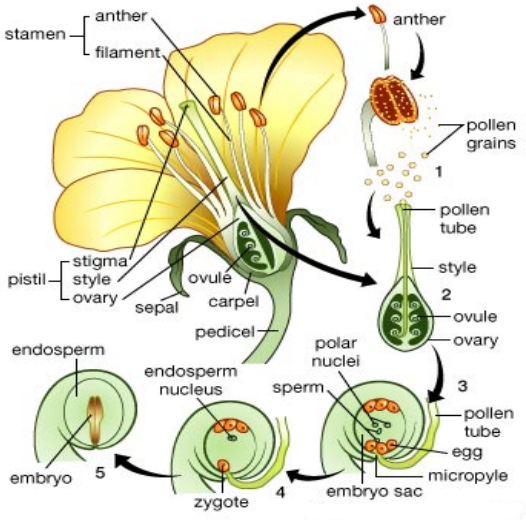
- Male and female gametophytes reproduced in flowers.
- Male gametophyte ------**Stamen** (made of anther and filament).
- Anther ---produces male gametes- pollen grains.
- Female gametophyte ------ **Pistil** (made of stigma, style and ovary).
- Ovary ----produces female gametes- ovules
- When --ovule --gets fertilized by a pollen grain---- a diploid seed forms.
- **Double fertilisation** -----one sperm fertilizes the egg to produce the diploid zygote and the second sperm unites with the two polar nuclei of the central mega gametophyte (female gametophyte) to form the triploid (3n) tissue which later develops into an endosperm.
- **After fertilization**---The ovary become the fruit and protects the seeds.
- **Seed** ---- has 3 parts:
  (1) Plant embryo;
  (2) A seed coat and
  (3) A nourishing endosperm.

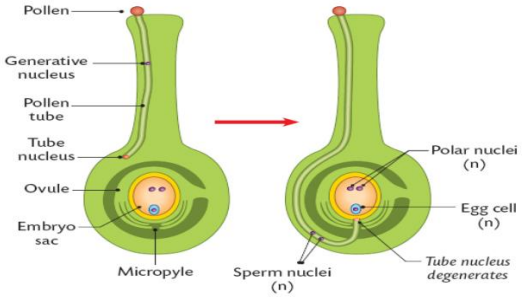


The Reproductive Structure in Angiosperms: Flower



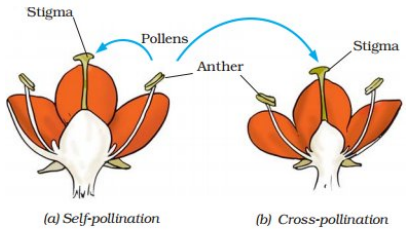
Double Fertilization



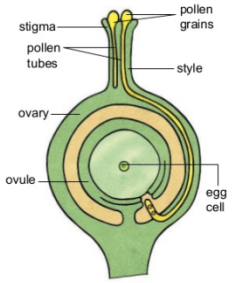


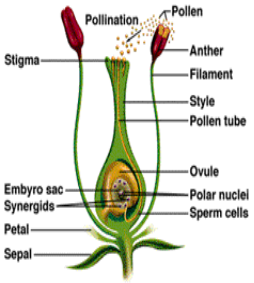
Pollination

- Most angiosperms use animals to **cross pollinate** their flowers, rather than depending on wind pollination.



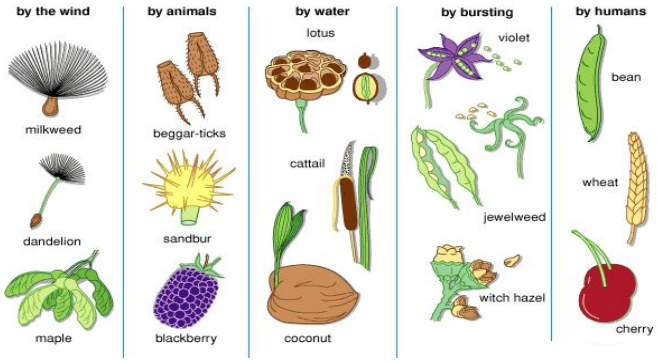
Pollination in flower





Seed Dispersal

- Angiosperms disperse their seeds using: wind; water and animals.
- Examples: Coconut trees; hibiscus plants; bread fruit trees; and all flowering plants.



Exercise

1. Explain the trend observed for the sporophyte and gametophyte in plants as they moved from aquatic environment to terrestrial environment.

2. Differentiate a spore from a seed. How is a seed better adapted for life on land?

3. Identify plant groups that require water for reproduction.

4. Read the following descriptions of the life cycles of different plants. State the group to which each plant belongs.

a. This plant spends almost its entire life in a sporophyte stage and produces fruits.

b. These terrestrial plants spend most of its life as a gametophyte.

c. These plants produce and protect gametes in a flower.

d. Plant produces naked seeds.

e. Terrestrial plant which is seedless, lack true roots, stems and leaves but has vascular tissues.

f. These plants produce seeds on cones.