Deserts-San Diego County

Classified as Sonoran Desert (sometimes subcategory: Colorado Desert)

Often segregated as:
- Desert floor/lowlannd
- Desert transition/highlands/mountains
Desert Adaptations

• **Avoidance** - annual herbs
• **Deep taproots** - e.g., Mesquite (*Prosopis*)
• **Drought deciduousness** - *Fouquieria*
• **CAM Photosynthesis** - Cacti
• **Leaf modifications**
• **Salt secretion** - e.g., *Atriplex*
• **Water storage**
Avoidance

Annual herbs  
(most desert wildflowers)  
- avoid drought by growing & flowering during wet season, seeding, then dying at start of dry season.
Annual Plants
Rule!
Hesperocallis undulata
Deep Taproots

E.g., *Prosopis glandulosa* var. *torreyana*
Taproots extend down to water table.
Drought deciduousness

Fouquieria splendens
Leaves fasciculate, grow during wet season, fall off at start of dry season (plant dormant).
Drought-deciduous and microphyllous trees & shrubs

*Senegalia greggii* (Fabaceae)
CAM Photosynthesis

Stomata open and CO$_2$ fixed at night
(into malate, stored in vacuoles)
- minimal loss of water through evapotranspiration

Most Cacti
CAM photosynthesis
Leaf modifications

Leaves caducous  (inhibit water loss)
Leaves reduced  (stem photosynthetic)
Leaves thick, coriaceous, with thick cuticle
Leaves with dense, white trichomes or resin
Leaves modified into spines  (protect from herbivory, reflect UV light)
6. Stem and leaf morphology

Leaves caducous: early leaf loss; e.g., *Psorothamnus spinosus* reduces surface area, water loss (transpiration).
Desert Adaptations

6. Stem and leaf morphology
   spines, thorns
   protect plant from herbivory, reflect UV light
Apical Hairs & Spines

Shading, Reflectance, Protection, Boundary Layers
Spines for antiherbivory??
Other Antiherbivory Defenses

Calcium oxalate crystals: Druses, raphides

Secondary chemicals: mescaline

Thick cuticle
Multi-layered epidermis
Stem Ribbing
Leaf modifications

Leaves resin-covered

Leaves white hairy
Salt-secretion

- Allows survival in alkaline flats

*Atriplex* spp.
Water Storage

Stem-succulents: cacti

Leaf-succulents: agave
Desert Plant Communities

Creosote Bush Scrub
Desert Succulent Scrub
Pinyon Pine - Juniper Woodland
Blackbush Scrub
Desert Microphyll Woodland
Alkali Sink
Creosote Bush Scrub
[very dry, low to high desert]

Larrea tridentata

Ambrosia dumosa
Desert Succulent Scrub

**Cactaceae:**
- Cylindropuntia bigelovii
- Cylindropuntia echinocarpa
- Cylindropuntia ganderi
- Ferocactus cylindraceus
- Mammilaria dioica

**Other shrubs:**
- Ambrosia dumosa
- Ambrosia salsola
- Encelia farinosa
- Fouquieria splendens
- Justicia californica
- Larrea tridentata
- Senna armata
Pinyon-Juniper Woodland
Pinyon-Juniper Woodland

*Pinus monophylla*  
*Juniperus californica*
Blackbush Scrub

Coleogyne ramosissima
Desert Microphyll Woodland

= Dry Desert Wash

[desert arroyos ("washes") and canyon bottoms]

Senegalia greggii
Chilopsis linearis
Ambrosia saldosa
Hyptis emoryi
Prosopis glandulosa
Psorothamnus spinosus
Washingtonia filifera
(in wet canyon bottoms)
Alkali Sink

[poorly drained alkaline regions]

*Atriplex polycarpa*