

BIODIVERSITY OF PLANTS

12 FEBRUARY 2014



Lesson Description

In this lesson we:

- Look at how plants are classified
- Define Alternation of generations
- Summarise the main characteristics of four groupings of plants – bryophytes, pteridophytes, gymnosperms, angiosperms
- Look at the ecological importance of the four groups of plants



Summary

Biodiversity of Plants

Classification of Plants

- Plants are grouped according to their evolutionary history and the presence or absence of vascular tissue.
- The bryophytes are small green plants and do not have vascular tissue.
- The tracheophytes which include the pteridophytes, gymnosperms and angiosperms all have vascular tissue in the form of xylem and phloem.

Alternation of Generations

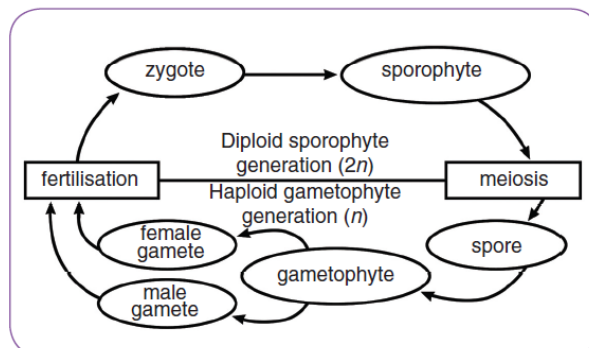


Fig. 2.3 Diagram showing the generalised alternation of generations in plants

(Solutions for all Life Sciences, Macmillan, p57)

Grouping of Plants

- **Bryophytes** (e.g. moss) are the most primitive terrestrial plants.
 - Gametophyte generation is dominant.
 - The plant body is known as a **thallus** and the roots-like structures are called **rhizoids**.
 - The **sporophyte** generation is attached to the gametophyte and consists of the foot, seta and sporangium (capsule). Spores are produced in the sporangium.
 - The **gametophyte** generation is **autotrophic** and the **sporophyte** generation is **semi-parasitic**.
- **Pteridophytes** (e.g. fern) are a grouped between the bryophytes and seed-bearing plants.

notes for...

- Sporophyte generation is dominant and has adventitious roots, rhizome (stem) and leaves (fronds).
- The sporophyte generation has well developed vascular tissue.
- Sporophyte is **autotrophic**.
- The **gametophyte** generation is a small simple **prothallus** without specialised tissue.
- The **prothallus** is **autotrophic**

- **Gymnosperms** have well developed vascular tissue.
 - Sporophyte generation is dominant
 - Gymnosperms are **heterosporous**.
 - Examples are cycads and pines
 - Pines have well-developed stems and root system.
 - Both male and female cones occur on one tree.
 - Male cones produce pollen grains (microspores) and female cones contain megaspores.

- **Angiosperms** are flowering plants that have a dominant diploid sporophyte generation.
 - They are divided into **monocotyledons** and **dicotyledons**.
 - Well developed vascular tissue
 - Microspores transferred by pollination.
 - Double fertilisation occurs

Ecological Importance of Plant Groups

- **Bryophytes** cover and bind the soil and reduce erosion. Mosses are pioneer plants in succession.
- **Pteridophytes** form dense mats which trap leaves and soil. They are pioneer plants in succession and a dense lower stratum in the climax community.
- **Gymnosperms** have a symbiotic relationship with mycorrhiza for absorbing mineral salts from the soil. Fallen pine leaves can prevent soil erosion but can also acidify soil making it infertile.
- **Angiosperms** are primary producers and maintain oxygen-carbon dioxide balance in atmosphere. They provide shelter and building material for many organisms. The constant growth, death and decomposition of the angiosperms provides a cycling of inorganic nutrients back into the soil.



Test Yourself

Question 1

Bryophytes are terrestrial plants that have no

- A. vascular tissue
- B. Leaf-like parts
- C. Water-absorption structures
- D. cellulose

Question 2

The sporophyte of a moss consists of

- A. rhizoids, stem and leaf-like structures
- B. foot, leaf-like structures and the sporangium
- C. foot, seta (stalk) and sporangium
- D. rhizoids, seta and sporangium

Question 3

When a spore of the moss germinates, it gives rise to a

- A. moss plant
- B. protonema (gametophyte)
- C. sporophyte
- D. prothallus

Question 4

Roots of gymnosperms are usually associated with

- A. ramenta
- B. mycorrhiza
- C. antheridia
- D. rhizoids

Question 5

The sporophyte and gametophyte generations of a fern is respectively represented by the

- A. spore and the egg cell
- B. antheridium and the archegonium
- C. fern plant and the prothallus
- D. sporophyll and the rhizome

Question 6

During pollination in the pine, pollen eventually lands on the

- A. nucellus
- B. archegonium
- C. ovuliferous scale
- D. bract scale

Question 7

In which of the following does the gametophyte generation exist independently of the sporophyte generation?

- A. Moss
- B. Fern
- C. Coniferous plant
- D. Flowering plant

Question 8

The male gametophyte in spermatophytes is the

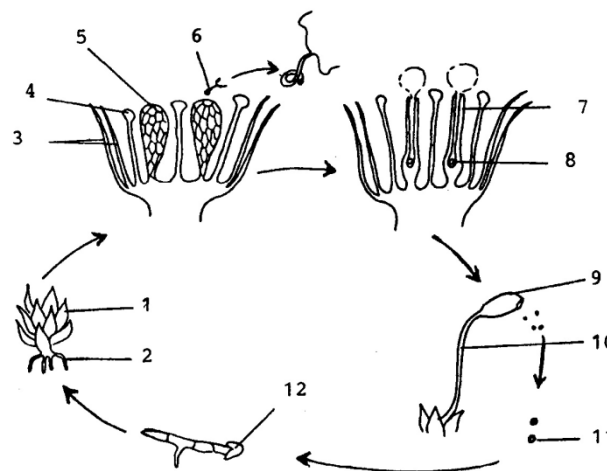
- A. pollen grain
- B. ovule
- C. anther
- D. nucellus



Improve your Skills

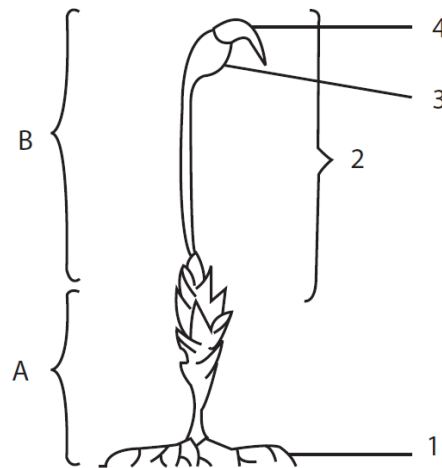
Question 1

The diagram below represents the life cycle in Bryophytes.



- 1.1 Write down the numbers and names of two different structures that photosynthesise.
- 1.2 Name the structure numbered 2 and state its function.
- 1.3 Describe the role played by the parts numbered 3, 5, 7 and 8 in sexual reproduction.
- 1.4 Write down the numbers of the parts which represent the sporophyte generation.
- 1.5 Name the structure numbered 11. What is the chromosome composition of this structure?
- 1.6 What is the main difference in structure between structure 2 and root hairs?

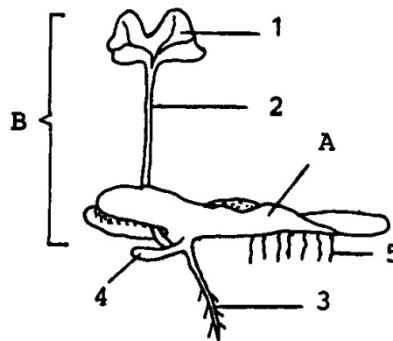
Question 2



- 2.1 Identify the structure labelled 4.
- 2.2 What type of reproductive body is formed in the part numbered 3? By which process is it formed?
- 2.3 Identify structure 1. Name its function.
- 2.4 Write down the numbers of the part in the drawing which represent the sporophyte.
- 2.5 Give the name of the organ in which the female gamete of this plant is formed.
- 2.6 The leaves have no cuticle. In what way does this limit the environment in which the moss can live?

Question 3

The following drawing represents a certain structure in the life cycle of a fern.



- 3.1 To which group of plants does the fern belong?
- 3.2 Which generation is represented by
 - a) A and
 - b) B?
- 3.3 Identify the parts numbered 2, 4 and 5.
- 3.4 What eventually happens to each of the parts mentioned in 3.3?

notes for...

- 3.5 In which respect does the nutrition of this generation correspond with the same generation in bryophytes?
- 3.6 If a cell in part numbered 3 possesses 10 chromosomes in the nucleus, what will the number of chromosomes be in the nucleus of a cell in part numbered
- a) 2
 - b) 4
 - c) 5?
- 3.7 State two similarities and one difference between the generation of ferns and mosses as indicated by A.