GREENHOUSE TOUR No. 2

The greenhouse is open weekdays from 8:00am to 4:00pm, and is located on the B2 basement level of Birge Hall. The greenhouses are numbered 1 to 8. (See the map on the last page of this handout). Please leave your bags and coats in the hallway so as to avoid knocking plants off tables. To find these plants, look for the number labels with orange tape!

Greenhouse 5 (Begonia House)

1. *Stegolepis* sp. – (Rapateaceae)

This small family contains ~100 species in 16 genera and is almost completely restricted to South America with one monotypic genus in West Africa. The majority of the species grow in the Guyana Highlands atop giant sandstone tepuis. These “sky islands” have allowed the group to radiate in isolation and many tepuis have their own endemic species. There are numerous growth forms seen on this table: some have leaves arranged distichously (like a fan), some are rosettes, and others have very narrow leaves. The species in flower now are all pollinated by bees, though some species are hummingbird-pollinated. DNA evidence has shown that the enigmatic African species arose ~6 million years ago, well after South America split from Africa. This confirmed the hypothesis that long distance dispersal is the cause of this strange distribution.

Greenhouse 2 (Tropical House)

2. *Crossandra infundibuliformis* — firecracker flower (Acanthaceae)

*Crossandra* is a genus of about 50 species that is restricted to the Paleotropical floristic kingdom, although the family is pantropical in distribution. The genus is found in Africa, Madagascar, Arabia and the Indian subcontinent; this species is native to India. This plant is cultivated for its vibrant blossoms.

3. *Malpighia glabra* — Barbados cherry (Malpighiaceae)

This species, also known as acerola or wild crape-myrtle, is a tropical shrub or small tree. It ranges from southern Texas south through Mexico and the Caribbean to Peru and Brazil. It is widely cultivated for its fruits which are high in vitamin C. Although the family is primarily pantropical, historical biogeographical analysis indicates that primitive members first evolved in temperate regions of the Northern Hemisphere and subsequently radiated separately into the tropical regions of the world – consistent with the “Boreotropics Hypothesis”.

4. *Passiflora* sp. — passionflower (Passifloraceae)

This genus exhibits a spectacular radiation of pantropical vines with showy flowers. *Passiflora* is well known for its co-evolutionary association with *Heliconius* butterflies. Passionflowers have evolved many ways to prevent butterflies from laying eggs on their leaves. Some species have foliar glands that attract ants that patrol the leaves for butterfly eggs. Other species have leaves with small spots that trick butterflies into thinking that eggs have already been laid on them. Passionflowers also produce one of the tastiest tropical fruits: the passion fruit. Although primarily tropical, there are species that range as far north as central Illinois and Indiana. A Central American species has been introduced to Hawaii and has become one of the most aggressive invaders in that state.

Greenhouse 1 (Research Greenhouse)

5. *Brocchinia micrantha* — (Bromeliaceae)

A carnivorous bromeliad?! This genus of 20 species is quite unique in the number of ways they acquire nutrients and the fact that they are sister to all other bromeliads. Ants live in the leaf bases and drop debris and dead nest-mates into the rolled leaves which absorb nutrients. The bromeliads, like the rapateads, are centered in the New World with one species restricted to West Africa.
6. *Gossypium hirsutum* — American upland cotton (Malvaceae)

This is the common cotton that is cultivated in the southern United States. It is an allotetraploid combination of an African genome and a New World genome. How this hybridization and subsequent polyploidy doubling could have occurred has led to much phytogeographic speculation. Proposals have included antiquity so great that continental drift was involved — or youth so extreme that human activity was responsible. What does the existence of *Gossypium sandwichense* (a Hawaiian endemic) imply for natural transatlantic, long-distance dispersal?

7. *Nepenthes* sp. — Asian pitcher plant (Nepenthaceae)

Nepenthaceae are carnivorous plants that are easy to recognize because of the lidded pitchers borne on the end of a twining prolongation of the leaf. This genus is found throughout Indonesia, extending to Australia, with a few species disjunct in Madagascar, Sri Lanka, and the Seychelles. Note their similarity to the American pitcher plants (*Sarracenia*, Sarraceniaceae) seen in the back of greenhouse 6. Some species of *Nepenthes* have ant mutualists that remove fungal spores from their pitchers. One species produces nectar from the lid of its trap which attracts tree shrews that sit and lick the nectar, sometimes defecating into the pitcher! The plant then absorbs these nutrients; an example of plant coprophagy.

**Greenhouse 6 (Cool House)**

8. *Fuchsia* sp. — fuchsia (Onagraceae)

This woody genus is largely tropical/temperate South American with an extensive radiation in the Andes where they have co-evolved with hummingbirds. However, one group of species occurs in New Zealand and Tahiti. The fossil record (in Australia) and molecular systematics indicate that the genus is an example of an element of the great southern hemisphere temperate flora that broke apart roughly 30-50 mya. Much more recent long distance dispersal has given rise to the species in Tahiti. Interestingly, *Fuchsia* is now known to be most closely related to the high latitude, Northern Hemisphere herbaceous genus *Circaea* (enchanter’s nightshade), which is found in Wisconsin.

9. *Eucalyptus* sp. — eucalypt (Myrtaceae)

This is a characteristic genus of aromatic-leaved trees and shrubs in Australia, containing about 500 species, with only two or three extending north into Malaysia, east of Wallace’s Line. Many species are cultivated in tropical, subtropical, and Mediterranean regions throughout the world as fast growing sources of timber and firewood. Some species have become aggressive weeds in Africa and California.

10. *Rhododendron* sp. — azalea (Ericaceae)

*Rhododendron* is a large genus of the Northern Hemisphere – illustrating the common “Arcto-Tertiary” disjunct pattern. Most species are found in Asia, especially the Himalayas, although a few occur in eastern North America and the Pacific Northwest. The tough, evergreen leaves, as well as mycorrhizal associations, are common in this family that is well adapted to nutrient-poor soil. A circumboreal species, *R. lapponicum*, has isolated populations in WI and NY. They became “trapped” there as the glaciers retreated, being able to survive because of very specific microclimates.

**Greenhouse 7 (Succulent House)**

11. *Rhipsalis* sp. — mistletoe cactus (Cactaceae)

*Rhipsalis* is the only genus of cacti that occurs naturally in the Old World, represented by one species that ranges across Africa to Madagascar and Sri Lanka: another case of long distance dispersal. There are many species of epiphytic cacti (such as the Christmas cactus) in the New World; they are found in both dry and wet habitats. Succulence and CAM (Crassulacean Acid Metabolism) are “pre-adaptations” to epiphytism perhaps explaining the large radiation of epiphytic cacti. There are many other epiphytic cacti in this greenhouse: look at the specimens hanging from the ceiling all around you.
12. **Lithops** — living stone (Aizoaceae)

This family is extremely diverse in the winter rainfall regions of South Africa and Namibia with a few species occurring pantropically on beaches. The genus contains weedy scramblers, large shrubs, and tiny succulents that consist of a single pair of leaves (as represented with this genus). The patterning of their leaves, which grow flush with the substrate to hide from herbivores. The species that are found in the Mediterranean biome of southern Africa have flowers that look similar to those of Asteraceae (daisies) which are also hyper-diverse in this region; a very interesting form of mimicry.

13. **Agavae americana** — century plant (Agavaceae)

This species is interesting in that it is a monocarpic perennial. Instead of flowering every year like most perennials can, monocarpic perennials remain vegetative for many years (decades in this case), flower once, and then die (hence the common name). *Agavae*, along with *Furcraea* and *Yucca* are the “aloes of the New World”. Like aloes, they are succulent monocots that have tight rosettes of leaves and can be tree-like or stemless. Some species of agaves are used for fibers and ornamentals while one species (*A. tequilana*) is used in the making of tequila.

**Greenhouse 8 (High House)**

14. **Coffea arabica** — coffee (Rubiaceae)

The pits in the drupes are the coffee beans of commerce. Native to tropical Africa, this species is cultivated in tropical areas worldwide — providing a nice example of the common pattern seen in the biogeography of cultivated plants, where a species is often a more economically important crop outside its native range. Coffee is often grown as a shade crop, a system that mimics the commonest ecological role of members of this family — understory shrubs in tropical rainforests.

15. **Ravenala madagascariensis** — traveler’s tree (Strelitziaceae)

This monotypic genus is endemic to Madagascar and is pollinated by lemurs. The other members of the family are sunbird-pollinated *Strelitzia* native to subtropical southern Africa (nearby in Greenhouse 2 near the door to Greenhouse 1) and the bat-pollinated *Phenakospermum* in Amazonian South America. Are we seeing the ghost of Gondwana?

**Greenhouse 4 (Tropical House)**

16. **Pandanus veitchii** — screw pine (Pandanaceae)

A large genus restricted to the Old World tropics. Mostly sea coast or marsh plants. Note the prop roots (stilt-like aerial roots) and perfect spiral arrangement of their long, sword-shaped leaves. These plants, not surprisingly, are characteristic of Pacific Islands. The leaves and roots of *P. utilis* are used like those of palms; for rope, baskets, paper, nets, thatch and matting, and the fleshy fruits of some species are used as food.

17. **Protea cynaroides** — king protea (Proteaceae)

This species is found in the Cape region of South Africa. Indeed, 70 of the 115 species of *Protea* are restricted to this small region. Though the pollination biology of the family is poorly known, it appears that many are pollinated by small mammals. The distribution of the Proteaceae: South America, Australia, and Africa suggests that the family expanded its range before the breakup of Gondwana. DNA evidence, in combination with molecular dating indicates that the distribution of the family can in part be explained by the vicariant model but also that long-distance dispersal has also played a role.

**In Birge Hall lobby and on 2nd floor foyer above stairs**

18. **Caryota mitis** — fishtail palm (Palmae)

These palms are known as fishtail palms because of the shape of their leaflets. The genus is almost strictly Asian and is a botanical example of a group that largely honors the Wallace Line by occurring west of it. One more recently derived species occurs east of the Wallace Line – perhaps evolving after the Australian and Asian plates collided.