Wednesday, 17 September 2014

Lecture 23

Seed plants - a dramatic innovation in land plant evolution

The developments that appeared in seed plants:

- **Definition of seed:** embryonic plant that is covered with a protective coating.

- **The developments that arose for the seed plants:**

  - **Secondary growth** = the *vascular cambium* is a *meristem* in plants that produces additional vascular tissue to increase the girth of a stem. Secondary growth is essential for increased height.

  - **Production of two types of spores** = *megaspores* are produced in the ovules of females and *microspores* are the pollen of males. In seed plants only one mother cell undergoes meiosis and this produces 4 megaspores, only one of which is functional. In conifers both of these are found on the cones.

  - **Reproduction by seeds** = the female gametophyte and embryo are enclosed within an *ovule* which is nourished and protected on the parent plant. Seeds develop from fertilised ovules. An *ovule* is a sporangium covered by a protective covering called the *integument*.

  - **Pollen** = the male gametes are no longer motile (*which means they do not require free water)* and are transported in pollen. Pollen grains are transported to the female prior to sperm cell development. The gametes are drawn into the ovule through a tube and after about a year a sperm cell is chosen and fertilised, then after another year the seed forms.

Example of seed plants:

- **Conifers (coniferophyta)** = They reproduce in cones ('cone'-ifers) and they are not common except for in cold temperate regions. It's too arid and hot in Australia to have many conifers. They form the world's largest terrestrial carbon sinks. It's easy to recognise the female and male cones visually. The female cones are closed off and often have sap on them to entrap the male gametes, and the males are more open because they are attempting to get blown in the breeze. Conifers have ecological and biogeographic importance, and also economic value because they can be used for paper.

  - The *Wollemi pine conifer* is a living fossil that was thought to be extinct until somebody found one in the blue mountains.

Gondwana:

- The southern hemispheric continents have similar conifer flora that reflect their origins in the great super continent of Gondwana. Australia was a part of Gondwana until about 30 million years ago so, although the climates and vegetation grew apart from the other continents, the ancient conifers that were growing on Gondwana remained similar on the separated continents.

Key terms and examples:

Seed = an embryonic plant that is covered with a protective coating.

Secondary growth = when a plant produces additional vascular tissue to increase the girth of the stem.

Vascular cambium = a meristem in plants that is the source of the secondary growth.

Meristem = a type of tissue found in plants that is made up of undifferentiated dividing cells.

Megaspores = the spore produced in a heterosporous plant that gives way to the female gametophyte.

Microspore = the spore produced in a heterosporous plant that gives way to the male gametophyte.

Ovule = the plant structure that develops into a seed when fertilised and consists of the integument, embryo sac, and nucellus.

Antheridia = a haploid organ that produces and/or contains the male gametes.

Archegonia = the female reproductive organ that produces and contains the ovum or female gamete.

Heterosporous = a plant that produces two types of meiotic spore the smaller of which gives rise to the male gametes and the larger that gives rise to the female gametes.

Homosporous = a plant that produces only one type of meiotic spore which germinates to produce a single type of gametophyte on which antheridia and archegonia are produced.

Caenozoic era = the time of flowering plant dominance that runs from 65 million years ago to the present day.

Mesozoic era = the time of cycad and conifer dominance that occurred from 250-65 million years ago.

Pollen = also called the microspores, pollen is a course powder containing the microgametophytes of seed plants which grow into the sperm cells.