Plant systematics (part 1)

Eu-bacteria

1. Unicellular
2. Prokaryotes
3. Both autotrophic and heterotrophic.
4. Reproduce by binary fission
5. Most of the bacteria causing disease in human.

Archae-bacteria

1. Unicellular
2. Prokaryotes with distinctive cell membranes.
3. Mostly heterotrophic, but some are autotrophic producing food by chemosynthesis.
4. Many live in harsh environments such as Sulfurous Hot Springs, very salty lakes, and in anaerobic environments, such as the intestines of mammals.

Protista

1. Unicellular and a few simple multicellular that is not specialized to perform specific functions.
2. Eukaryotes that are NOT Plants, Animal, or Fungi.
3. Protista include: subkingdom

1. Phytotrophs (plant-like protists) (photosynthetic).
2. Heterotrophs, Protozoa (animal-like protists) (ingestion).
3. Decomposers and parasites, (fungus-like protists)(Absorption)

Plantae

1. Multicellular and specialized for different functions.
2. Eukaryotic and carry out photosynthesis (Chlorophylls a and b).
3. Plant cells have cell walls, that contain the polysaccharide cellulose.
4. Store reserve food as amylose (starch)
5. Sessile (can not move)

Fungi

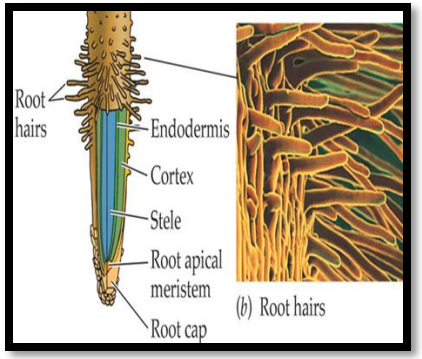
1. Mostly multicellular.
2. Eukaryotes.
3. The cell wall of fungi are made up of chemical chitin.
4. Heterotrophic and obtain their nutrients by releasing digestive enzymes into a food source.
5. act either as decomposers or as parasites in nature.

خزن المواد الغذائية الاحتياطية (المدخرة) على شكل الأميلوز (النشا)

Animalia

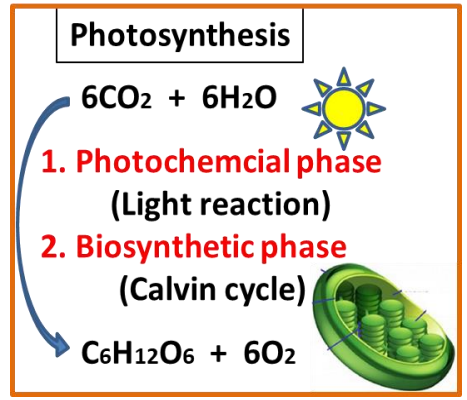
1. Multicellular.
2. Eukaryotic
3. Heterotrophic.
4. Animal cells have NO CELL WALLS.
5. Most animals can move from place to place.
6. Fish, Birds, Reptiles, Amphibians, and mammals-including humans belong to the Kingdom Animalia.
7. This Kingdom also includes sponges, jellyfish, worms, sea stars, and insects.

What do plants need to survive?



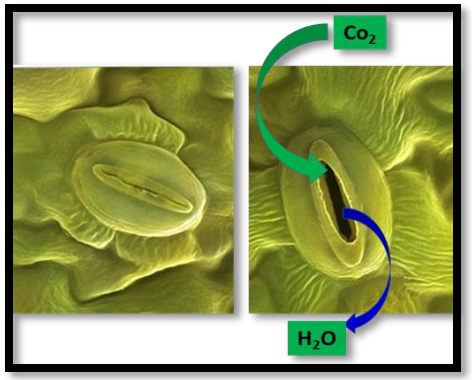
- **Sunlight**

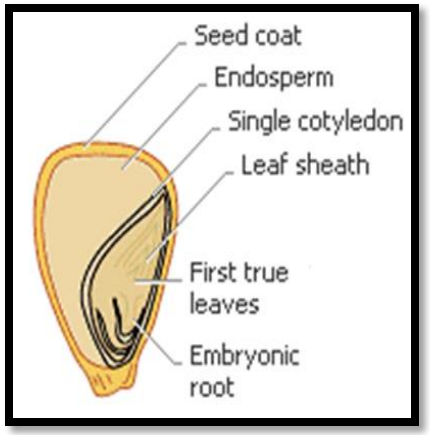
- energy of sun captured by chlorophyll and used to join CO_2 and H_2O to form glucose ($C_6H_{12}O_6$); plants need broad leaves to maximize light absorption أشعة الشمس – تمتص طاقة الشمس بالكلوروفيل وتستخدم مع ثاني اكسيد الكربو ن والماء لتشكيل الجلوكوز (النباتات تحتاج إلى أوراق واسعة لتمتص اكبر قدر من الضوء



- **Water and minerals**

- roots to absorb these الماء والمعادن – وتقوم الجذور بهذه العملية





- **Gas Exchange**

– stomata in leaves تبادل الغازات – تقوم بها الثغور في أوراق

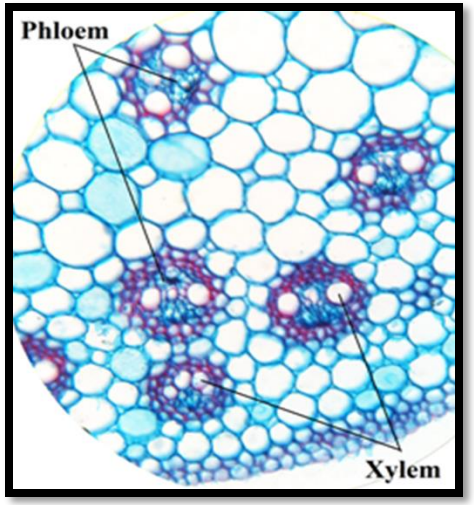
- **Protective structures** هياكل لحماية - لتحمي الأجنة النامية.

- were required to protect the developing embryos.

- **Movement of water and nutrients**

  – **Most plants have tubes – phloem (nutrients up & down) and xylem (water up)** حركة الماء والمواد الغذائية
  معظم النباتات لها أنابيب - اللحاء (لنقل المواد الغذائية أسفل) والخشب (لنقل الماء الى اعلى)

  – **Some small plants use diffusion** بعض النباتات الصغيرة تستخدم عملية الأنتشار



Plant Adaptations to Land

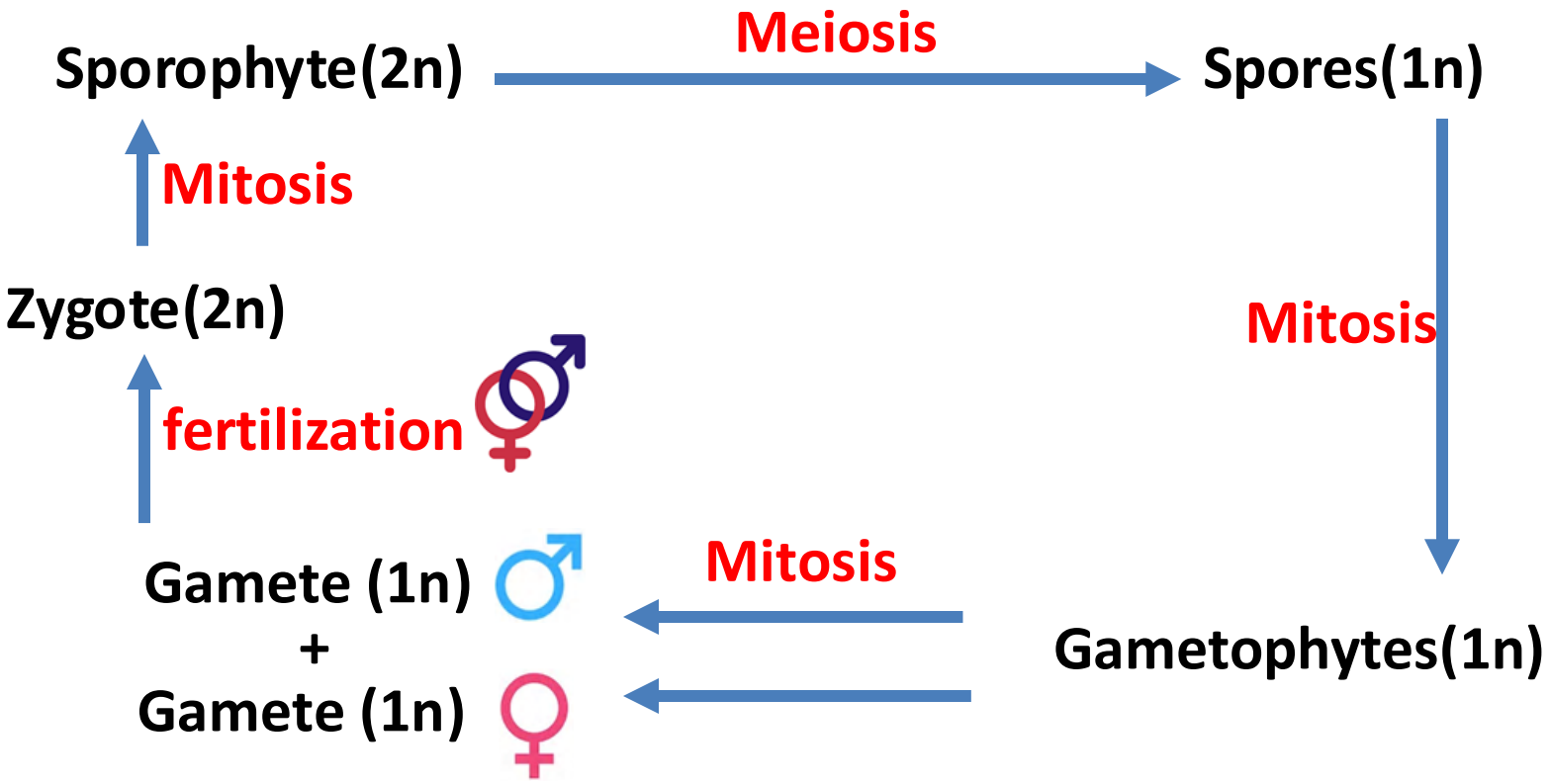
Problems:

- Need minerals
- Gravity
- Increase in Height for Light
- Adaptations for Drier environment
- Reproduction

Solutions:

- Roots absorb H_2O & minerals
- Lignin & cellulose in cell walls
- Vascular Transport System
- Waxy cuticle & stomata with guard cells
- Pollen containing sperm

All land plants have life cycles in which a multicellular diploid sporophyte phase alternates with a multicellular haploid gametophyte phase



GENERAL LIFE CYCLE OF PLANTS

Alternation of Generations تعاقب الأجيال

- **The life cycle of plants has two different phases. This is called; ALTERATION OF GENERATIONS are: (1). Sporophyte (2n) الطور البوغي ذو النوى (2ن) (2). Gametophyte (n) الطور المشيجي ذو النوي (ن)**

Spores **Gametes** **Zygote**

- Spores and gametes are singles celled and haploid (1n)
- Spores are used in asexual reproduction, while gametes are used in sexual reproduction

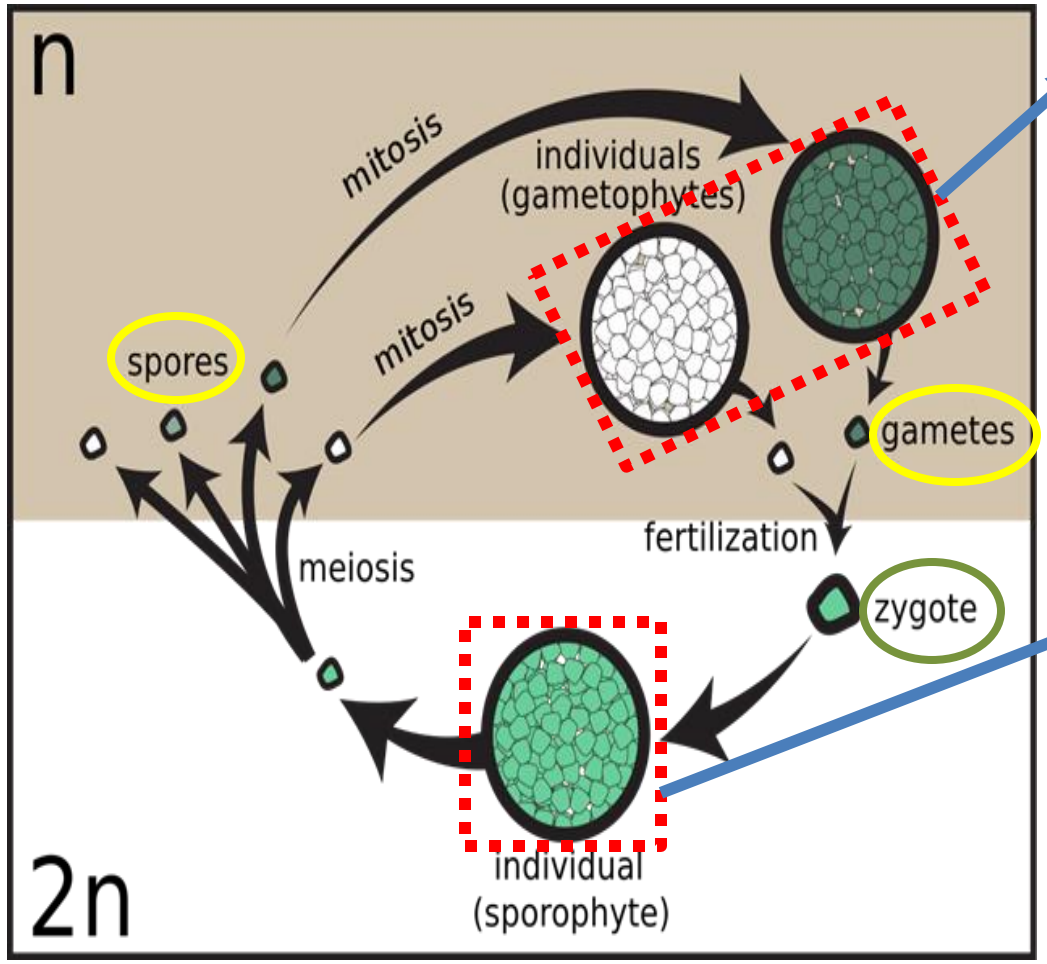
Sporophyte(2n) **Meiosis** Spores(1n)

Zygote(2n)

fertilization ♂♀

Gamete (1n)♂ + Gamete (1n)♀ **Mitosis** Gametophytes(1n)

Mitosis

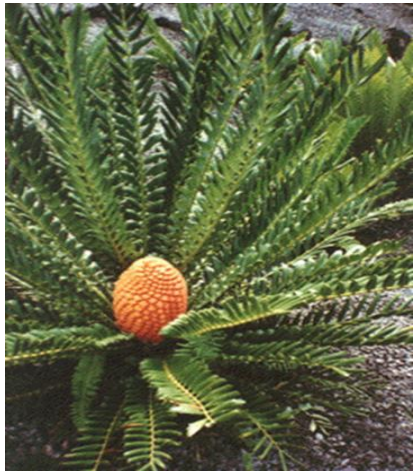


Individuals (Gametophytes)

- Haploid(1n)
- Undergoes **mitosis** to produce gametes (1n) (eggs and sperm)

Individual (Sporophytes)

- Diploid(2n)
- Produce haploid spores (1n) by **meiosis**











Lily bulb




The Plant Kingdom
Kingdom Plantae

Non-Vascular Plants
Bryophytes

Liverworts
Marchantiophyta

Hornworts
Anthocerotophyta

Mosses
Bryophyta

Vascular Plants
Tracheophytes

Spore-Producing Plants
Pteridophyte

Seed-Producing Plants
Spermatophytes

Club Mosses
Lycopodiophyta

Horsetails
Equisetophyta

Ferns
Pteridophyta

Non-Flowering Plants
Gymnosperms

Flowering Plants
Angiosperms

Conifers
Pinophyta

Cycads
Cycadophyta

Ginkgo
Ginkgophyta

Plants With One Seed Leaves
Monocotyledon (Monocots)

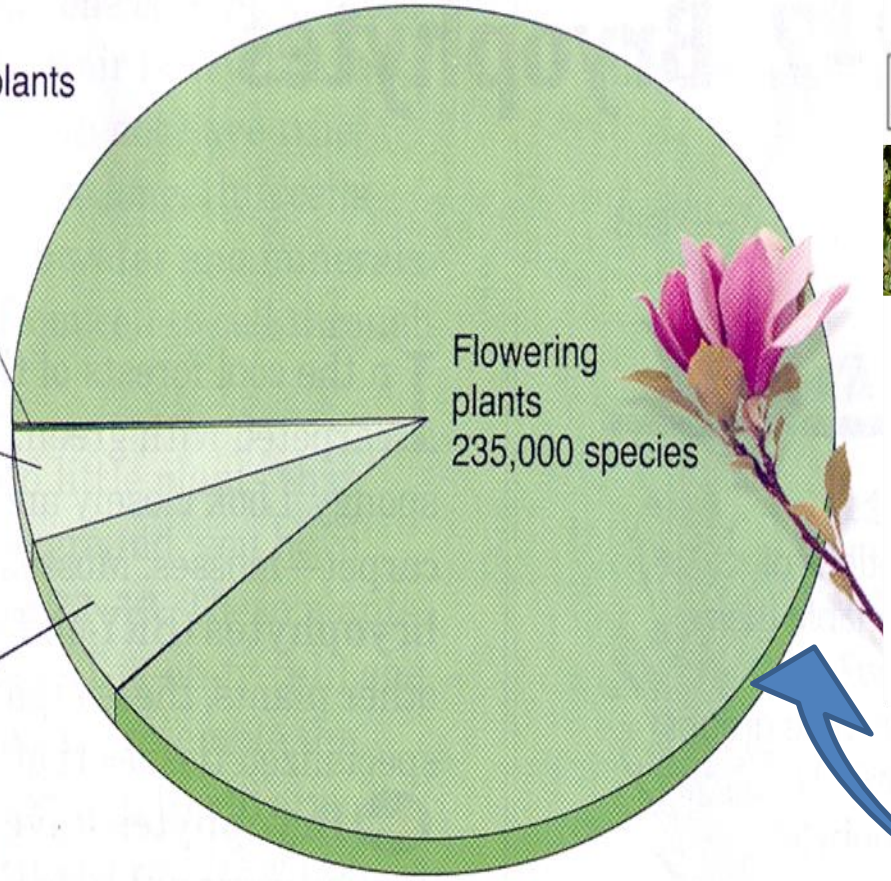
Plants With Two Seed Leaves
Dicotyledon (Dicots)

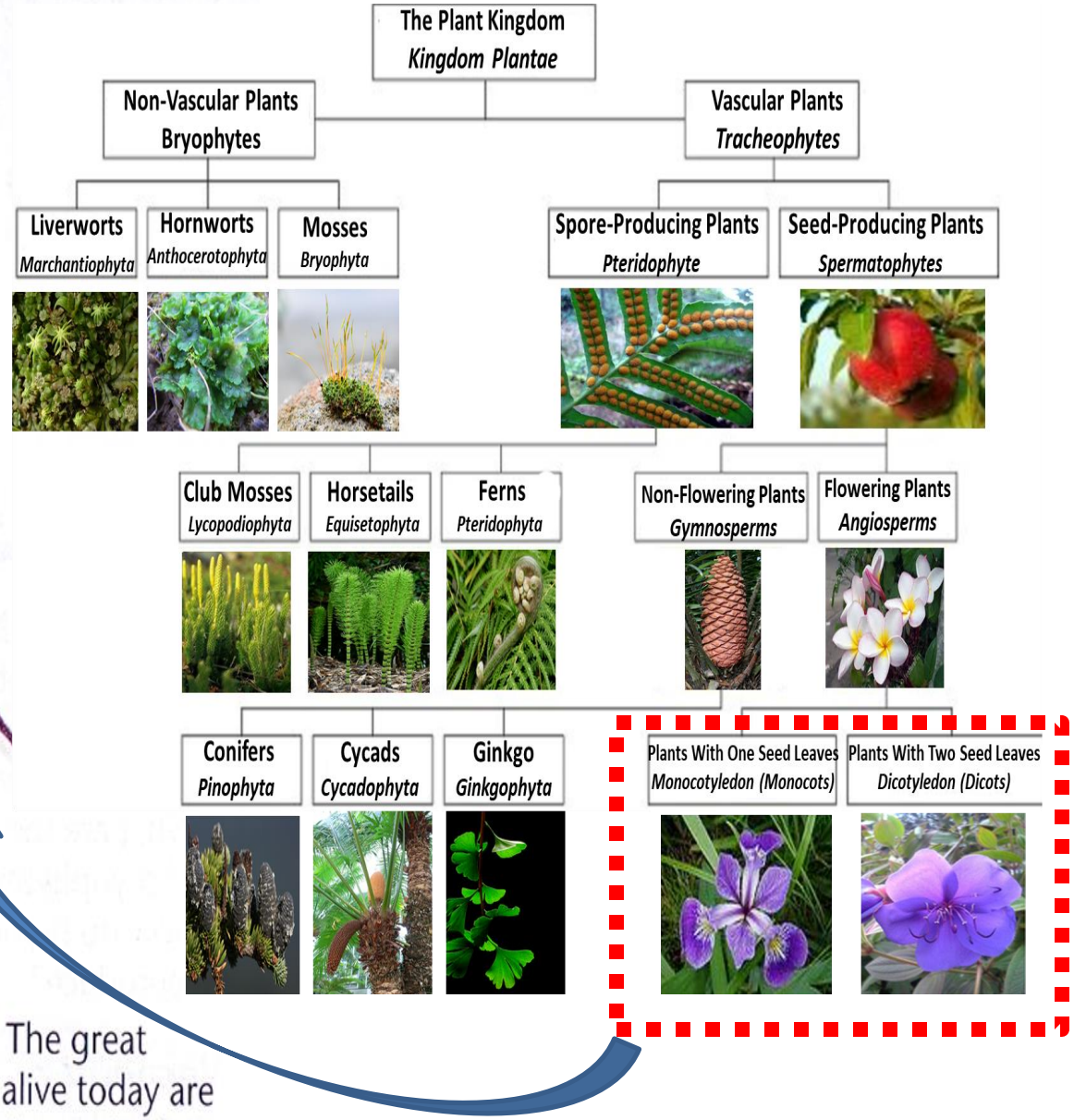
Diversity of plants today

Cone-bearing plants
760 species

Ferns and
their relatives
11,000 species

Mosses and
their relatives
15,600 species





▲ **Figure 22–7** The great majority of plants alive today are angiosperms, which are also known as flowering plants. **Interpreting Graphics** *What is the second largest group of plants?*

The four main groups of plants

1. **Mosses (Bryophytes)** نباتات الحزازية

النباتات لا وعائية
(nonvascular plants)–(15,600 species)

2. **Ferns (Pterophytes)** النباتات السرخسية

وعائية لا بذرية منتجة الابواغ
(vascular, seedless plants, spore bearing plants)–(11,000 species)

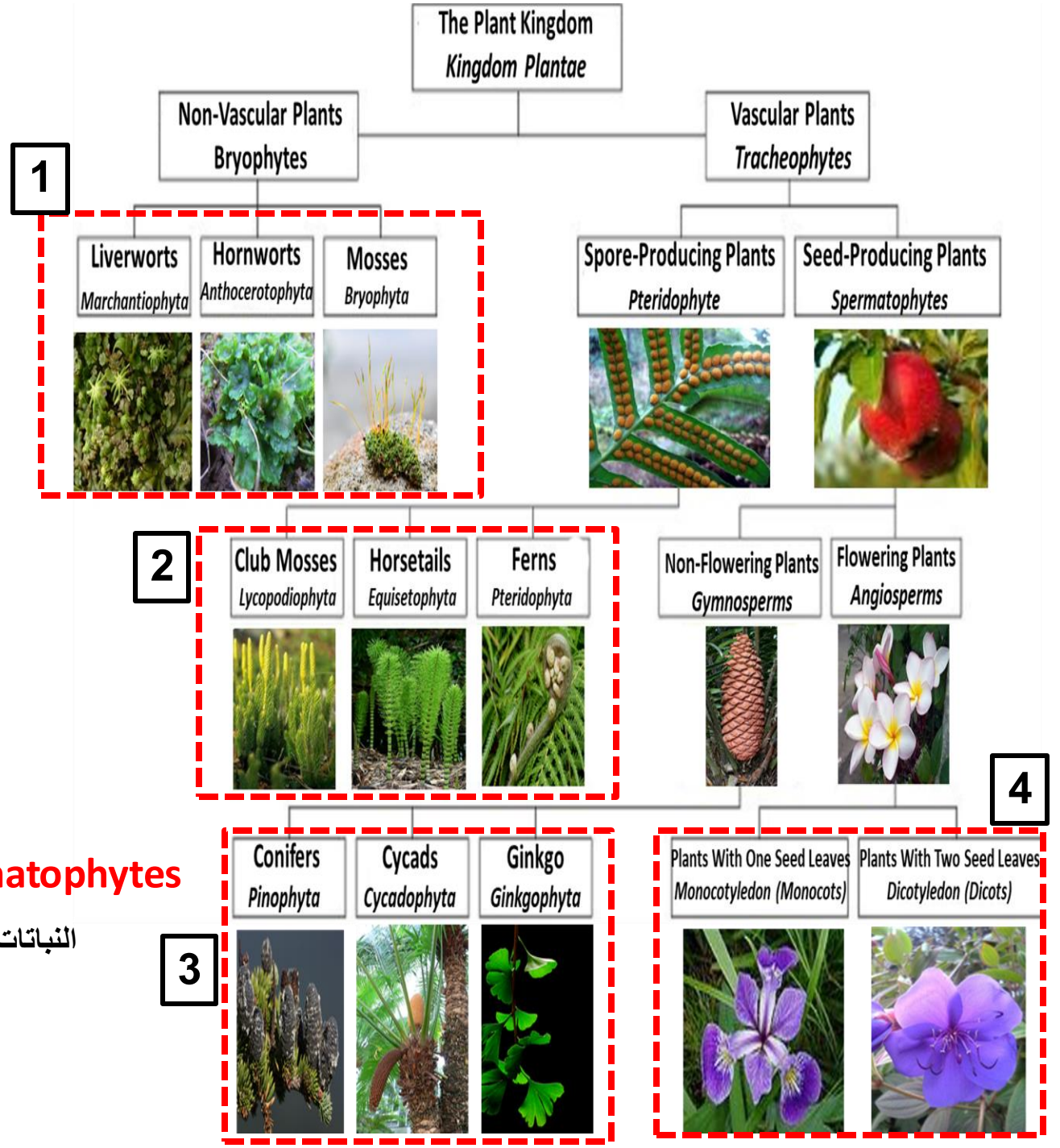
3. **Gymnosperms** عاريات البذور

وعائية عارية البذور منتجة لمخاريط
(vascular, Naked seeds, Cone-bearing Plants-(760 species)

4. **Angiosperms** كاسيات البذور

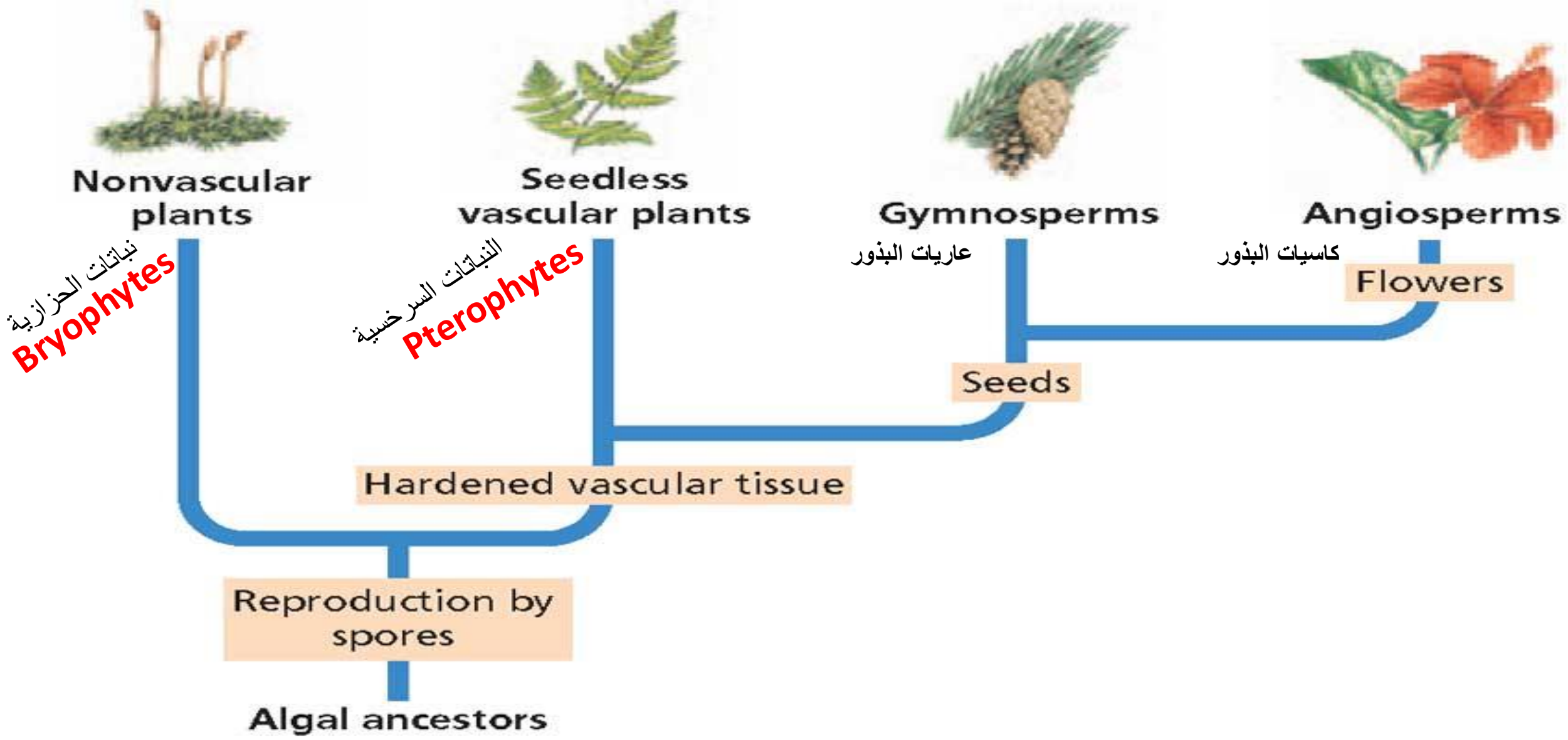
وعائية مغطاة البذور منتجة للأزهار
(vascular, Covered seeds, Flowering Plants (245,000 species)

Spermatophytes
النباتات البذرية



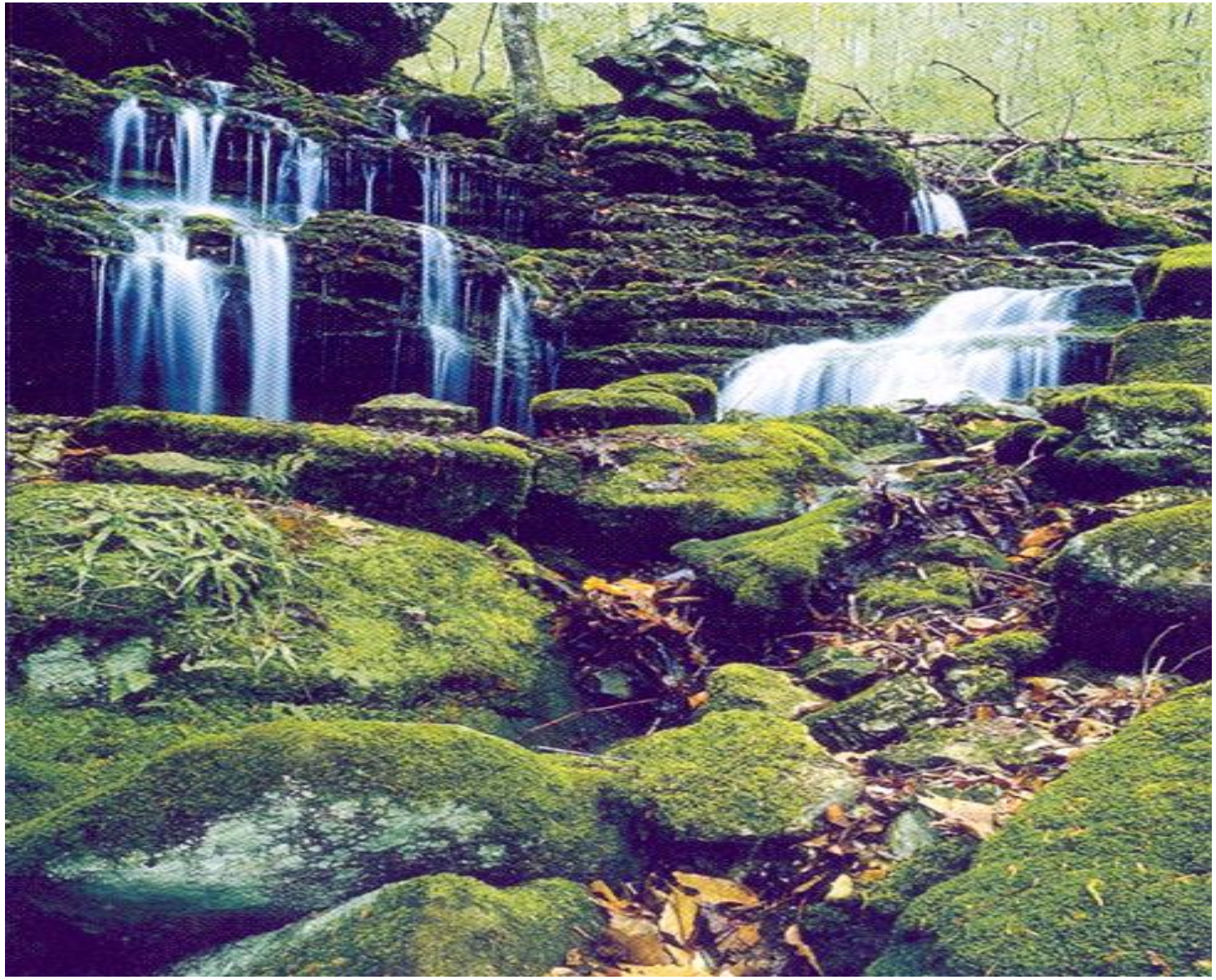
Plant Cladogram

Relationships among the various groups of plants



BRYOPHYTES

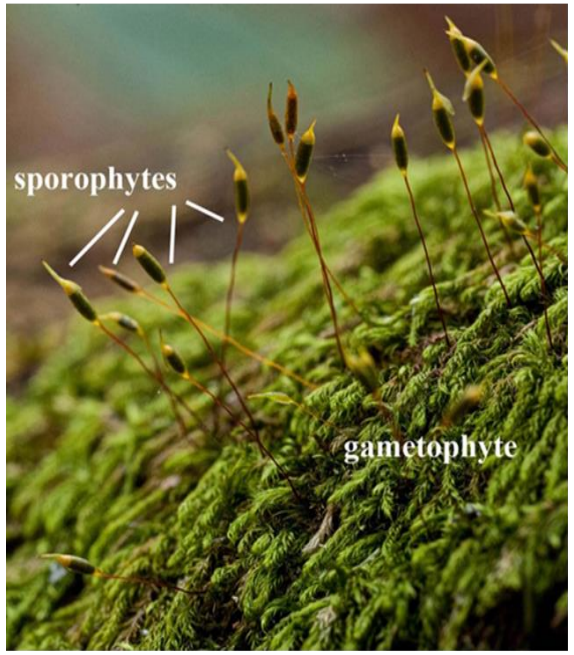
- Do not have vascular tissue for support or conduction of water & mineral and food.
- Require a constantly moist environment
- Cells must be in direct contact with moisture
- Sperm must swim to egg through water droplets



Classes of Bryophytes

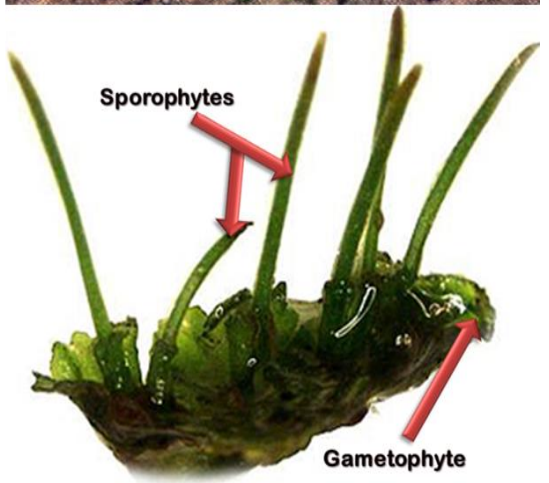
- **Gametophyte** (n) is **dominant** phase of life cycle
- **Sporophyte** (2n) phase of life cycle is **small**

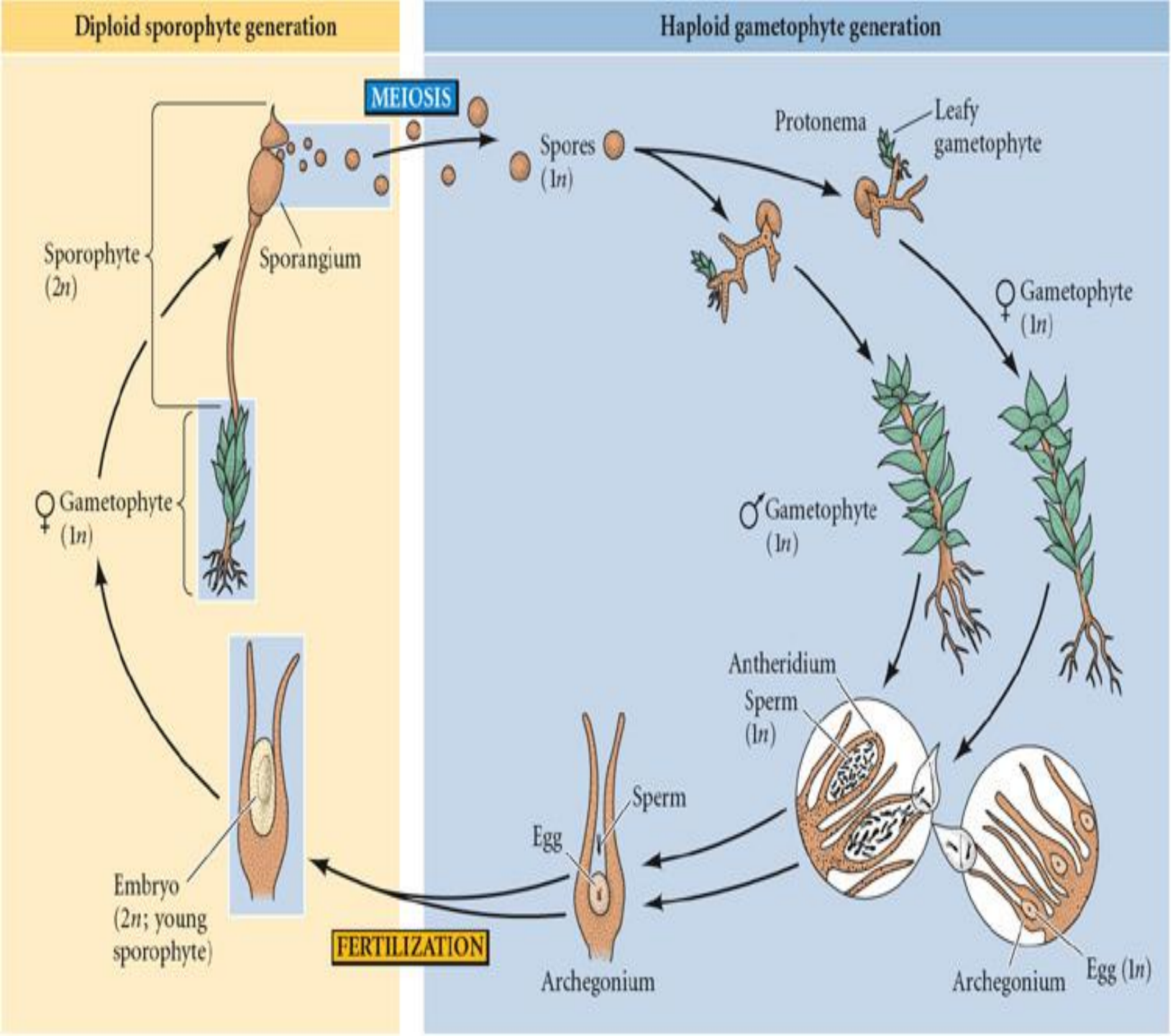
1- Bryophyta
(Moss)
Funaria Sp.
الحزازيات القائمة
مثل نبات الفيوناريا



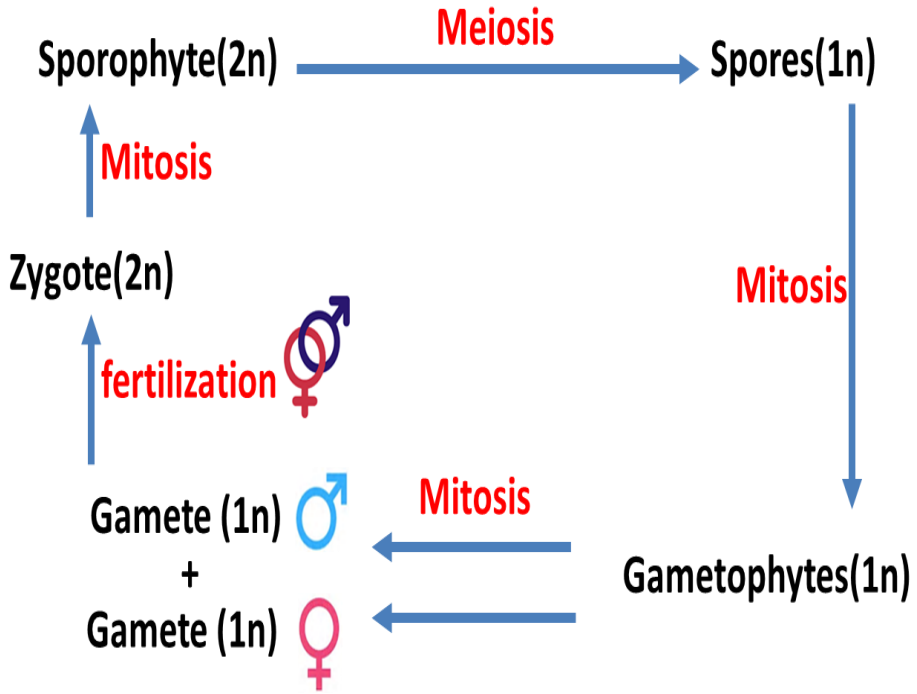
2- Hepatophyta
(Liverwort)
Marchantia, Riccia
حزازيات كبدية منبطحة
مثل اجناس الماركنتيا والريشيا

3- Anthocerophyta
(Hornworts)
Anthoceros sp.
الحزازيات الكبدية القرناء
مثل نبات الأنثوسيروس





Simplified Lifecycle of a Moss (Bryophytes)



- **Gametophyte** (n) is **dominant** phase of life cycle
- **Sporophyte** (2n) phase of life cycle is **small**

PTERIDOPHYTA

أوراقها عريضة تسمى الأوراق السرخسية

- **Broad leaves called fronds**

وريقاتها ريشية مركبة

- **Leaflets called pinnae**

تتشكل اكياس بوغية تسمى على الجانب السفلي من الورقة السرخسية

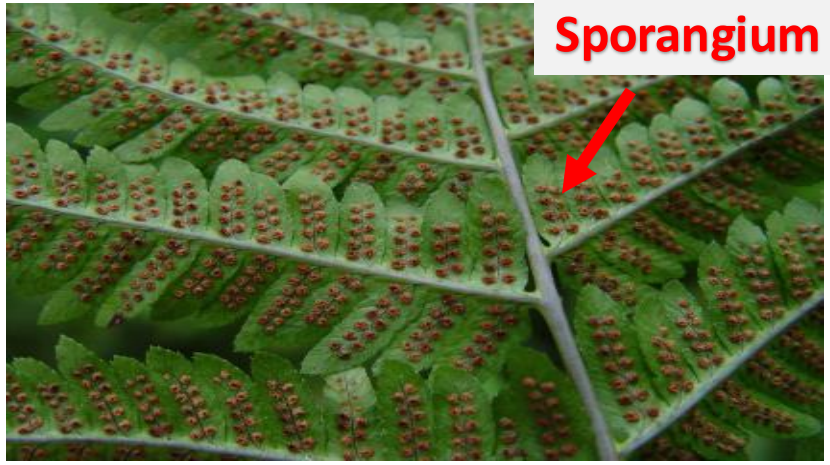
- **Sporangium are formed on the underside of the fronds.**
- **Unfolding fronds are called fiddleheads.**

تسمى الورقة السرخسية الغير منبسطة "رأس الكمان"

- **Spores are dispersed by the wind.**

تنشر وتفرق الجراثيم بواسطة الرياح

- **Sporangium produces spores.**



Frond containing spores at lower surface

Classes of Pteridophyte

(1) Psilophyta (whisk ferns) Psilotum Sp.

النباتات السليوتية
مثل نبات السيلوتم

(2) Lycophyta (Spike Mosses) *lycopodium Sp.*

النباتات الليكوبودية
مثل نبات ليكوبديوم

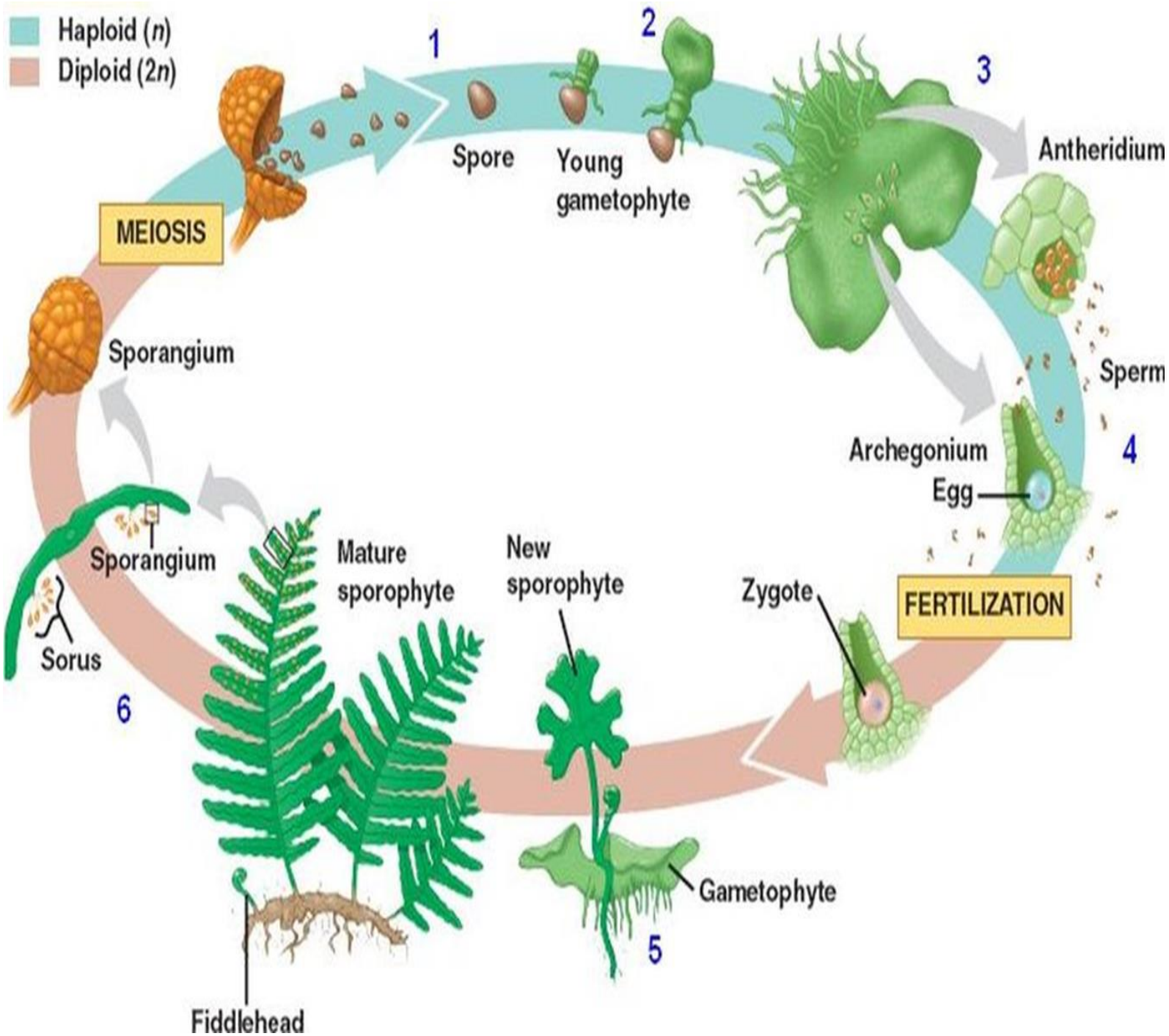
(3) Sphenophyta (Horsetails)

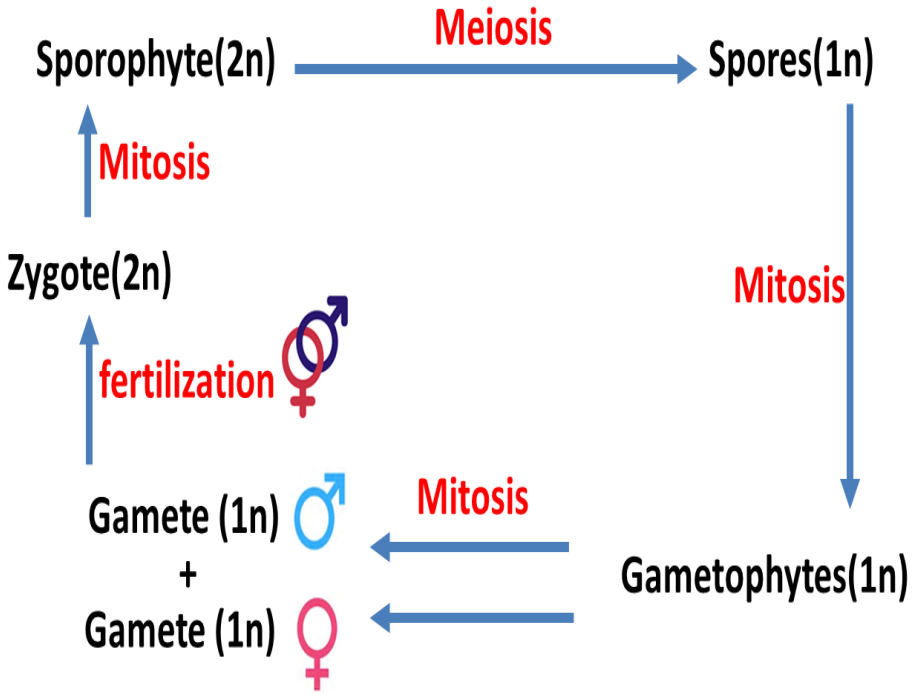
النباتات الأسفينية
جنس: ذيل الحصان

(4) Pterophyta (True ferns)

النباتات السراخسية

Simplified Lifecycle of a Pteris (Pteridophyta)





- **Sporophyte** (2n) is **dominant** phase of life cycle
- **Gametophyte** (1n) phase of life cycle is **small**