Cool Temperate
What are your first impressions upon entering this room? Depending on the season, you will either find a room full of lush growth, bursting with flowers - or a landscape of bare branches and little greenery. A large proportion of the plants in the Cool Temperate room are deciduous. This room is kept just above freezing in the winter months, with a high of between 45-50 degrees Fahrenheit. In the summer this room is a pleasant retreat from the ambient high temperatures, as it is air-conditioned to maintain the climate of the cooler mountain or coastal biomes.

Find Ginkgo biloba and Metasequoia glyptostroboides. These plants are considered by many scientists to be “primitive” or “living fossils.” The ginkgo, or maidenhair tree, is in the Family Ginkgoaceae, in which there is only the one genus, Ginkgo, and only the one species, biloba. This tree, a native to south-eastern China, is evidently extinct in the wild, but is widely used today as an ornamental or street tree, hardy to zone 5. The fossil records show that very similar plants existed in the late paleozoic and widely throughout the mid-mesozoic ages. Interestingly enough, ginkgos share characteristics of both the cycads and conifers; their sex-organs and gametophyte development are very similar to that of cycads, while their stems with their long shoots and spur shoots are similar to conifers.

The Cool Temperate Room contains several examples of plants in the phylum, Coniferophyta, specifically several in the family Taxodiaceae. Conifers are believed to have been widely spread throughout the northern hemisphere in the early tertiary period, but today they occupy a narrow ecological zone. They have developed xerophytic adaptations and some are deciduous, such as the Metasequoia, more commonly known as the Dawn Redwood. This genus was first described from fossil records in 1941, and amazingly enough, living plants were brought to the attention of botanists in 1948 after they were discovered in Szechwan, China (Hortus III). As with the other conifers, the lifecycle of the Metasequoia is similar to that of ferns, where the sporophyte generation is the dominant form and the gametophyte generation is dependent on the sporophyte. Other conifers in the Cool Temperate Room include the bald cypress (Taxodium distichum) and the buddist pine (Podocarpus macrophyllus).
By the door leading out of the Cool Temperate room into the greenhouse hallway is a planting box containing a uniquely beautiful small tree - a **Brugmansia versicolor** of the family Solanaceae. This graceful tree is also sometimes placed in the genus **Datura**, and bears the common name, Angel’s Trumpet. If it is in flower, note the large, pendulous blossoms that are white, fading to apricot-peach with age. The Solanaceae Family (including potato, tomato, red pepper and tobacco) is known for having large numbers of poisonous or medicinal plants and plant parts, while at the same time being of high economic importance. The genus **Solanum** (nightshades, potato) contains a poisonous alkaloid originally termed solanine, which has various levels of toxicity. Species of **Brugmansia**, on the other hand, contain several solanaceous alkaloids, including atropine, hyoscyamine, and hyoscine. The total alkaloid content is very high, varying from 0.25 to 0.7 percent (Kingsbury) and is present in all plant parts. Although in some cultures Brugmansia or Datura have occasionally been deliberately used for their hallucinogenic effects, the onset of toxicity in humans and animals varies with relation to the concentration of the several alkaloids present and by individual body chemistry - most often to fatal ends (Kingsbury).
Desert

What immediately strikes you when you enter the desert room? What are some ways the plants in this room are very different from those in the other houses thus far? In what ways are they similar to each other?

The desert room contains plants we consider to be adapted to a harsh environment - that of the desert with hot, dry days and cold nights. Plants along the western wall (toward the Cool Temperate room) are predominately native to Africa, with many representatives of the Euphorbiaceae Family. Plants on the eastern wall, along the Tropical Room glass, are primarily representatives of North and South America, with the Cactaceae Family predominating. Plants in the center planting bed represent natives from both Africa and the Americas. It is evident that there is a great deal of similarity between these two unrelated families, which are often at first glance all mistakenly viewed as “cacti.” The majority of the plants in the desert room are all considered “succulents” - i.e. thick, fleshy plants with abundant sap that are predominantly native to arid or semi-arid regions, at least for part of the year (Hortus III). The succulents growing in the Desert room come from all over the globe and are representatives of many different families: Cactaceae, Agavaceae, Crassulaceae, Euphorbiaceae, Liliaceae, Aizoaceae, Compositae, Portulacaceae, and so on. The independent development of similar structures in unrelated, or distantly related, life forms is often displayed in individuals living in a similar environment, and is known as convergent evolution. Look around the species in the collection, and name some of these similar structures!
What can’t be seen by the naked eye are similarities that occur within many succulents at the cellular level. In 1813 Dr. Benjim Heyne conducted a simple experiment by tasting the leaves of Kalanchoe in the morning, midday, and in the evening. He discovered that the leaves were very acid in the morning, tasteless at midday, and nearing bitter by nightfall. He deduced that there was a build up of acids overnight and that these broke down during the course of the day. Subsequent investigations discovered the Crassulacean Acid Metabolism (C.A.M.), which is a distinct characteristic of succulents worldwide. In the typical leaf, the stomata open in the day to take up CO2, which, in the presence of chlorophyll, completes a complex sequence and releases O2. Energy is gained at night by the partial reversal of this process (respiration) and CO2 is released back to the air. Succulents, on the other hand, open their stomata at night when the loss of moisture from the plant is less, and take up CO2 to be stored as an organic acid, malic acid. This is the acid that Dr. Heyne tasted in the morning. In this manner, the chemical process of respiration can be completed in the day without the stomata being open.

A tour of the Desert room is not complete without a close look at some interesting species. In the center bed note the large Euphorbia trigone. The thick stem contains a latex-type sap that is poisonous if swallowed and can produce a dermal rash on the skin. The leaves are reduced in size, or even further reduced to spines. Across the aisle from the Euphorbia you should find one or two species of Lithops, a unique succulent in the Aizoaceae Family. Lithops are commonly called “Living Stones” because of their appearance. They are adapted to survival in the harshest of deserts, and with their translucent top surfaces they can survive being buried for days in blowing sand while still conducting photosynthesis. On the eastern wall you will find a number of Agave americana specimens, the Century Plant. Some Agavaceae species are cultivated for fiber (sisal) or for the sap, which is fermented or distilled.

Proceed into the Tropical Room…