

Ministry education and Science of Republic of Kazakhstan
Karaganda State University named after academician
Ye.A. Buketov

Biological and geographical faculty

Botany Department

Course – Botany

Specialty - 5B011300 – «Biology»

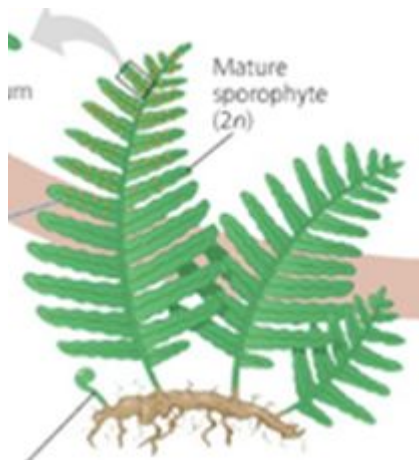
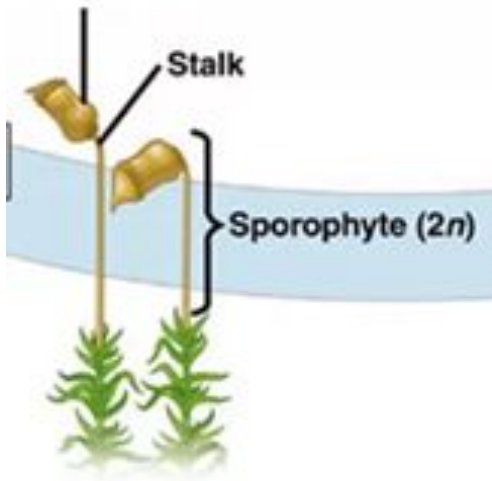
Lecture № 19

Division Polypodiophyta

(1 hour)

Lecturer: candidate of biological science, associated
professor

Ishmuratova Margarita Yulaevna



Plan of lecture:

- 1 General characteristic of fern.**
- 2 Circle of development of ferns.**
- 3 Systematic of ferns.**

Main literatures:

- 1 Еленевский А.Г., Соловьев М.П., Тихомиров В.Н. Ботаника: систематика высших, или наземных, растений. 2 изд. - М.: Academia, 2001. - 429 с.
- 2 Нестерова С.Г. Лабораторный практикум по систематике растений. - Алматы: Қазақ ун-ті, 2011. - 220 с.
- 3 Родман А.С. Ботаника. – М.: Колос, 2001. - 328 с.

Additional literatures:

- 1 Абдрахманов О.А. Систематика низших растений. – Караганда: Изд-во КарГУ, 2009. - 188 с.
- 2 Билич Г.Л., Крыжановский В.А. Биология. Т. 2: Ботаника. - М.: Оникс 21 век, 2002. - 543 с.
- 3 Ишмуратова М.Ю. Систематика и интродукция растений (курс лекций). - Караганда: РИО Болашак-Баспа, 2015. - 100 с.
- 4 Тусупбекова Г.Т. Основы естествознания. Ч. 1. Ботаника. – Астана: Фолиант, 2013. – 321 с.

Pteridopsida (true ferns) have more than 10,000 species and make up the majority of living monilophytes (all classes of Pteridophyta except lycophytes). Their leaves are called fronds because of apical growth; young leaves are coiled into fiddleheads (Fig. 6.6). True ferns are megaphyllous: their leaves originated from flattened branches. True ferns have unique sporangia: leptosporangia.

Modern ferns

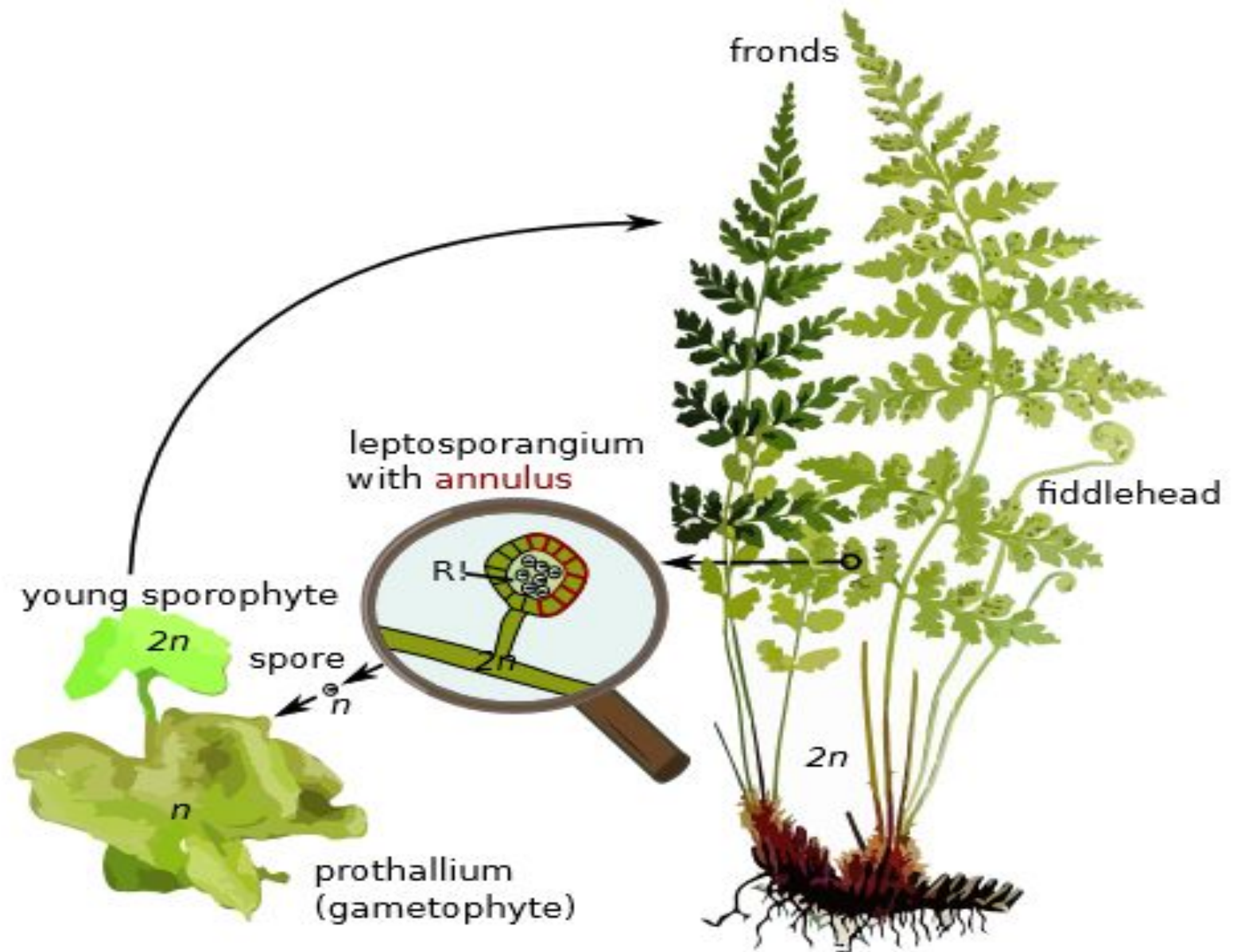


Leptosporangia originate from a single cell in a leaf, they have long, thin stalks, and the wall of one cell layer; they also open actively: when sporangium ripens (dries), the row of cells with thickened walls (annulus) will shrink slower than surrounding cells and finally would break and release all spores at once. Leptosporangia are also grouped in clusters called sori which are often covered with umbrella- or pocket-like indusia. Gametophytes of Pteridopsida are minute and grow aboveground. Some genera of true ferns (like mosquito fern *Azolla*, water shamrock *Marsilea* and several others) are heterosporous.

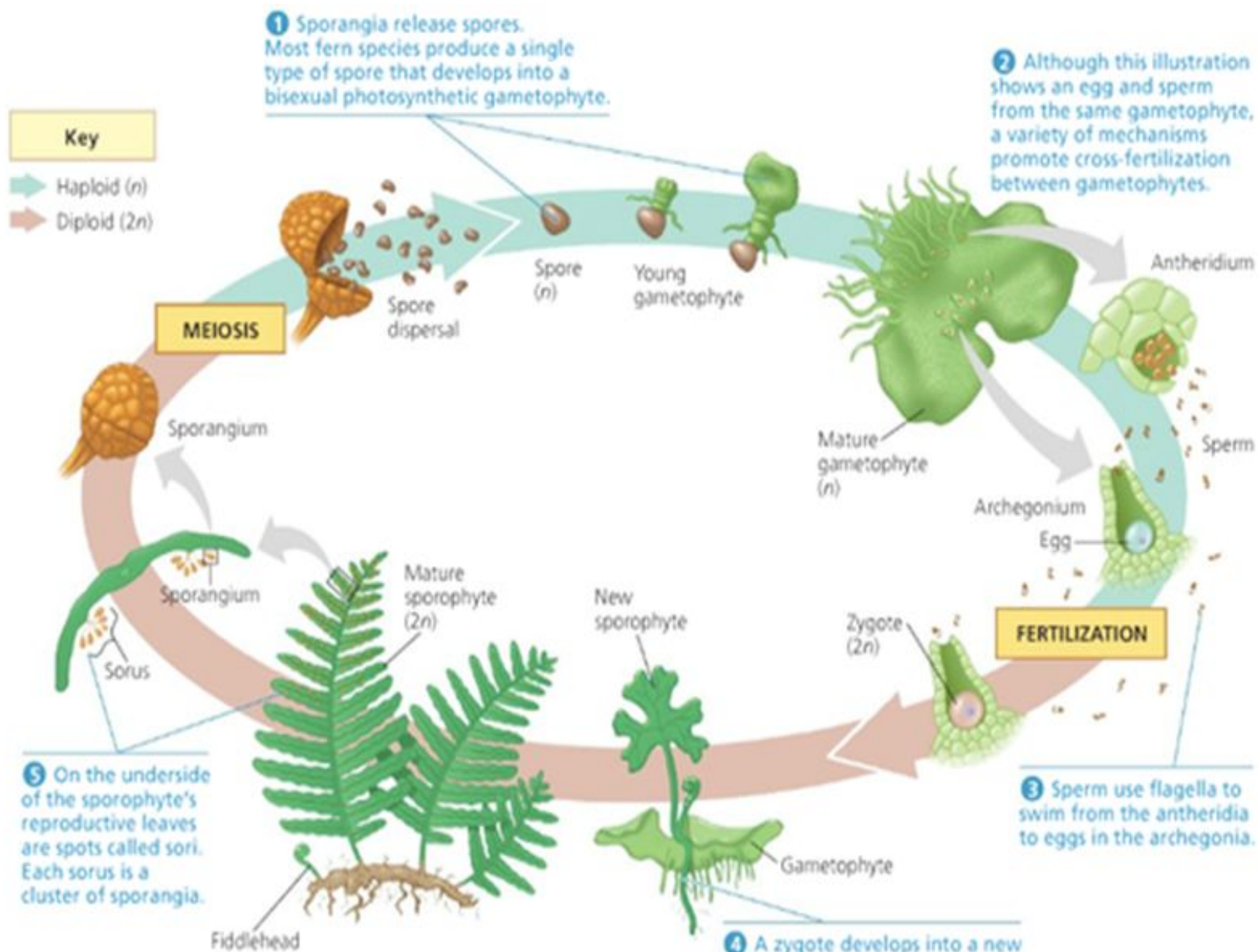
Woody ferns



True ferns are highly competitive even to angiosperms. Despite their “primitive” life cycle, they have multiple advantages: abilities to photosynthesize in deep shade (they are not obliged to grow fast), to survive high humidity, and to make billions of reproductive units (spores). Ferns do not need to spend their resources on flowers and fruits, and are also less vulnerable to vertebrate herbivores and insect pests, probably because they do not employ them as pollinators and, therefore, can poison tissues against all animals.



Selected stages of *Cystopteris* life cycle, representative of Pteridopsida.

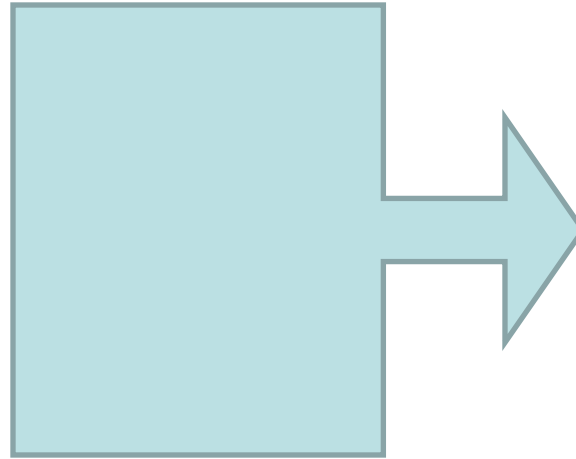


The life cycle of a fern.

WHAT IF? If the ability to disperse sperm by wind evolved in a fern, how might its life cycle be affected?

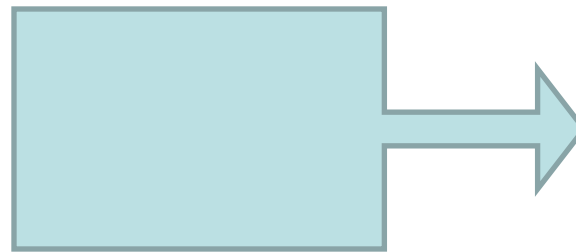
Division includes 7 classes:

Aneurophytopsida,
Archaeopteridopsida,
Cladoxylopsida,
Zygopteridopsida,
Ophioglossopsida,



**Died
forms**

Marattiopsida,
Polypodiopsida



**Living
forms**

Ophioglossus (Ophioglossaceae family)



Marattia salicina



Many species of ferns have practical value as decorative and food plants. From ground parts of *Dryopteris filix-mas* is produced extract with anti-gelminth activity.

Control questions:

- 1 Fine similar signs between ferns, mosses, lycopodium and horsetails.
- 2 Why ferns have evolutionary domination before horsetails and mosses?
- 3 Which role do play modern ferns for nature and human?
- 4 Which generation does dominate in life circle of ferns?
- 5 Why circle of development of ferns depend from drop water?

Test question:

Horsetails prefer soil:

- A) Acid
- B) Alkali
- C) Neutral
- D) Acid and neutral
- E) Alkali and neutral
- F) Stone
- G) Salty
- H) Alkali and salty