Biology 10

Ch 22-4
"The Seed Plants" (Gymnosperms)
p 646-649

Objectives

- **Analyze the advantages of seed production.**
- **Describe the four divisions of gymnosperms.**
- **Be able to explain the life cycle of a conifer.**

What is a Gymnosperm?

- gymnosperm: **"_____*" plants***
- **the evolution of the seed was a major advantage to these plants**
  - **used to be the dominant land plant, as the climate dried out towards the end of the Paleozoic era**
- **sporophyte generation dominant**
  - **gametophyte reduced to tiny structures within the cones of the plant**
    - **male gametophyte develops in the _____**
    - **female gametophyte develops in the _____**

Fun Facts About Gymnosperms

- **largest organism- sequoia tree named "General Sherman" – circumference of 26 m, and weighs more than 12 space shuttles**
- **oldest organism- a bristlecone pine name "Methuselah"- 4600 years old**
- **Largest leaves- produced by the *Welwitschia* from South Africa**

Importance of Seeds

- **Seeds are a huge advantage to plants**
  - **_____ the embryo much better than a spore**
  - **contain a _____ for the baby plant to live on as it develops its own leaves**
  - **allows better _____**
    - **ex: dandelion seeds float on the wind, pine seeds and maple seeds shaped like wings, coconuts float, etc…**

Other Gymnosperm Adaptations for Success

- **Many gymnosperms are _____**
  - **able to photosynthesize all year long**
  - **no waste in energy from dropping leaves**
- **Conifer leaves adapted for dry climates**
  - **very low _____ to minimize water loss**
  - **stomata of leaves located in tiny pits to help trap water vapor leaving**
    - stomata**: _____**
- **Development of pollen (male gametophyte)**
  - **pollen _____**
  - **no longer need water for sperm to swim in!!**

Division Cycadophyta

- **Includes _____**
- **cycads resemble palm trees, but are not true palms**
- **separate male and female plants**
- **only one species native to U.S., lives in _____**

Division Ginkgophyta

- **Only one species, *Ginkgo bilboa***
  - **kept alive by monks living in China and Japan**
- **Unusual gymnosperm in that it is** deciduous
  - deciduous trees**: _____**
- **Resistant to _____, so is planted in cities.**

Division Gnetophyta

- **Three surviving genera, all of which are odd plants**
  - ***Gnetum*: tropical trees or vine plants**
  - ***Welwitschia*: desert plant from S. Africa**
  - ***Ephedra*: shrub like plant found in American southwest**

Division Coniferphyta

- **the conifers (_____, etc.)**
  - **conifer = "cone bearing"**
- **largest division of gymnosperms**
- **Mostly evergreen (exception: larch)**
- **Very important economically**
  - **main source of _____**

Life Cycle of a Pine

- **Pine (= sporophyte) produces both male and female cones**
- **Cones produce the male and female spores (n)**
  - **male= microspore**
  - **female = megaspore**
- **Spores undergo meiosis to produce the male and female gametophytes**
  - **male = pollen**
  - **no special name for female gametophyte**

Life Cycle of a Pine

- **Pollen is released, and _____ carries it to the female cone, = _____**
  - **pine must produce a LOT of pollen to insure success! _____!**
- **Pollen tube grows into the female gametophyte, and sperm nuclei fuses with egg produced by female gametophyte**
  - **= fertilization, produces a zygote which develops into plant embryo**
- **Remaining female gametophyte develops into _____, and a seed coat is developed around the entire structure**
- **Seed is released upon the _____, and eventually germinates to grow into a new tree (_____)**

Pine Life Cycle Image