Plant reproduction

You know about the birds and the bees, why not the birch and the beech?

Lecture outline

- Life cycles and alternation of generations
- Flowers
- Pollination and fertilization
- Fruits and seeds
- Asexual reproduction

Life cycles

- Generation-to-generation sequence of stages

Each gamete is a single cell. Also, look at Fig. 13.6a & b

Alternation of generations

- Multicellular haploid and diploid stages take turns producing each other

Gametophyte-sporophyte variations

Fig. 30.2
Angiosperm life cycle

Also see Fig. 38.6

Flowers: Reproductive shoots

- Four major parts (floral organs)

Fig. 38.2

(a) Structure of an idealized flower

Complete vs. incomplete flowers

- Four vs. fewer

Trillium—complete

Sweet grass—incomplete

More about incomplete flowers

- If a flower is missing either stamens or carpels, the plant can be described as being either:

  - **Monoecious**: individual flowers with either stamens or with carpels occur on the same individual plant
  - **Dioecious**: individual flowers with either stamens or with carpels occur on different plants

Monoecious plants

Ear of corn—fertilized carpellate flowers

Silk = styles

Female

Corn tassels—staminate flowers

Male

Dioecious plants

Sagittaria—staminate Male

Sagittaria—carpellate Female

Fig. 38.14a
Male gametophyte
- **Microspores** lead to male gametophyte

- Anther
- **Diploid**
- **MEIOSIS**
- **Haploid**
- Laploid male gametophyte (in pollen grain)
- Each of 4 microspores
- Generative cell (will form 2 sperm)
- Nucleus of tube cell
- Forms pollen tube
- Ragweed pollen grain (colorized SEM)

Also see Fig. 38.6

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Female gametophyte
- **Megaspores** lead to female gametophyte

- **Diploid**
- **MEIOSIS**
- **Haploid**
- Laploid female gametophyte
- Also see Fig. 38.6

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Pollination
- Bringing the male and female gametophytes together
- **Co-evolution**

- Pollination by moths and butterflies
- Pollination by bats
- Pollination by flies
- Long-tongued bee feeding on datura flower at night
- Bumble bee on cotton flower

- Hummingbird drinking nectar of columbine flower

**Do plants usually self-fertilize?**
- **Why?**
- **Self-incompatibility**—biochemical block is most common
- **Structural adaptations**

- Thrum flower
- Pin flower

**Seed formation**
- After fertilization, **ovule** develops into a ? and **ovary** develops into a ?

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**Double fertilization**
- **Endosperm and zygote** formed
- **Role of endosperm?**

1. **Stigma**
   - **Pollen**
   - **tube**
   - 2 **sperm**
   - **Style**
   - **Ovary**
   - **Ovule**
   - **Micropyle**
   - **Pollens**

2. **Endosperm nucleus** (3n) (2 polar nuclei plus sperm)
   - **Ovule**
   - **Polar nuclei**
   - **Egg**
   - **Synergid**
   - 2 **sperm**
   - **Zygote** (2n)

Also see Fig. 38.6

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**Seed formation**
- **Gynophore**
- **Carpel**
- **Follicle**
- **Seed**
- **Cell wall**
- **Central vacuole**
- **Chloroplast**
- **Membrane**
- **Nuclear envelope**
- **Proembryo**
- **Suspensor**
- **Seed coat**

Also see Fig. 38.7
From flower to fruit

Fig. 38.11

Seed structure

Fig. 38.8

Seed germination

- What happens first?
- Pulling vs. pushing

Fig. 38.9

Asexual reproduction

- Many plant species can clone themselves: asexual or vegetative reproduction
- Partly a result of plants’ ability for indeterminate growth
- Why can this be a good thing?

Fig. 38.13

Humans and plant reproduction

- We’ve taken advantage of plants ability to reproduce asexually
- Cuttings (or fragments) from plants are used to produce MANY plants with certain desired characteristics
- At one end of a cutting is a mass of dividing, undifferentiated cells called a callus
- A callus forms adventitious roots and eventually differentiates into all parts of a plant

Garlic callus

Fig. 38.15