

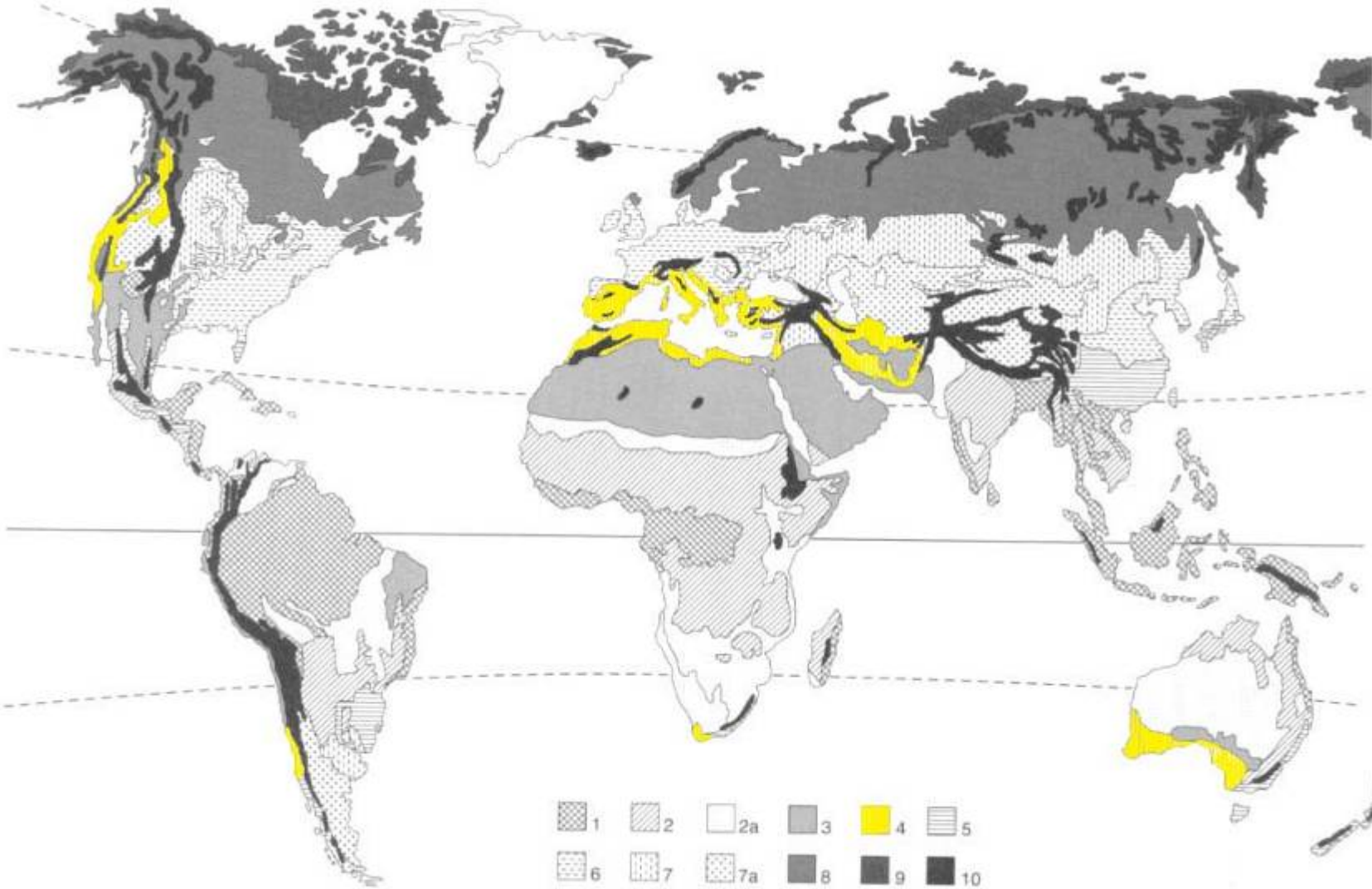
# 4 Mediterranean Biome

## Lecture 9

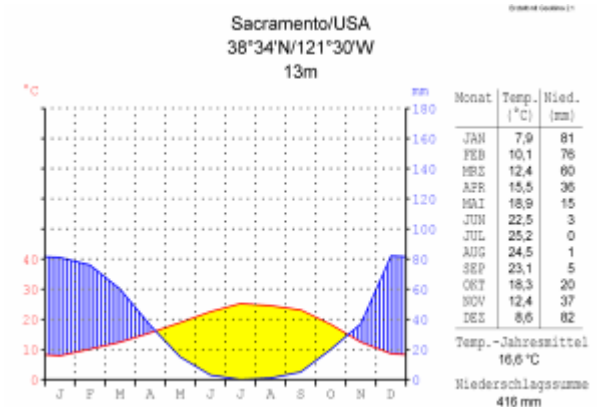
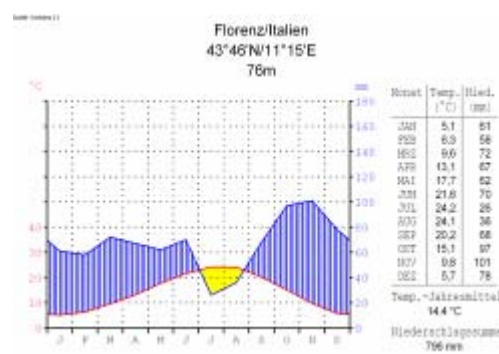
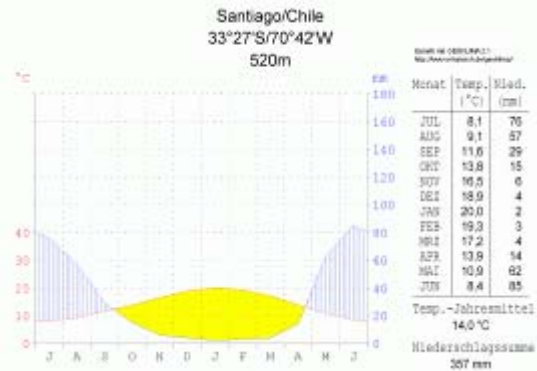
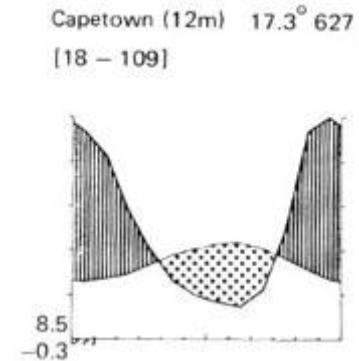
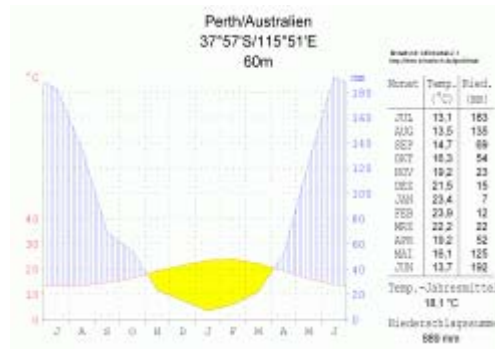
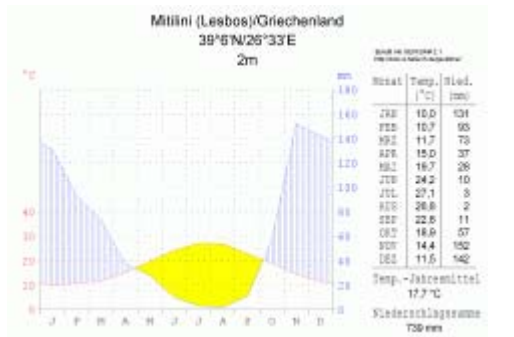
Our home biome! Odd bits on the west side of continents with cold currents offshore



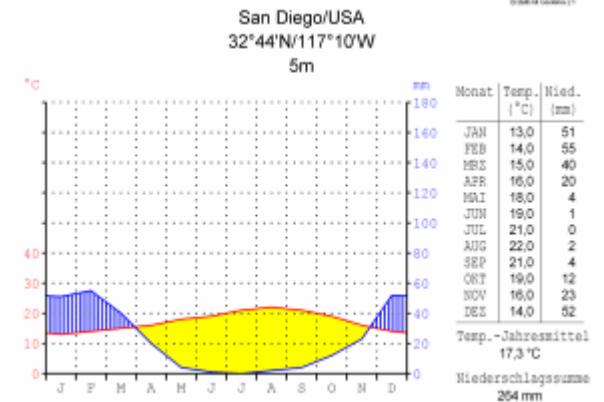
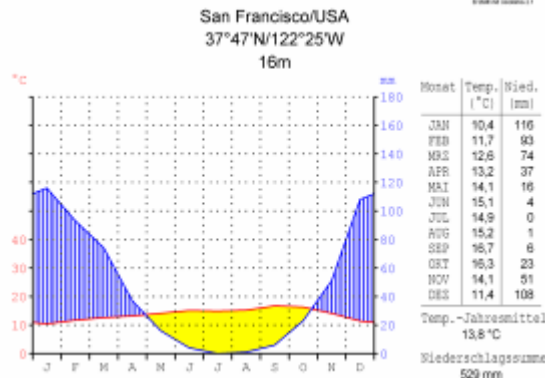
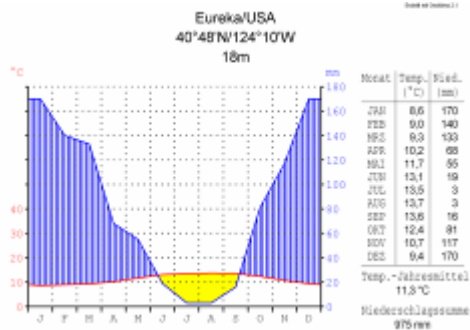
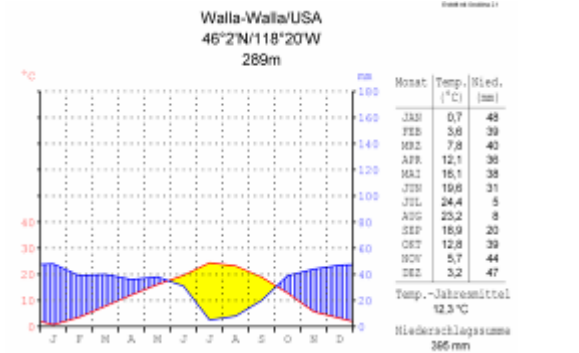
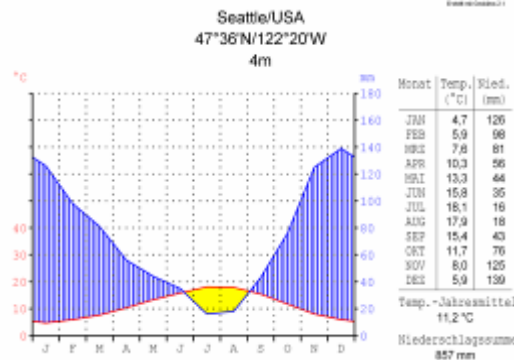
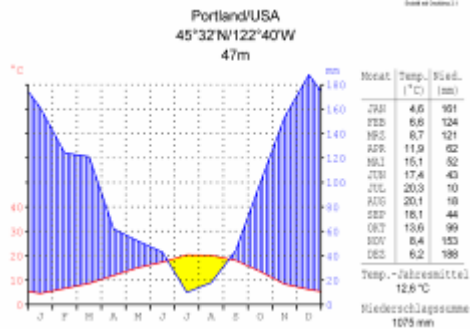
Walter's view. Many would not think the northern extension of this biome into interior British Columbia correct



**Climographs.** Note that the degree of summer drought varies some for the same mean rainfall. California, Chile, and the eastern Mediterranean have rainless summer months. The Cape province, the western Mediterranean, and Western Australia do get some summer rain. This makes for some subtle but interesting differences in the vegetation. For example, many California natives, such as our many lovely bulbs, are hard to manage in gardens. They are subject to fungal diseases in warm moist soil. On the other hand, many of our garden bulbs are drown from the very rich “Fynbos” community around Cape Town. These bulbs are summer dormant but get wet often enough in the summer to be resistant to fungi under warm, wet conditions. English gardeners can grow some of our difficult shrubs because in England the summer-wet soil is cool.



**Climographs from the Western US.** You can see why biogeographers have a hard time defining exactly where the Mediterranean Biome stops. In some early editions of his book, Walter even mapped our Redwood Forests (Eureka is a representative climograph) as Warm Temperate Forest (Biome 5). But if you take Eureka, Portland or even Seattle out of Biome 4 then you might have to take Cape Town out too. Nobody wants to do that for some reason. Of course, the idea is not to let arbitrary boundary drawing exercises consume too many brain cells but rather let the biomes be a basic framework to organize the immense climatic and biotic diversity we have to try to get our heads around.





**Vegetation Mosaic.** Most vegetation is patchy, but in the semiarid Mediterranean Biome this is especially conspicuous because communities with very different structure abut one another. Here, at San Simeon, there is a coastal pine forest in the distance, Oak Woodland in the draws, bits of Coastal Scrub scattered about, and Coastal Grassland in much of the picture. Trying to figure out what drives these patterns is half the fun of Mediterranean natural history. You might think that human disturbance is the primary cause but this is mostly not the case in California.



**Mediterranean communities are fire prone.** This is especially true of the variants like California with very dry summers. Many of our plants are adapted to fire. Chamise and some Manzanitas stump sprout after fires. Some of our “closed cone” pines have cones that persist on the tree for decades until a fire comes, melts the pitch that glues the cone shut, allowing the seed to be scattered into the ashes of the fire. Our live (evergreen) oaks have thick fire resistant bark. They can have their leaves burnt off, but they are killed only by very hot fires. Perennial herbs and annual plants are dead in the summer, and their underground storage organs and seeds are hard to kill, again except in very hot fires. Unfortunately, fire suppression leads to fuel buildup and very hot fires. We Californians have not got living in a summer-dry climate down to a science yet.

Spring after burn previous summer in Cold Canyon. Burns are typically patchy like this and sometimes are the cause of vegetation mosaics.

Burned Chamise resprouting





**Annual grasses.** The very dry summers in the eastern Mediterranean favor a large flora of annual grasses, many with big seeds. These include the ancestors of domesticated wheat, barley, and oats. When the Spanish came to California, they brought weedy wild oats, wild barley and many others in the hay they used to feed livestock on ships. These made their way into California where they outcompeted our native bunch grasses. Overgrazing harms the bunchgrasses, but this is not the whole story. The weedy grasses do well even when grazing is restricted. We don't know the whole story. Cache Crk Canyon now public lands.





**Annual “forbs” (wildflowers).** California is particularly well endowed with showy annual flowers. These plants sprout with the first rains and grow slowly until the brief spring season when it is warm and wet. Years are very variable in their fall and spring rains that are crucial to these plants. They often exhibit extreme forms of seed dormancy, much as in their desert relatives. These plants are like stock speculators, trying to guess if this is the right year to sprout in or not, but always having a large portfolio to mitigate risk. This means that they persist even through many unfavorable years. As with desert annuals, they are difficult for gardeners. Few seeds sprout in any one year, sometimes none, sometimes a big show. Garden races with little or no dormancy enter the nursery trade, but most remain uncultivated.

Photos from Bear Valley in the Inner Coast Range about 90 miles NW of Davis







A Clarkia. This is big  
genus in California



Collinsia, “Chinese  
Houses”



Three of our many species in the Lupine genus



A few colorful perennial herbs  
and bulbs from California



Fairy lantern, bulb



Blue Dicks, bulb

Bush Monkey Flower





**Cape Province.** A botanical wonderland dominated by the “Fynbos” (Afrikaans ~ little woods) Community vaguely like our chaparral, but exceeding rich in species.





A tiny sample of Fynbos plants



Wild Gladiolus



Iceplants are big

Sunbird flower



Protea with pollinating sunbird, the perching equivalent of our hummingbird

Two shrubs in the sunflower family





Evergreen shrubland and woodland communities. The Mediterranean Biome is rich in these community types. Here, in our Sierra Foothills, Gray Pine and Manzanita are mixed together.





## Some California evergreen shrubs



Ceanothus, Wild Lilac, another genus rich in neoendemics

Manzanita (Arctostaphylos), a genus with many California “neoendemics,” many species evolved very recently, restricted to California



Flannel Bush, a “paleoendemic,” restricted to California, 1 species, fairly rare. California has many plants left over from its past that now live in special habitats. Redwoods are a good example. They were much more widespread when California had summer rain



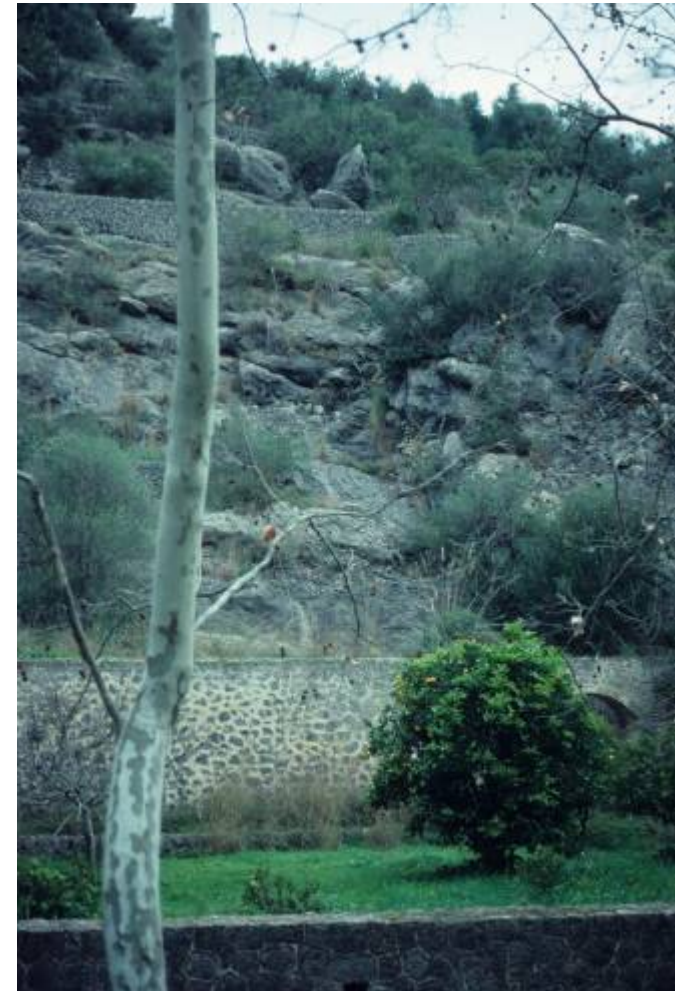


Evergreen shrubland. Mallorca, Mediterranean  
Island off the E Coast of Spain.



## Wild olive scrub.

Background. Sicily. Citrus,  
lawn, and Sycamore tree in  
foreground, all requiring  
summer irrigation





**The Madrean Hypothesis.** The Sierra Madre mountains of Mexico are a major center of oak diversity. Daniel Axelrod and Peter Raven reckoned that our drought tolerant oaks were recruited out of this center within the last 2 million years as the mediterranean summer-dry climate evolved. The Sierra Madre are a summer rain region, but the plants are adapted to drought in the relatively warm winters. This Sierra Madre forest at the end of the dry season does look a lot like the Oak Woodlands of California.





**Cone Peak**, Santa Lucia Mtns, California. This is populated mainly by plants with a Madrean affiliation. The exception is the conifers growing just below Cone Peak near the upper left. These are paleoendemic Santa Lucia Firs, plants that have their relatives to the north rather than to the south. Cone peak is a trip! You can find California's northern-most yuccas growing within a stone's throw of our southernmost Redwoods. If you haven't been to Cone Peak you really haven't seen been to California!



Blue Oak Woodland, grassland, thin chaparral mosaic. Our Blue Oak does bear a close resemblance to its cousin the Mexican Blue Oak. You can find some specimens of the latter in the Arboretum oak collection





**Holly-leaved Oak Forest** near Barcelona, Cataluña (Spain). These are very similar to our Coast and Interior Live Oak dominated communities. Holly-leaved Oaks are fairly common in Davis, for example they are planted in front of the apartment complex between the railroad tracks and J Street on East 8<sup>th</sup> Street. They do tolerate summer water. Note how all the live oaks around the Quad have broad unwatered strips around them to protect them from warm season root rot.





**Human uses of the Mediterranean Biome.** The very earliest agriculture began in the eastern Mediterranean about 11,500 years ago. By 8,000 years ago or so it reached the western Mediterranean. The classic Mediterranean agricultural system is based upon wheat, barley, vines, olives, fava beans, lentils, and chickpeas. These are either winter annuals or drought tolerant perennials, well adapted to the Mediterranean climate. Cattle, sheep and goats were domesticated quite early in this region as well. Irrigation and crops less well suited to summer drought, such as rice and citrus, came later. The Spanish settlers brought the whole complex to California and Chile in the 18<sup>th</sup> Century.

“Neolithic” people (= New Stone Age, = early horticulturalists) built this village on Mallorca about 8,000 years ago.





Agricultural village, Erice, western Sicily. At least as late as the 1970s, the agriculture here was classic Mediterranean



Vineyards

Olive orchard

Wheat field

The California real estate booms (and busts!). California's climate proved very attractive to settlers. This goes back to aboriginal times. California Native Americans had representatives from all but one of North America's major language families. It was ethnically the most diverse region in North America. Then came the Spanish and Mexicans, then the Anglos, then the Chinese, Japanese, Filipinos, Armenians, Africans, Vietnamese, Iranians, and all the rest of us. (We mustn't forget an Austrian or two.) Maybe now we are the most ethnically diverse region in the world? In California, it is adaptive to think like an ecologist. Diversity is fun and interesting!



Silicon Valley in the late 1960s.  
Houses rapidly replaced farms.





California agriculture: Still a major industry in our state. Irrigated corn field a few miles west of Campus





Sicily, 1977. The Mediterranean region itself remained in a relative time warp for a long time, and parts still are very traditional. But Northern Italy's, Spain's and Portugal's economies have modernized very rapidly in the last few decades. The diversity of both plants and peoples in the Mediterranean biome warns us off any rigid geographical determinism. History and choices matter.

