



BIOLOGY

Laboratory Manual and Workbook

Fifth Edition

WAYNE P. ARMSTRONG

12

Local Field Trip to the Coastal Sage Scrub

A. INTRODUCTION

Southern California is dominated by a dense, impenetrable, shrubby vegetation known collectively as the chaparral. It is found throughout the foothills and mountains of Los Angeles, Orange, Riverside, and San Diego Counties, and extends into Baja California. The word chaparral comes from the Spanish "chaparro," meaning the scrub oak (*Quercus dumosa*). It is also called "elfin forest" because of the low, shrubby nature of the vegetation. A similar vegetation is found in various parts of the world; in southern Europe it is known as "machie"; in Australia it is called "scrub."

The chaparral is a rather distinct plant community or assemblage of plants occupying a given region. It is composed of plants which are adapted to prolonged summer drought and periodic brush fires during late summer and fall. The climate is essentially Mediterranean, with winter-wet and summer-dry seasons. Many of the shrubs have enlarged subterranean burls (stumps) which can resprout rapidly after a fire. Seeds of some species such as *Ceanothus* will not germinate unless subjected to the heat from fire. Some of the rare coniferous species, such as Tecate cypress and knobcone pine, have serotinous cones which open during the heat of a fire. Xeric leaf adaptations to reduce transpiration and thus conserve water during the prolonged drought season (May through November) include the following: reduced leaf size (microphyllous) in some species such as *Ceanothus* and buckthorn; tough, leathery leaves (sclerophyllous) composed of compact cells with few air spaces; hard, linear leaves of chamise and wild buckwheat; aromatic, resinous or glutinous leaves; leaves covered with whitish bloom or pubescence; revolute leaf margins with stomata confined to the pubescent (hairy) under-surface; multiple layers of epidermal cells with thick cuticle. Desert plants have gone one step further with the absence of leaves in cactus and certain drought deciduous species such as the ocotillo and smoke tree.

The chaparral provides the food and shelter (niches) for a variety of birds, mammals, reptiles, and invertebrates. A rather incomplete list includes the following: mule deer, coyote, bobcat, woodrat, mountain quail, scrub jay, wren-tit (voice of the chaparral), alligator lizard, horned lizard, striped racer, and western rattlesnake.

The low hillside vegetation surrounding Palomar College is more appropriately termed coastal sage scrub. This plant community occurs at lower elevations than the chaparral (generally below 2000 ft.), and is dominated by the coastal sagebrush (*Artemisia californica*). Typical chaparral species are also present, such as chamise, laurel sumac, toyon, buckthorn, and *Xylococcus bicolor*, particularly along the upper slopes near the "P." Many of the coastal sage scrub species have adaptations similar to chaparral plants, since they both occur in a Mediterranean climate. Mesophytic shrubs, such as elderberry, may be found along ravines where there is more moisture. Shady, moist sites, especially on north-facing slopes, often support mesophytes such as ferns, mosses, and flowering herbaceous species. Some of the animal inhabitants include the following: California ground squirrel (*Citellus beecheyi*), wood rat (*Neotoma fuscipes*), California mouse (*Peromyscus californicus*), short-eared pocket mouse (*Perognathus fallax*), costa hummingbird (*Calypte costae*), wren-tit (*Chamaea fasciata*), valley quail (*Lophortyx californica*), fence lizard (*Sceloporus occidentalis*), coast horned lizard

(*Phrynosoma coronatum*), striped racer (*Masticophis lateralis*), Pacific rattlesnake (*Crotalus viridis*), red diamond-back rattlesnake (*Crotalus ruber*).

Some of the common plants to see on the field trip are listed below. Be sure to take notes on their identification and adaptations because you will see some of them again in the form of a short laboratory practicum.

Native and Naturalized Plants Adjacent to Palomar College Campus: With Particular Emphasis on the Hills North and East of Campus Following the Fire of Spring, 1970. Compiled by W. P. Armstrong Spring, 1973.

Note: These areas are essentially native coastal sage scrub and are in great danger of total destruction due to encroaching urbanization.

Agavaceae

Yucca whipplei Chaparral Yucca

Amaranthaceae

Amaranthus albus Tumbling Pigweed
A. retroflexus Rough Pigweed

Amaryllidaceae

Brodiaea pulchella Wild Hyacinth

Anacardiaceae

Rhus laurina Laurel Sumac
R. integrifolia Lemonade Berry
Schinus molle Pepper Tree

Asclepiadaceae

Asclepias fascicularis Narrowleaf Milkweed

Boraginaceae

Cryptantha intermedia White Forget-Me-Not
Amsinckia intermedia Yellow Fiddleneck
Plagiobothrys californicus Popcorn Flower
Pectocarya linearis var. *ferocula* Comb-Bur
Heliotropium curassavicum var. *oculatum* Heliotrope

Cactaceae

Opuntia littoralis Coast Prickly Pear

Campanulaceae

Triodanis biflora Venus Looking-Glass

Caprifoliaceae

Sambucus mexicana (*S. coerulea*) Elderberry

Caryophyllaceae

Spergularia villosa Sand Spurrey
Stellaria media Common Chickweed
Spergula arvensis Spurrey
Silene gallica Windmill Pink
Cerastium viscosum Mouse-ear Chickweed

Chenopodiaceae

Atriplex semibaccata Australian Saltbush
Chenopodium album Lamb's Quarters
C. californicum California Pigweed
Salsola kali Russian Thistle

Cistaceae

Helianthemum scoparium var. *aldersonii* Rock Rose

Compositae

Chaetopappa aurea Golden Daisy
Gnaphalium californicum Green Everlasting

G. bicolor Everlasting
G. beneolens Everlasting
Cirsium californicum Thistle
Baeria chrysostoma ssp. *gracilis* Goldfields
Sonchus oleraceus Common Sow-thistle
S. asper Prickly Sow-thistle
Centaurea melitensis Tocalote
Silybum marianum Milk Thistle
Stylocline gnaphalioides Everlasting Nest-straw
Senecio vulgaris Common Groundsel
Matricaria matricarioides Pineapple Weed
Anthemis cotula Mayweed
Artemisia californica California or Coastal Sagebrush
Picris echioides Ox Tongue
Encelia californica Bush Sunflower
Eriophyllum confertiflorum Golden Yarrow
Haplopappus squarrosus Sawtooth Goldenbush
H. venetus ssp. *vernonioides* Isocoma
Heterotheca grandiflora Telegraph Weed
Baccharis viminea Mule Fat
B. sarothroides Chaparral Broom
B. pilularis var. *consanguinea* Coyote Brush
Conyza canadensis Horseweed
Cotula australis Australian Brass Buttons
Cotula coronopifolia Brass Buttons
Lactuca serriola Prickly Lettuce
Cichorium intybus Chicory
Holocarpha virgata Tarweed
Ambrosia psilostachya Western Ragweed
Hemizonia fasciculata Golden Tarweed

Convolvulaceae

Convolvulus aridus Morning Glory

Crassulaceae

Tillaea erecta Pigmy Weed

Cruciferae

Brassica campestris Field Mustard
B. geniculata Perennial Mustard
B. nigra Black Mustard
Streptanthus heterophyllus Jewel Flower
Lepidium lasiocarpum Peppergrass
Thelypodium lasiophyllum California Mustard
Raphanus sativus Wild Radish
Sisymbrium orientale Sisymbrium (pedicels thick)
S. irio London Rocket (pedicels filiform)

Cucurbitaceae

Marah macrocarpus Wild Cucumber

Cuscutaceae

Cuscuta californica California Dodder (parasitic on *Eriogonum*)

Cyperaceae

Cyperus eragrostis Green Sedge (wet seepage area on campus)

Ericaceae

Xylococcus bicolor Mission Manzanita

Euphorbiaceae

Euphorbia polycarpa Sand Mat
E. supina Spotted Spurge
E. peplus Petty Spurge
Eremocarpus setigerus Dove Weed

Gentianaceae

Centaurium venustum Canchalagua

Geraniaceae

Erodium cicutarium Filaree

E. moschatum Filaree

E. obtusiplicatum Long-Beaked Filaree

Geranium carolinianum Geranium (*E. Botrys*)

Gramineae

Bromus rigidus Ripgut Grass

B. rubens Foxtail Chess

B. mollis Soft Chess

B. carinatus California Brome ?

B. catharticus (*B. willdenovii*) Rescue Grass (San Marcos area)

Avena fatua Wild Oat *A. barbata* Slender Wild Oat

Melica imperfecta California Melic

Pennisetum setaceum (*P. ruppelii*) Fountain Grass

Hordeum leporinum (*H. murinum*) Common Foxtail

Poa annua Annual Bluegrass

Polypogon monspeliensis Rabbitfoot Grass

Lolium multiflorum Italian Ryegrass

Distichlis spicata Salt Grass

Sorghum halepense Johnson Grass

Cynodon dactylon Bermuda Grass

Digitaria sanguinalis Crab Grass

Hordeum vulgare Barley

Lamarchia aurea Goldentop

Stipa lepida Needlegrass

Festuca megalura Foxtail Fescue

Phalaris angusta Canary Grass

Hydrophyllaceae

Pholistoma auritum Fiesta Flower

Eriodictyon crassifolium Felt-Leaved Yerba Santa

Eucrypta chrysanthemifolia Eucrypta

Nemophila maculata Fivespot (Introduced)

N. menziesii Baby Blue-eyes (Introduced)

Phacelia cicutaria var. *hispida* Caterpillar Phacelia

P. grandiflora Large-flowered Phacelia

P. parryi Parry Phacelia

P. minor Wild Canterbury Bell

Iridaceae

Sisyrinchium bellum Blue-eyed Grass

Labiatae

Marrubium vulgare Horehound

Salvia columbariae Chia

S. apiana White Sage

S. mellifera Black Sage

Scutellaria tuberosa ssp. *australis* Skullcap

Trichostema lanceolatum Vinegar Weed

Leguminosae

Lotus scoparius Deerweed

L. strigosus Lotus

Lupinus hirsutissimus Hairy Lupine

L. truncatus Chaparral Lupine

Medicago hispida Bur Clover

Lathyrus laetiflorus ssp. *alefeldii* Wild Sweet Pea

Trifolium tridentatum var. *aciculare* Tomcat Clover

Trifolium repens White Clover

Melilotus indicus Yellow Sweet Clover

Astragalus leucopsis Southern Calif. Locoweed

Liliaceae

Chlorogalum pomeridianum Soap Plant (Bulb fibrous)

C. parviflorum Amole

- Malvaceae
Malva parviflora Cheeseweed
Malacothamnus fasciculatus Bush Mallow
Sidalcea malvaeflora Wild Hollyhock
- Myrtaceae
Eucalyptus globulus Blue Gum
- Nyctaginaceae
Mirabilis laevis Wishbone Bush
- Onagraceae
Oenothera micrantha Sun Cup or Field Sun Cup
- Oxalidaceae
Oxalis californica California Oxalis
- Paeoniaceae
Paeonia californica California Peony
- Papaveraceae
Eschscholzia californica California Poppy
Platystemon californicus Cream Cups
- Plantaginaceae
Plantago hookeriana var. *californica* California Plantain
P. lanceolata Narrow-Leaf Plantain
- Polemoniaceae
Gilia angelensis Blue Gilia
Linanthus dianthiflorus Ground Pink
Navarretia hamata Prickly Navarretia
Eriastrum filifolium Thread-leaf Eriastrum
- Polygonaceae
Pterostegia drymarioides California Threadstem
Eriogonum fasciculatum Wild Buckwheat *Rumex crispus* Curly Dock
- Polypodiaceae
Polypodium californicum Polypody Fern
- Portulacaceae
Calandrinia ciliata var. *menziesii* Red Maids
Montia perfoliata Miner's Lettuce
- Primulaceae
Dodecatheon clevelandii Shooting Star
Anagallis arvensis Pimpernel
Anagallis linifolia var. *monellii* Blue Pimpernel
- Pteridaceae
Pityrogramma triangularis Goldenback Fern
Pellaea mucronata Bird's-foot Fern
Adiantum jordanii California Maidenhair Fern
Cheilanthes newberryi Cotton Fern
- Ranunculaceae
Clematis sp. (*C. pauciflora*) Southern California Clematis
- Rhamnaceae
Rhamnus crocea Buckthorn
- Rosaceae
Heteromeles arbutifolia Toyon
Adenostoma fasciculatum Chamise
- Rubiaceae
Galium aparine Bedstraw
G. nuttallii Climbing Bedstraw
- Salicaceae
Salix lasiolepis Arroyo Willow
- Scrophulariaceae
Mimulus puniceus Red Bush Monkeyflower
M. brevipes Yellow Hillside Monkeyflower
Linaria canadensis var. *texana* Toadflax
Orthocarpus purpurascens Owl's Clover
Castilleja affinis Indian Paintbrush
Antirrhinum nuttallianum Nuttall Snapdragon
Scrophularia californica Figwort

- Solanaceae
Solanum douglasii Nightshade
S. parishii Purple Nightshade
S. elaeagnifolium Silverleaf Nettle (along r.r. track)
Nicotiana glauca Tree Tobacco
Datura meteloides Jimson Weed
- Typhaceae
Typha latifolia Cattail
- Umbelliferae
Sanicula arguta Snakeroot
S. crassicaulis Yellow-flowered Snakeroot
Apiastrum angustifolium Wild Celery
Foeniculum vulgare Sweet Fennel (leaf stalks edible)
- Urticaceae
Parietaria floridana Pellitory
- Verbenaceae
Verbena lasiostachys Verbena
Lippia nodiflora Matgrass (planted on campus)
- Violaceae
Viola pedunculata Johnny-Jump-Up

Also during wet months abundant mosses and liverworts of the genus *Conocephalum*.

Note: Nomenclature used in this checklist follows *A California Flora* by P. A. Munz.
 Many of the species are on file in the Palomar College herbarium.

REFERENCES

- Brown, V. 1957. The California wildlife region. Naturegraph Co., Healdsburg, Calif. 125 p.
- DeLisle, H. F. 1963. Wildlife of the southern California mountains. Naturegraph Co., Healdsburg, Calif. 94 p.
- Jaeger, E. C., and A. C. Smith. 1966. Introduction to the natural history of southern California. University of California Press, Berkeley. 104 p.
- Munz, P. A. 1959. A California flora. University of California Press, Berkeley. 1681 p.
- Munz, P. A. 1961. California spring wildflowers. University of California Press, Berkeley. 122 p.

The Appendix contains a list of ways in which native Indians and early settlers used wild plants found in the area of Palomar College (see p. 233).



Rhus diversiloba
Poison Oak
(*Toxicodendron diversilobum*)



Rhus laurina
Laurel Sumac



Mimulus puniceus
Red Bush Monkey-flower



Rhus integrifolia
Lemonade Berry



Salvia mellifera
Black Sage



Salvia apiana
White Sage

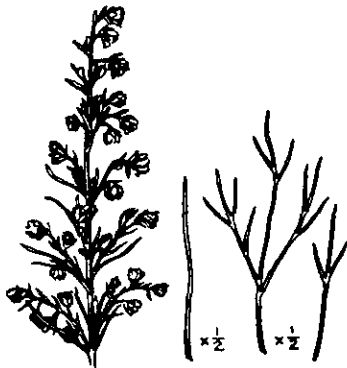
Figure 12-1



Marah macrocarpus
Wild Cucumber



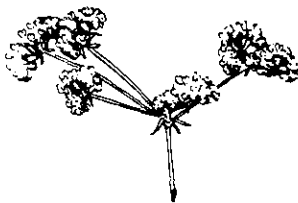
Heteromeles arbutifolia
Toyon or Christmas Berry



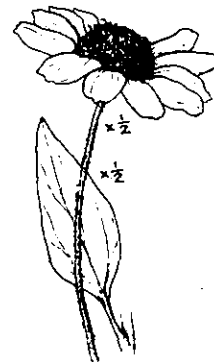
Artemisia californica
Coastal Sagebrush



Chlorogalum pomeridianum
Soap Plant



Eriogonum fasciculatum
Wild Buckwheat



Encelia californica
Bush Sunflower

Figure 12-2

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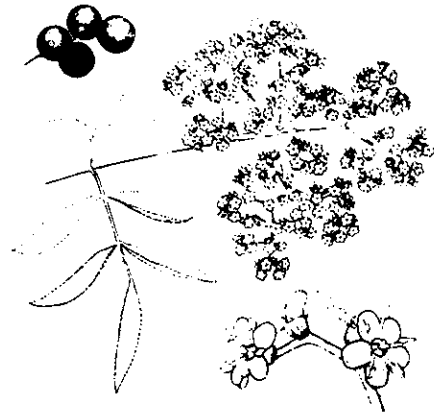
Eriophyllum confertiflorum
Golden Yarrow



Rhamnus crocea
Buckthorn or Redberry



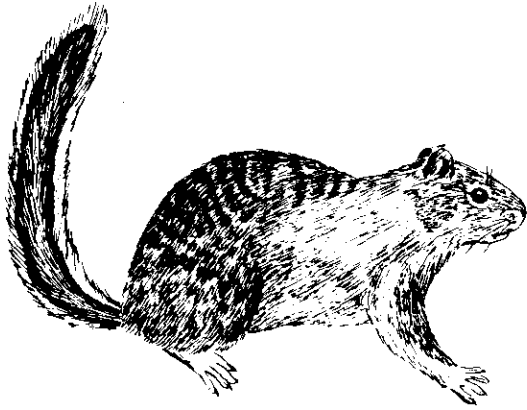
Xylococcus bicolor
Mission Manzanita



Sambucus coerulea
Blue Elderberry

Figure 12-3

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Citellus beecheyi
California Ground Squirrel
14-20" Mottled gray and brown with
bushy tail.



Neotoma fuscipes
Wood Rat (Pack or Trade Rat)
also *N. lepida*
Builds piled stick houses under shrubs
such as toyon.

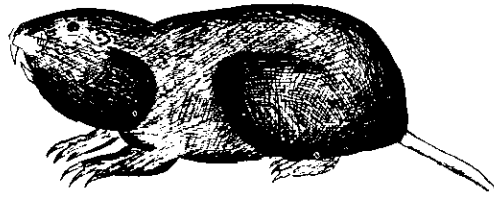


Perognathus californicus
California Pocket Mouse
Cheek pouches similar to gopher.

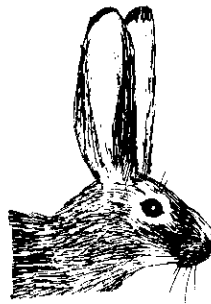


Peromyscus californicus
California Mouse
Conspicuous ears.

Thomomys bottae
Pocket Gopher
Shovel-like front feet
and external cheek pouches.

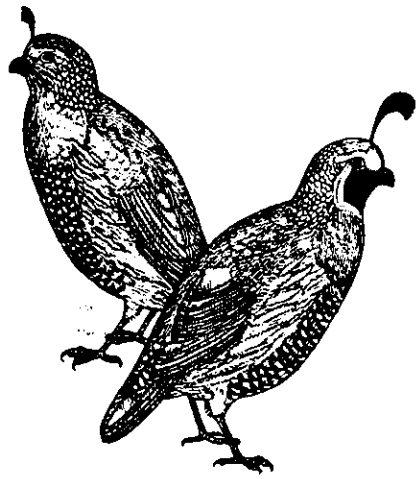


Sylvilagus bachmanii
Brush Rabbit
also *S. audubonii*
Cottontail

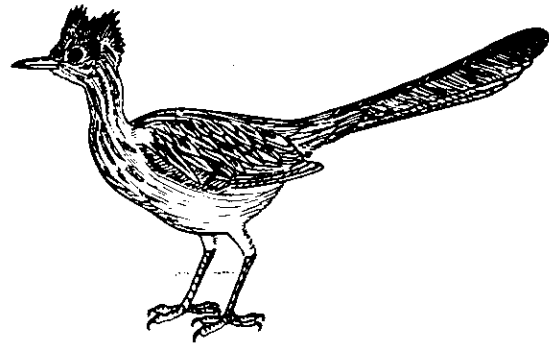


Lepus californicus
Jackrabbit
Black tail and long ears.

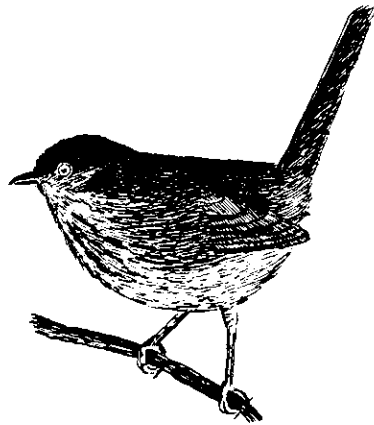
Figure 12-4



Lophortyx californica
California Valley Quail



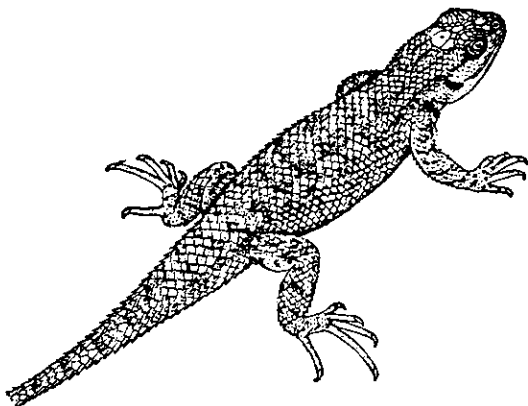
Geococyx californianus
Roadrunner



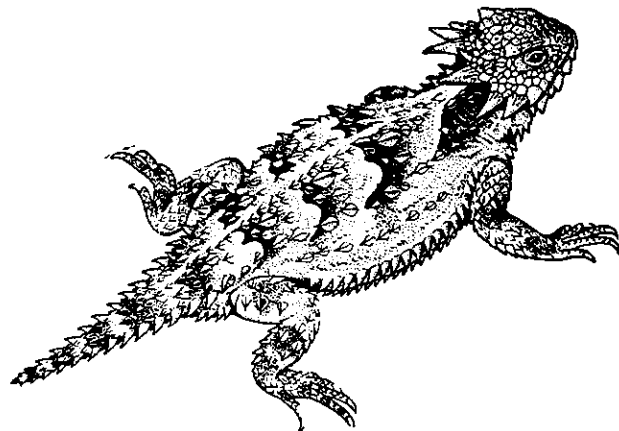
Chamaea fasciata
Wren-Tit
(voice of the Chaparral)



Speotyto cunicularia
Burrowing Owl

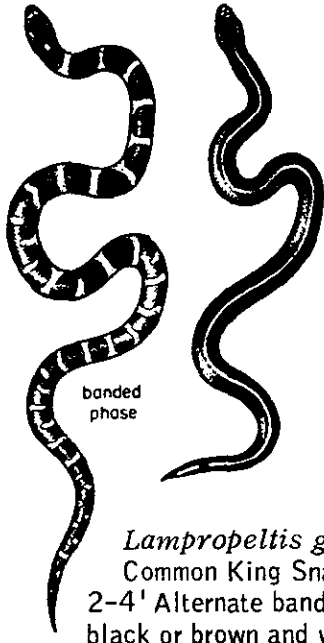


Sceloporus occidentalis
Western Fence Lizard



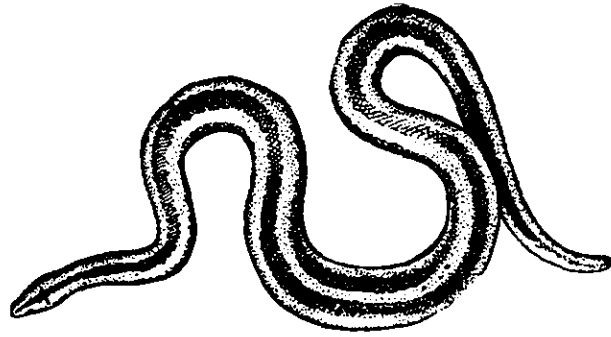
Phrynosoma coronatum
Coast Horned Lizard

Figure 12-5

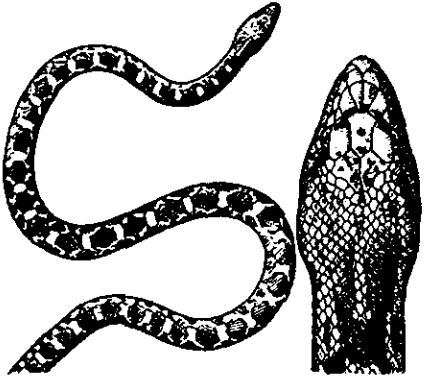


banded phase

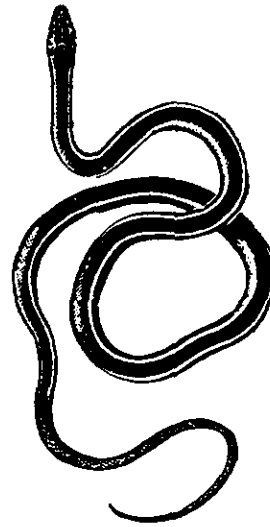
Lampropeltis getulus
Common King Snake
2-4' Alternate bands of black or brown and white.



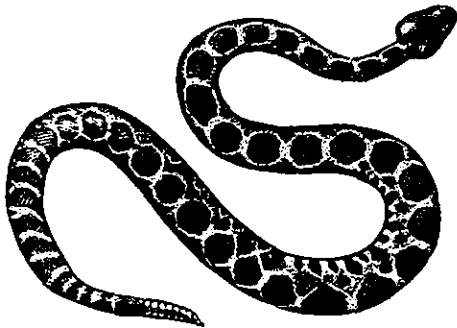
Lichamur roseofusca
California Boa
2-3' Three reddish-brown stripes on bluish back.



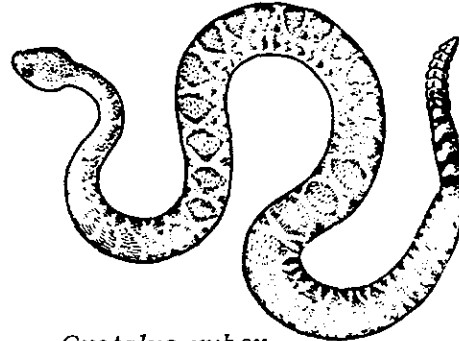
Pituophis catenifer
Gopher Snake
3-8' Dark brown or blackish blotches on yellowish-brown body.



Masticophis lateralis
Striped Whipsnake (Racer)
2-4' Grayish-black with light yellow stripe on each side.



Crotalus viridis
Western or Pacific Rattlesnake
2-5' Dark gray with longitudinal series of dark brown or black rectangular blotches.



Crotalus ruber
Red Diamond-Back Rattlesnake
2-6' Pink or reddish-brown with darker diamond markings; black and white rings on tail.

Figure 12-6

SOIL LICHENS:

1. Cladonia chlorophaea [Gray-green lichen with podetia](#)
2. Diploschistes scruposus [Grayish white lichen](#)

BARK LICHENS:

3. Candelaria concolor [Lemon-yellow lichen on shrubs](#)
4. Flavoparmelia caperata [Gray foliose lichen on shrubs](#)
5. Flavopunctelia flaventior Greenish foliose lichen

ROCK LICHENS

6. Acarospora bullata [Brown rock lichen](#)
7. Acarospora socialis (A. schleicheri) [Yellow rock lichen](#)
8. Buellia pullata [See Identification of Buellia pullata](#)
9. Caloplaca bolacina [Orange rock lichen](#)
10. Dimelaena radiata [Gray rock lichen](#)
11. Verrucaria nigrescens [Pyrenocarpous black rock lichen](#)
12. Xanthoparmelia cumberlandia [Foliose rock lichen](#)
13. Xanthoparmelia mexicana [Foliose rock lichen](#)

THE UNUSUAL BIRD'S NEST FUNGUS



FUNGI

14. Calvatea gigantea [Giant Puffball](#)
15. Cyathus olla [Bird's Nest Fungus](#)
16. Geastrum sp. [Earth Star](#)
17. Lysurus cruciatus [Lizard's Claw Stinkhorn](#)
18. Tulostoma brumale "group" (cf. T. berteroanum) [Stalked Puffball](#)

[Wayne's Word Lichen Links](#)

[Wayne's Word Fungus Links](#)

[Unusual Bird's Nest Fungus](#)

Wayne's Word Internet Links

1. Wayne's Word Home Page:

<http://waynesword.palomar.edu/>

2. Coastal Sage Scrub:

<http://waynesword.palomar.edu/labman12.pdf>

3. Arboretum Plant List:

<http://waynesword.palomar.edu/pcarbor1.htm>

4. Arboretum Plant List:

<http://waynesword.palomar.edu/arblast1.pdf>

5. Botany 100 Plant List:

<http://waynesword.palomar.edu/armaplst.htm>

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