

VIII. GEOGRAPHIC REGIONS OF CALIFORNIA AND THEIR FLORAS. 11.

FRANCISCAN SECTION [yellow labels, beds 401-413]

• James Roof was a particularly keen proponent of the uniqueness of the Franciscan flora: the plants connected with the mountainous parts of San Francisco, adjacent San Mateo, and Marin counties. His contention was the mix of Franciscan rocks and plants was particular to this region alone. In terms of geography, most of the region belongs to what is known as the northern part of the Santa Cruz Mountains, which terminate at San Bruno Mountain just south of San Francisco. Certainly that northern area has at least two prominent mountains (San Bruno and Montara mountains) whose floras are unusual± with some highly localized endemics, such as Montara Mountain manzanita (*Arctostaphylos montaraensis*) and shingle-leaf manzanita (*Arctostaphylos imbricata*). Perhaps even more fitting is the special attention we should be focusing on the plight of Montara Mountain, with the proposed bypass by CalTrans of the Devil's Slide on Highway 1.

This area is particularly rich in contrasts of vegetation and unusual forms: thickets of California hazelnut (*Corylus cornuta californica*), lush conglomerations of north coastal scrub and chaparral (including such notable southern California plants as holly-leaf cherry and hummingbird sage, *Salvia spathacea*), protected canyons with remnants of northern forest understory plants (including fringe-cups; false lily of the valley, *Maianthemum dilatatum*; trillium; sword fern, *Polystichum munitum*; and lady fern, *Athyrium filix-femina*), wind-pruned oaks, crowns of blue-blossom ceanothus (*Ceanothus thyrsiflorus*) on hill-tops; near-balds covered with three different species of creeping manzanitas (*Arctostaphylos uva-ursi*, *pacifica*, and *imbricata*); coastal bluff wildflowers; and valley grassland wildflowers. This flora represents a convergence of northern and southern elements and a mixture of coastal and inland climatic influences.

SIERRA NEVADA [blue labels, beds 601-662]

This huge geographical area is represented by the mountain massif itself--from Plumas County in the north to Tulare County in the south, and from the low western foothills to the high crest--and also the high desert areas to the east. Such an area is botanically and geologically complex and has a correspondingly rich flora.

Typical Sierran plant communities go something like this (from western foothills to the base of the east side): valley grassland with vernal pools, oak and foothill woodlands, and hard chaparral in the foothills; mixed conifer forest (including giant sequoia), montane meadows, and montane chaparral at the middle elevations; various kinds of subalpine forest (including red fir and lodgepole pine forests), montane meadows, and montane chaparral at higher elevations; alpine tundra and fell-fields above timberline; dry-phase mixed conifer and subalpine forests, aspen groves, montane meadows, and montane chaparral on the east side of the crest; and Jeffrey pine forest, pinyon-juniper woodland, and sagebrush scrub toward the eastern base. In addition, various versions of riparian woodland follow permanent water courses throughout the area. Thus, climatic conditions range from a mild Mediterranean climate in the western foothills to montane at the higher elevations to high desert on the east side.

Horticulturally, plants from the high elevations of this area are a challenge, for they are adapted to long periods of cold dormancy and intense, brief growing periods in summer. The Garden has succeeded admirably with a number of these, including several kinds of trees (even a grove of quaking aspen, *Populus tremuloides*) and a bed designed especially for alpinists. Alpine plants--those growing above timberline--are particular about their drainage and are prone to crown rot and so need highly specialized soil conditions. Nonetheless, many have adapted to this low elevation. Typical are densely matted or tufted plants whose main crown is buried at or beneath the soil and whose leaves are covered with woolly or matted white or gray hairs. The genus *Eriogonum* (wild buckwheat) is particularly instructive of plants adapted to alpine conditions.

REDWOOD SECTION [red labels, beds 701-735]

California's redwood region, dominated by coast redwood (*Sequoia sempervirens*)--the world's tallest trees--stretches from southern Monterey County to just north of the Oregon border, within the coastal fog belt. The best development of this region, however, is north of the Golden Gate in Marin, Sonoma, Mendocino, and other north coastal counties,

where high winter rainfall and heavy summer fogs create near-rainforest conditions. Redwoods reach their maximum development on silted flood plains of coastal canyons; there their size and age is greatest. The dense canopy created by these conifers makes for very shaded conditions in the understory where, typically, the number of species is dependent on the amount of moisture available and the specific light conditions. Redwood needles also help create acid soils. Stream corridors and second-growth forests provide more ample light and are home to a greater variety of species than old-stand virgin redwood forests.

Most typical of the darkest understories are various ferns, herbaceous ground covers, and spring-blooming lily relatives. Ferns include sword fern (*Polystichum munitum*), lady fern (*Athyrium filix-femina*), wood ferns (*Dryopteris* spp.), deer fern (*Blechnum spicant*), and five-finger fern (*Adiantum aleuticum*). Ground covers are exemplified by inside-out flower (*Vancouveria hexandra* and *planipetala*), redwood sorrel (*Oxalis oregana*), various saxifrage relatives, western bleeding heart (*Dicentra formosa*), vanilla-leaf (*Achlys triphylla*), modesty (*Whipplea modesta*), violets (*Viola* spp.), and anemone (*Anemone deltoidea*). Lily relatives include foetid adder's tongue (*Scolopus bigelovii*), false Solomon's seals (*Smilacina stellata* and *racemosa*), trilliums, fairy bells (*Disporum hookeri* and *smithii*), false lily-of-the-valley (*Maianthemum dilatatum*), and bead lily (*Clintonia andrewsiana*).

Shrubs, by contrast, favor forest openings. There is a wealth of berry-producing shrubs connected with redwood forests: thimbleberry (*Rubus parviflorus*), salmonberry (*Rubus spectabilis*), cascara (*Rhamnus purshianus*), huckleberries (*Vaccinium ovatum* and *parvifolium*), salal (*Gaultheria shallon*), gooseberries (*Ribes* spp.), and barberries (*Berberis nervosa* and *aquifolium*). Birds and mammals serve to disperse these shrubs far and wide by eating the fruits and excreting the seeds. Ants serve a similar function for understory plants; many forest floor herbs have special elaiosomes or oil bodies on their seeds that ants nibble off after having carried the seeds away. The embryo inside the main seed is discarded after the ants have feasted.

Many of the plants adapted to redwood forest conditions show ways of maximizing photosynthesis: dark green leaves (with an extra-dense concentration of chlorophyll), leaves horizontally held and with a broad, often dissected leaf surface to intercept maximum light. Such designs are water wasteful, but since direct sunlight and high summer temperatures are seldom a problem, these plants rarely show signs of water stress.

PACIFIC RAINFOREST [green labels, beds 501 to 523]

There is no hard line that separates the lushest parts of northern redwood forests from stands of temperate rainforest conifers. The two forests meet and mix along their margins. Although this rainforest reaches its best development on the Olympic Peninsula in Washington, a narrow fringe of it marches down California's coast on bluff and hill tops as far south as northern Sonoma and Mendocino counties. At those extremes, there is merely a suggestion of rainforest; California's best examples are found along the coastal side of redwood forests in Humboldt and Del Norte counties. This coastal fringe replaces redwoods, since redwoods are poor competitors where wind and salt spray locally rule the climate. {Redwoods are shallow rooted and easily undermined by strong winds and soil erosion.}

In place of redwoods, Pacific rainforest consists of several moisture-loving conifers, often in different mixtures according to local ecological circumstances: Douglas fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis*), western hemlock (*Tsuga heterophylla*), Sitka spruce (*Picea sitchensis*), Port Orford cedar or Lawson cypress (*Cupressus lawsoniana*), and red or canoe cedar (*Thuja plicata*). Although the Lawson cypress is restricted to the mountains of northwestern California and southwestern Oregon, the other species have extensive ranges beyond our borders, reaching their best development to the north of us.

As the name "rainforest" implies, this is an area of high rainfall: heavy in winter and spring, less in summer, but mitigated by the nearly constant heavy fogs that condense on tree branches and drip to the ground in place of rain. The cool, damp conditions here create acid soils and exuberant growth; every available surface that receives light carries a tapestry of mosses, leafy liverworts, lichens, and ferns. A couple of ferns are even epiphytic in this forest; principally, licorice fern (*Polypodium glycyrrhiza*) and leather fern (*Polypodium scolieri*). Even though the overall

plant cover is high, diversity is low as compared to tropical rainforests. In fact, most of the plants associated with the understory of coast redwoods, also occur here. Some additional species of understory shrubs or small trees include California hazelnut, vine maple (*Acer circinatum*), and stink currant (*Ribes bracteosum*).

SHASTA-KLAMATH SECTION [green labels, beds 901 to 999]

This large region covers the remaining northernmost parts of California: Tehama, Shasta, Lassen, Modoc, Siskiyou, and Trinity counties. This a complex area filled with a wide variety of geological forms and

precipitous mountains: the western part--comprising the Klamath Mountains--is actually made up of several distinct mountain chains, including the Trinity Alps, Trinity Mountains, Castle Crags, Marble Mountains, Scott-Salmon Mountains, and the Siskiyou. Some of these mountains are granitic; others are volcanic; still others metamorphic, with marbles and limestones and serpentinites. The relief here is often stark, although the highest

mountains go to only around 9,000 feet. And the climate includes heavy winter rainfall and searingly hot, dry

summers.

Vegetation in the Klamaths is highly complex, with a mixture of Sierran plant communities and other communities rare in California. In addition to the mixed conifer forests, montane meadows, montane chaparral,

and even isolated stands of alpine fellfields (Mt. Eddy, for example), there are sphagnum bogs, serpentine barrens, knobcone pine forests, serpentine chaparral, and enhanced conifer forests. The word "enhanced" refers to the fact that there are relict or range-extended stands of conifers otherwise unknown in California: subalpine fir (*Abies lasiocarpa*), noble fir (*Abies procera*), and Engelmann spruce (*Picea engelmannii*) are examples. In addition, the weeping or Brewer's spruce (*Picea breweriana*) is restricted to this corner of California and adjacent Oregon, and foxtail pine (*Pinus balfouriana*) is found here and ¹ disjunctly in the high southern Sierra. One particularly rich area--the Russian Peak, Duck Lake area in the Scott-Salmon Mountains--has 17 species of conifers in little more than one square mile!

Sphagnum bogs are no less intriguing for the beautiful mixtures they support of heather relatives (Labrador tea, Sierra laurel--*Leucothoe davisae*, western azalea, rosebay rhododendron), lilies and their relatives (*Lilium volmeri* and *pardalinum*, *Narhecium californicum*, *Hastingsia* spp., *Tofieldia glutinosa*, *Stenanthium occidentale*), orchids (*Cypripedium californicum*--California lady's slipper and *Platanthera* spp.--reindeer orchids), and insectivorous plants (*Darlingtonia californica*--cobra plant, *Drosera rotundifolia*--common sundew, and *Pinguicula vulgaris*, common butterwort). In addition, there are many endemics restricted to this and southwestern Oregon.

The remainder of this region, east of the Klamaths, consists of the Cascade Range in its southernmost extension and the Modoc Plateau. The Cascades are comprised of a series of volcanic cones, represented in California by Mt. Lassen at over 10,000 feet and Mt. Shasta at over 14,000 feet. These mountains typically show the same high elevation plant communities as the Sierra, but at the lowest elevations there is often droughty, high desert vegetation. The Modoc Plateau consists of a series of mid-elevation lava flows that have been dissected by erosion over the years. In the easternmost part lies an isolated mountain range, the Warners, that are home to more Sierralike plant communities. Owing to the extreme isolation of these mountains and their proximity to other high desert ranges to the north and east, the Warners contain a number of range extensions as well as endemic species. The plateau itself consists of dry-phase yellow pine forest, montane chaparral, sagebrush scrub and, in localized hollows with poor drainage, vernal pools.