

These are supplementary notes for David Attenborough's "The Private Life of Plants" Video Series, Branching Out (Volume 1). Additional material on this topic was covered in our lecture "Introduction to Dispersal."

Like animals, plants fight one another, compete for mates, and invade new territories but do so on a much slower time scale.

How do plants travel from place to place?

- woodland bramble (*Rubus* sp., Rosaceae) grows along ground 3" per day to invade new territory; new shoots put down adventitious roots.
- skeleton of birdcage plant blows along desert's sands to disperse seeds.
- most plants do most of their "traveling" in seed / fruit form. These structures that scatter widely to disperse their seeds are called **diaspores**.

Wind Dispersal

Microscopic diaspores

- smallest diaspores belong to fungi and are called spores.
- spores carried by wind in puffball or knocked from it like smoke.
- dripping rain hits earth star fungus and propels spores into air (note: this is also a mechanism of water dispersal).

Larger diaspores

- dandelions (*Taraxacum officinale*, Asteraceae) seeds (achenes) travel by parachutes (the persistent pappus) and can be carried high in the sky.
- cottonwood trees (*Populus* spp., Salicaceae) with comose seeds. The farther a seed has to fall, the longer before it reaches the ground, and the farther it can travel.
- where wind is scarce, like within the canopy of a tropical rain forest, some plants have seeds with wings to aid dispersal (e.g., *Alsomitra macrocarpa* [Cucurbitaceae], a liana in Borneo)
- "helicopter" dispersal is seen in such plants as sycamore (this is the sycamore maple, *Acer campestre* (Aceraceae), from Europe) and *Dipterocarpus grandiflorus* (Dipterocarpaceae). The tristar plant has 6 blades on its seeds.
- Tilia* sp., linden (Tiliaceae; not named in video) has a persistent bract subtending the fruits that acts like a sail.

Mechanical Dispersal

- Squirting cucumber (*Echballium elaterium* sp., Cucurbitaceae) with jet propulsion!
- Himalayan balsam (*Impatiens glandulifera*, Balsaminaceae), the slightest touch can explode the capsule to propel its seeds 15'.
- the ivy-leaved toadflax (*Cymbalaria muralis*, Scrophulariaceae) has pedicels which move about to plant its seeds in crevices (virginia creepers have suckers and ivy has clinging roots).

Water Dispersal

- the tropical sea bean (*Entada gigas*, Fabaceae) can float many miles over a long period of time, and can travel from the Caribbean to Europe along the Gulf Stream. Its fruits can grow up to 1.8 m long!

Animal Dispersal

Passive (simple adhesion, awns, hooks, and barbs)

- burdock (*Arctium* spp., Asteraceae) with many hooked involucre bracts.
- fruit with spikes, such as the devil's thorn (*Tribulus terrestris*) of S. Africa.
- the grapple plant (*Uncaria procumbens*, Pedaliaceae), with its claw-like appendages (inflorescence axes), has evolved for dispersal by ostriches.

Active (carrying and caching, and ingestion)

- animals are enticed by rewards of various types.
- ants rewarded by fleshy, oily elaiosomes, and help bury seeds.
- color of blackberry fruits (*Rubus* sp., Rosaceae) used as attractant; birds attracted to red and black colors. Because the fruits do not ripen simultaneously, they are not removed all at once.
- rhinoceros hornbills carry tropical fig fruits many miles. Although the flesh of the fruit is digested, the indigestible seeds are voided.
- Cassowary bird's wattles are same color as the fruit they eat; color serves as an attractant.
- Durian (*Durio zibethinus*) fruit has a foul-smelling rind to attract orangutans
- Seeds from "rhino apples" (*Elytropappus rhinocerotis*, Asteraceae) cannot germinate in forests and have to be removed by rhinoceroses to open grasslands; seeds germinate in dung.
- elephants "disinfect" acacia seeds (*Acacia* spp., Fabaceae) by eating pods parasitized by beetle grubs; when seeds are defecated they are grub-free.
- the seeds ("nuts") and capsules of brazil nut trees (*Bertholletia excelsa*, Lecythidaceae) are very hard. The agouti (related to the guinea pig but not as cute!), with its sharp teeth, gnaws these capsules open, eats its fill, and then buries those seeds that it can't eat immediately. Because agoutis are not very intelligent creatures, they forget where their food is stored.
- the alpine nut cracker picks seeds out of pine cones, carries seeds in its crop to new and open habitats, and buries seed.

Why produce seeds? Seeds can travel in space AND in time.

- the proteas (Proteaceae) of South Africa only release their seeds after seasonal fires. Although the fire kills the adult plants, the seeds survive and germinate in the rich nutritious ash.
- in an archaeological Site in Japan, a viable *Magnolia* seed was found in a preserved rice pit. This seed was buried more than 2,000 years ago, and the resultant plant might represent an extinct species of *Magnolia* (Magnoliaceae).