GYMNOSPERMS

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What are Gymnosperms?

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- Gymnosperms are seed bearing vascular plants
- Gymnosperm means "naked seed"(From the Greek: gymnos = naked; sperm = seed)
- Seeds are formed naked
- The seeds of the gymnosperms lack a protective enclosure (unlike flowering plants which have flowers and fruit)
- Seeds are produced on the scales of cones
- More advanced than ferns because they do not have spores, they have seeds

General Features

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- Most of the gymnosperms are trees
- Some are evergreen, i.e. pine
- All gymnosperms have exposed seeds
- All of them don’t posses flowers
- Mostly massive

Scientific Classification

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- Gymnosperms belong to 4 different phyla which are

1. Coniferophyta
2. Cycadophyta
3. Ginkgophyta
4. Gnetophyta

1

Coniferophyta

THE LARGEST GYMNOSPERM PHYLUM

1. Coniferophyta

- Conifers include Pines, Firs, Spruces, Yews, Junipers, Cedars, Cypress, and Redwoods





1. Coniferophyta

- The term **conifer** comes from the reproductive structure, the cone, which is a cluster of scalelike sporophylls

- About 550 species

1. Coniferophyta

- Many conifers are evergreen

1. Coniferophyta

- They have long, thin, needle-shaped leaves (Cypress)

- Some plants have broad and flat leaves

1. Coniferophyta

1. Coniferophyta

- **Well adapted in drier climates**

2
Cycadophyta

2. Cycadophyta

- Seed plants made up of only three living families
- Members are scattered around the globe but are restricted to tropical or subtropical climates
- The cycads radiated and spread widely in the early Mesozoic
- Dioecius

3
Ginkgophyta

3. Ginkgophyta

- Ginkgos produce bad smelling fruites
- Used as medicinal plants

4
Gnetophyta

4. Gnetophyta

- They are closely related with conifers
- This likeness leads scientists to believe that gnetales are evolved from conifers
- This theory is supported by extensive fossil records, some dating back to the Palezoic era
- Though they are non-flowering plants, gnetales have a reproductive structure similiar to that of flowering plants

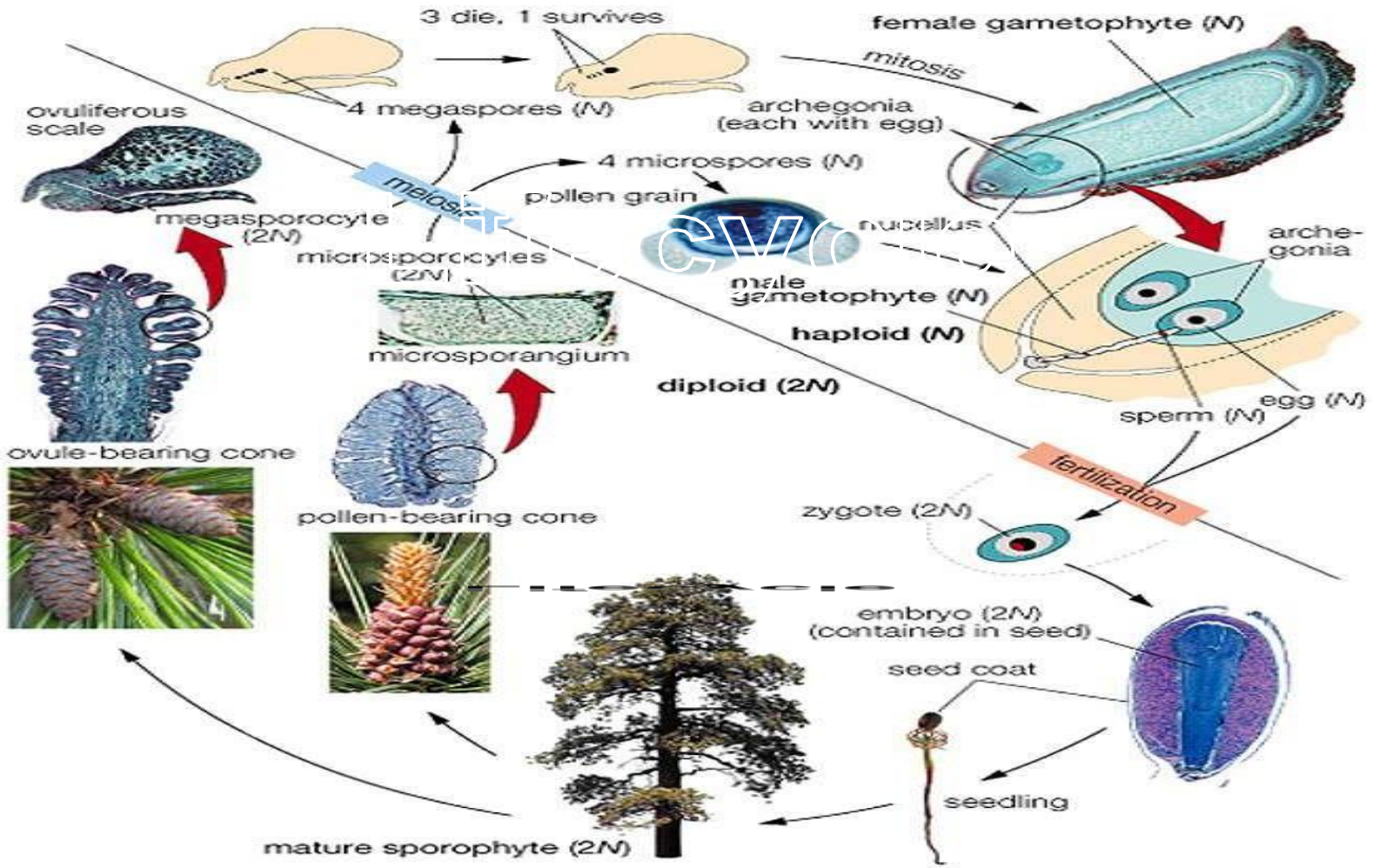
Habitat of Gymnosperms

Habitat of Gymnosperms

- Occupy large areas of the Earth's surface
- Can grow in drier conditions
- Gnetophytes grow at high altitudes
- Cycads are distributed throughout the world but are concentrated in equatorial regions

Habitat of Gymnosperms. Cont…

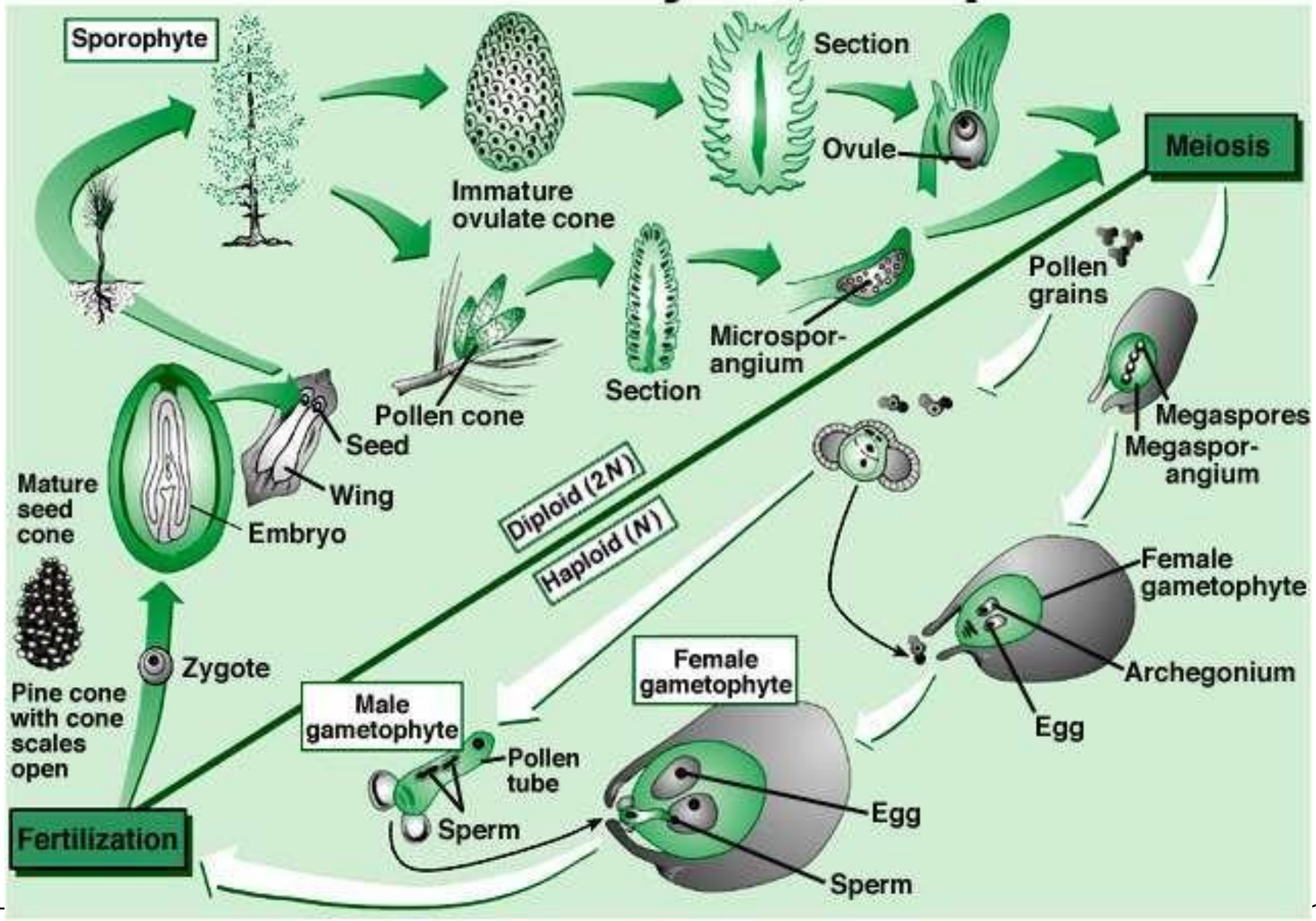
- Gymnosperms that occupy areas of the world with severe climatic conditions are adapted to conserving water ; leaves are covered with a heavy, waxy cuticle and pores (stomata) are sunken below the leaf surface to decrease the rate of evaporation.


3 die, 1 survives
4 megaspores (N)
female gametophyte (N)
mitosis
archegonia
(each with egg)
ovuliferous
scale
4 microspores (N)
pollen grain
meiosis
megasporocyte
(2N)
microsporocytes
(2N)
nucellus
male
gametophyte (N)
archegonia
microsporangium
haploid (N)
diploid (2N)
sperm (N)
egg (N)
ovule-bearing cone
fertilization
pollen-bearing cone
zygote (2N)
embryo (2N)
(contained in seed)
seed coat
seedling
mature sporophyte (2N)

Lifecycle

- The gymnosperm (pine tree) life cycle takes about two years to complete
- Exhibits alternation of generation
- The dominant photosynthetic part of the life cycle is the sporophyte
- Sporophyte is diploid (2n)
- Gametophyte (n) is dependent on sporophyte
- Cones are reproductive structures(Gametophytes)
- Pollen grains are produced by male cones and carried to female cone by wind where fertilization occurs
- After fertilization, a sporophyte is formed which is enclosed in a seed. It germinates to produce a sporophytic plant once again

Pine Life Cycle, Simple



Importance of Gymnosperms

Ecological Importance

- Provide food and habitat for wild life
- Forests prevent soil erosion
- Reduce green house gases
- Conifers are often featured in gardens
- Junipers are low-growing shrubs and are cultivated to cover grounds
- Conifers are affective wind breakers

Economical Importance

- They are major source of paper pulp, turpentine and resins
- They are used as fuel
- They are major source of world’s timber
- Used as medicines (Ginkgos)
- Source of food (Pine Nuts)
- Gymnospermous plants are widely used as ornamentals