

## CHAPTER 44

### Plant Reproduction and Development

#### Sexual versus Asexual Reproduction

Many plant species can reproduce both sexually and asexually.

Asexual reproduction can occur via fragmentation

Fragmentation can be an artificial process (cuttings) or a natural process.

The parent plant sends out horizontal stems (**runners**) that can lead to completely new plants.

Asexual reproduction is natural cloning where all the offspring are genetically identical to the parent plant.

Sexual offspring combine the genes from two parents and are genetically different from their parents

#### Plant Life Cycles

Alternation of generations revisited (see fig 44-1)

2 distinct multicellular adult forms

**sporophyte**: diploid plant which produces haploid **spores**

**gametophyte**: haploid plant which produces **gametes**

In mosses and ferns the gametophyte is small and **independent**

**Water is essential for sexual reproduction**

In seed plants, gymnosperms and angiosperms, the **gametophyte is very small** and relies on the sporophyte (it's part of the sporophyte)

**Water no longer needed for transporting the gametes**

Two types of spores are seen in the flowering plants. They are **heterosporous**

**Megaspores** - gives rise to the female gametophyte

**Microspores** - gives rise to the male gametophyte

The two different gametophytes produce two types of gametes

female gametophyte is an embryo sac containing an **egg cell**

male gametophyte is a **pollen grain** (sperm)

After fertilization the zygote develops into the **seed** (plant embryo), which will grow into a new sporophyte.

The Evolution of Flowers

Gymnosperms were the earliest seed plants

The gymnosperms and some angiosperms rely on wind pollination for fertilization (see fig E44-1 and 44-6).

Advantage - don't need any biological help

Disadvantage - it's an inefficient process

Insects began carrying pollen grains from the male cone to the female cones about 150 million years ago.

Why?

The plants enticed the insects with food.

Pollen is a protein-rich food source and the female cones produce sugar-rich secretions.

Angiosperms (flowering plants) developed about 130 million years ago.

The flowers attracted the pollinators

## The Flower Structure

The parts of the flower evolved from leaves.

**Complete flowers** have 4 main parts (see fig. 44-2)

**-Sepals**

**-Petals**

**-Stamens**

**-Carpel**

The **stamens** are the male reproductive part and consist of the **filament** (or stalk), which hold the **anther**.

The anther contains the pollen grains (male gametophyte)

The **carpel** is the female reproductive part and is a vase shaped structure made up of the **stigma**, the **style**, and the **ovary**.

The stigma is the top of the vase. It is a sticky structure designed to catch the pollen.

The style is the neck of the vase. The pollen must "grow" through the style to reach the egg.

The ovary is the bottom of the vase. The ovary contains the **ovules, which** become seeds. The outer layers of the ovary become the fruit.

**Incomplete flowers** lack one or more of the 4 floral parts.

**Imperfect flowers** are single sex and therefore are missing one set of sex parts (either stamens or carpel) (see fig 44-3).

## Gametophyte Development in Flowering Plants

The gametophytes are haploid and develop within sporophyte flowers

They are very small compared to the sporophyte and cannot live on their own