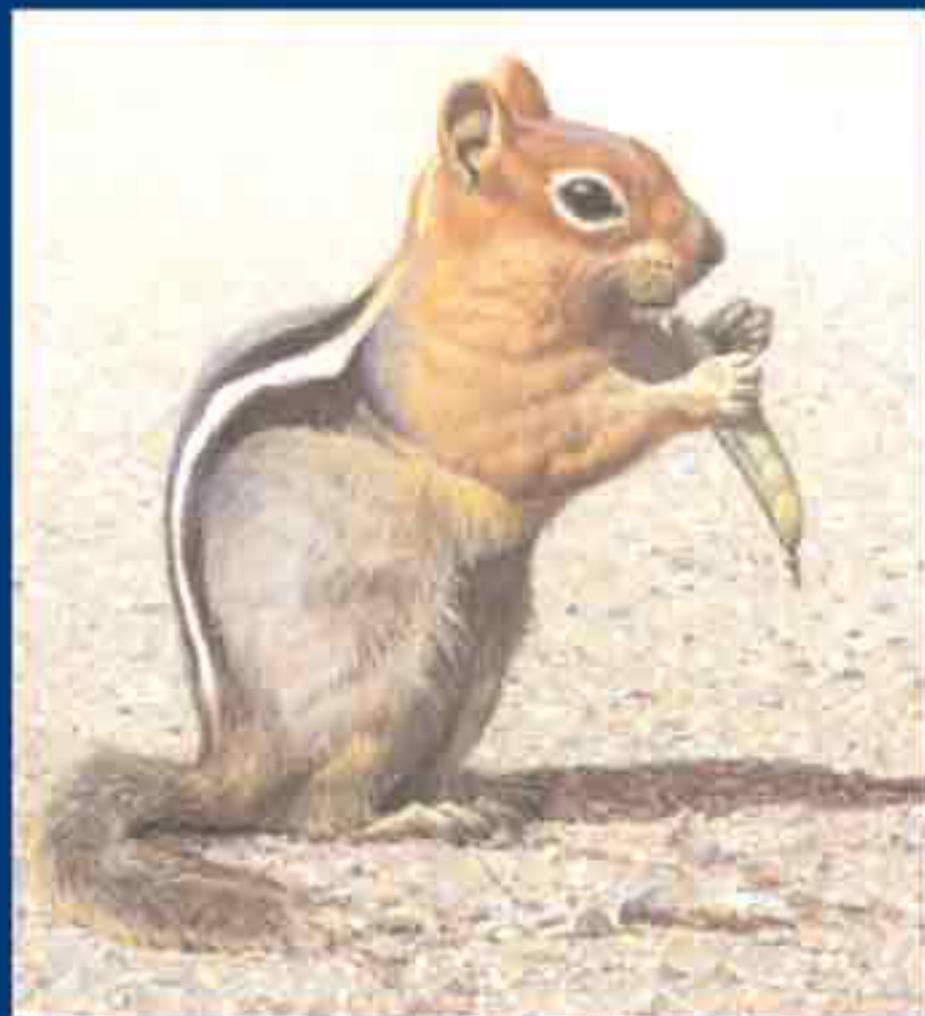


CALIFORNIA NATURAL HISTORY GUIDES

MAMMALS OF CALIFORNIA

E. W. JAMESON, JR., and HANS J. PEETERS



SPECIES ACCOUNTS



CARNIVORA

Two major groups of meat-eating mammals have existed: the Creodonta and the Carnivora. Members of the Carnivora are conventionally referred to as “carnivorans” to separate them from the creodonts, which died out in the Miocene. Most carnivorans are clearly modified for a diet of meat and the capture of living prey. They feed mostly on birds and on other mammals, but some, such as the pinnipeds, feed largely on fish and marine invertebrates. Bears and raccoons are generalists, eating fruits when available. Carnivoran dentition is distinctive; the incisors are rather small and used for grooming and pulling, whereas the canines are conical and long, suitable for holding and tearing meat (fig. 4). The molars are variously shaped and often serve to shear or crush bones. The cheek teeth are sometimes modified for cutting flesh; the inner side of the fourth upper premolar and the outer side of the first lower molar fit tightly together and slide past each other like the blades of scissors. These two teeth are referred to as carnassials and are characteristic of those carnivorans that are primarily flesh eaters, such as cats. Like meat eaters in general, carnivorans have a rather short, simple gastrointestinal tract.

The first Carnivora may have arisen from the miacoids, carnivorans that existed from the Late Cretaceous to the early Paleocene. Carnivorans first appeared in the Paleocene but did not begin to diverge until the late Eocene and early Oligocene. The earliest carnivorans existed together with the creodonts, which survived to the Oligocene in North America. The carnivorans replaced the creodonts in the Oligocene, but there is no evidence to support a close relationship between the two orders.

The earliest relatives of dogs (Canidae) diversified into running types in North America, where they were the dominant carnivorans for the first part of the Cenozoic. Bears (Ursidae) are derived from an ancient group, the Arctoids, and underwent evolutionary changes in Europe. The family Ursidae first appeared in North America in the late Miocene. Early ursids did not resemble modern bears, for they walked on their toes (digitigrade) and were adapted for running (cursorial). The modern bears with which we are familiar date from the Oligocene and en-

tered North America in the Pliocene. Procyonids, which include the Ringtail (*Bassariscus astutus*) and Raccoon (*Procyon lotor*) evolved in North America. The weasels and their friends (Mustelidae) are probably a loosely related assemblage, for skunks and otters are not really close to weasels (*Mustela* spp.) and martens (*Martes* spp.). Presumably they radiated in Asia, where fossils date from the early Oligocene, and entered North America in the early Miocene.

Major groups of carnivorans are classified on the basis of the structure of the foot. Bears and Raccoons, for example, walk on the palms or plantar surface of the feet (plantigrade). In contrast, dogs and cats are digitigrade. Weasels are intermediate, with some species plantigrade and others digitigrade. Seals (Phocidae), sea lions (Otariidae), and walruses (*Odobenus*) are appropriately designated pinnipeds—literally, "fin feet." Although they differ in some features, they constitute a natural group. Legs and body shape are correlated with habits: martens, with retractile claws, are climbers; plantigrades, such as bears, are mostly terrestrial; pinnipeds, with flippers, are swimmers and awkward on land.

Most carnivorans other than dogs tend to be solitary except during the mating season.

Dogs, Foxes, and Allies (Canidae)

Dogs and their relatives (wolves, foxes, and the like) are somewhat generalized carnivorans that are adapted for running. Light bodied, with rather slender legs, they are digitigrade and have nonretractile claws. The long tail is frequently bushy. The grooved baculum, or penis bone, characterizes the family. The skull is rather long, with an elongate snout and strong zygomatic arches. The eyes are rather large, lateral in position but directed forward somewhat, and vision is binocular. The bullae are rounded and somewhat inflated, and the ears are erect. The dental formula of California species is 3/3, 1/1, 4/4, and 2/3. The molars are formed for both shearing and crushing bones, indicating a dietary position somewhat between cats and bears (figs. 37–39).

Numerous genera of canids exist today, with the greatest diversity in South America and Africa. Canids first appeared in North America in the middle Eocene, in the absence of the bear-

like arctoids, and invaded Asia in the early Pliocene. There was a great diversity of canids in North America from the late Eocene until the late Miocene. The arid climate of the early Miocene favored an increase of grasslands and diversification of herbivores, such as horses (*Equus* spp.) and the Pronghorns (*Antilocapra americana*), which perhaps accounted for the differentiation of canids into doglike predators specialized for running. With the development of grasslands, the woodlands became restricted.

Dogs and their allies are rather sociable, forming semipermanent groups, and pairing (monogamy) is typical of many species. Both parents tend to care for the growing young, with the male commonly providing food when the pups are small. Even when the young mature, there is a strong bond in a dog family, which sometimes continues as a hunting group. Young of the previous year may help care for their growing siblings.

COYOTE

Canis latrans

Pl. 4, Fig. 37

DESCRIPTION: A medium-sized, rangy, doglike carnivoran, approximately the shape of a German shepherd. It is gray, sandy, or brown in color. Most Coyotes weigh from 8 to 20 kg. Some extremely large individuals, weighing from 25 to 33 kg, could be mistaken for Wolves (*C. lupus*). TL 1.0–1.3 m, T 300–400 mm. (See fig. 37.)

DISTRIBUTION: Found throughout the western states, typically in open country. The Coyote can occur almost anywhere, even in parts of Los Angeles. It is common in the sagebrush plains of the Great Basin. Though it is most frequently seen west of the Mississippi River, in the last 40 years—perhaps because of the disappearance of the Wolf—it has spread to many regions to the east, even reaching the Atlantic coast in some areas. Its range extends from Alaska and central Canada south to Panama.

FOOD: The Coyote preys extensively on jackrabbits (*Lepus* spp.), cottontails (*Sylvilagus* spp.), and ground squirrels (*Spermophilus* and *Ammospermophilus* spp.), supplementing this fare with small mice, fruits, berries, insects, carrion, and domestic sheep.

REPRODUCTION: Mating takes place in February in California; from five to 10 pups are born some two months later. Both parents remain with the young until fall. You may encounter pairs or even groups of three or five animals, perhaps comprising parents

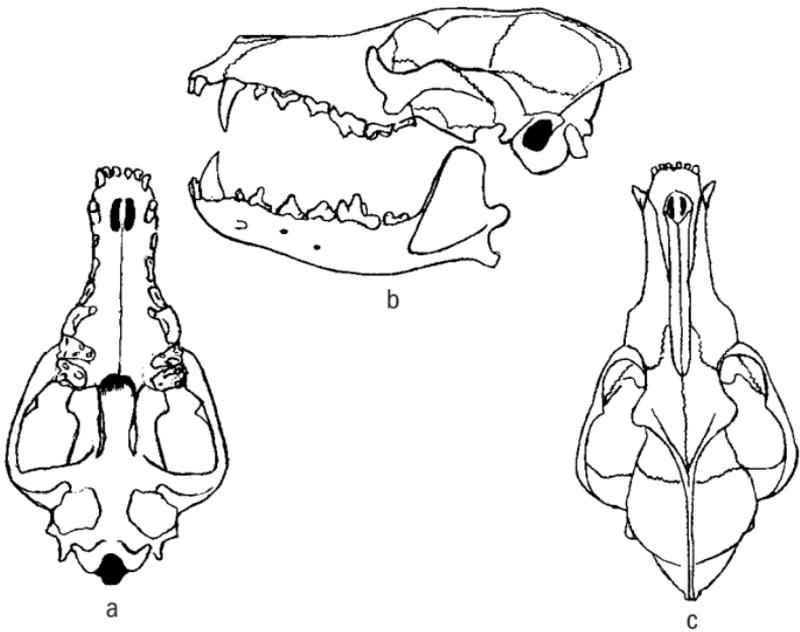


Figure 37. Skull of the Coyote (*Canis latrans*): (a) ventral view; (b) lateral view; (c) dorsal view.

and grown young. Family groups tend to disperse in early winter, however, when food becomes scarce.

COMMENTS: Some montane populations tend to move downhill in autumn.

Coyotes are sometimes seen mousing, stalking and pouncing on mice, often quite oblivious to human observers. They are also seen on occasion accompanying foraging Badgers (*Taxidea taxus*), capturing rodents dislodged by the digging of these predators.

Versatility is the key to the Coyote's success. Its major conflict with human society stems from the penchant some individuals develop for domestic stock, especially sheep. Once such a habit is formed, it is not lost, and such individuals do economic damage. However, the Coyote is very prolific and has sustained its numbers in the face of many decades of persistent hunting and poisoning.

This species has been known to mate with domestic dogs; the hybrid, called a coydog, is sometimes found in the wild.

GRAY FOX***Urocyon cinereoargenteus***

Pl. 3, Fig. 38

DESCRIPTION: A silvery gray fox with conspicuous patches of yellow, russet, brown, or white on the throat and belly and a black-tipped tail, with a middorsal crest of stiff black hairs, which is not present on other foxes (except the Island Fox [*U. littoralis*]). The Gray Fox has rather short legs, perhaps an adaptation for climbing trees. The skull has two distinct sagittal crests, parallel ridges that end in a lyre-shaped flare posteriorly (see fig. 38b, c). TL .8–1.1 m, T 275–443 mm, HF 100–150 mm. Weight: 3–5 kg, occasionally to 7 kg.

DISTRIBUTION: By far the most common and widespread fox in the Pacific states, the Gray Fox survives well in cultivated land, chaparral, and forested areas. It ranges through most of the United States, except the Rocky Mountains, and south through most of South America.

FOOD: This fox eats small rodents, birds, and berries, as well as insects and fungi. Its climbing ability allows it to obtain a greater variety of foods than other foxes.

REPRODUCTION: Mating in late winter is followed by birth of three to five young in April or May. Larger litters may represent combined broods of two females that have denned together. This fox sometimes dens under farm outbuildings or even under suburban homes. The male remains with the female while the young are dependent.

COMMENTS: This is a very beautiful fox that has a rather good quality fur. Because of its abundance and wide distribution, it is

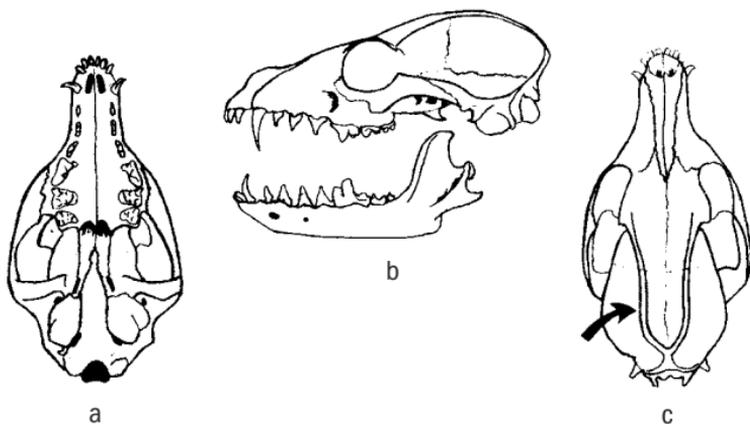


Figure 38. Skull of the Gray Fox (*Urocyon cinereoargenteus*): (a) ventral view; (b) lateral view; (c) dorsal view (arrow to sagittal crest).

an important predator. Like others in the dog family, it is playful at times. One was observed tossing a dried cow pie into the air, chasing after it, and flinging it up again, whether by mouth or paw was not clear.

ISLAND FOX

Urocyon littoralis

DESCRIPTION: A diminutive replica of the Gray Fox (*U. cinereoargenteus*), which it closely resembles in every way but size. TL 590–780 mm, T 110–290 mm, HF 98–157 mm. Weight: 2.0–2.2 kg.

DISTRIBUTION: Found on six of the Channel Islands, where it has been generally abundant but has recently declined.

FOOD: This fox is omnivorous, taking more plant and insect food than does the Gray Fox (*U. cinereoargenteus*). It feeds extensively on berries such as manzanita, toyon, saltbush, prickly pear, and ice plant, and also eats mice.

REPRODUCTION: Mating takes place in February and March; a litter, usually of two kits, is born in late April or May. The Island Fox dens in holes or hollow trees. Both parents care for the young, and the family forages as a group.

STATUS: This species is listed by the state as threatened. Four subspecies (the San Miguel Island Fox [*U. l. littoralis*]; the Santa Rosa Island Fox [*U. l. santarosae*]; the Santa Cruz Island Fox [*U. l. santacruzae*]; and the Santa Catalina Island Fox [*U. l. catalinae*]) have been proposed for federal listing as endangered.

COMMENTS: Although presumably nocturnal, the Island Fox is frequently seen in the daytime.

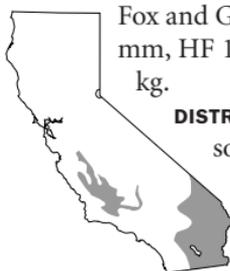
This little fox does not conflict with human activity and apparently does not suffer much from the presence of humans. Its main competitor is the domestic house cat (*Felis sylvestris*). Golden Eagles, which only recently arrived on three of the northern islands of this fox's habitat, prey on it and are being removed.

KIT FOX

Vulpes macrotis

Pl. 3

DESCRIPTION: A small gray fox with exceptionally large ears. Its color is rather uniform except for a black tip to the tail. Of the similar species, the Red Fox (*Vulpes vulpes*) is appreciably larger, has smaller ears, and is reddish with a white-tipped tail, whereas the Gray Fox has much shorter legs and is usually a mixture of red and gray. The Kit Fox skull also lacks the sagittal crests of the Red



Fox and Gray Fox skulls. TL 730–840 mm, T 260–325 mm, HF 113–137 mm, E 78–94 mm. Weight: 1.7–2.5 kg.

DISTRIBUTION: Found in open, arid regions of the southern part of the Great Basin and the interior valleys of California and southeastern Oregon. One or more relict populations persist in Contra Costa County, California. The range of this species extends

from southeastern Oregon east to west Texas and New Mexico and south to central Mexico, including Baja California.

FOOD: This fox eats various small rodents, especially kangaroo rats, as well as mice and small squirrels, lizards, insects, and berries of wild shrubs. Brush Rabbits (*Sylvilagus bachmani*) sometimes form an important part of its diet.

REPRODUCTION: Mating takes place in winter; three to five young are born in February or March. The female spends much of her time in the den when the young are small. Some family groups consist of one male with two females and their offspring. The young disperse in fall.

STATUS: The San Joaquin Kit Fox (*V. m. mutica*) is federally listed as endangered and listed by the state as threatened.

COMMENTS: The Kit Fox's range has narrowed greatly in recent years. This delicate little fox does not conflict with human activities, but it has declined with the expansion of agriculture and intensification of predator control. Intensive agricultural use of much of the San Joaquin Valley renders the habitat unsuitable for it. Moreover, the Kit Fox picks up poisoned baits left out for Coyotes. It is believed to increase in areas where the Coyote is reduced in numbers.

The use of the specific name *macrotis* is a matter of controversy; some authorities use *velox*. We have followed Wilson and Reeder (1993).

RED FOX

Vulpes vulpes

Pl. 3, Fig. 39

DESCRIPTION: A rather bright reddish or yellowish fox with much black on the legs and feet and a white tip to the tail. Color variations include an all black or melanistic silver fox and a brown



and gray cross fox, but all of these are nevertheless Red Foxes. The skull is distinctive in having sagittal crests that come to a point posteriorly (see fig. 39c), in contrast to the lyre-shaped sagittal crests of the Gray Fox (see fig. 38c). TL .88–1.0 m, T 340–390 mm, HF 140–165 mm. Weight: 5–8 kg.

DISTRIBUTION: Found in two widely separated parts of California. One population lives at the higher elevations (1,500 m and above) of the Sierra Nevada, north through the Cascade Range into British Columbia. The other lives in coastal regions from the northern Sacramento Valley south to the Los Angeles area. This species is found throughout North America and also Eurasia and northern Africa.

FOOD: Small rodents, birds, berries, and insects form the bulk of the Red Fox's diet. It can capture birds up to the size of a Pheasant (*Phasianus colchicus*) or Mallard (*Anas platyrhynchos*). In recent years the Red Fox has invaded salt marshes around San Francisco Bay, where it preys on the Clapper Rail (*Rallus longirostris*).

REPRODUCTION: Little is known of the breeding of the Red Fox in the Pacific states. A litter of five to 10 kits is born in early spring. As in other members of the dog family, the male helps the female provide food for the young.

STATUS: The Sierra Nevada Red Fox (*V. v. necator*) is listed by the state as threatened.

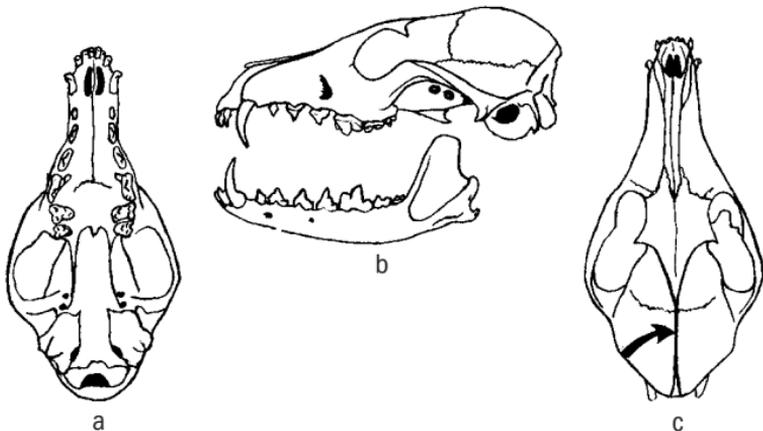


Figure 39. Skull of the Red Fox (*Vulpes vulpes*): (a) ventral view; (b) lateral view; (c) dorsal view (arrow to sagittal crest).

COMMENTS: The Sierra Nevada population is native to California. The coastal population stems from a population of the eastern Red Fox introduced into the lowlands of the state in the nineteenth century, presumably by release or escape from fur farms, and its members most closely resemble Red Foxes from the northern Central Plains states.

GRAY WOLF
Canis lupus

Fig. 40

DESCRIPTION: A very large dog, with the general aspect of a Coyote (*C. latrans*) or a German shepherd. It is usually gray with varying amounts of black on the back, but it is sometimes white or all black. The face is often sharply bicolored, with whitish lower cheeks contrasting with dark fur surrounding the eyes and covering the forehead. The legs are long, and the chest is deep. The auditory bullae are well rounded and rather smooth, in contrast to domestic dogs, in which the bullae are relatively flat and rugose (wrinkled). The canines are well developed. Weight: 30–75 kg (adult males).

DISTRIBUTION: Once inhabited the eastern margin of California, west to Sacramento. The Gray Wolf is characteristically a forest- and plains-dweller, avoiding deserts. Its range extends throughout the Northern Hemisphere, including North America from the Arctic to central Mexico. In the contiguous states, it is now known in Minnesota, Montana, Idaho, Wyoming, Washington, Oregon, Utah, and Nevada.

FOOD: The Gray Wolf is primarily a predator of hoofed mammals, such as sheep, deer (*Cervidae*), and Caribou (*Rangifer tarandus*); it is known to kill young bison and moose. In addition, it takes many Beavers (*Castor canadensis*) and other rodents, as well as rabbits (*Lepus* spp.).

REPRODUCTION: Mating takes place in middle or late winter. After a gestation of about two months, from five to nine pups are born in a den, either in a hole in the ground or among rocks. Both parents, and sometimes young of the previous year, provide food for the pups. The den is clean, for the mother eats the scats of her young until weaning. In fall, family groups remain as a unit, and several families hunt together until mating. Young are sexually mature at two to three years.

STATUS: This species is federally listed as endangered in most of the contiguous states.

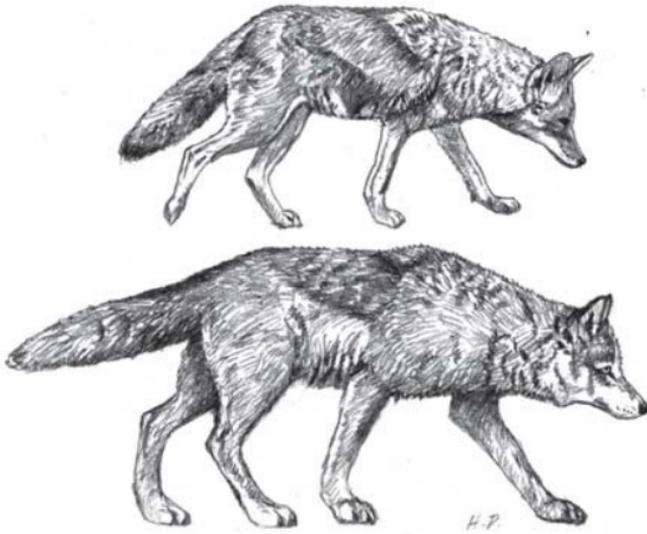


Figure 40. Differences between Coyote and Gray Wolf. Coyote (top): medium size, slender snout, large ears, face fox-like, small feet, tail usually carried low when running. Wolf (bottom): Large size, heavy snout, medium ears, face dog-like, large feet, tail usually carried high when running.

COMMENTS: The wolf has long had a reputation as a formidable predator and for centuries has been feared in North America and Eurasia. In early United States history, the Gray Wolf preyed on livestock, which led to persistent trapping and poisoning that eliminated the species from almost all of its original range in the contiguous states. Large-scale poisoning of wolves in the early twentieth century, under the auspices of state and federal agencies, also resulted in the loss of hundreds of thousands of individuals of nontarget species, including, but not limited to, Black-footed Ferrets (*Mustela nigripes*), skunks, and other innocuous mammals.

In 1995 a small population of Gray Wolves was introduced into Yellowstone National Park, and releases in other states followed. The populations are gradually spreading, resulting in the return of wolves to the western states, where they had been extirpated. Last known in California in 1924, the Gray Wolf is expected to return to our state in the near future.

Many people would welcome the reappearance of the Gray Wolf in California. Although ranchers have reason to be concerned for their livestock, in other states stockmen are reimbursed for losses due to wolf predation with funds provided by conservation groups and governments.

In *The Wolves of North America*, Stanley Young and Edward Goldman (1944) reviewed the encounters of wolves and humans in North America. Although these accounts and similar ones from Eurasia are anecdotal and may be sensationalized, there can be no doubt that, at times, wolves will attack, kill, and eat humans. Reports from India also attest to this (Prater 1971). Nevertheless, with a population of more than 200 wolves and thousands of hikers in the greater Yellowstone area, no attacks have been reported as of 2002, and biologists studying this species have remarked on its fear of humans.

Long-term studies have shown that wolf predation removes chiefly ill, old, and very young animals, thus improving the health and preventing excessive growth of the prey population. Because it hunts in family groups or larger aggregations, a wolf is able to capture animals many times its size. Wolves are intolerant of Coyotes and suppress that species where their ranges overlap.

Bears (Ursidae)

Bears are large, heavy bodied, almost tail-less carnivorans. They have stout limbs and heavy, blunt, nonretractable claws, and they are plantigrade. Reflecting their omnivorous diet, bears' molars are flat crowned—shaped for crushing, like those of swine and humans, not for cutting, like those of cats (fig. 42). Dentition 3/3, 1/1, 4/4, and 2/3.

Most of the evolutionary history of bears took place in the Old World, starting in the Miocene. The genus *Ursus* dates from the Pliocene in North America and Eurasia.

Three species of bears are found in North America. The Polar Bear (*Ursus maritimus*) is an arctic species, and the Grizzly Bear, or Brown Bear, (*U. arctos*) no longer exists in the three coastal states (see the section "Mammals and California Society"). The Black Bear (*U. americanus*), however, is common in many parts.

BLACK BEAR

Ursus americanus

Pl. 4, Figs. 41, 42

DESCRIPTION: A large, stout bear with coarse black, brown, or cinnamon fur, a white or pale patch on the throat or belly, and a minute tail. It sometimes weighs more than 190 kg, but this is unusual. Its claws are about the same length on the forefeet and hind



Figure 41. Black Bear (*Ursus americanus*).



feet; in comparison, the Grizzly Bear (*U. arctos*) has much longer claws on the forefeet. (See fig. 42.)

DISTRIBUTION: Found in most forested regions; in the Cascade Range and Sierra Nevada it occurs from the upper edge of the forested elevations down to about 1,000 m or less. In the northwest coastal forests (Marin County and Yolo County) it may occur at sea level and even venture out on the beaches. The

Black Bear has moved into regions formerly occupied by the Grizzly Bear, especially in southwestern California, including the Tehachapi Mountains and southern coastal regions. Its range extends from the Canadian coniferous forests to Mexico.

FOOD: The Black Bear is a true omnivore, finding nutrition in almost any organic food. It is fond of berries, nuts, and other vegetable foods, and in fall it often subsists on manzanita berries and acorns. Like other forest dwellers, it is also fond of underground fungi, or truffles. Most of its animal food consists of insects, espe-

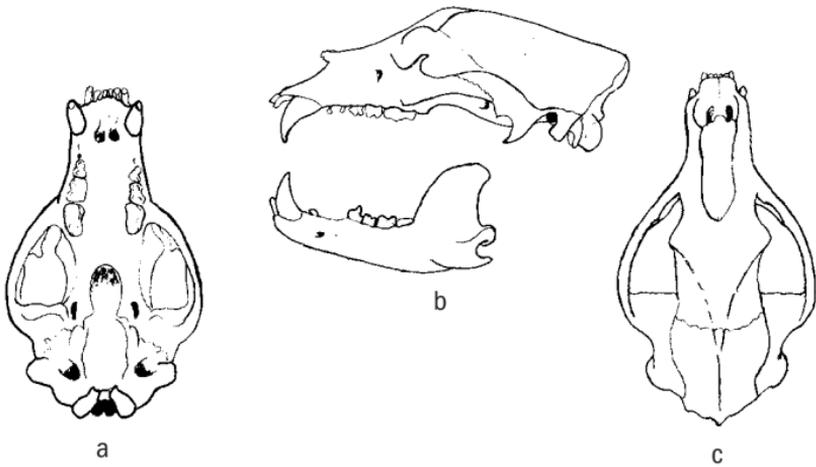
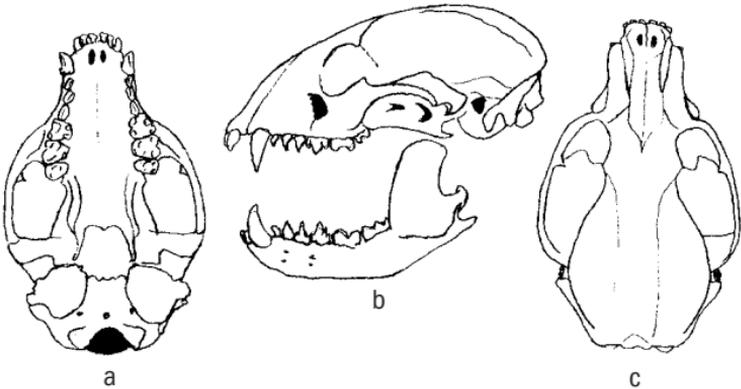


Figure 42. Skull of the Black Bear (*Ursus americanus*): (a) ventral view; (b) lateral view; (c) dorsal view.

cially ant larvae and beetle larvae, but it also eats mice, ground squirrels, and occasionally a ground-nesting bird.

REPRODUCTION: Mating takes place in summer, and implantation is delayed for several months. One or two small young are born in midwinter, when the female has retreated for a winter rest. The cubs nurse and grow during the winter, while the mother remains semitorpid, with reduced heart and breathing rates. Her fat stores, accumulated during the previous summer and fall, contribute to the manufacture of milk, which is the sole nourishment of the rapidly growing young until springtime, when they emerge from their winter home. This species breeds only every other year. Apparently this schedule is necessary because of the tremendous drain on the female's stored energy during her extended period of fasting.

COMMENTS: Adult male bears are known to kill younger bears. The removal of adult males, as by hunting, probably does not reduce bear populations by more than the number killed. The Black Bear frequently forages in garbage dumps in mountain communities and is a pest in some montane parks. It may invade apple orchards in fall and also cause great damage to beehives. Despite their bulk and short limbs, Black Bears climb well.



Figures 43 a-c. Skull of the Raccoon (*Procyon lotor*): (a) ventral view; (b) lateral view; (c) dorsal view.

Raccoons and Ringtails (Procyonidae)

Modern procyonids are diverse morphologically and ecologically, but they have certain common characteristics, including similar inner structures of the ear and a bilobed baculum. The Raccoon (*Procyon lotor*) and Ringtail (*Bassariscus astutus*), together with their Central American relatives, the Coati (*Nasua narica*) and Kinkajou (*Potos flavus*), are related to bears and pandas. Coatis occur as far north as Arizona and New Mexico and are getting close to California. Procyonids are plantigrade, walking on the bare or partly furred soles of the feet. Raccoons, like bears, have low-crowned, tuberculate molars shaped for crushing, whereas Ringtails, like cats, have teeth formed for shearing (fig. 43). Dentition in California species 3/3, 1/1, 4/4, and 2/2 or 2/3.

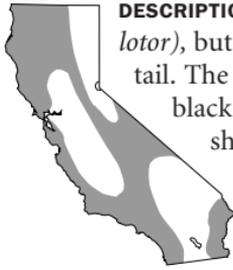
The Procyonidae date from the early Eocene in North America and are known from Oligocene fossil beds in Europe.



Figure 43d. Skull of the Ringtail (*Bassariscus astutus*): lateral view.

RINGTAIL***Bassariscus astutus***

Pl. 5, Figs. 43, 44



DESCRIPTION: Somewhat like a small Raccoon (*Procyon lotor*), but with a slender build and an extremely long tail. The huge, dark eyes of the Ringtail replace the black facial mask of the Raccoon, but the relationship is still obvious. The soles are mostly or partly furred; the claws are partly retractable. TL 620–800 mm, T 315–504 mm, HF 55–75 mm, E 45–50 mm. Weight: .9–1.2 kg. Dentition: 3/3, 1/1, 4/4, 2/2.

DISTRIBUTION: Found in brushy and wooded areas, generally at lower and middle elevations. The Ringtail is especially common in foothill canyons and in some areas of the Sacramento Valley north to southern Oregon. It is less common in the high mountains but is known to live up to 2,600 m. A population is found in the Sutter Buttes. The Ringtail, like the Raccoon, seems to prefer to live along watercourses. Its range extends from Oregon and Colorado south into Central America.

FOOD: The studies of Professor Gene Trapp of Sacramento State University have revealed much about the habits of the Ringtail. It preys on mice and wood rats (*Neotoma* spp.), but also takes berries and soft fruits such as cherries, raspberries, and the fruits of the Pacific madrone (*Arbutus menziesii*), as well as arthropods and small birds. It does much of its foraging in trees. It does not forage in water or eat aquatic organisms.

REPRODUCTION: Little is known of the breeding pattern of this animal. Mating occurs in late winter, and three to four kits are born

Figure 44. Ringtail
(*Bassariscus astutus*).



in May or June. Dens are secreted among large boulders near canyon bottoms and in hollow trees.

STATUS: The Ringtail is fully protected in California.

COMMENTS: The Ringtail's hind foot is capable of a wide rotation, enabling the animal to descend from a tree headfirst.

Like the Raccoon, the Ringtail is nocturnal. It shuns urban regions but is known to enter cabins in the mountains. According to early stories, gold miners welcomed the Ringtail because it kept their cabins free of mice and wood rats. This little carnivoran is friendly and unafraid, and its presence should be encouraged.

RACCOON

Procyon lotor

Pl. 5, Figs. 43, 45



DESCRIPTION: Perhaps the most familiar carnivoran in North America. Its black mask and ringed tail distinguish it from all other carnivorans but the Ringtail (*Bassariscus astutus*). TL 780–930 mm, T 300–390 mm, HF 100–130 mm, E 50–60 mm. Weight: 4–8 kg; females tend to be smaller than males. Dentition: 3/3, 1/1, 4/4, 2/2. (See fig. 43.)

DISTRIBUTION: Found almost everywhere throughout North America, in forests, swamps, and marshes, though not in extremely dry regions. It may live in woodlands far from water or in cattail marshes far from trees. It is found about homes and is a common resident of San Francisco parks. It persists along creeks that course through urban areas. In some cities it has learned to live in storm drains, presumably preying upon rats. Its range extends far into Central America.

FOOD: The Raccoon eats vertebrates, invertebrates, fruits, nuts, and berries. It commonly forages along watercourses for crayfish



Figure 45. Raccoon (*Procyon lotor*).

and frogs. It also eats mice and small birds, including young and eggs from birds' nests.

REPRODUCTION: Mating takes place in late winter. A litter of three to six young is born in a hollow log or tree. Mother and offspring remain together until the end of summer, at which time the young are nearly full grown. Raccoons are sociable, and family groups may remain in a unit through the winter. Dispersal occurs at about one year of age.

COMMENTS: The Raccoon survives where other carnivorans disappear. Its persistence is doubtless due in part to its adaptability and perhaps also to its tree-climbing ability and its extreme ferocity when encountering dogs.

The name *lotor* means "one who washes." When captives are provided with water, they usually wash their food before ingesting it; when deprived of water, they usually rub their food with their dry paws. The meaning of this activity is not known.

Weasels, Marten, Skunks, and Allies (Mustelidae)

Mustelids are small to medium-sized carnivorans. Though diverse, they exhibit an underlying similarity. They have short snouts, elongate braincases, rather large auditory bullae, small eyes, and broad, rounded ears. Most have long bodies and short legs. In skunks (*Mephitis* and *Spilogale* spp.), the body and leg proportions are concealed by long, loose fur. Anal scent glands are present in most genera and well developed in skunks. Like canids, mustelids vary with the nature of their hunting. The meat eaters, such as weasels, have sharp carnassials, and their postcarnassial molars tend to be reduced or absent. In skunks, the carnassials are less developed. Dentition 3/3, 1/1, 4/4 (or 4/3 or 3/3) and 1/2 or 1/1.

Reproduction in many species of mustelids includes delayed implantation—mating and fertilization in summer or fall, with a subsequent prolonged quiescent stage during which no development occurs. Implantation follows in late December, apparently under the influence of day length, and cell division resumes. (See the section "Gestation".)

Mustelids are divided into five subfamilies, three of which occur in California. They vary from tiny weasels to the formidable Wolverine (*Gulo gulo*). Although most species are terrestrial, the Marten (*Martes americana*) and the Fisher (*M. pennanti*) are

expert tree climbers, the Badger is greatly modified for digging, the Mink (*Mustela vison*) is slightly adapted for an aquatic life, and the otters are clearly modified for swimming and foraging in the water. The skunks have many unique features but retain the basic mustelid body pattern.

The family first appeared in the Oligocene in Asia and Europe. It apparently reached North America in the Miocene, presumably across a Bering connection.

Key to Genera of Mustelidae in California

- 1a Premolars 4/4 2
- 1b Premolars fewer than 4/4 3
 - 2a Body with lateral stripe more lightly pigmented than rest of dorsal and lateral fur *Gulo*
 - 2b Body without lateral stripe *Martes*
- 3a Fur conspicuously black and white dorsally 4
- 3b Fur dorsally an even brown or mottled gray; head may be striped 5
 - 4a With white and black stripes on back *Mephitis*
 - 4b With two indistinct rows of white patches or spots *Spilogale*
- 5a Tail at base not greatly thickened (but sometimes bushy); premolars 3/3; feet variable but not broad and webbed 6
- 5b Tail thick and muscular at base; premolars 4/3 or 3/3; feet broad and webbed 7
 - 6a Dorsal fur of an even brown or black; tail slender *Mustela*
 - 6b Dorsal fur mottled gray; head with white stripe, sometimes extending onto shoulders; tail bushy *Taxidea*
- 7a Premolars 4/3 *Lutra*
- 7b Premolars 3/3 *Enhydra*

SEA OTTER

Enhydra lutris

Pl. 5

DESCRIPTION: The most aquatic member of the weasel family and the largest of the living mustelids: the adult male is almost 2 m long, the female somewhat smaller. The Sea Otter is dark brown or black in color. The tail is thickened at the base. The hind feet

are compressed into flippers, sparsely furred; the foreclaws are retractile. The female has a single pair of mammae on the abdomen. The four upper molars are broad and modified for crushing, not for shearing and cutting. Weight: 21–45 kg (males), 14–33 kg (females). Dentition: 3/2, 1/1, 3/3, 1/2.

DISTRIBUTION: Found along the coast of California (estimated population 2,000), with concentrations in Monterey County. It is established as far south as Morro Bay and rarely seen south to Baja California. The Sea Otter is associated with kelp beds in our area but may occur independent of kelp elsewhere. Strictly coastal, it rarely enters fresh water, nor does it migrate. It is found sporadically in Oregon and has been reestablished (by transplanting individuals from Alaska) in Washington and British Columbia. It also occurs on the Aleutians, the Commander Islands, and the Kuriles.

FOOD: The Sea Otter feeds on a variety of bottom-dwelling invertebrates. A large lung capacity allows it to dive to about 100 m, where it gathers abalone, sea urchins, crabs, and a few slow-moving fish. It sometimes feeds on mussels, scallops, and other bivalves. Although it takes abalone, this large snail is far less important in its diet than are sea urchins.

REPRODUCTION: Mating and birth probably occur every other year. They are not seasonal in California, but young are born in summer in the Aleutians. A single pup is born after a gestation of six to nine months, which includes a period of delay in implantation. In California birth usually takes place offshore, in kelp beds, but in Alaska it most commonly takes place on land. The young is precocial, fully furred, and active at birth. Nursing may continue until it is full grown.

STATUS: The Southern Sea Otter (*E. l. nereis*), which is the race occurring in California, is federally listed as threatened and is fully protected in California.

COMMENTS: A complex relationship exists between densities of the Sea Otter, sea urchins, abalone, bivalves, and shallow-water fish. Whereas moderate levels of these various organisms do not conflict with one another, excessive removal of any one of them may affect densities of the others. When Sea Otters abound, they seem to curb populations of sea urchins, which, in turn, feed on kelp. Shallow-water fish find protective cover in kelp; consequently, a healthy growth of kelp allows larger populations of some fishes. Thus the Sea Otter promotes an increase of kelp—and therefore fishes—whereas a scarcity of Sea Otters allows an

increase of sea urchins, which tends to depress the growth of kelp and thereby the fish populations.

The Sea Otter is one of the few mammals to use a tool. It is often seen to lie on its back on the surface, using a rock to break a shellfish on its chest. It is also reported to use rocks to dislodge abalone attached to bedrock.

The demand for Sea Otter pelts led the Russians first to Alaska and eventually to the California coast in the mid-eighteenth century. Early in the nineteenth century the Sea Otter was abundant along the coast of Oregon and Washington, where the Indians not only used the pelts for their own clothing but also traded them to merchants for beads. In 2003, the central California coast otter population, only recently recovered, experienced a sharp decline caused principally by pollution of ocean waters with the parasite-laden feces of domestic cats.

WOLVERINE

Gulo gulo

Pl. 4, Fig. 46



DESCRIPTION: Exceeds all other terrestrial members of the weasel family in body mass and ferocity. It is nearly equal to a large Fisher (*Martes pennanti*) in length, but much heavier, with a heavy body and short legs. The fur is dark brown, and the head is whitish between the eyes and ears. A wide, light band is found on each side of the body, with considerable individual variation. The feet are large and become cov-



Figure 46. Wolverine (*Gulo gulo*).

ered with thick fur in winter. TL .9–1.1 m (males), 880–970 mm (females); T 190–260 mm (males), 170–195 mm (females); HF 180–200 mm (males), 170–185 mm (females). Weight: 13.6–16.0 kg (males), 9.0–11.5 kg (females). Dentition: 3/3, 1/1, 4/4, 1/2.

DISTRIBUTION: Mostly found in the High Sierra south of Lake Tahoe; also occurs in the northwest coast counties (Humboldt, Del Norte, Trinity). It inhabits high montane forests. Its range extends north to Oregon and Washington and across much of the coniferous forest of northern North America. It is also found in Eurasia.

FOOD: The Wolverine takes various squirrels up to the size of a marmot; it also takes Porcupines (*Erethizon dorsatum*), although the quills may kill it. At times it eats carrion or berries.

REPRODUCTION: Mating takes place in winter, and a litter of one to four young is born in spring. Known dens of Wolverines are on the ground, in crevices under rock ledges at 3,000 m or above, well above timberline.

STATUS: The Wolverine is listed by the state as threatened and is fully protected in California.

COMMENTS: The Wolverine is nowhere common and is seldom seen. It is the most powerful predator among the Mustelidae. Hunters tell of bears and Mountain Lions (*Panthera concolor*) that retreat from their meals at the approach of a Wolverine. However, it apparently does not threaten livestock or humans. Legends of its ferocity may be partly based on the damage it can do to mountain cabins. One cabin in Plumas County was broken into and ransacked, and the distinctive hairs of a Wolverine were found where the window had been forced open. In captivity this animal may become tame and docile, even playful.

RIVER OTTER

Lutra canadensis

Pl. 5, Fig. 47



DESCRIPTION: One of the largest of the weasel family, with the thick, dense fur characteristic of aquatic mammals. The River Otter is dark brown, appearing black at a distance or in poor light. The toes are connected by webbing. TL .89–1.3 m, T 300–500 mm, HF 100–145 mm. Weight: 5–10 kg. Dentition: 3/3, 1/1, 4/3, 1/2.

DISTRIBUTION: Found along the margins of rivers and larger streams in the Cascade



Figure 47. River Otter
(*Lutra canadensis*).

Range and Sierra Nevada down to the Central Valley and Delta; also occurs in major drainages in the Coast Ranges north of San Francisco to Alaska. Tracks are often seen on the sandbars of larger rivers, and otter slides are frequent in the Delta. The River Otter occurs over much of North America, from Alaska to Mexico.

FOOD: This species eats crayfish, frogs, shellfish, and fish, especially rough fish (minnows and suckers). It also eats mice, birds, and birds' eggs, but it seldom forages far from water. In the San Juan Islands and other coastal areas it enters tidal regions and feeds on marine fish, mollusks, and crustaceans.

REPRODUCTION: The River Otter breeds at two years of age. Mating takes place in fall, followed by delayed implantation and birth of two to four young in a streamside burrow in April or May.

STATUS: The Southwestern River Otter (*L. c. sonorae*) is a California subspecies of special concern.

COMMENTS: The otter was one of the great incentives for the exploration of California prior to the gold rush. Commercial trapping ceased in 1961 in California; like the Marten (*Martes americana*) and Fisher (*M. pennanti*), the River Otter has greatly increased since then. In this century the River Otter has never been taken in large numbers. From 1921 to 1961, from 14 to 163 were taken annually; over this 40-year period there was no apparent trend of increase or decrease in abundance. Intensity of trapping is probably greatly influenced by abundance as well as by price, but this species holds its numbers with controlled commercial trapping.

The River Otter is sometimes a nuisance near fish hatcheries,

but control is simple. This otter is usually playful and commonly constructs slides on muddy streambanks. These are worn smooth and slippery by constant use. In the mountains in winter it makes similar slides in the snow.

Some taxonomists place the River Otter in the genus *Lontra*.

Marten and Fisher (*Martes*)

In North America the genus *Martes* is represented by the Marten (*Martes americana*) and the Fisher (*M. pennanti*), but in Eurasia it includes a number of species, more or less Marten-like in general aspect. Members of this genus are arboreal and feed mostly on tree squirrels. They live in temperate or cool areas and are active all winter. Perhaps as a result of these habits, they grow a rich fur that has always been highly valued. The fur known as sable comes from one or more Old World species of *Martes*.

Of the North American mustelids, only the Marten, the Fisher, and the Wolverine (*Gulo gulo*) have four upper and four lower premolars; the other genera have fewer. The Marten and Fisher are larger than weasels and minks (*Mustela* spp.) and are distinctive in having rather bushy tails.

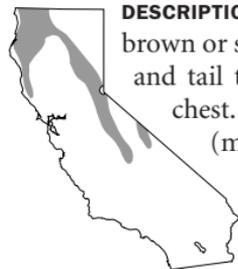
Key to Species of *Martes* in California

- 1a Tail more than 290 mm; color grayish brown to black on rump; tail entirely black *Martes pennanti*
- 1b Tail less than 290 mm; color chocolate or yellow brown, to black on tip of tail *Martes americana*

MARTEN

Martes americana

Pl. 6



DESCRIPTION: A moderately large mustelid, chocolate brown or sometimes yellow brown, with blackish feet and tail tip, and orange yellow or buff throat and chest. The tail is long and bushy. TL .57–1.0 m (males), 540–597 mm (females); T 170–210 mm (males), 170–206 mm (females); HF 80–92 mm (males), 82–84 mm (females). Weight: 1.2–1.5 kg (males), .9–1.1 kg (females). Dentition: 3/3, 1/1, 4/4, 1/2.

DISTRIBUTION: Found in northwestern California, where it seems to favor redwood forests. It also occurs at high elevations in the

northern Cascade Range and Sierra Nevada in forests of pine, fir, and hemlock above 1,200 m; on talus slopes; and in open rocky areas. Its range includes the Olympic Mountains, Cascade Range, and Blue Mountains of Washington, and high elevations in Oregon; it extends to southern Canada, the northern Rocky Mountains, and the northeastern United States.

FOOD: The Marten takes a great variety of vertebrates, especially tree squirrels and chipmunks (*Neotamias* spp.). It may prey heavily on Pikas (*Ochotona princeps*), rabbits (*Lepus* spp.), and wood rats (*Neotoma* spp.). It sometimes eats insects and many kinds of fruits and berries. Mountain ash provides a favorite food, and scats of the Marten may consist almost entirely of the seeds of this small tree.

REPRODUCTION: From two to four young are born in April or May. Mating, followed by delayed implantation, takes place shortly thereafter.

STATUS: The Humboldt Marten (*M. a. humboldtensis*) is a California subspecies of special concern.

COMMENTS: The Marten is the most frequently encountered of the larger weasels and is frequently seen by persistent enthusiasts. A skillful climber, it is as likely to be seen in the trees as on the ground. Under total protection, it has increased in numbers.

This species is sometimes considered to be the same as some Old World martens (*Martes martes*, *M. melampus*, and *M. zibellina*).

FISHER

Pl. 6

Martes pennanti

DESCRIPTION: A rather large, dark brown or blackish mustelid, somewhat grayish on the head and shoulders, with patches of white on the throat or underside. The Fisher has a heavy body and a long, thickly furred tail. As in mustelids generally, the males are much larger than the females. TL .9–1.2 m (male), 750–950 mm (females); T 381–422 mm (males), 340–380 mm (females); HF 113–128 mm (males), 89–115 mm (females). Weight: 3.5–5.5 kg (males), 2.0–2.5 kg (females).



Dentition: 3/3, 1/1, 4/4, 1/2.

DISTRIBUTION: Found in northwestern California at rather low elevations and in the Cascade Range and Sierra Nevada at 1,000 m and above, north to British Columbia. It favors stands of pine, Douglas-fir (*Pseudotsuga menziesii*), and true fir, avoiding red-

wood forests. Its range extends from southern Canada through the northern Rocky Mountains and to the northeastern United States.

FOOD: The Fisher eats many sorts of small mammals, from mice to rabbits (*Lepus* spp.); tree squirrels are a favorite. In northwestern California the false truffle (a hypogeous fungus) is also an important food item. The Fisher does not capture fish but is known to eat them. A formidable predator, it has been seen to capture and kill a Gray Fox (*Urocyon cinereoargenteus*). Under duress it will attack and kill a Porcupine (*Erethizon dorsatum*).

REPRODUCTION: Mating occurs in spring or summer and is followed by an extremely long gestation of some 330 to 360 days. A single brood of one to five young is born in April or May.

STATUS: The Fisher is a California species of special concern.

COMMENTS: Although the Fisher was rare or uncommon early in the century, sightings and evidence of its presence have increased from the 1960s. It may no longer be regarded as rare in some parts of Humboldt and Trinity Counties.

Skunks

Skunks comprise a group of conspicuously black and white carnivorans infamous for their offensive odors. The color pattern is assumed to be a warning to predators. Certainly skunks have few enemies (though the Great-horned Owl [*Bubo virginianus*] does capture them); this is undoubtedly what accounts for their lack of fear. Tameness, which might indicate rabies in a fox, is typical of skunks even in good health. One can easily approach a skunk closely as it feeds in the early evening, but proximity is dangerous.

Unlike the scents used for social communication by many kinds of mammals, the secretion of a skunk is reserved to repel enemies. The fluid is ejected from anal glands that are surrounded by voluntary muscles; it can be ejected at will and fired some 3 to 4 m with accuracy. Prior to discharging its scent, a skunk turns its rear and elevates its large bushy tail. This display is sufficient to deter all but the naive or hungriest predator.

Two species of skunks are found in California.

STRIPED SKUNK

Mephitis mephitis

Pl. 5, Figs. 48, 49

DESCRIPTION: Instantly recognized by almost everyone, though occasionally mistaken for a black and white cat; its long fur and bushy tail



do give it a vaguely catlike aspect. Typically it has two broad stripes down the back, but these vary in width. Frequently there is a white stripe on the head. TL 575–800 mm (males), 600–725 mm (females); T 185–390 mm (males), 240–270 mm (females); HF 60–90 mm (males), 60–80 mm (females). Weight: 1.8–2.7 kg, but large males may approach 4 kg.

DISTRIBUTION: Occurs throughout most of California north to Washington, except in the extremely arid southeastern deserts. It frequently lives in well-settled areas and is often found in gardens that are not tightly fenced. Its range covers the southern half of Canada and virtually all of the United States and extends south into Mexico.

FOOD: Unlike most weasels, the skunk is a true omnivore. In well-watered lawns and gardens, it forages deliberately, searching every depression and crevice for beetle larvae, cutworms, mice, and earthworms. It also takes berries on low-growing bushes and eats underground parts of plants, such as bulbs and corms.

REPRODUCTION: The female remains in estrus for prolonged periods, as ovulation occurs only after mating, which takes place in late winter or spring. Implantation is not delayed; gestation lasts for 60 to 77 days. Four to seven (or more) young are born in May or June in a hollow log or underground chamber. They remain with the mother most of the summer.

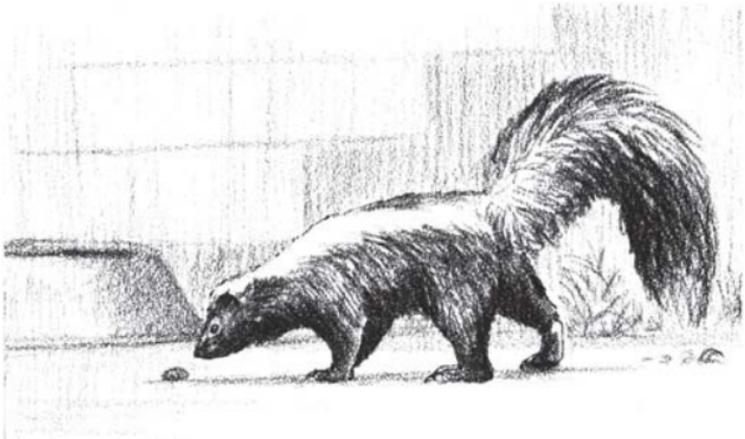


Figure 48. Striped Skunk (*Mephitis mephitis*).

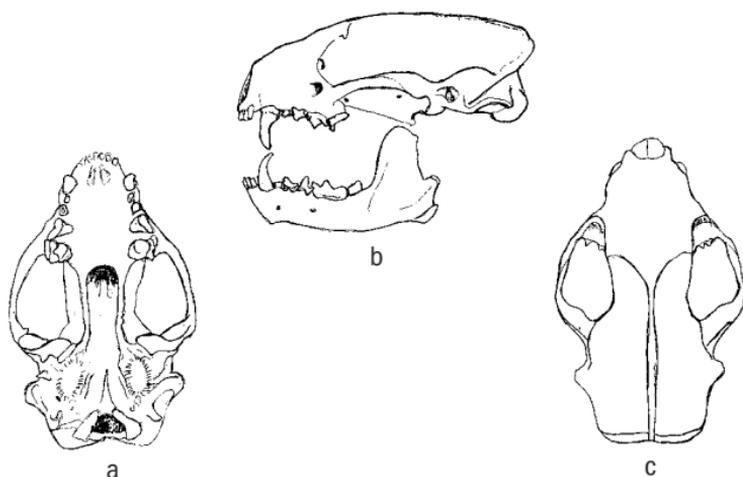


Figure 49. Skull of the Striped Skunk (*Mephitis mephitis*): (a) ventral view; (b) lateral view; (c) dorsal view.

COMMENTS: The skunk's digging leaves numerous small, cup-shaped depressions in the ground.

One occasionally sees a mother skunk in the evening with her young following in single file, a charming sight. Skunks foraging on open ground often move with a smooth, flowing motion, their long tails trailing behind. In the failing light of dusk, they seem to glide over the ground like wraiths. In spite of their friendliness and beauty, skunks are a dangerous source of rabies. In fact, the incidence of rabies in the Striped Skunk exceeds that in the domestic dog.

Although it brings a very low price, the fur has long been used extensively for trim as well as for full-length coats.

SPOTTED SKUNK

Spilogale putorius

Pl. 5, Figs. 50, 51

DESCRIPTION: About half the length of the Striped Skunk (*Mephitis mephitis*), and one-third or less in weight. Its fur is much softer and glossier, and its pattern is broken up into spots of white on black. TL 310–610 mm (males), 270–544 mm (females); T 80–280 mm (males), 85–210 mm (females); HF 32–59 mm (males), 30–59 mm (females). Weight: 535–800 g (males), 200–280 g (females). Dentition: 3/3, 1/1, 3/3, 1/2.



DISTRIBUTION: Found throughout most of California, north to western Washington, though it apparently avoids high mountains. It also occurs on Santa Cruz and Santa Rosa Islands, California. Its range covers most of the United States (except the northeast) and extends from Vancouver to central Mexico.

FOOD: Like the Striped Skunk, this species is omnivorous. It forages both day and night for soil-dwelling insects, worms, and mice, and it preys on small ground-nesting birds. It also eats corn, grapes, and other vegetable food.

REPRODUCTION: The Spotted Skunk dens underground, usually in the burrow of some digging mammal, such as a ground squirrel. Mating occurs in fall or winter, implantation is delayed up to 200 days, and a litter of two to six young is born in spring. Because eastern populations of the Spotted Skunk mate in spring and do not experience delayed implantation, it has been suggested that the western populations constitute a separate species. The time of implantation appears to be variable, especially in the southern part of its range, and the distinctions between the eastern and western populations may remain equivocal for some time.

STATUS: The Channel Islands Spotted Skunk (*S. p. amphiala*) is a California subspecies of special concern.

COMMENTS: The Spotted Skunk's search for food can tear up a lawn. Its fondness for insects sometimes leads it to beehives, where it can be destructive to domestic honeybees.



Figure 50. Spotted Skunk
(*Spilogale putorius*).

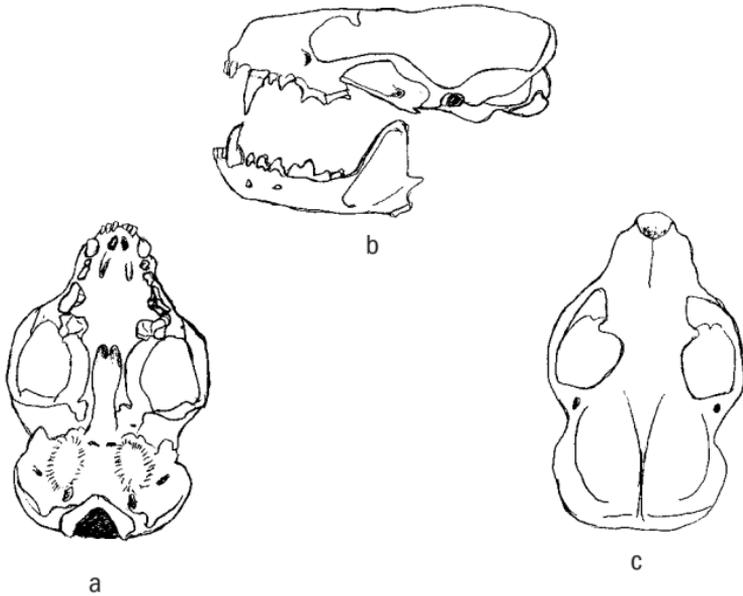


Figure 51. Skull of the Spotted Skunk (*Spilogale putorius*): (a) ventral view; (b) lateral view; (c) dorsal view.

The Spotted Skunk is known for various behaviors that may indicate nervousness or display to induce fear in the observer. Some observers have noted that it is prone to stamp its forefeet. Better known are its handstands—it sometimes stands erect on its forefeet, tail and hind legs held high over the body, perhaps to alarm its potential attacker (see pl. 5).

Weasels and Minks (*Mustela*)

These little carnivorans perhaps best illustrate the stereotype of the weasel family: the head is narrow, the neck is long and very muscular, the legs are short, and the body is elongate. The carnassials are well developed for cutting. The *Mustela* skull (fig. 52) is easily recognized by the large auditory bullae. The dentition is 3/3, 1/1, 2–3/3–2, 1/2.

Key to Species of *Mustela* in California

- 1a Color brown dorsally, much lighter (even white) ventrally; may be white in winter 2

- 1b Color dark brown or black, scarcely any lighter ventrally; no seasonal color change *Mustela vison*
- 2a Tail usually not more than 40 percent as long as head and body; hind foot less than 35 mm (males) or 28 mm (females) *Mustela erminea*
- 2b. Tail usually more than 40 percent as long as head and body; hind foot more than 40 mm (males) or 30 mm (females) *Mustela frenata*

SHORT-TAILED WEASEL or ERMINE***Mustela erminea***

Pl. 6

DESCRIPTION: The smallest weasel in the Pacific Coast states, generally much smaller than the Long-tailed Weasel. It is usually brown or yellow brown, though it has a white winter coat in the mountains. Its tail is rather short, and black on the distal third. TL 225–275 mm (males), 190–230 mm (females); T 55–75 mm (males), 50–63 mm (females); HF 27–34 mm (males), 23–27 mm (females). Weight: 50–60 g (males), 28–35 g (females); specimens in the mountains average smaller.

DISTRIBUTION: Found throughout the foothills and mountains of both the Cascade Range and Sierra Nevada in the northern half of the state; also in the Coast Ranges from Marin County north through Oregon and Washington to Alaska. It prefers coniferous forests. Its range extends throughout North America from Greenland to the southwestern United States. It is also found in Eurasia; in England it is called the Stoat.

FOOD: This weasel mostly eats mice and small, ground-nesting birds. Its prey ranges from deer mice and voles up to rodents the size of a chipmunk or wood rat. It also eats some reptiles and amphibians and rarely fruits and berries. It climbs well and takes the eggs and young of small birds.

REPRODUCTION: Mating takes place in late summer and is followed by delayed implantation. Four to eight young are born in spring, weighing about 1.7 g. Females may mate in their first summer; males become sexually mature the following summer.

COMMENTS: The Short-tailed Weasel is active day and night, foraging over 50 to 100 acres.

Although this species is, in its white winter coat, the Ermine of commerce, the pelts bring only a dollar or two. An Ermine cape becomes expensive because of the large number of skins used in a

single garment. The skin is thin and the fur quality is vastly inferior to that of the Mink (*Mustela vison*). The development of the white winter pelage may be influenced by genetic factors, but experimentally it can be induced by low temperature. Molt itself is induced by day length.

LONG-TAILED WEASEL

Mustela frenata

Pl. 6, Fig. 52



DESCRIPTION: A chocolate brown weasel with a black-tipped tail, a pale yellow or white underside, and frequently, a distinctive white or light-colored facial mask, sometimes in the form of a whitish patch between the eyes. It is both longer and heavier than the Short-tailed Weasel (*M. erminea*) and has a relatively long tail. Its winter pelage is white in montane populations but brown at lower elevations where there

is not normally snow on the ground. TL 350–450 mm (males), 335–395 mm (females); T 125–180 mm (males), 120–145 mm (females); HF 42–50 mm (males), 32–41 mm (females). Weight: 225–345 g (males), 115–220 g (females). (See fig. 52.)

DISTRIBUTION: Found statewide except in extremely arid country. It favors fairly open areas, rock piles, and stacks of firewood, though it can be found almost anywhere except the streamside habitat apparently preempted by the Mink (*Mustela vison*). Its range extends from southern Canada to southern Bolivia, up to 3,300 m in the United States.

FOOD: This weasel forages at any hour and is opportunistic in its choice of prey, though it clearly prefers warm-blooded vertebrates. It takes a variety of small mice, pocket gophers (*Thomomys* spp.), ground squirrels (*Ammospermophilus* and *Spermophilus* spp.), chipmunks (*Neotamias* spp.), and small birds. It prefers mice and other mammals of approximately that size; its small head and long neck permit the exploration of crevices and hiding places of mice. However, it is capable of killing rabbits (*Lepus* spp.) several times its own weight. It also eats bees.

REPRODUCTION: Mating normally takes place in July, after the young are weaned. The prolonged copulation resembles that of the Mink: a pair of Long-tailed Weasels may remain clasped together for two hours or more and may repeat the performance

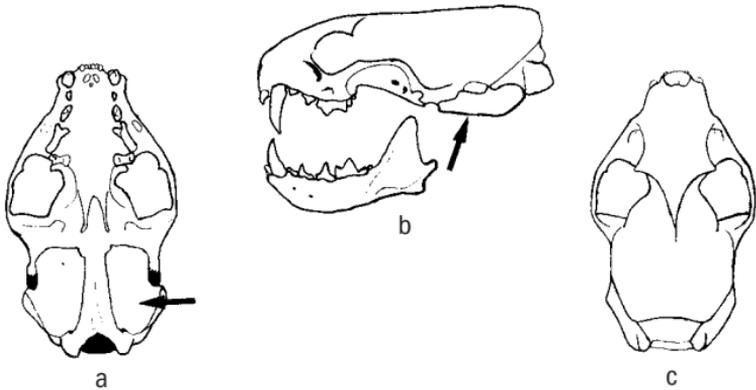


Figure 52. Skull of the Long-tailed Weasel (*Mustela frenata*): (a) ventral view; (b) lateral view; (c) dorsal view (arrows to auditory bullae).

the same day. After a prolonged delay, implantation occurs the following winter; four to eight young are born in June, some 225 to 300 days after mating. Embryonic growth takes four weeks or slightly longer. The young are nearly naked and weigh approximately 3 g at birth. They take milk for five weeks or so. The nest can be almost any concealed shelter, hollow log, or squirrel nest and is frequently lined with the fur of prey. Females become sexually mature in their first summer, in advance of their male siblings, and while older males are still sexually active.

COMMENTS: The Long-tailed Weasel's predatory prowess is the result of technique, not size: typically it clutches the back or neck of large prey and then bites the soft parts of the skull, especially about the ears, taking advantage of the sharp posterior edges of its canines.

Although this weasel sometimes kills grown chickens, it more commonly feeds upon rats that infest chicken coops. In view of the well-established rat-killing habits of weasels generally, it is foolish to destroy them on sight on the assumption that they are about to prey on domestic fowl.

Like other members of this family, the Long-tailed Weasel is playful. A captive enjoyed chasing dead Starlings (*Sturnus vulgaris*) swung before it on a string; when finally allowed to catch its "prey," it performed a little dance, jumping high into the air while doing twists and aerial somersaults, the meaning of which is not apparent.

MINK***Mustela vison***

Pl. 6



DESCRIPTION: A dark brown or black weasel with small white spots about the chin or throat and dense, glossy fur. Its general form is weasel-like, with a rather bushy tail. TL 491–720 mm (males), 473–560 mm (females); T 160–211 mm (males), 157–203 mm (females); HF 60–75 mm (males), 58–64 mm (females). Weight: .88–1.3 kg (males), 540–750 g (females).

DISTRIBUTION: Found in watercourses and marshes from the San Joaquin Valley north to the Delta and throughout most of the northern half of California, Oregon, and Washington. It frequents tidal margins in the Delta, mudflats around San Francisco Bay, and streamsid es to elevations of 2,000 m or higher. Its range extends throughout North America to Alaska, and it has been introduced into Eurasia.

FOOD: The Mink subsists on streamside invertebrates, such as crayfish; vertebrates, such as frogs and Muskrats (*Ondatra zibethicus*); and carrion. It sometimes captures ducks and coots.

REPRODUCTION: Mating takes place in late winter; three to 10 young are born in June or July. The den is usually near water, under a log or beneath the ground.

COMMENTS: As a predator the Mink is of neutral value. It preys on mice and carrion, but also takes some game birds and rabbits (*Lepus* spp.) and may occasionally molest domestic fowl and even domestic trout.

This species used to be important as a furbearer, and it survived well under sustained trapping. In 1978–1979, Mink pelts brought the trapper \$10 to \$20 apiece, for a total of more than \$7,000 for the state. In 1996–1997 the price averaged only \$7.63, for a total of less than \$1,000.

BADGER***Taxidea taxus***

Pl. 5, Figs. 53, 54

DESCRIPTION: A large mustelid rather obviously modified for a semifossorial life, with powerful forefeet for digging and a stout, flattened body. The body is silver gray, the head patterned with gray and white. The tail is short and moderately furred. TL



Figure 53. Badger (*Taxidea taxus*).

600–730 mm, T 100–135 mm, HF 92–126 mm. Weight: up to 11.4 kg (large males), 4.5 kg (females). Dentition: 3/3, 1/1, 3/3, 1/2. (See fig. 54.)

DISTRIBUTION: Most commonly found in the Great Basin region of California, Oregon, and Washington, and sporadically common in the Sacramento Valley, fluctuating with populations of squirrels (*Sciuridae*) or pocket gophers (*Thomomys* spp.). A creature of open areas, including deserts, it ranges from south-central

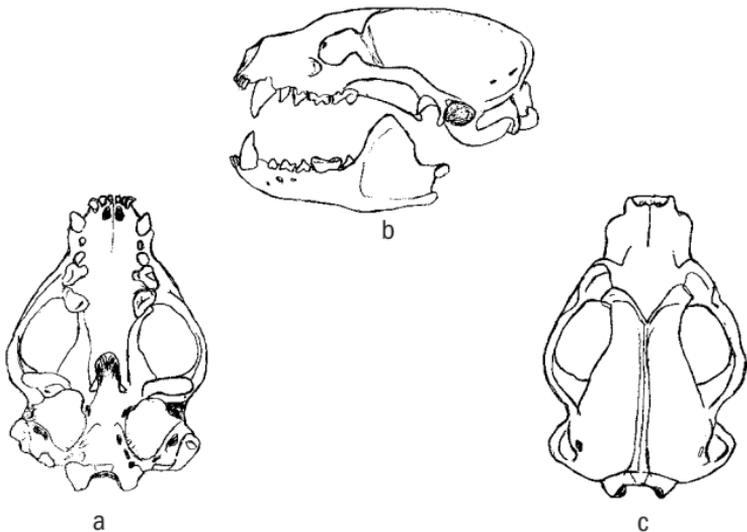


Figure 54. Skull of the Badger (*Taxidea taxus*): (a) ventral view; (b) lateral view; (c) dorsal view.

Canada over the western and central United States to central Mexico.

FOOD: The Badger mostly eats ground squirrels (*Ammospermophilus* and *Spermophilus* spp.) and pocket gophers.

REPRODUCTION: Mating takes place in late summer, but implantation is delayed until December or January. One to four young are born in March or April in an extensive burrow system.

COMMENTS: In its almost constant pursuit of its quarry, the Badger tears up a great deal of ground and may damage rodent-infested levees. On open range, ranchers object to its burrows because they may endanger horses. In the 1950s, Badgers were so common in alfalfa fields heavily infested with pocket gophers that their diggings sometimes damaged the blades of cutting machines.

Red-tailed Hawks (*Buteo jamaicensis*) may hover over and watch foraging Badgers and have been known to stoop down and snatch ground squirrels fleeing the mammalian predator. Coyotes (*Canis latrans*) sometimes attend a digging Badger for the same reason.

The Badger is sometimes an important furbearer. The pelage is soft, durable, and very beautiful. Before the advent of the electric razor and brushless shaving cream, the fur of the Badger provided half the adult population with shaving brushes.

Cats (Felidae)

Throughout the world there is little basic diversity among cats. Our two native species, the Mountain Lion (*Panthera concolor*) and the Bobcat (*Felis rufus*), have typical feline structure.

The cat's skull reveals its diet. The dentition is reduced: 3/3, 1/1, 2-4/2-3, 1/1. The molars are reduced. The bladelike upper and lower carnassials meet so that their adjacent lateral surfaces form a shearing tool, in contrast to the cheek teeth in bears, which form a crushing or grinding surface. The canine teeth are long and pointed.

Cats have a short snout, in contrast to the pointed snout of dogs, and large, elliptical eyes, reflecting their nocturnal habit (figs. 55, 57). They are digitigrade, and all California species have retractable claws: they can be withdrawn to prevent their becoming dulled when walking or extended to grapple with prey.

The cat family is first recorded from the Miocene in Europe.

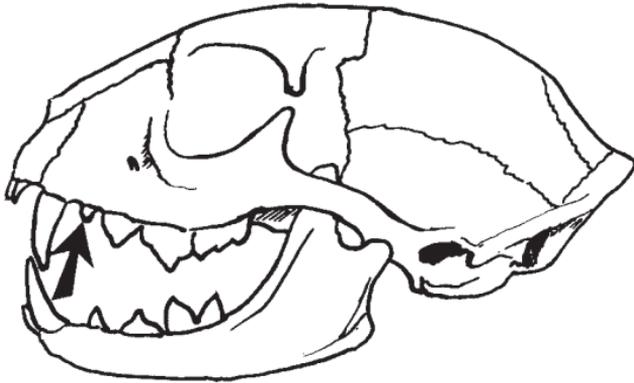


Figure 55. Skull of the Feral House Cat (*Felis sylvestris*). Note small upper premolar (arrow) behind the canine tooth, characteristic for this species.

FERAL HOUSE CAT

Felis sylvestris

Fig. 55

Most agricultural areas have populations of feral house cats. These are continuously augmented when people abandon unwanted pets, which are frequently able to survive in the wild. They seem to subsist mostly on wild rodents taken at some distance from human dwellings, and they probably take some carrion after the shooting of upland game birds. They are mentioned here to remind readers that the “wild mammal” they glimpse may be only a feral house cat.

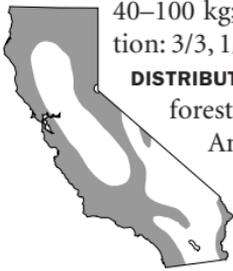
Linnaeus applied the specific name *catus* to the domestic cat. This cat presumably derives from *Felis sylvestris*, a wild species in Eurasia and North Africa. (See fig. 55.)

MOUNTAIN LION

Panthera concolor

Pl. 4 Fig. 56

DESCRIPTION: The Mountain Lion (also called Puma or Cougar) is the largest cat in California. Its sandy color and long (1 m), usually black-tipped tail are distinctive. The kits have sometimes indistinct brownish spots, which are lost in the first six months of life. TL 1.5–2.5 m, T 550–775 mm, HF 220–275 mm. Weight:



40–100 kg; males usually larger than females. Dentition: 3/3, 1/1, 3/2, 1/1. (See. fig. 56.)

DISTRIBUTION: Found throughout most of the forested and brushy regions of western North America. It survives within the city limits of Berkeley, Hayward, Richmond, and Sacramento. It is the most widely ranging mammal in the New World, found from the Canadian coniferous forest south to

Patagonia.

FOOD: The Mountain Lion preys heavily on deer (*Cervidae*) and other mammals. It takes squirrels (*Sciuridae*), rabbits (*Lepus* spp.), and even mice and is one of the few predators to take skunks (*Mephitis* and *Spilogale* spp.) and Porcupines (*Erethizon dorsatum*). It has been known to molest domestic stock but is a lesser problem than the Coyote (*Canis latrans*) in this regard. Most urban lions seem to live on house cats (*Felis sylvestris*).

REPRODUCTION: Gestation takes about 90 days. A litter of one to six kits is born blind and helpless, usually in spring. The Mountain Lion is sexually mature at 25–35 kg.

STATUS: The Yuma Mountain Lion (*P. c. browni*) is a California subspecies of special concern.

COMMENTS: The Mountain Lion is not uncommon today and is

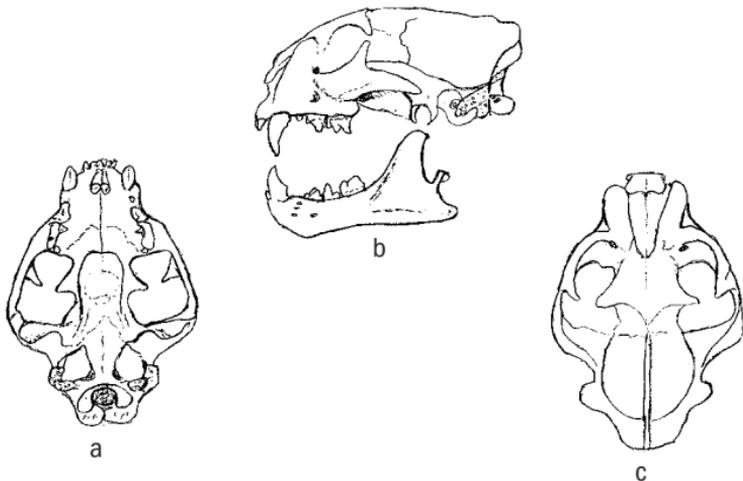


Figure 56. Skull of the Mountain Lion (*Panthera concolor*): (a) ventral view; (b) lateral view; (c) dorsal view.

among the many wild mammals that are found as road kills on mountain highways. This magnificent cat survives close to civilization for two reasons: it is very shy and seldom seen, and it seldom conflicts with human activities. It tends to avoid open areas; its presence is known more from tracks than from sightings. It is an extremely valuable predator, for it is a check on numbers of deer. However, it has been implicated in the reduction in numbers of the few remaining Bighorn Sheep (*Ovis canadensis*) in California. For many years it was assumed to have disappeared from eastern North America except for a population in Florida. In recent years, however, the unmistakable tracks have been reported from Georgia, Pennsylvania, New York, Maine, and New Brunswick. It has survived in these areas, undetected, for as long as 75 years. In the Pacific states it has become common and has extended its range. Although it is rarely dangerous, attacks on humans—including hikers and joggers—have increased in recent years. The New Mexico Department of Fish and Game pays a bounty of \$350 on Mountain Lions.

BOBCAT
Felis rufus

Pl. 4, Fig. 57

DESCRIPTION: A spotted cat with a short, white-tipped tail, tufted ears, and broad whiskers. It is rather long-legged for a cat. TL .7–1.0 m, T 95–150 mm, E (from crown) 60–75 mm. Weight: 5–15 kg; males average larger than females; in eastern North America, Bobcats may weigh more than 30 kg. (See fig. 57.) Dentition: 3/3, 1/1, 2/2, 1/1.

DISTRIBUTION: Occurs statewide in California, from Death Valley to the high mountains, equally at home in brushland, foothill chaparral, sagebrush, and forests. It is also widespread in Oregon, Washington, and British Columbia; its range extends from southern Canada to central Mexico.

FOOD: The Bobcat is an opportunist whose diet varies with availability more than with any apparent preference. It takes many rabbits (*Lepus* spp.), squirrels (Sciuridae), mice, and pocket gophers (*Thomomys* spp.), as well as small reptiles and birds. It occasionally molests sheep, but it is not nearly as troublesome as the domestic dogs or the Coyote (*Canis latrans*). In eastern North America it is a major predator of the White-tailed Deer (*Odocoileus virginianus*), but eastern Bobcats are larger than California specimens.

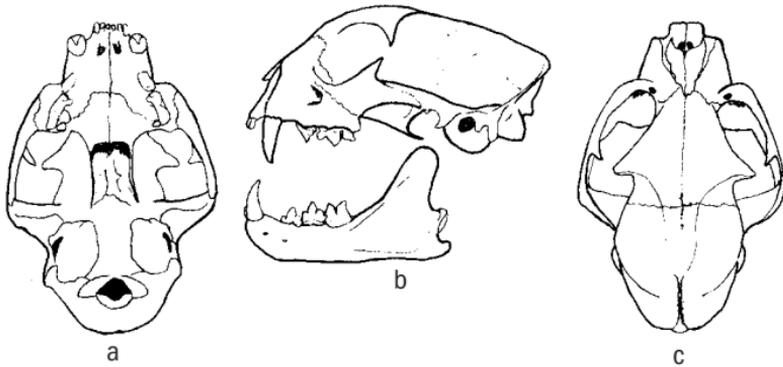


Figure 57. Skull of the Bobcat (*Felis rufus*): (a) ventral view; (b) lateral view; (c) dorsal view.

REPRODUCTION: A litter of one to six kits is born in spring or summer after a gestation of some 50 days. If a fertile mating does not occur at the first estrous period, estrus recurs one or more times. This accounts for the extended period over which young are born.

COMMENTS: The Bobcat remains relatively common despite heavy trapping and controls on sheep pastures. In contrast to the secretive Mountain Lion (*Panthera concolor*), it is sometimes quite bold and may not run away at the first sight of human observers. It may occur close to buildings and has been known to crouch next to water troughs and strike down bats as they fly low to drink. Its spotted fur and erect pointed ears make it one of the most beautiful mammals in our fauna.

Some taxonomists place Bobcats in the genus *Lynx*, which is sometimes considered a subgenus of *Felis*. As with the Mountain Lion, morphological features, distinctive in the flesh, are not present in fossil material.

Pinnipeds (Pinnipedia)

Paleontologists generally consider Pinnipedia—walruses (Odobenidae), seals (Phocidae), and sea lions (Otariidae)—to be a superfamily (or suborder) of Carnivora. Biochemical information and external parasites (sucking lice) indicate that the pinnipeds are monophyletic, derived from a single ancestor. Details of the skull suggest that they are derived from very early relatives of bears, the Arctoids. Presumably this descent occurred some 22 million years ago, as Pinnipedia dates from the early and middle Miocene.

Because walruses do not occur in California, we consider here only the seals (Phocidae) and the sea lions (Otariidae). Phocids have a long history in both the Atlantic and Pacific Oceans, whereas otariids are primarily Pacific in distribution. The common ancestry and the long history of aquatic existence could certainly account for many physical and physiological resemblances between these groups. Although it is convenient and reasonable to refer to them collectively as pinnipeds, seals and sea lions have a number of differences, some of them obvious even when these animals are viewed from a distance.

Pinnipeds are properly considered to be semiaquatic or amphibious, for they bear their young on land. Infants, moreover, may not enter water immediately. Pinnipeds, however, find locomotion on land difficult and awkward, and they do not obtain food on land. In the water they are swift and graceful, and they do all of their hunting beneath the surface.

Seals mate after the young are weaned. Female sea lions come into estrus immediately following birth of the young and usually mate within hours after parturition. Such postpartum estrus occurs among many groups of mammals, including some artiodactyls and many rodents. Like many species of mustelids, sea lions and seals experience delayed implantation. This delay represents an adaptation to the temporary presence of both sexes together on land and provides for birth of the young nearly a year after mating, when the females return to their breeding grounds (rookeries). Actual embryonic development takes much less than one year.

In many species, the mothers remain with the young continu-

ously until weaning, though such intensive parental care may prevent the adults from feeding. Most seals have a rather brief nursing period, during which the mother usually does not feed. Lactation in seals is shortened by the provision of extremely fat-rich milk that enables the pup to grow rapidly. Most sea lions have less rich milk and a longer lactation period, during which the mother may feed.

Pinnipeds' senses also reflect their long history in a marine environment. Although the external ears are reduced in sea lions and absent in seals, pinnipeds hear quite well underwater. An ability to echolocate is reported but disputed; in any case pinnipeds very likely recognize sounds produced by potential food items. They have much larger eyes than land mammals of comparable body size, allowing more light to enter the eye when they forage in murky depths. Most pinnipeds, moreover, seem to hunt at night. When light is bright, the pupil can be greatly reduced for aerial vision. Both the lens and the cornea are thickened—an adjustment to the increased refractive index of water—that probably results in some degree of myopia when on land. Apparently the senses of smell and taste are not nearly as acute as in terrestrial carnivorans.

The diving ability of pinnipeds results not only from a streamlined body form but also from less obvious physiological adaptations. Just before diving, a pinniped exhales and the heart-beat slows. Circulating blood is concentrated to the brain and heart, which have a great need for oxygen. The Harbor Seal can remain submerged for nearly a half hour and forage to depths of about 100 m. After surfacing, heavy breathing and rapid circulation restore oxygen to the tissues.

Sea Lions or Eared Seals (Otariidae)

Sea lions have rather long limbs (flippers), nude at the tips and with fewer than five toenails on each foot. Males are much larger than females. As in most groups of land mammals, the testes lie within a scrotum. The ears are small but clearly visible, pointed and protruding from the outline of the head. The outer incisor is like the canine of a carnivoran; the molars and premolars are somewhat triangular and expanded in the middle (fig. 60b).

Sea lions, including fur seals, are better able than seals to progress on land. They can rotate their hind limbs anteriorly,

which provides some thrust in movement on land and also assists, in a small way, in raising the rear of the animal off the ground. They use their forelimbs for propulsion both on land and in the water.

Sea lions have many natural enemies. In addition to being a favorite food of the Killer Whale (*Orcinus orca*), they are susceptible to neurotoxins produced by dinoflagellates. When these protozoans become extremely abundant, fish and fish-eating vertebrates may pick up their toxins. Researchers at Moss Landing linked the death of more than 400 sea lions on the California coast to one toxic bloom of dinoflagellates.

The four California species are rather similar in many respects. They do differ in shape, color, size, and distribution, but these differences are not always conspicuous, and field identification may not always be certain. Polygyny is characteristic of the family.

GUADALUPE FUR SEAL

Arctocephalus townsendi

Pl. 7, Fig. 58

DESCRIPTION: The smallest of the sea lions known to occur in California waters; males reach 2 m in length, females typically reach 1.5 m. This sea lion is dark brown when wet, somewhat grayish when dry; old males tend to become a light yellow or gold on the



Figure 58. Guadalupe Fur Seal (*Arctocephalus townsendi*).

chest. The underfur is dense. The species is additionally distinguished by very long front flippers and a rather long, slender snout. Weight: 150 kg (males), 45 kg (females). Dentition: 3/2, 1/1, 4/4, 2/1.

DISTRIBUTION: Today known to breed only on Guadalupe Island, off Baja California, but in early times it bred on islands at least north to the Channel Islands or perhaps the Farallon Islands. It is sometimes seen off San Miguel and San Nicholas Islands off southern California; it may be expected to occur more frequently as populations increase.

FOOD: Its diet is unknown, but it probably consumes medium-sized fish and shellfish.

REPRODUCTION: This fur seal repairs to caves for birth and breeding. One bull and a small number of cows form the breeding unit. Pups are born in spring, and mating follows within a week or so. Presumably the pup nurses for a prolonged period at sea, for the population tends to disperse at the end of summer.

STATUS: This species is federally listed and listed by the state as threatened. It is fully protected in California.

COMMENTS: This species belongs to a group which is otherwise confined to the Southern Hemisphere. It has sometimes been considered the same species as a fur seal (*Arctocephalus philippi*) known from Juan Fernández Islands, off the coast of Chile, that may now be extinct. Until the 1950s the Guadalupe Island population was considered to be extinct; since its rediscovery, it has been increasing steadily, and an estimated 1,000 or more exist today.

NORTHERN FUR SEAL***Callorhinus ursinus***

Pl. 7, Fig. 59

DESCRIPTION: A dark brown sea lion of medium size. Males are more than 2 m long, females are 1.5 m. The flippers, especially the hind flippers, are quite long, with nails only on the dorsal surface. Weight: up to 225 kg (males), 50 kg (females). Dentition: 3/2, 1/1, 4/4, 2/1.

DISTRIBUTION: Breeds on the Pribilof Islands west to the Commander Islands, and on islands off the coast of Asia. A recently established colony on San Miguel Island greatly expands its breeding range. During the nonbreeding season, populations are dispersed. Although bulls remain mostly in the Gulf of Alaska,



Figure 59. Northern Fur Seal (*Callorhinus ursinus*).

cows and pups migrate; they commonly get as far south as our coast, although they are seldom seen near shore.

FOOD: Foraging at night, the Northern Fur Seal may take advantage of the upward nocturnal movement of many fish and squid, its staples. In addition to several kinds of squid and cuttlefish, this pinniped takes many species of rockfish, herring, and mackerel.

REPRODUCTION: A breeding unit comprises one bull and a group of cows. Like other sea lion bulls, the Northern Fur Seal bulls arrive at the rookeries first and set up territories. They announce their presence to the cows, which arrive just before the pups are born. Mating occurs shortly after the birth of the pups. By fall the cows (already long pregnant) and pups have begun their migration.

COMMENTS: Because of the great commercial importance of this sea lion, its habits have been rather intensively studied. The Northern Fur Seal, together with the Sea Otter (*Enhydra lutris*), was in large measure responsible for early exploration of the North Pacific coast. Its habit of polygyny results in a large surplus of nonbreeding, bachelor bulls, which originally formed the basis of the sealing industry. Because these bulls do not reproduce, many can be removed without affecting the annual productivity of the population. In the eighteenth and nineteenth centuries, however, these furbearers were taken in a totally indiscriminate manner, with both sexes being killed throughout the year. Consequently there were drastic declines in both species. A treaty among Canada, Japan, the Soviet Union, and the United

States not only limited the numbers of Northern Fur Seals that could be killed but confined the take to the bachelor bulls. Commercial sealing no longer occurs.

**NORTHERN SEA LION or
STELLER SEA LION**

Eumetopias jubatus

Pl. 7

DESCRIPTION: A large sea lion: adult males reach more than 3 m in length, females reach about 2 m. The pups are black, but the adults are straw, yellow brown, or even whitish when submerged. The ears are small but distinct. Weight: up to 1,000 kg (males), 250 kg (females). Dentition: 3/2, 1/1, 4/4, 1/1.

DISTRIBUTION: Breeds from the northern Channel Islands north to the Aleutians and Pribilofs and west to Kamchatka; the islands in the Sea of Okhotsk, north of Hokkaido; and intervening islands. Año Nuevo Island has a breeding colony. This species is sometimes seen on the California coast but is less common inshore than the California Sea Lion (*Zalophus californianus*). After breeding, southern populations move to the north, whereas northerly populations tend to move south.

FOOD: We have little specific knowledge on the food of this offshore species; it eats squids, crabs, bivalves, and a variety of medium-sized fish.

REPRODUCTION: Females collect into groups of 20 to 30 within the territory of a large bull. Bulls defend their territories, and battles may be vigorous and bloody. Cows apparently have no loyalty toward either a particular bull or his plot of rock but move about from one harem to another. When breeding, bulls do not eat for some six weeks, but cows apparently feed at night. A single pup is born in late spring or early summer; mating follows within about a week. Nursing may last for about a year. Females may breed in their third year, and bulls do not breed until several years later.

STATUS: This species is federally listed as threatened.

CALIFORNIA SEA LION

Zalophus californianus

Pl. 7, Fig. 60

DESCRIPTION: A rather dark brown or blackish sea lion, darker when wet. Males are darker than females. Males reach 2.5 m in length, females reach some 2 m. The ears are short and pointed;

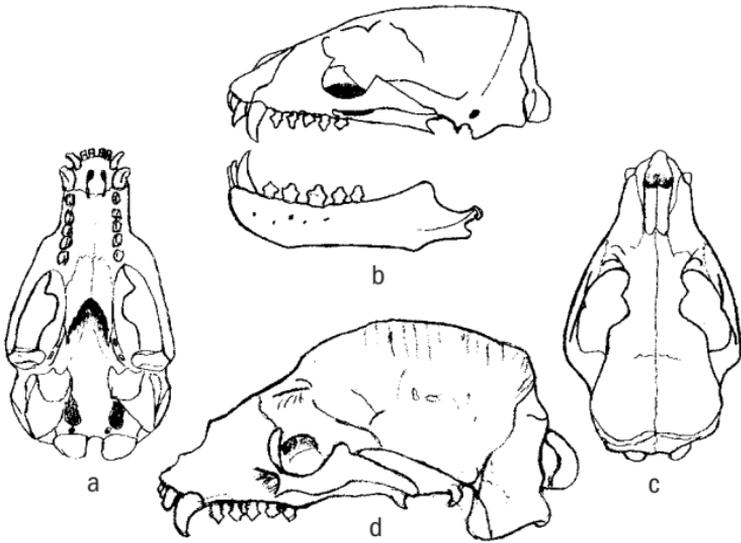


Figure 60. Skull of the California Sea Lion (*Zalophus californianus*): (a) ventral view, female; (b) lateral view, female; (c) dorsal view, female; (d) adult male, showing sagittal crest.

males have prominent foreheads. Weight: 250 kg (males), 100 kg (females). Dentition: 3/2, 1/1, 4/4, 2–1/1; the molars and premolars are nearly triangular (see fig. 60b).

DISTRIBUTION: Breeds from the Channel Islands south to Baja California and occurs in the Gulf of California. It is most commonly observed during the nonbreeding period, when individuals may move north as far as British Columbia and are found in many areas along our coast. This sea lion habitually seeks certain beaches where it is not disturbed. It is known also to ascend coastal rivers. Separate populations (subspecies) occur on the Galápagos Islands and in the Sea of Japan.

FOOD: This species takes squid and a variety of fish.

REPRODUCTION: This sea lion is known for its large and conspicuous aggregations during the breeding season. Females assemble on offshore islands, and bulls move in. Bulls are territorial, but females move from one harem to another. A single pup is born in early summer; mating follows within 10 days or two weeks. Thus the female may be pregnant for much of the lactation period, which may last for the better part of a year. Gradually, during summer, the pups venture more and more into the sea. From the

end of summer until the following spring, mothers and young may move in small or large groups.

COMMENTS: Although this species' predation on commercial fisheries may be negligible, it is known to damage salmon in gill nets and to damage the nets themselves by becoming entangled in them.

This is the animal famous as the "trained seal." Usually only the female is used for this purpose. In the wild, this sea lion frequently can be heard before it is seen. Its loud barking is a familiar sound that aids in distinguishing it from the Steller Sea Lion (*Eumetopias jubatus*).

Seals (Phocidae)

Seals have smaller, less flexible limbs than sea lions. The forelimbs are furred. In *Phoca*, the limbs have some toenails or claws; in *Mirounga*, the claws are rudimentary or absent. Ear openings are present, but external pinnae are lacking. The sexes are similar in size in most species.

Seals are perhaps more adapted to an aquatic life than sea lions and fur seals. Their body form is more compact, with the neck not apparent, and their limbs are smaller and weaker. Consequently, seals can do little more than wriggle along the rocks. Their forelimbs lie adpressed to the sides of the body when swimming, and propulsion results from movement of the hind flippers and tail region. The testes are housed permanently within the body cavity, as is also the case with cetaceans.

NORTHERN ELEPHANT SEAL *Mirounga angustirostris*

Pl. 7, Fig. 61

DESCRIPTION: A very large seal: males reach more than 5 m in length, females 3 m. Adults are gray or brown; the young are black. The immense size and the seal body form identify this species. The male is also distinguished by its pendulous but inflatable snout. Weight: up to 3,500 kg (males), 900 kg (females). Dentition: 2/1, 1/1, 4/4, 1/1.

DISTRIBUTION: Breeds on coastal islands from Baja California north to the Farallon Islands and Año Nuevo. It ranges north to Alaska during the nonbreeding season.

FOOD: This species apparently eats bottom fish, such as ratfish and cusk eels, as well as squid.



Figure 61. A month-old Northern Elephant Seal (*Mirounga angustirostris*) weaner (foreground), having been left by its mother, and a doomed so-called super weaner grossly overfatted by nursing from more than one female.

REPRODUCTION: This seal differs from most in that a male dominates a group of breeding females. Adults gather on coastal islands in December, and the single pup is born within days, usually in early January. Nursing is completed in about a month, during which period the pup more than triples its natal weight as a result of the fat-rich milk characteristic of many pinnipeds. Until the pup is weaned, the mother does not feed; by the time lactation ceases, therefore, she has lost a great deal of weight. After her pup is weaned, she mates; gestation lasts 11 months (including the delay in implantation), until she returns once again to the rookery. Mating takes place on land, in contrast to the aquatic sexual pursuit characteristic of most seals. This may be because constant territorial defense by the bulls prevents their entering the water.

STATUS: This species is fully protected in California.

COMMENTS: This seal is known to dive at least 200 m.

Like the Guadalupe Fur Seal (*Arctocephalus townsendi*), the Northern Elephant Seal was once very scarce. Its large size made it a source of a great amount of oil, and commercial exploitation almost caused its extinction. A small population remained on Guadalupe Island and prospered, and breeding populations have now spread northward. With continued protection, we can expect this northward movement to continue.

One other species of elephant seal, the Southern Elephant Seal (*Mirounga leonina*), is found in the Southern Hemisphere.

HARBOR SEAL*Phoca vitulina*

Pl. 7

DESCRIPTION: This seal is extremely variable in color, from nearly white to almost black, though usually some shade of brown or gray and spotted. It is chunky in shape and appears neckless. Males reach up to 1.7 m in length and more than 130 kg in weight; females are slightly smaller.

DISTRIBUTION: Occurs commonly along the coasts of California, Oregon, and Washington, frequently close to shore, and sometimes on isolated beaches; it is found in San Francisco Bay. It may forage close to shore and commonly hauls out on rocky islets close to beaches. It is mostly coastal and is known to enter rivers for 160 km or more. This seal is well distributed about the northern seas of both hemispheres, although there are local variations. Probably the Atlantic and Pacific populations were in contact until the emergence of the Isthmus of Panama some 3 million years ago.

FOOD: The Harbor Seal takes bivalves, crabs, squid, octopus, and a wide variety of medium-sized fish, including herring, flounders, and cod.

REPRODUCTION: A single pup is born in spring. As in most seals, the period of nursing is rather brief; mating occurs in the water after the pup is weaned. A delay in implantation regulates development so that the next pup is born just about one year later. Breeding assemblages may contain a smaller number of both males and females than nonbreeding groups.

COMMENTS: Salmon make up a very small amount of its natural diet, but the Harbor Seal may damage gill nets trying to remove captured fish.

This little seal seems to have remained common throughout the encroachment of civilization. It tends to be timid and enter the water as people approach. Its small size is not a great inducement to commercial exploitation.