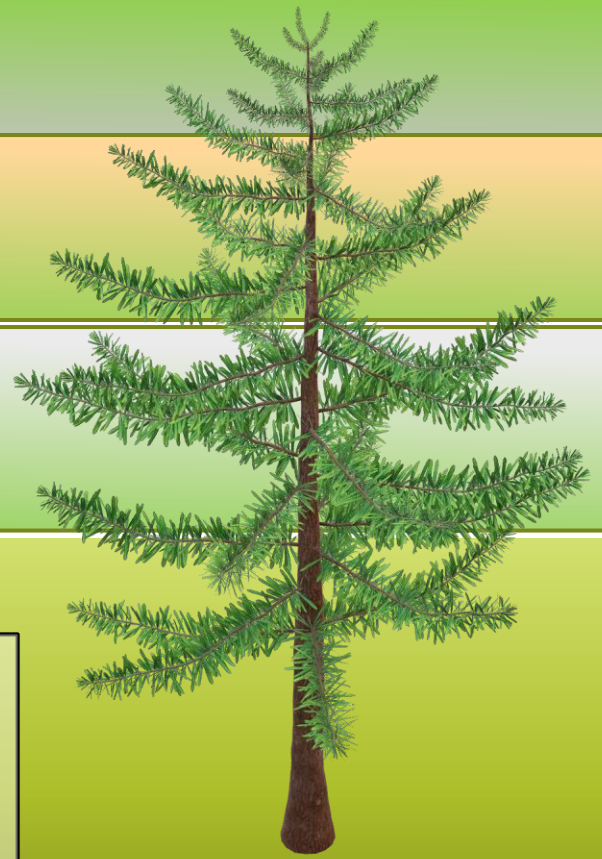
ATOMIC ENERGY CENTRAL SCHOOL, INDORE

CLASS XI BIOLOGY

MODULE 3.2

UNIT – I DIVERSITY IN THE LIVING WORLD

CHAPTER 3. PLANT KINGDOM



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PGT(SS) - BIOLOGY

CHAPTER 3. PLANT KINGDOM

3.2 BRYOPHYTES

Bamania

3.2 BRYOPHYTES

Bryo- *gr. moss.* & ~16,000 species.

Liverworts-ex:Marchantia


Liverworts-ex:pellia

Non-vascular plants

- ✓ Advancements over algae: **cuticle, multicellular gametangia, stomata**
- ✓ Habitat: they require moist environment for active growth and sexual reproduction
- ✓ The diverse bryophytes are not a monophyletic group. Several lines of evidence indicate that these three divisions diverged independently early in plant evolution, before the origin of vascular plants.
- ✓ Mosses are the bryophytes most closely related to vascular plants.
- ✓ The **gametophyte is the dominant** generation in the life cycles of bryophytes


Moss-Ex:Polytrichum


Uverworts


Liverworts-ex:Riccia


MOSS:EX-Sphagnum


Hornwort-ex:anthoceros

Note: the name Bryophyta refers only to one division, but the informal term bryophyte refers to all nonvascular plants.

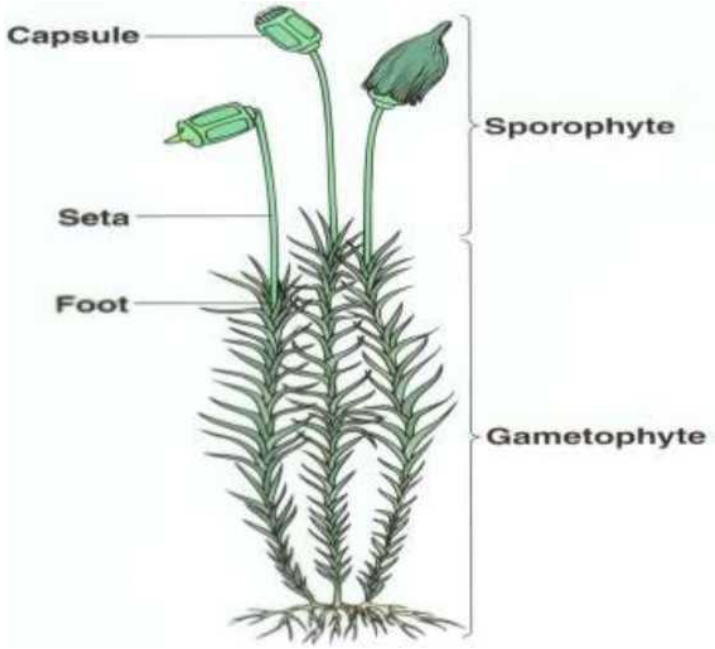
3.2 BRYOPHYTES

Mode of nutrition : autotrohic as well as saprophytic.

Plant body is thallus (not differentiated into Root,stem and leaf) e.g Marchantia,Anthoceros.

Sporophyte has three parts : foot,seta,capsule.

- The gametophyte bears multi-cellular and jacketed sex organs (antheridia and archegonia).
- Sexual reproduction is oogamous type.
- Multi-cellular embryo develops inside archegonium.
- Sporophyte differentiated into foot, seta and capsule.
- Capsule produces haploid meiospores of similar types (homosporous).
- Spore germinates into juvenile gametophyte called protonema.
- Progressive sterilization of sporogenous tissue noticed from lower to higher bryophytes.



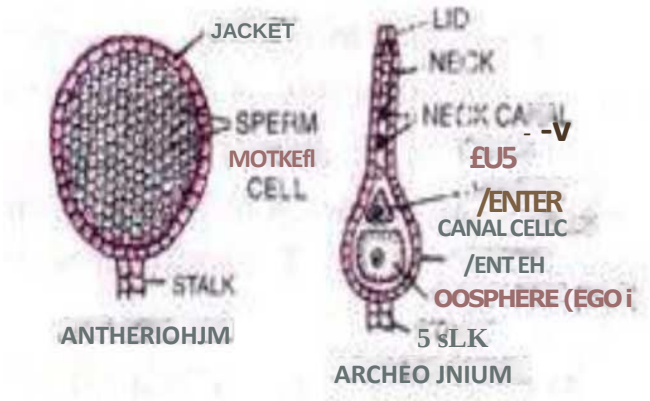


Fig. 3.10. Anth«ri<3iu m ar>d a^chegooium

3.2 BRYOPHYTES

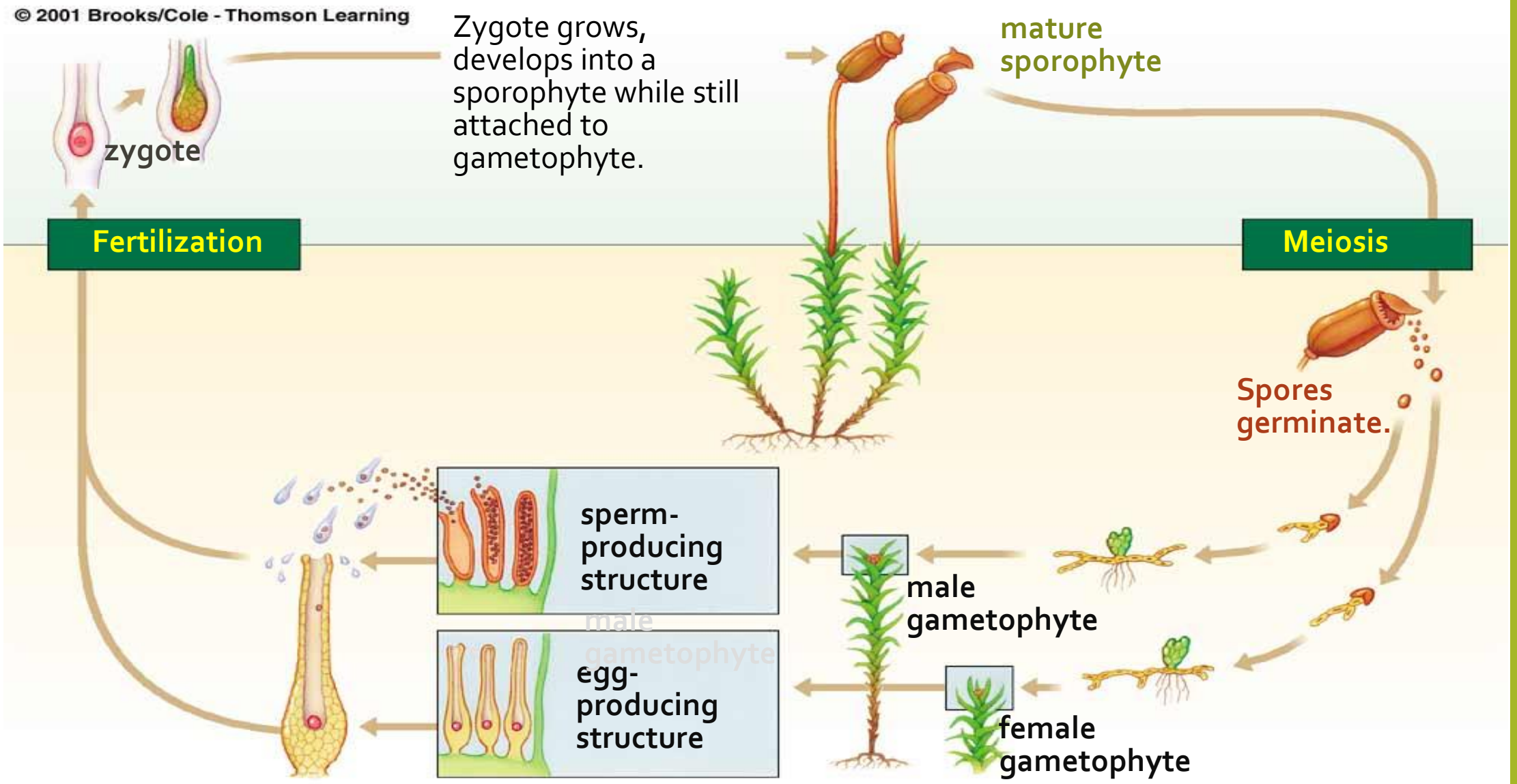
- **What is alternation of generations?**

- **First time demonstrated by Hofmeister(1851)**
- **Life cycle of a plant is called alternation of generations.**
- **Haploid and diploid generation alternating during life cycle -Sporophyte ie. Multicellular, spore forming diploid plant str. -Gametophyte ie. Multicellular haploid plant structure, forms gametes.**
- **Bryophytes(mosses and ferns)**
- **- dominant generation-haploid phase**
- **- main plant body is composed of gametophyte**

Habit shot of female shoots with terminal sporophytes and male shoots with clusters of orange antheridia surrounded by leaves.

Close-up of gametophyte with orange antheridia (right) and sporophyte (left).

Moss Life Cycle



3.3 PTERYDOPHYTA

Pteridophytes are primitive seedless vascular plants also called cryptogams. These have conspicuous sporophytic plant body, inconspicuous independent gametophytes with antheridia and partially embedded archegonia having 4-rowed necks.

The term Pteridophyte was coined by Haeckel (1866). There are about 13000 species of pteridophytes have been reported. They were perhaps the first land plants evolved during ordovician (450-500 million years ago) period.

Bamania

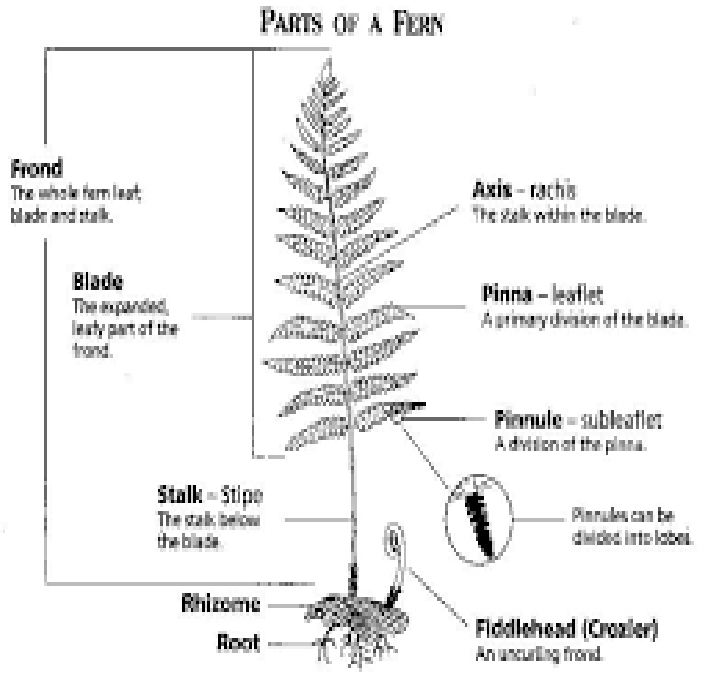
3.3 PTERYDOPHYTA

- **Habitat**
  The pteridophytes are found in cool, damp shady places though some may flourish well in sandy-soil conditions.
  Some members like Azolla, Salvinia, Marsilea species.

- **Plant Body**
  The size varies from a fraction of centimeter (e.g, Azolla) to 20 m in tree ferns (e.g, Angiopteris). The main plant body is a sporophyte which is differentiated into true root, stem and leaves. These organs possess well differentiated vascular tissues. The leaves are small (microphyllus) as in Selaginella or large (macrophylls) as in ferns.

- **Vascular Tissues**
  These are xylem and phloem present throughout the body. Xylem consists of tracheids and phloem is made up of sieve cells and albuminous cells.

- **Sporophylls**
  The sporophytes bear sporangia that are subtended by leaf like appendages called sporophylls. In some cases sporophylls may form distinct compact structure called strobili or cones (Selaginella and Equisetum). The sporangia produce spores by meiosis in spore mother cells.

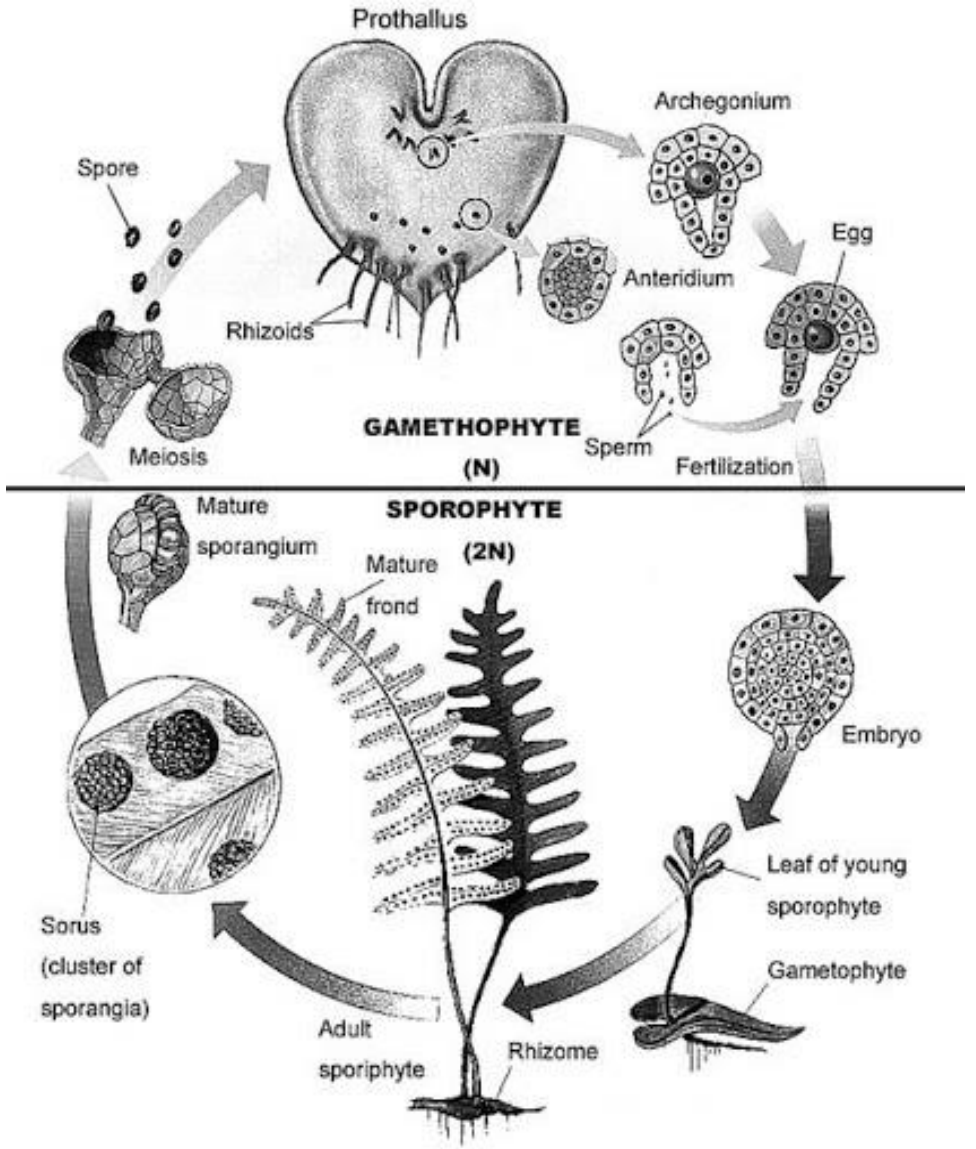


3.3 PTERYDOPHYTA

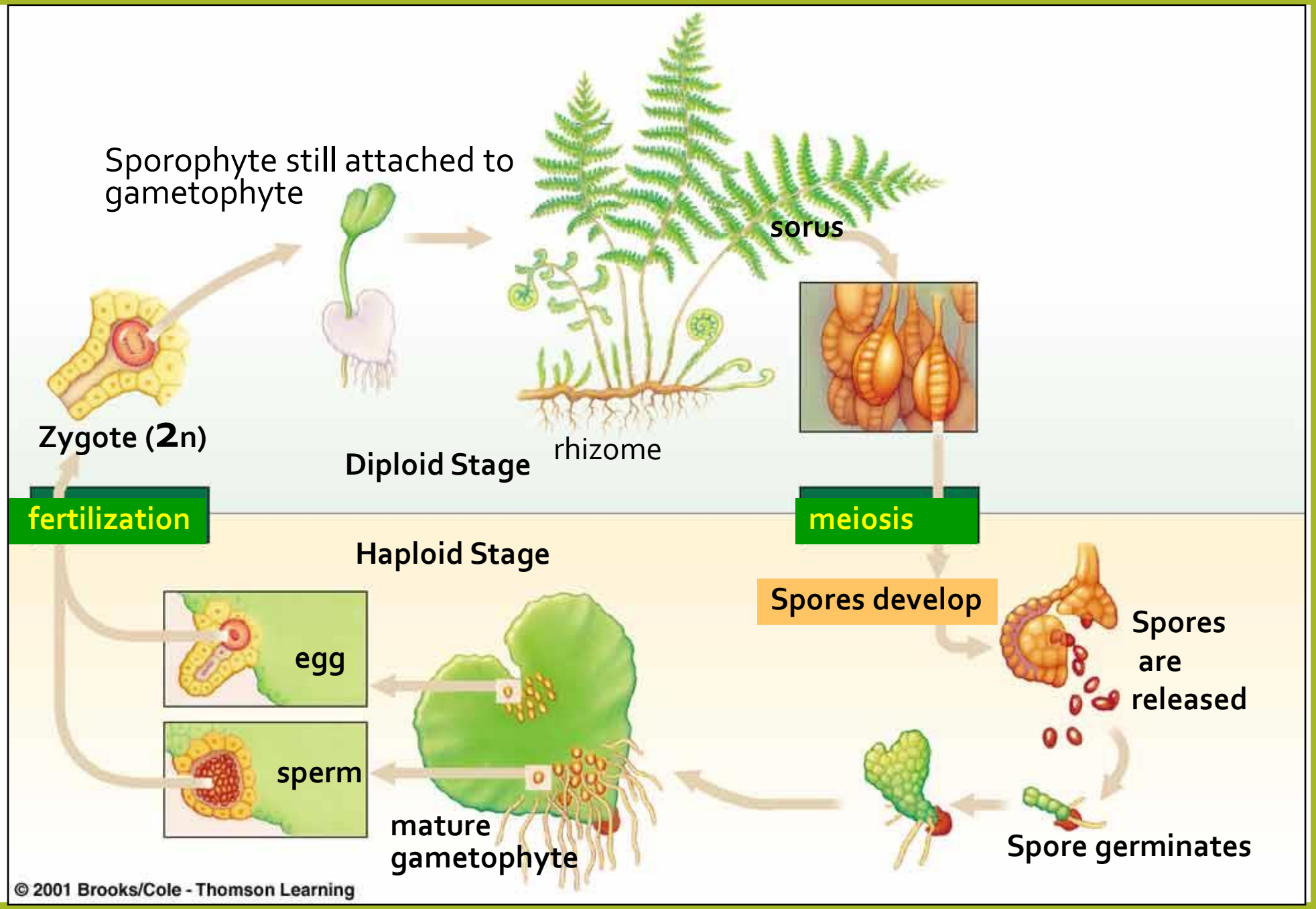
- **Spores**
  The spores germinate to give rise to inconspicuous, small but multicellular free-living, mostly photosynthetic thalloid gametophytes called prothallus.
- In majority of the pteridophytes, all the spores are of similar kinds; such plants are called homosporous.
- Genera like Selaginella and Salvinia which produce two kinds of spores, macro (large) and micro (small) spores; such plants are called heterosporous.
- **Gametophyte**
  The thalloid gametophyte or prothallus require cool, damp, shady places to grow.
- The megaspores and microspores germinate and give rise to female and male gametophytes respectively.
- The female gametophytes in these plants is retained on the parent sporophytes for viable periods. In most ferns, prothallus is green and autotrophic.
- In heterosporous ferns, the female gametophyte depends on food stored by the megaspore.

3.3 PTERYDOPHYTA

- **Sex Organs**
  The gametophytes bear male sex organs called antheridia and female sex organs called archegonia.
- Antheridium is sessile and surrounded by a single layered jacket.
- Archegonium is flask-shaped. It is partially embedded.
- **Fertilisation**
  Water is required for transfer of antherozoids.
- The male gametes released from the antheridia and reach to the mouth of archegonium. Fusion of male gamete with the egg present in the archegonium result in the formation of zygote. Zygote therefore, produces a multicellular, well differentiated sporophyte, which is the dominant phase of the pteridophytes.
- **Embryo**
  Fertilisation produces a zygote that undergoes division to produce embryo. The development of the zygote into young embryo takes place within the female gametophyte.
  * This event is a precursor of the seed habit and considered as an important step in evolution, e.g., Dryopteris, Selaginella, Adiantum, Equisetum and Salvinia.



Fern Life Cycle

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