
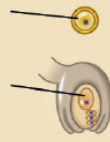





## Seed-Dispersing Plants Introduction- 1

The seed plants include the most successful plants in our earth's ecosystems today: the conifers and flowering plants, along with three other, less prominent, phyla. As we have discussed, the production of a seed, kept within an ovule for dispersal, gives a plant a distinct survival advantage over a single-celled spore, with the seed's nutrient-packed head start for the next generation and a variety of methods of dispersing to new locations. In addition, transporting sperm within a pollen grain frees the plant from the need for water for fertilization.

Megaphylls, multi-stranded vascular leaves, provide more conduction and support for a larger surface area for photosynthesis. The ferns are the only spore-dispersing vascular plants that have functional megaphylls.

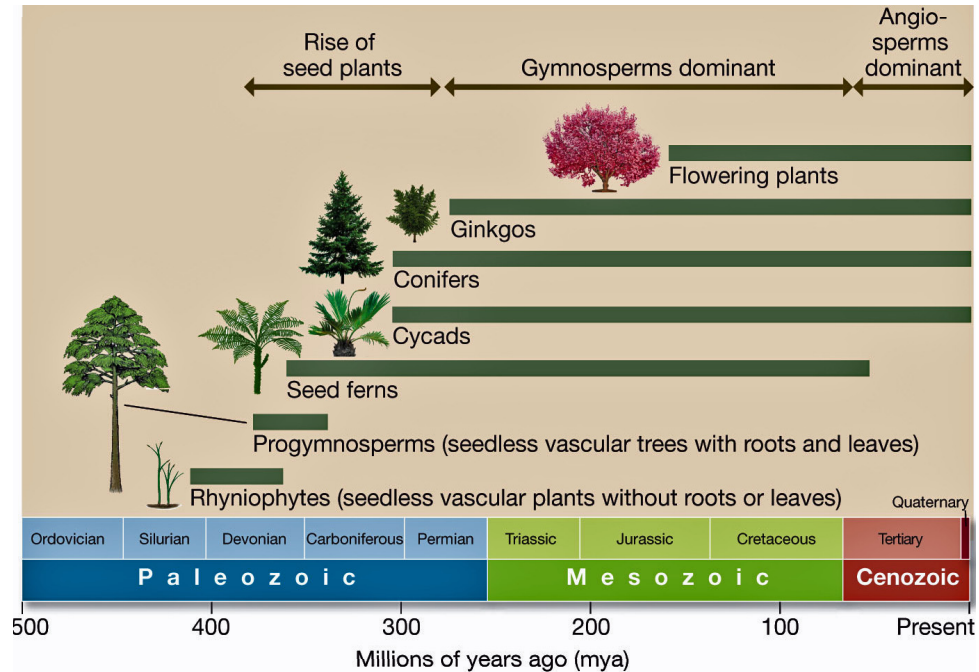
As with all vascular plants, the dominant generation for the seed plants is the sporophyte generation. All seed plants are heterosporous. Heterospory often ensures greater genetic variation for sexual reproduction, providing for enhanced survival in changing or different environments. Both male and female gametophytes are dependent upon the sporophyte and female gametophytes are retained by the sporophyte plant until the seeds (of the next sporophyte generation) are mature.

<b>Reduced gametophytes</b>	Microscopic male and female gametophytes ( $n$ ) are nourished and protected by the sporophyte ( $2n$ )	 <p>Male gametophyte Female gametophyte</p>
<b>Heterospory</b>	<p>Microspore (gives rise to a male gametophyte)</p> <p>Megaspore (gives rise to a female gametophyte)</p>	
<b>Ovules</b>	Ovule (gymnosperm)	 <p>Integument (<math>2n</math>) Megaspore (<math>n</math>) Megasporangium (<math>2n</math>)</p>
<b>Pollen</b>	Pollen grains make water unnecessary for fertilization	
<b>Seeds</b>	Seeds: survive better than unprotected spores, can be transported long distances	 <p>Integument Food supply Embryo</p>

Seed Plant Traits

Seed plant fossils date back about 350 million years.

## Seed-Dispersing Plants Introduction- 2



### Phyla of Seed-dispersing Vascular Plants

#### Fossil Groups

##### Progymnospermophyta

Pteridospermales – Fossil Seed Ferns

Cordaitales – Primitive Conifer-like

Bennettitales – Fossil Cycadeoides

#### Extant Phyla

Gymnosperms – Seed not protected by a fruit

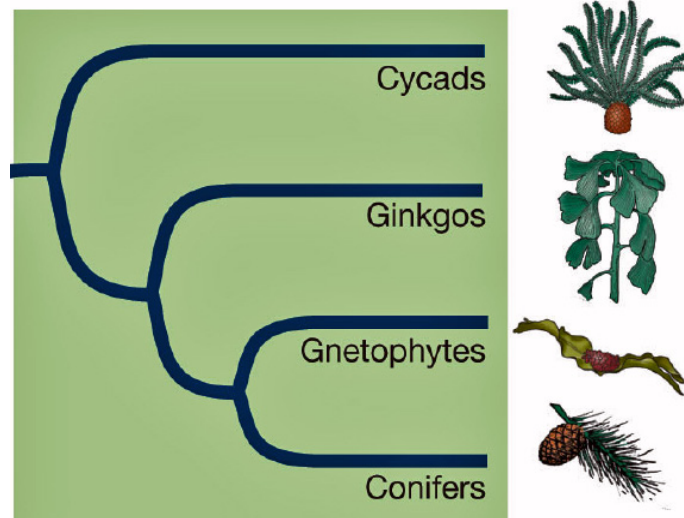
##### Four Phyla

Cycadophyta: Cycads

Coniferophyta: Conifers (e.g., Pine, Spruce, Fir, Hemlock, Yew)

Ginkgophyta: *Ginkgo*

Gnetophyta: *Gnetum*, *Ephedra*, *Welwitschia*



# Seed-Dispersing Plants Introduction- 3

## Gymnosperm Phyla with Living Representatives

PHYLUM	REPRESENTATIVE GENUS OR GENERA	TYPE OF TRACHEARY ELEMENT(S)	PRODUCE MOTILE SPERM?	POLLEN TUBE A TRUE SPERM CONVEYOR?	TYPE OF LEAVES PRODUCED	MISCELLANEOUS FEATURES
Cycadophyta (cycads)	<i>Cycas</i> and <i>Zamia</i>	Tracheids	Yes	No	Palmlike	Ovulate and microsporangiate cones simple and on separate plants
Ginkgophyta (maidenhair tree)	<i>Ginkgo</i>	Tracheids	Yes	No	Fan-shaped	Ovules and microsporangia on separate plants; fleshy-coated seeds
Coniferophyta (conifers)	<i>Abies</i> , <i>Picea</i> , <i>Pinus</i> , and <i>Tsuga</i>	Tracheids	No	Yes	Most needlelike or scalelike	Ovulate and microsporangiate cones on same plant; ovulate cones compound; pine needles in fascicles
Gnetophyta (gnetophytes)	<i>Ephedra</i> , <i>Gnetum</i> , and <i>Welwitschia</i>	Tracheids and vessel elements	No	Yes	<i>Ephedra</i> : small scalelike leaves; <i>Gnetum</i> : relatively broad, leathery leaves arranged in pairs; <i>Welwitschia</i> : two enormous, strap-shaped leaves	Ovulate and microsporangiate cones compound; borne on separate plants, except for some species of <i>Ephedra</i> ; have conifer and angiosperm-like features; leaves borne in opposite pairs

**Angiosperms** (Flowering plants) – Seed protected by a fruit (the ovary)

**One Phylum Anthophyta** – Flowering Plants

Two Classes comprise 97% of Angiosperms

**Eudicotyledones** (Eudicots)

**Monocotyledones** (Monocots)

Additional Groups comprise 3% of the more primitive Angiosperms

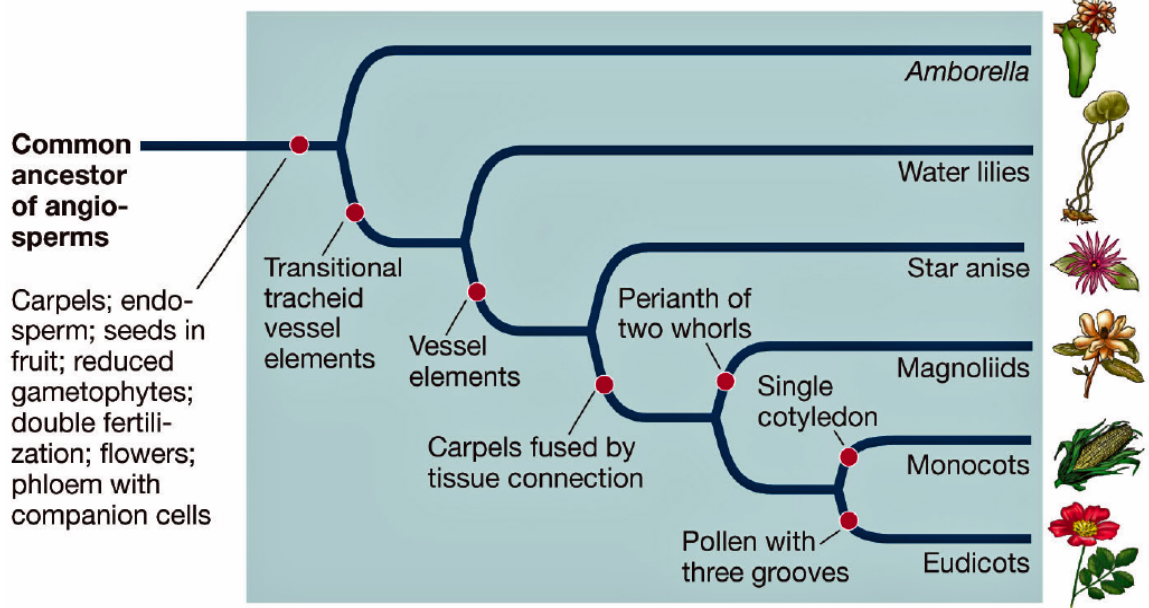
**Magnoliidae**, including several orders

**Nymphaeales** – Water Lilies

**Illiciales** – Star Anise, Avocado and Pepper families

**Amborellales**

**Archaeofractales** – Fossil progenitor of Magnoliides



## Seed-Dispersing Plants Introduction- 4

### General Life History of the Seed-Dispersing Vascular Plants

All seed plants are heterosporous. Male and female sporangia may be on separate plants (dioecious) or on the same plant (monoecious). Generally, sporangia are clustered in strobili. In Angiosperms, the flowering plants, the male and female sporangia may be in the same flower (bisexual), on different flowers on the same plant (monoecious), or on separate plants (dioecious). As learned previously, special terms are used for sporangia and gametophyte structures in flowering plants.

