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Chapter 1.
House Wren and Common Rabbit

House Wren

The House Wren is a very small songbird of the wren family. It occurs from Canada to southernmost South America, and in most suburban areas in its range it is the single most common wren.

Adults are 11-13 cm long and weigh about 12 g. The subspecies vary greatly, with upperparts ranging from dull greyish-brown to rich rufescent-brown, and the underparts ranging from brown, over buff and pale grey, to pure white. All subspecies have blackish barring to the wings and tail, and some also to the flanks. All subspecies show a faint eye-ring and eyebrow and have a long, thin bill with a blackish upper mandible, and a black-tipped yellowish or pale grey lower mandible. The legs are pinkish or grey. The short tail is typically held cocked.

In North America, the House Wren is thought to achieve the highest density in floodplain forests in the western great plains where it uses woodpecker holes as nesting sites.

They usually construct a large cup nest in various sorts of cavities, taking about a week to build. The nest is made from small dry sticks and is usually lined with a variety of different materials. These include: feather, hair, wool, spider cocoons, strips of bark, rootlets, moss, and trash. The male wren finds dry sticks, which he adds to the nest. Once he is done, the female inspects at the nest; but if she does not approve of the construction, she will throw any unwanted sticks to the ground. After this process, the female lines the nest.
Common Rabbit

Rabbits are small mammals in the family Leporidae, found in several parts of the world.

Rabbit habitats include meadows, woods, forests, thickets, and grasslands. They also inhabit deserts and wetlands. Rabbits live in groups, and the best known species, the European rabbit, lives in underground burrows, or rabbit holes. A group of burrows is called a warren.

Rabbits live in many areas around the world. More than half the world's rabbit population resides in North America. They are also native to southwestern Europe, Southeast Asia, Sumatra, some islands of Japan, and in parts of Africa and South America. They are not naturally found in most of Eurasia, where a number of species of hares are present.

The rabbit's long ears, which can be more than 4 inches long, are probably an adaptation for detecting predators. They have large, powerful hind legs. The two front paws have 5 toes, the extra called the dewclaw. The hind feet have 4 toes. They are digitigrade animals; they move around on the tips of their toes. Wild rabbits do not differ much in their body proportions or stance, with full, egg-shaped bodies. The fur is most commonly long and soft, with colors such as shades of brown, gray, and buff. The tail is a little plume of brownish fur (white on top for cottontails).

Rabbits, being prey animals, tend to be exploratory in new spaces and if confronted by a potential threat, tend to freeze and observe. Rabbits have a remarkably wide field of vision, and a good deal of it is devoted to overhead scanning. Both indoors and outdoors, rabbits will scan for overhead threats. They survive by burrowing, hopping away from danger in a zig-zag motion, and delivering powerful kicks with their hind legs. Their teeth are strong to allow them to eat and bite if necessary to get out of struggle.
There are several species of cottontail rabbit, but the eastern cottontail is the most common. This ubiquitous animal can be found from Canada to South America and, in the United States, from the East Coast to the Great Plains. Cottontails range from reddish brown to gray, but all feature the distinctive "cotton ball" tail for which they are named.

These rabbits seek out habitat on the fringes of open spaces, such as fields, meadows, and farms, but can adapt to other habitats—including those of humans.

They browse at night on grasses and herbs and are fond of garden fare such as peas and, of course, lettuce. In winter, their diet becomes a bit coarse and consists of bark, twigs, and buds. During the day, cottontails often remain hidden in vegetation. If spotted, they flee from prey with a zigzag pattern, sometimes reaching speeds of up to 18 miles (29 kilometers) an hour.

Females give birth in shallow ground nests, to young so helpless that perhaps only 15 percent survive their first year. Fortunately, rabbits breed three or four times every year and produce three to eight young each time. Young rabbits mature quickly and are self-sufficient after only four or five weeks.
Northern Hare

Hares are much longer-limbed and swifter than rabbits. They use their powerful hind legs to escape predation by outrunning their enemies, and have been known to reach speeds of 45mph. Brown hares are widespread throughout central and western Europe, including most of the UK, where they were introduced by the Romans. Courtship involves boxing, and this well-known 'mad March hare' behavior actually involves unreceptive females fending off passionate male
The Marsh Rabbit is a small cottontail rabbit found in marshes and swamps of coastal regions of the Eastern and Southern United States. It is a strong swimmer and found only near regions of water. It is similar in appearance to the Eastern Cottontail but is characterized by smaller ears, legs, and tail.

Marsh rabbits have a number of features that distinguish them from cottontails and swamp rabbits. The short ears and legs are much smaller than that of a swamp rabbit. The tail is also much reduced from the bushy tail seen in cottontails.

The marsh rabbit commonly inhabits brackish and freshwater marshes, mainly of cattails and cypress. In southern Florida, they commonly occupy sandy islands and mangrove swamps. They are strictly limited to regions with ready access to water, unlike most rabbits. Often, they will enter tidal marshes, but remain near high ground for protection. Normal hiding spots include dense thickets of magnolia, black-gum, sweet-gum, briers, and cattails.

Marsh rabbits are strictly herbivorous. Typically, they feed on leaves and bulbs of marsh plants including cattails, rushes, and grasses. They can also feed on other aquatic or marsh plants such as centella, greenbrier vine, marsh pennywort, water hyacinth, wild potato, and amaryllis.

Marsh rabbits are most active nocturnally; they spend most of the daylight hours resting in hidden areas. Frequent hiding spots include dense thickets, hollow logs, and stands of cattails and grasses. They have also been known to take advantage of the abandoned burrows of other animals.
Chapter 3.
The Swamp Hare, Arctic Hare, Prairie Hare, Antelope Jack and Common Jack Rabbit

The Swamp Rabbit

The Swamp Rabbit is a large cottontail rabbit found in the swamps and wetlands of the Southern United States. The swamp rabbit eats reeds, plants, and grasses native to its marshy habitat. The swamp rabbit nests above ground in small dens made of dead plants and lined with its shed fur. When fleeing a predator, the swamp rabbit can run over 45 miles per hour, usually in an evasive zig-zag pattern.

The Swamp Rabbit is a skilled swimmer, often crossing streams, ponds and rivers. The semi-aquatic cottontail will occasionally hide from natural enemies by sitting still in shallow water, exposing only its nose to the air to breathe.
Arctic Hare

The arctic hare lives in the harsh environment of the North American tundra. These hares do not hibernate, but survive the dangerous cold with a number of behavioral and physiological adaptations. They sport thick fur and enjoy a low surface area to volume ratio that conserves body heat, most evident in their shortened ears. These hares sometimes dig shelters in snow and huddle together to share warmth.

Hares are a bit larger than rabbits, and they typically have taller hind legs and longer ears. Like other hares and rabbits, Arctic hares are fast and can bound at speeds of up to 40 miles (60 kilometers) an hour. In winter, they sport a brilliant white coat that provides excellent camouflage in the land of ice and snow. In spring, the hare's colors change to blue-gray in approximation of local rocks and vegetation.

Arctic hares are sometimes loners but they can also be found in groups of dozens, hundreds, or even thousands of individuals. Unlike many mammals, arctic hare groups disperse rather than form during mating season. Animals pair off and define mating territories, though a male may take more than one female partner.

Females give birth to one litter per year, in spring or early summer. Two to eight young hares grow quickly and by September resemble their parents. They will be ready to breed the following year.

Food can be scarce in the Arctic, but the hares survive by eating woody plants, mosses, and lichens which they may dig through the snow to find in winter. In other seasons they eat buds, berries, leaves, roots, and bark.

Traditionally, the arctic hare has been important to Native Americans. These fairly plentiful animals are hunted as a food resource and for their fur, which is used to make clothing.
White-tailed Prairie Hare

This is the most northern species of the group of hares, familiarly known in the United States as jack rabbits because of their large size and enormous ears. They are lively animals of astounding jumping powers. In America there is no such distinction between the term “hare” and “rabbit” as there is in Europe, where the large, long-eared, stout varieties, living in shallow “forms,” are named hares, and the smaller and more slender kind, which digs a deep burrow, is the “rabbit.” In this country the authorities say that no well-defined distinction exists. Of the so-called jack rabbits the northern prairie hare here depicted may be taken as the type. It is one of the largest species of hares, measuring about twenty inches in length, and it has long, strong, and vigorous limbs, and such remarkably long ears that the popular name it bears is fully justified.

This northern species is found on the western prairies from British America to Colorado. It undergoes a winter change of coat, becoming nearly white, but the blanching is never complete and russet streaks or patches remain through the winter. The habits of this animal are those of hares in general, and all the species known as jack rabbits are famous for their great speed and for the astounding leaps they make in running. They are the most fleet and agile of American mammals. They are not much pursued for the reason that they are difficult to shoot, and their celerity of movement enables them to elude four-footed foes also. Pending the complete change from the summer brown to the snowywhite coat of winter, the animal presents a very singular mottled appearance.
"Antelope jackrabbit" is the popular name for the black-tailed hair. The animal has been named "antelope" because of its unique ability to flash its undercoat of white like a pronghorn antelope. The reason for this behavior is not really known but it may be to warn other hares of some danger, to confuse a predator or attract a mate. The antelope jackrabbit has amazingly long ears up to 8 inches long (1/3 of its body length).

During the day, they lie about under brush or sit in open places that they have cleared by nibbling away the plant life. In the evening, on moonlit nights and in the very early morning they venture out to eat a variety of green plants including tender stems, leaves from bushes and grass. During hot summer they clip 8 to10 inch sprigs off the end of the lower branches of creosote bushes. Experts think this may be to sharpen their teeth.

Young jackrabbits are not rabbits but hares. They are born full-furred with open eyes and active bodies in contrast with cottontail rabbits which are born naked and immature and cannot take care of themselves for several days. Hares are also born on the ground while rabbits are usually born underground. Jackrabbits have several litters a year. Almost always one litter is born in April or May.

The jackrabbit is a most secretive animal and screens himself in every possible way from view of predators. If it senses any movement it immediately goes on the alert intently listening, then it speeds off. They rely heavily on hearing more than any other sense to detect a threat from birds of prey and carnivores. Jackrabbits shift their ears to hear.
The Grey Squirrel

The eastern gray squirrel, or grey squirrel (depending on region), is a tree squirrel in the genus Sciurus native to the eastern and midwestern United States, and to the southerly portions of the eastern provinces of Canada. The native range of the eastern gray squirrel overlaps with that of the fox squirrel with which it is sometimes confused, although the core of the fox squirrel's range is slightly more to the west.

A prolific and adaptable species, the eastern gray squirrel has been introduced to, and thrives, in several regions of the western United States.

As the name suggests, the eastern gray squirrel has predominantly gray fur but it can have a reddish color. It has a white underside and a large bushy tail. Particularly in urban situations where the risk of predation is reduced, both white- and black-colored individuals are quite often found. The melanistic form, which is almost entirely black, is predominant in certain populations and in certain geographic areas, such as in large parts of southeastern Canada. There are also genetic variations within these, including individuals with black tails and black colored squirrels with white tails.

Like many members of the family Sciuridae, the eastern gray squirrel is a scatter-hoarder; it hoards food in numerous small caches for later recovery. Some caches are quite temporary, especially those made near the site of a sudden abundance of food which can be retrieved within hours or days for re-burial in a more secure site. Others are more permanent and are not retrieved until months later. It has been estimated that each squirrel makes several thousand caches each season.
The Fox Squirrel

The fox squirrel is the largest species of tree squirrel native to North America. They are also sometimes referred to as the stump-eared squirrel, raccoon squirrel, or monkey-faced squirrel.

The fox squirrel's natural range extends throughout the eastern United States, excluding New England, north into the southern prairie provinces of Canada, and west to the Dakotas, Colorado, and Texas. They have been introduced to both Northern and Southern California. While very versatile in their habitat choices, fox squirrels are most often found in forest patches of 40 hectares or less with an open understory, or in urban neighborhoods with trees. They thrive best among trees such as oak, hickory, walnut and pine that produce winter-storable foods like nuts.

Fox squirrels depend primarily on tree seeds for food, but they are generalist eaters and will also consume buds and fruits, cultivated grain, insects, birds' eggs, lizards and small snakes. In their regular diet of nuts, fox squirrels are classic scatter-hoarders that bury caches of nuts in dispersed locations, some of which are inevitably left unretrieved to germinate.

Fox squirrels are strictly diurnal, non-territorial, and spend more of their time on the ground than most other tree squirrels. They are still, however, agile climbers. They construct two types of homes called "dreys", depending on the season. Summer dreys are often little more than platforms of sticks high in the branches of trees, while winter dens are usually hollowed out of tree trunks by a succession of occupants over as many as 30 years.
The red squirrel or Eurasian red squirrel is a species of tree squirrel in the genus Sciurus common throughout Eurasia. The red squirrel is an arboreal, omnivorous rodent.

The coat of the red squirrel varies in color with time of year and location. There are several different coat color morphs ranging from black to red. Red coats are most common in Great Britain; in other parts of Europe and Asia different coat colors co-exist within populations, much like hair colour in some human populations. The underside of the squirrel is always white-cream in color. The red squirrel sheds its coat twice a year, switching from a thinner summer coat to a thicker, darker winter coat with noticeably larger ear-tufts (a prominent distinguishing feature of this species) between August and November. A lighter, redder overall coat color, along with the larger ear-tufts (in adults) and much smaller size, distinguish the Eurasian red squirrel from the American eastern grey squirrel.

The red squirrel, like most tree squirrels, has sharp, curved claws to enable it to climb and descend broad tree trunks, thin branches and even house walls. Its strong hind legs enable it to leap gaps between trees. The red squirrel also has the ability to swim.

The red squirrel eats mostly the seeds of trees, neatly stripping conifer cones to get at the seeds within.
The Kaibab Squirrel (Sciurus aberti kaibabensis) is a tassel-eared squirrel that lives in the Kaibab Plateau in the Southwest United States, in an area of 20 by 40 miles. The squirrel's habitat is confined entirely to the ponderosa pine forests of the North Rim of Grand Canyon National Park and the northern section of Kaibab National Forest around the town of Jacob Lake, Arizona. In 1965, 200,000 acres of Kaibab squirrel habitat within Grand Canyon National Park and Kaibab National Forest were declared the Kaibab Squirrel National Natural Landmark. It is not found anywhere else in the world.

It has a black belly, white tail, and tufted ears. The tufts on the ears grow longer with age and may extend 1 to 2 inches above the ears in the winter, but may not be visible in the summer.

The Kaibab squirrel lives in the ponderosa pine forests, where it builds its nest out of twigs and pine needles. It eats acorns, fruit, and fungi, as well as the seeds, bark, and twigs of the trees where it makes its home. The Kaibab squirrel's most significant source of food is the seeds found within ponderosa pine cones. Young squirrels are born between April and August.
Abert's squirrel (or tassel-eared squirrel) is a tree squirrel in the genus Sciurus, endemic to the Rocky Mountains from United States to Mexico, with concentrations found in Arizona, The Grand Canyon, New Mexico, and southwestern Colorado.

Abert's squirrels are 46–58 cm long with a tail of 19–25 cm. The most noticeable characteristic would be their hair ear tufts, which extend up from each ear 2–3 cm. They typically have a gray coat with a white underbelly and a very noticeable rusty/reddish colored strip down their back.

Abert's squirrels make almost exclusive use of ponderosa pine for cover, nesting, and food.

The Abert's squirrel typically builds its nest in the branches of the ponderosa pine in groups of twigs infected with dwarf mistletoe. They are strictly diurnal. The Abert's squirrel does not store its food like other North American squirrels.

Abert's squirrels consume ponderosa pine year-round. Parts eaten include seeds, which are the most highly preferred item, inner bark (particularly of young twigs), terminal buds, staminate buds, and pollen cones. Other foods include fleshy, carrion, bones, and antlers.
Chapter 6
The Chipmunk, Spermophiles and Flying Squirrel

The Chipmunk

Chipmunks are small striped squirrels native to North America and Asia.

Chipmunks have an omnivorous diet consisting of grain, nuts, fruit, berries, birds' eggs, small frogs, fungi, worms, insects and on occasions small mammals like young mice. At the beginning of autumn, many species of chipmunk begin to stockpile these goods in their burrows, for winter. Other species make multiple small caches of food. These two kinds of behavior are called larder hoarding and scatter hoarding. Larder hoarders usually live in their nests until spring. Cheek pouches allow chipmunks to carry multiple food items to their burrows for either storage or consumption.

These small mammals fulfill several important functions in forest ecosystems. Their activities harvesting and hoarding tree seeds play a crucial role in seedling establishment.

Chipmunks play an important role as prey for various predatory mammals and birds, but are also opportunistic predators themselves, particularly with regard to bird eggs and nestlings. In Oregon, Mountain Bluebirds have been observed energetically mobbing chipmunks that they see near their nest trees.

Chipmunks construct expansive burrows which can be more than 3.5 m in length with several well-concealed entrances. The sleeping quarters are kept extremely clean as shells and feces are stored in refuse tunnels.
California Ground Squirrels prefer open, well-drained habitat, and are common along roadsides, on farms, especially where grain is grown, and in grassy fields. Adult squirrels are active only a few months of the year. Males usually retreat underground in early summer and remain there until the following spring. Females follow as soon as they finish nursing their young, usually in late summer or early fall. The aboveground fall and winter populations are composed almost entirely of young squirrels.
Flying squirrels are not capable of sustained flight, instead they glide between trees, with flights recorded to 295 ft. The direction and speed of the animal in midair is varied by changing the positions of its two arms and legs, largely controlled by small cartilaginous wrist bones. This changes the tautness of the patagium, a furry parachute-like membrane that stretches from wrist to ankle. It has a fluffy tail that stabilizes in flight. The tail acts as an adjunct airfoil, working as an air brake before landing on a tree trunk.

Flying squirrels can easily forage for food in the night, given their highly developed sense of smell, where they hunt for fungi, nuts, fruits and bird eggs. Gliding conserves energy.

At birth, they are mostly hairless, apart from their whiskers, and most of their senses are not present. The internal organs are visible through the skin, and their sex can be signified. By week 5 of their life, they are almost fully furred and developed. At that point, they can respond to their environment and start to develop a mind of their own. Through the upcoming weeks of their lives, they practice leaping and gliding. After two and a half months, their gliding skills are perfected, they are ready to leave their nest and are capable of independent survival.
Chapter 7
The Woodchuck (Groundhog)

The Woodchuck

The groundhog also known as a woodchuck, or in some areas as a land-beaver, is a rodent of the family Sciuridae, belonging to the group of large ground squirrels known as marmots. Other marmots, such as the yellow-bellied and hoary marmots, live in rocky and mountainous areas, but the woodchuck is a lowland creature. It is widely distributed in North America and common in the northeastern and central United States. Groundhogs are found as far north as Alaska, with their habitat extending southeast to Alabama.

Mostly herbivorous, groundhogs primarily eat wild grasses and other vegetation, and berries and agricultural crops when available. Groundhogs also eat grubs, grasshoppers, insects, snails and other small animals, but are not as omnivorous as many other sciuridae. Like squirrels they also have been observed sitting up eating nuts such as shagbark hickory but unlike squirrels do not bury them for future use.

Groundhogs are one of the few species that enter into true hibernation, and often build a separate "winter burrow" for this purpose. This burrow is usually in a wooded or brushy area and is dug below the frost line and remains at a stable temperature well above freezing during the winter months. In most areas, groundhogs hibernate from October to March or April, but in more temperate areas, they may hibernate as little as 3 months. To survive the winter, they are at their maximum weight shortly before entering hibernation. They emerge from hibernation with some remaining body fat to live on until the warmer spring weather produces abundant plant materials for food.
Marmots are generally large ground squirrels. Those most often referred to as marmots tend to live in mountainous areas such as the Alps, northern Apennine Mountains, Eurasian steppes, Carpathians, Tatra, and Pyrenees in Europe, the Rockies, the Black Hills, the Cascade Mountains, and the Sierra Nevada in North America, Deosai plateau in Pakistan, and Ladakh in India. The groundhog, however, is also properly called a marmot.

Marmots typically live in burrows (often within rockpiles, particularly in the case of the Yellow-bellied Marmot), and hibernate there through the winter. Most marmots are highly social, and use loud whistles to communicate with one another, especially when alarmed.

Marmots mainly eat greens and many types of grasses, berries, lichens, mosses, roots, and flowers.

Alaska celebrates every February 2 as "Marmot Day," a holiday intended to observe the prevalence of marmots in that state and take the place of Groundhog Day.
Prairie dogs (Cynomys) are burrowing rodents native to the grasslands of North America. There are five different species of prairie dogs: black-tailed, white-tailed, Gunnison, Utah, and Mexican prairie dogs. They are a type of ground squirrel. On average, these stout-bodied rodents will grow to be between 12–16 in long, including the short tail and weigh between 1–3 lb. They are found in the United States, Canada, and Mexico.

Prairie dogs are named for their habitat and warning call, which sounds similar to a dog's bark. The name was in use by at least 1774. The 1804 journals of the Lewis and Clark Expedition note that in September 1804, they "discovered a Village of an animal the French Call the Prairie Dog." Its genus, Cynomys, derives from the Greek for dog mouse.

Highly social, prairie dogs live in large colonies or "towns" – collections of prairie dog families that can span hundreds of acres. Families usually consist of 1 male and 2 to 4 females living in a strict social hierarchy.

The prairie dog is chiefly herbivorous, though it eats some insects. It feeds primarily on grasses and, in the fall, broadleaf forbs. Prairie dogs have 1-6 pups (babies) yearly, which are born blind and furless and need about 30 days of close nurturing from their mother.

Sometimes two prairie dogs touch teeth with each other. Researchers think they do this as a way of recognizing each other.
Chapter 9
The Pika (Cony) and Mountain Beaver (Sewellel)

The pika is a small animal, with short limbs, rounded ears, and short tail. It is also known as the "whistling hare" due to its high-pitched alarm call when diving into its burrow. The name "pika" appears to be derived from the Tungus piika, or perhaps from the Russian pikat "to squeak".

Pikas are native to cold climates, mostly in Asia, North America and parts of eastern Europe. Most species live on rocky mountain sides, where there are numerous crevices to shelter in, although some also construct crude burrows.

Pikas are diurnal (opposite of nocturnal), with higher altitude species generally being more active during the daytime. They show their peak activity before the winter season. Pikas do not hibernate, so they rely on collected hay for warm bedding and food. Pikas gather fresh grasses and lay them in stacks to dry. Once the grasses dry out, the pikas take this hay back to the burrows for storage. It is not uncommon for pikas to steal hay from others; the resulting disputes are usually exploited by neighboring predators like ferrets and large birds.

Eurasian pikas commonly live in family groups and share duties of gathering food and keeping watch. At least some species are territorial. North American pikas (O. princeps and O. collaris) are asocial, leading solitary lives outside the breeding season.
The Mountain Beaver is the most primitive extant rodent. Not to be confused with the North American beaver, it has several common names including Aplodontia, Boomer, Ground Bear, and Giant Mole. The name Sewellel Beaver comes from sewellel or suwellel, the Chinookan term for a cloak made from its pelts.

Mountain Beavers are brown in color, but fur can range from slightly more reddish to more blackish depending on subspecies. There is a light patch under each ear. The animals have distinctively short tails. Adults weigh between about 18–32 oz. Total length is about 12–20 in with a tail length of 0.39–1.6 in.

Mountain Beavers are found in the coastal mountains of British Columbia and southward to include the Cascades Mountain ranges, the Siskyous, Sierra Nevada mountain range of Southern California within North America. They range from sea level to the tree line. They can be found in both deciduous and coniferous forests.

Mountain Beavers build elaborate burrow systems with chambers devoted to fecal and food caches.

Food includes fleshy herbs and young shoots of more woody plants. Ferns probably make up the bulk of the diet. They appear to be strictly vegetarian. Their consumption of seedling trees has led some to consider them a pest. They appear to build hay mounds at some burrow entrances, but whether this behavior is related to water regulation, curing food, or gathering nest materials is debated.

Mountain Beavers are capable of climbing trees, but rarely travel far from burrows. The thumb is slightly opposable and the animals will sit on their hindquarters and manipulate food with their forelimbs and incisors.
Chapter 10
The Porcupine and Pocket Gopher

Porcupine

The porcupine is the prickliest of rodents, though its Latin name means "quill pig." There are about two dozen porcupine species, and all boast a coat of needle-like quills to give predators a sharp reminder that this animal is no easy meal. Some quills, like those of Africa's crested porcupine, are nearly a foot (30 centimeters) long.

Porcupines have soft hair, but on their back, sides, and tail it is usually mixed with sharp quills. These quills typically lie flat until a porcupine is threatened, then leap to attention as a persuasive deterrent. Porcupines cannot shoot them at predators as once thought, but the quills do detach easily when touched.

Many animals come away from a porcupine encounter with quills protruding from their own snouts or bodies. Quills have sharp tips and overlapping scales or barbs that make them difficult to remove once they are stuck in another animal's skin. Porcupines grow new quills to replace the ones they lose.

The porcupines found in North and South America are good climbers and spend much of their time in trees. Some even have prehensile (gripping) tails to aid in climbing. The North American porcupine is the only species that lives in the U.S. and Canada, and is the largest of all porcupines. A single animal may have 30,000 or more quills. North American porcupines use their large front teeth to satisfy a healthy appetite for wood. They eat natural bark and stems, and have been known to invade campgrounds and chew on canoe paddles. North American porcupines also eat fruit, leaves, and springtime buds.

Other porcupine species live in Africa, Europe, and Asia. These animals usually live on the ground and can inhabit deserts, grasslands, and forests.

Female porcupines have between one and four young, depending on the species. Babies have soft quills at birth, which harden within a few days. Most young porcupines are ready to live on their own at about two months of age.
The pocket gophers are burrowing rodents of the family Geomyidae. These are the "true" gophers, though several ground squirrels of the family Sciuridae are often called gophers as well.

Most gophers have brown fur that often closely matches the color of the soil in which they live. Their most characteristic feature is their large cheek pouches, from which the word "pocket" in their name derives. These pouches are fur-lined, and can be turned inside out. They extend from the side of the mouth well back onto the shoulders. They have small eyes and a short, hairy tail, which they use to feel around tunnels when they walk backwards.

All pocket gophers are burrowers. They are larder hoarders, and their cheek pouches are used for transporting food back to their burrows. Gophers can collect large hoards. Their presence is unambiguously announced by the appearance of mounds of fresh dirt about 7.9 inches in diameter. These mounds will often appear in vegetable gardens, lawns, or farms, as gophers like moist soil. They also enjoy feeding on vegetables. For this reason, some species are considered agricultural pests.

Pocket gophers are solitary outside of the breeding season, aggressively maintaining territories that vary in size depending on the resources available. Males and females may share some burrows and nesting chambers if their territories border each other, but in general, each pocket gopher inhabits its own individual tunnel system.
Chapter 12 (Chapter 11 intentionally omitted because a repeat discussion of the Porcupine)
The Beaver

The North American Beaver (Castor canadensis) is the only species of beaver in the Americas, native to North America and introduced to South America. In the United States and Canada, where no other species of beaver occurs, it is usually simply referred to as beaver.

This beaver is the largest rodent in North America and the third largest rodent in the world, after the South American capybara and the Eurasian beaver.

Like the capybara, the beaver is semi-aquatic. The beaver has many traits suited to this lifestyle. It has a large flat paddle-shaped tail and large, webbed hind feet reminiscent of a human diver's swimfins. The unwebbed front paws are smaller, with claws. The eyes are covered by a nictitating membrane which allows the beaver to see underwater. The nostrils and ears are sealed while submerged. A thick layer of fat under its skin insulates the beaver from its cold water environment. The beaver's fur consists of long, coarse outer hairs and short, fine inner hairs (see Double coat). The fur has a range of colors but usually is dark brown.

Beavers are mainly active at night. They are excellent swimmers but are more vulnerable on land and tend to remain in the water as much as possible. They are able to remain submerged for up to 15 minutes. The flat, scaly tail is used to signal danger and also serves as a source of fat storage.

They construct their homes, or "lodges," out of sticks, twigs, and mud in lakes, streams, and tidal river deltas. These lodges may be surrounded by water, or touching land, including burrows dug into river banks. They are well known for building dams across streams and constructing their lodge in the artificial pond which forms. When building in a pond, the beavers first make a pile of sticks and then eat out one or more underwater entrances and two platforms above the water surface inside the pile. The first is used for drying off. Towards winter, the lodge is often plastered with mud which when it freezes has the consistency of concrete. A small air hole is left in the top of the lodge. In the event of danger, a beaver slaps its tail on the water to warn other family members.

Beavers are most famous, and infamous, for their dam-building. They maintain their pond-habitat by reacting quickly to the sound of running water, and damming it up with tree branches and mud. Early ecologists believed that this dam-building was an amazing feat of architectural planning, indicative of the beaver's high intellect. This theory was disproved when a recording of running water was played in a field near a beaver pond. Despite the fact that it was on dry land, the beaver covered the tape player with branches and mud.
Chapter 13
The Muskrat and the Brown (Norway) Rat

Muskrat

The muskrat is a medium-sized semi-aquatic rodent native to North America. The muskrat is found in wetlands and is a very successful animal over a wide range of climates and habitats. It plays an important role in nature and is a resource of food and fur for humans.

Muskrats are referred to as "rats" in a general sense because they are medium-sized rodents with an adaptable lifestyle and an omnivorous diet. They are not, however, so-called "true rats". The muskrat's name comes from the two scent glands which are found near its tail; they give off a strong "musky" odor which the muskrat uses to mark its territory.

Muskrats are covered with short, thick fur which is medium to dark brown in color with the belly a bit lighter but as the age increases the "fur" turns a partly gray in color. The fur has two layers, which helps protect them from the cold water. They have long tails which are covered with scales rather than hair and are flattened vertically to aid them in swimming. When they walk on land the tail drags on the ground, which makes their tracks easy to recognize.

Muskrats spend much of their time in the water and are well suited for their semi-aquatic life, both in and out of water. Muskrats can swim under water for 12 to 17 minutes. They can close off their ears to keep the water out. Their hind feet are semi-webbed, although in swimming the tail is their main means of propulsion.

Muskrats are most active at night or near dawn and dusk. They feed on cattails and other aquatic vegetation. They do not store food for the winter, but sometimes eat the insides of their lodges. While Muskrats may appear to steal food that beavers have stored, more seemingly cooperative partnerships with beavers exist.

Plant materials make up about 95 percent of their diets, but they also eat small animals such as freshwater mussels, frogs, crayfish, fish, and small turtles.
The brown rat, common rat, sewer rat, Hanover rat, Norway rat, Brown Norway rat, Norwegian rat, or wharf rat is one of the best known and most common rats.

Originally called the "Hanover rat" by people wishing to link problems in 18th century England with the House of Hanover, it is not known for certain why the brown rat is named Rattus norvegicus (Norwegian rat) as it did not originate from Norway. However, the English naturalist John Berkenhout, author of the 1769 book *Outlines of the Natural History of Great Britain*, is most likely responsible for popularizing the misnomer. Berkenhout gave the brown rat the binomial name “Norwegian Rat” believing that it had migrated to England from Norwegian ships in 1728, although no brown rat had entered Norway at that time.

The fur is coarse and usually brown or dark grey, while the underparts are lighter grey or brown. The brown rat is usually active at night and is a good swimmer, both on the surface and underwater, but unlike the related Black Rat (Rattus rattus) they are poor climbers. Brown rats dig well, and often excavate extensive burrow systems.

The brown rat is a true omnivore and will consume almost anything, but cereals form a substantial part of its diet. Martin Schein, founder of the Animal Behavior Society in 1964, studied the diet of brown rats and came to the conclusion that the most-liked foods of brown rats were (in order) scrambled eggs, macaroni and cheese, and cooked corn kernels. According to Schein, the least-liked foods were raw beets, peaches, and raw celery.
Cotton Rat

A cotton rat is any member of the Sigmodon genus of rodents. They are called cotton rats because they build their nests out of cotton, and can damage cotton crops. Cotton rats have small ears and dark coats, and are found in North and South America. They are primarily herbivores. The molars of cotton rats are S-shaped when viewed from above. The genus name literally means S-tooth.
Wood or Pack Rat aka Bushy-tailed Woodrat

A pack rat, also called a trade rat or wood rat, can be any of several species in the genus Neotoma, but most commonly the Bushy-tailed Woodrat.

Pack rats are prevalent in the deserts and highlands of western United States and northern Mexico. They also inhabit parts of the eastern United States and Western Canada. Pack rats are a little smaller than a typical rat and have long, sometimes bushy tails.

Pack rats build complex nests of twigs, called "middens", often incorporating cactus. Nests are often built in small caves, but frequently also in the attics and walls of houses. Some Neotoma species, such as the White-throated Woodrat (N. albigula), use the base of a prickly pear or cholla cactus as the site for their home, utilizing the cactus' spines for protection from predators.

A peculiar characteristic is that if they find something they want, they will drop what they are currently carrying, for example a piece of cactus, and "trade" it for the new item. They are particularly fond of shiny objects, leading to tales of rats swapping a stone for jewelry.[citation needed]

They can also be quite vocal and boisterous, sounding at times as if a "family rift" is taking place.

Pack rats are known for their characteristic searching of materials to bring back to their nests creating an ever expanding collection known as a "midden" for its messiness. In natural environments, the middens are normally built out of sticks in rock crevices or caves for protection from predators. In the absence of crevices or caves, the middens are often built under trees or bushes. The pack rats will also use plant fragments, animal dung and small rocks in building the nest. The vast majority of the materials will be from a radius of several dozen yards of the nest. The pack rats urinate in the midden; sugar and other substances in the urine crystallizes as it dries out, creating a material known as amberat, cementing the midden together. After a few decades, the rats will abandon the midden and move on to start a new nest.

A pack rat midden is the nest of a pack rat. Pack rat middens may preserve the materials incorporated into it up to 40,000 years. The middens may thus be analyzed to reconstruct their original environment, and comparisons between middens allow a record of vegetative and climate change to be built.
Kangaroo rats, are small rodents native to North America. The common name derives from their bipedal form: as they hop in a manner similar to the much larger kangaroo, although they are not related.

The overall color of the kangaroo rats can be anywhere between pale, sandy yellow, and dark brown, with a white underside and often with white banding across the thighs. Tails tend to be dark with white sides and a tuft of longer hairs.

Kangaroo rats are found in arid and semi-arid areas of Canada, the United States and Mexico that retain some grass or other vegetation and thus fall under category xerocole, (animals adapted to live in a desert). Their diet includes seeds, leaves, stems, buds, some fruit, and insects. Most kangaroo rat species use their burrows and buried caches nearby to store food against the possibility of bad seasons.

Kangaroo rats live in unknown environments in which food availability varies widely in space and time. The ability to hoard food is a vital adaptation. Food-hoarding is facilitated by the presence of external fur-lined cheek pouches that are used to transport food items from the harvest location to the storage site. The fur lining allows for seed transport with minimal water loss. The pouches open on either side of the mouth and extend back to the shoulders. They fill the pouches with food, then empty them by turning them inside out, like pockets, with their forepaws. There is a special muscle that, once the pouch is empty and clean, pulls it back in again.

Kangaroo rats lose water mainly by evaporation during gas exchange, and so have developed a behavioral adaptation to prevent this loss. As they spend a lot of time within their burrows to escape the heat of the day, the burrows become much more humid than the air outside (due to evaporative loss). When collecting seeds, they store them in the burrows rather than eating them straight away. This causes the moisture in the air to be absorbed by the seeds, and the kangaroo rat regains the water it has previously lost when it then consumes them.
The Wood Mouse or Long-tailed Field Mouse

The wood mouse also called the long-tailed field mouse, is a common murid rodent from Europe and North Africa. If a wood mouse is caught by its tail, it can quickly shed the end of it, which may never regrow. The wood mouse does not hibernate and, despite its name, it prefers hedgerows to woodland.

Wood mice inhabit forests, grasslands, and cultivated fields. Almost entirely nocturnal and terrestrial, wood mice burrow extensively, build nests of plants and live in buildings during harsh seasons.

Wood mice are primarily seed eaters, particularly seeds of trees such as oak, beech, ash, lime, hawthorn and sycamore. If there is a plentiful amount of seeds on the ground, they carry them back to their nests/burrows for storage. They may eat small invertebrates such as snails and insects, particularly in late spring and early summer when seeds are least available. They also consume berries, fruits and roots. They do not hibernate, however during severe winter seasons they fall into a sort of torpor; a decrease in physiological activity. They are mainly active during the dark, and are very good climbers. While foraging, the wood mice pick up and distribute visually conspicuous objects, such as leaves and twigs, which they then use as landmarks during exploration.
Meadow Vole

The Meadow Vole (Microtus pennsylvanicus), sometimes called the Field Mouse or Meadow Mouse, is a small North American vole found across Canada, Alaska and the northern United States. Its range extends further south along the Atlantic coast.

Voles often live in open fields as opposed to wooded areas, and are abundant in areas with a high degree of plant cover. If an area experiences an event which results in a decrease in its amount of plant cover, such as the activity of grazing animals, it will result in a decrease in the abundance of meadow voles in that area. Meadow voles prefer areas of increased plant cover, providing increased cover from predators. The meadow vole is so strongly attracted to areas of dense plant cover that even the presence of the scent of a predator will not discourage the meadow voles from remaining in that area. In winter, M. pennsylvanicus tends to remain below the snow surface in tunnels and winter nests on the ground surface. In the spring, they lose snow-tunnel pathways and move in ground-surface tunnels through the vegetation.

The Meadow Vole is an herbivore, feeding mainly on the grasses that are abundant in its environment. When grass is not readily available, such as during the winter months, the meadow vole may often gnaw on tree bark as a source of nourishment. They often will eat nuts and seeds when available. In captivity, they will frequently feed on lettuce and sunflower seeds as supplements to their diets. The part of the plant on which the meadow vole will most likely feed depends on the nutritional value of that part of the plant. They prefer parts of plants with high amounts of digestible energy and nutrients, while they tend to avoid the parts containing large quantities of fiber. This is because fiber is difficult to digest and will therefore be an inefficient source of calories. Though if poorly digestible food is all that is available to the meadow vole, it will compensate for the low nutritional value of the food by increasing the quantity of it that it ingests. This increase in food intake causes the gastrointestinal tract of the meadow vole to become larger, allowing the food to remain for a longer time in the animal's digestive system and giving it a longer period of time to absorb the few nutrients that are present.
Chapter 16
Banded and Brown Lemmings and the Jumping Mouse

Lemmings are small rodents, usually found in or near the Arctic, in tundra biomes. They are subniveal animals, and together with the voles and muskrats, they make up the subfamily Arvicolinae (also known as Microtinae), which forms part of the largest mammal radiation by far, the superfamily Muroidea, which also includes the rats, mice, hamsters, and gerbils.

They generally have long, soft fur, and very short tails. They are herbivorous, feeding mostly on leaves and shoots, grasses, and sedges in particular, but also on roots and bulbs. At times, they will eat grubs and larva. Like other rodents, their incisors grow continuously, allowing them to exist on much tougher forage than would normally be possible.

Lemmings do not hibernate through the harsh northern winter. They remain active, finding food by burrowing through the snow and utilizing grasses clipped and stored in advance. They are solitary animals by nature, meeting only to mate and then going their separate ways, but like all rodents they have a high reproductive rate and can breed rapidly when food is plentiful.

Misconceptions about lemmings go back many centuries. In the 1530s, the geographer Zeigler of Strasbourg proposed the theory that the creatures fell out of the sky during stormy weather and then died suddenly when the grass grew in spring. This myth was refuted by the natural historian Ole Worm, who accepted that the lemmings could fall out of the sky but that they had been brought over by the wind rather than created by spontaneous generation. It was Worm who first published dissections of a lemming, which showed that they are anatomically similar to most other rodents, and the work of Carl Linnaeus proved that the animals had a natural origin.
Jumping mice are a group of mouse-like rodents in North America and China.

Although mouse-like in general appearance, these rodents are distinguished by their elongated hind limbs, and, typically, by the presence of four pairs of cheek-teeth in each jaw. There are five toes to all the feet, but the first in the fore-feet is rudimentary, and furnished with a flat nail. The tail makes up for 60% of its body length and is used to gain balance while bounding. The cheeks have pouches.

In America these rodents inhabit forest, pasture, cultivated fields or swamps. When disturbed, they start off with enormous bounds of eight or ten feet in length, which soon diminish to three or four; and in leaping the feet scarcely seem to touch the ground. they are nocturnal and generally live alone. The nest is placed in clefts of rocks, among timber or in hollow trees, and there are generally three litters in a season.
Chapter 17
The Pine Mouse, Red-backed Mouse, Rufous Tree Mouse, Harvest Mouse and House Mouse

Woodland Vole

The Woodland Vole, is a small vole found in eastern North America. It is also known as the Pine Vole.

These animals have short, soft reddish-brown fur on the upperparts and greyish brown underparts. They have short ears and a short tail, somewhat darker on top. They are 12 cm long with a 2 cm tail and weigh about 29 g.

They are found in deciduous woods with leaf litter and soft soils in the eastern United States to central Texas and as far north as southern Ontario and Quebec. These animals make shallow underground burrows, also sometimes using burrows built by other small mammals. They are often found in small loose colonies.

They feed on grasses, roots, seeds, bark and underground fungi, sometimes berries and insects. Food is stored in their burrows. Predators include hawks, owls, foxes and snakes. They may cause damage in orchards. These animals give a high-pitched sound to warn of danger.

The female vole has 2 to 4 litters of 3 to 7 young in a nest lined with vegetation in an underground burrow or under a log. Pairs are usually monogamous.

They are active year-round, at most times of the day, but mainly travel in their burrows.

Most woodland voles have a lifespan of 3 months.
The red-backed voles are the members of the genus *Myodes*, a group of small slender voles found in North America, Europe and Asia. The genus name comes from the Greek "keyhole mouse".

They inhabit northern forests, tundra and bogs. These animals feed on shrubs, berries and roots. Most species have reddish brown fur on their back. They have small eyes and ears. Unlike other voles, the molar teeth are rooted in adults.

*Rufous Tree Mouse (no picture)*

The Ghana Rufous-nosed Rat (*Oenomys ornatus*) is a species of rodent in the Muridae family. It is found in Ivory Coast, Ghana, Guinea, Liberia, and Sierra Leone. Its natural habitats are subtropical or tropical seasonally wet or flooded lowland grassland and seasonally flooded agricultural land.
Habitat: Rock mice are associated with montane shrubland and piñon-juniper woodlands along the Eastern Slope. The northern rock mouse lives in rocky canyons, cliffs, cuestas, and exposed hogbacks that provide numerous cracks, fissures, and overhanging ledges. The animals occupy colluvial debris at the bases of such outcrops.

Diet: Oakbrush, piñon, juniper, skunkbrush, mountain-mahogany, choke cherry, and bitterbrush are common woody species that provide cover and seeds for food. Other plant materials and insects are also consumed.

Description: The northern rock mouse has long ears and is rather similar in appearance to the piñon mouse. However, the pelage is grayish brown, less huffy than that of the piñon mouse, with whitish to silver-gray underparts. Furthermore, the bicolored tail is usually slightly longer than the head and body, and the ears usually are less than 22 mm long, equal to or shorter than the hindfoot. Measurements are: total length 170-200 mm; length of tail 80-100 mm; length of hindfoot 22-25 mm; length of ear 21-24 mm; weight 25-30 g.

Range in Colorado: They occur northward along the foothills of the Sangre de Cristos and the Front Range. They continue eastward in the roughlands of the Raton Section of southeastern Colorado to southwestern Baca County and westward to the eastern part of the San Luis Valley.
Oldfield Mouse

The oldfield mouse or beach mouse (Peromyscus polionotus) is a nocturnal species of rodent in the Cricetidae family. It is found in the southeastern United States on sandy beaches, in corn and cotton fields, and in hedge rows and open timber tracts. Coloration varies with geographic location: inland populations are generally fawn-colored while coastal populations are lighter or white. The mouse eats seeds, fruits, and occasionally insects, and lives and raises its three to four young in a simple burrow. Weaning occurs at 20–25 days, and females may mate at 30 days of age.

P. polionotus are omnivores and the principal diet is seasonal seeds of wild grasses and forbs but blackberries, acorns, and wild pea may be consumed. Insects consumed include beetles, leaf hoppers, true bugs, and ants. Vertebrates are consumed. Beach populations will consume the fruits and wind-deposited seeds of sea oats and sea rocket and will feed on invertebrates when seeds are scarce.

The beach mouse burrows and leaves mounds of earth around the burrow entrance. The burrow slopes down from the entrance for a space then levels off with a nest at its end. A branch of the burrow may extend above the nest to just a few centimeters below the surface as an emergency exit. Should the burrow be disturbed, the mouse will "explode" through the sand via the exit and dash off. The mice will close any burrows in heavy rains should flood threaten. Spiders, snakes, and other species may move into a burrow.
This small, light-colored mouse can be distinguished from other rodents by: 1) light grayish buff upperparts and sides mixed with black hairs, 2) yellowish to buffy wash along the sides and around the ears and nose, 3) small, sometimes indistinct, white patches at the base of the ears, 4) white underparts, 5) dorsal stripe on the tail, 6) external cheek pouches which are fur-lined and open on each side of the mouth, and 7) grooved upper incisor teeth. Immatures are grayer than adults.

The plains pocket mouse does not hibernate, but does become inactive for short periods during severely cold weather. Its denning areas are characterized by many small holes localized in sandy or soft soils. These holes lead to nesting sites and other chambers where seeds are cached. During daylight hours the main entrance is plugged and, like gophers, if the plug is removed the mouse will reseal the entrance with another plug. The plains pocket mouse begins to feed at late twilight and continues all night until daybreak when it returns to its cool, protected subterranean shelter. Seeds are placed in cheek pouches with the front feet and are than carried to the storage chambers.

Food of the plains pocket mouse consists almost entirely of grass seeds, and rarely arthropods. Water is provided by dew and the manufacture of metabolic water.
The genus Onychomys contains species commonly referred to as grasshopper mice. This is a genus of New World mouse only distantly related to the common house mouse.

The New World rats and mice are a group of related rodents found in North and South America. They are extremely diverse in appearance and ecology, ranging in from the tiny Baiomys to the large Kunsia. They represent one of the few examples of muroid rodents (along with the voles) in North America, and the only example of muroid rodents to have made it into South America.

The New World rats and mice are often considered part of a single subfamily, Sigmodontinae, but the recent trend among muroid taxonomists is to recognize three separate subfamilies. This strategy better represents the extreme diversity of species numbers and ecological types.

Some molecular phylogenetic studies have suggested that the New World rats and mice are not a monophyletic group, but this is yet to be confirmed. Their closest relatives are clearly the hamsters and voles.

Deer mice, white-footed mice and sigmodontine rodents may carry hantaviruses that cause severe illness in humans.

The New World rats and mice are divided into 3 subfamilies, 12 tribes, and 84 genera.
The Harvest Mouse, is a small rodent native to Europe and Asia. It is typically found in fields of cereal crops such as wheat and oats, in reed beds and in other tall ground vegetation such as long grass and hedgerows. It has reddish-brown fur with white underparts and a naked, highly prehensile tail which it uses for climbing. It is the smallest European rodent: an adult may weigh as little as 4 grams (0.14 oz). It eats chiefly seeds and insects but also nectar and fruit. Breeding nests are spherical constructions carefully woven from grass and attached to stems well above the ground.

Before the Harvest Mouse had been formally described, Gilbert White sensed that they were an undescribed species, and reported their nests in Selborne, Hampshire:

They never enter into houses; are carried into ricks and barns with the sheaves; abound in harvest; and build their nests amidst the straws of the corn above the ground, and sometimes in thistles. They breed as many as eight at a litter, in a little round nest composed of the blades or grass or wheat. One of these nests I procured this autumn, most artificially platted, and composed of the blades of wheat; perfectly round, and about the size of a cricket-ball. It was so compact and well-filled, that it would roll across the table without being discomposed, though it contained eight little mice that were naked and blind.

Conservation efforts have taken place in Britain since 2001. Tennis balls used in play at Wimbledon have been recycled to create artificial nests for harvest mice in an attempt to help the species avoid predation and recover from near-threatened status.

The upper part of the body is brown, sometimes with a yellow or red tinge, and the under-parts range from white to cream coloured. It has a prehensile tail which is usually bicoloured and furless at the tip. The mouse's rather broad feet are adapted specifically for climbing, with a somewhat opposable large outermost toe, allowing it to grip stems with each hindfoot and its tail, thus freeing the mouse's forepaws for food collection. Its tail is also used for balance.
The house mouse (Mus musculus) is a small rodent, a mouse, one of the most numerous species of the genus Mus.

As a wild animal the house mouse mainly lives associated with humans, causing damage to crops and stored food.

House mice thrive under a variety of conditions: they are found in and around homes and commercial structures as well as in open fields and agricultural lands. House mice consume and contaminate food meant for humans, pets, livestock, or other animals. In addition, they often cause considerable damage to structures and property. They can transmit pathogens that cause diseases such as salmonellosis, a form of food poisoning.

House mice usually run, walk or stand on all fours; but when eating, fighting or orienting themselves, they stand only on the hind legs, supported by the tail. When running the horizontal tail serves for balance; the end stands up vertically, unless the mouse is frightened. Mice are good jumpers, climbers, and swimmers.

Mice are mostly active during dusk or night; they do not like bright lights. They have an instinctual fear of so-called "black lighting" and strobe lighting, which leads to a common method of controlling mice in the home. They live in a wide variety of hidden places that are near food sources and construct nests from various soft materials.

House mice primarily feed on plant matter, but they will also accept meat and dairy products. Although they are generally known to like fruits, they are repelled by the scent of many varieties of artificial fruit scent, for example strawberry or vanilla-scented candles. The reason for this is unknown, although it dates back to antiquity when Roman Senators used candles scented with strawberry oils to keep mice out of their sleeping chambers.
The Long-tailed Shrew or Rock Shrew (Sorex dispar) is a small North American shrew found in Atlantic Canada and the north-eastern United States.

This shrew is slate grey in colour with a pointed snout, a long tail and lighter underparts. It is found on rocky slopes in mountainous areas along the Atlantic coast from New Brunswick/Nova Scotia to northern Georgia. It eats insects and spiders. Predators include hawks, owls, and snakes.

The Long-tailed shrew is a medium sized shrew with slat gray fur with blackish tips. It has light gray under parts and white feet. The tips of its teeth are a dark chestnut color. It has a body length of four and a half inches with a tail that is two inches long. See Picture of Long-Tailed Shrew.

Also known as the Rock Shrew, the long-tailed shrew uses its tail for balance when climbing rocks and slopes in deciduous and coniferous forests. They tunnel in rocky crevices between boulders and beneath moss covered logs and are found from New Brunswick, Canada south to Tennessee and North Carolina and in high elevations of the Great Smokey Mountains.
Southern Short-tailed Shrew

Although its external appearance is generally that of a long-nosed mouse, a shrew is not a rodent, as mice are, and not closely related to rodents. Shrews have sharp, spike-like teeth, not the familiar gnawing front incisor teeth of rodents. All shrews are comparatively small, most no larger than a mouse. The largest species is the House Shrew.

In general, shrews are terrestrial creatures that forage for seeds, insects, nuts, worms and a variety of other foods in leaf litter and dense vegetation, but some specialize in climbing trees, living underground, in the subniveal layer or even hunting in water. They have small eyes, and generally poor vision, but have excellent senses of hearing and smell. They are very active animals, with voracious appetites and unusually high metabolic rates. Shrews must eat 80-90% of their own body weight in food daily.

They do not hibernate, but are capable of entering torpor. In winter, many species undergo morphological changes that drastically reduce the animal’s body weight. Shrews can lose between 30% and 50% of their body weight, shrinking the size of bones, skull and internal organs.

Whereas rodents have gnawing incisors that grow throughout life, the teeth of shrews wear down throughout life, a problem made more extreme by the fact that they lose their milk teeth before birth, and therefore have only one set of teeth throughout their lifetime. Apart from the first pair of incisors, which are long and sharp, and the chewing molars at the back of the mouth, the teeth of shrews are small and peg-like, and may be reduced in number.

Shrews are unusual among mammals in a number of respects. Unlike most mammals, some species of shrew are venomous. Shrew venom is not conducted into the wound by fangs, but by grooves in the teeth. The venom contains various compounds and the contents of the venom glands of the American short-tailed shrew are sufficient to kill 200 mice by intravenous injection. One chemical extracted from shrew venom may be potentially useful in the treatment of blood pressure while another compound may be useful in the treatment of neuromuscular conditions and migraines. The saliva of the Northern Short-tailed Shrew has also been studied for use in medicine to treat ovarian cancer.
The Marsh Shrew (Sorex bendirii), also known as the Pacific Water Shrew, is a large North American shrew found near aquatic habitats, the largest member of genus Sorex in North America. It is found along the Pacific coast from southern British Columbia in Canada to northern California in the United States.

The Marsh Shrew is dark brown in colour with dark underparts and a long tail. Its hind feet have coarse hairs on the toes. Its body is about 16 cm in length including a 7 cm long tail and it weighs about 13 g. It swims and takes short dives in search of food. Its diet includes earthworms, aquatic insects, slugs and snails. This animal is active during the day but is more active at night. The female has a litter of 3 or 4 young in a nest in a tunnel or under a log. Water shrews typically live about 18 months. The range and numbers of these animals are thought to have declined due to loss of suitable wetland habitat, especially near urban areas and farmlands.
Chapter 20
The common Mole, Brewer’s or Hairy-tailed Mole, Oregon Mole, Star-nosed Mole

The European Mole, Talpa europaea, is a mammal of the order Soricomorpha. It is also known as the Common Mole and the Northern Mole.[3]

This mole lives in an underground tunnel system, which it constantly extends. It uses these tunnels to hunt its prey. Under normal conditions the displaced earth is pushed to the surface, resulting in the characteristic "mole hills". It feeds mainly on earthworms, but also on insects, centipedes and even mice and shrews. Its saliva contains toxins which paralyze earthworms in particular.[4]

It has a cylindrical body and is around 12 cm (5 inches) long. Females are typically smaller than males. The eyes are small and hidden behind fur, while the ears are just small ridges in the skin. The fur is usually dark grey, but the actual range of colors is larger, as due to the subterranean habits there is no disadvantage in having off-coloured fur. European moles with white, light grey, tan, taupe, and black fur have all been reported.
The Hairy-tailed Mole (Parascalops breweri), also known as Brewer's Mole, is a medium-sized North American mole.

Hairy-tailed moles are most distinguishable from other moles by their hairy tale, short snout, and the lack of protuberances on the snout. The length of the head and body is 116 to 140mm, and the length of it's tail is 23 to 36mm. When Hairy-tailed moles become adults, they weigh from 40-85 grams. The fur is soft and thick, colored blackish. There usually are white spots on the belly. The snout, tail, and feet often become pure white with age. The snout has a middle horizontal groove on the front half. There are no external ears, and the eyes are barely visible from the fur. the palms of hands of the Hairy-tailed mole are as wide as they are long. The tail is thick and fleshy with scales covered with long hairs. Males are slightly physically larger than females.

Hairy-tailed moles are mainly found in hardwood forests and meadows. The soil is usually light and well drained. Their habitat is usually elevated from the seal level to about 900 meters. Usually two to eleven Hairy-tailed moles live in an acre. Hairy-tailed moles interact with their environment by digging underground tunnels in the dirt.

Hairy-tailed moles are found from southern Quebec and Ontario to the middle of Ohio, and south as far as the western part of North Carolina. They mainly stay in the East of the USA.

Hairy-tailed moles are insectivores. Their main diet consists of earthworms, ants, beetle larvae, centipedes, and small rootlets. Ants are important when other food items are scarce. Some natural predators are the Red Fox, copperhead snake and opossum.
The star-nosed mole (Condylura cristata) is a small North American mole found in wet low areas of eastern Canada and the north-eastern United States.

Star-nosed moles are easily identified by the eleven pairs of pink fleshy appendages ringing their snout which are used as a touch organ with more than 25,000 minute sensory receptors, known as Eimer’s organs, with which this hamster-sized mole feels its way around.

The star-nosed mole lives in wet lowland areas and eats small invertebrates, aquatic insects, worms and mollusks. It is a good swimmer and can forage along the bottoms of streams and ponds. Like other moles, this animal digs shallow surface tunnels for foraging; often, these tunnels exit underwater. It is active day and night and remains active in winter, when it has been observed tunnelling through the snow and swimming in ice-covered streams.

The incredibly sensitive nasal tentacles are covered with minute touch receptors known as Eimer's organs. The nose is approximately one centimeter in diameter with approximately 25,000 Eimer's organs distributed on 22 appendages. Eimer's organs were first described in the European mole in 1871 by German zoologist Theodor Eimer. Other mole species also possess Eimer's organs, though they are not as specialized or numerous as in the star-nosed mole. Because the star-nosed mole is functionally blind, it had long been suspected that the snout was used to detect electrical activity in prey animals,[5] though there is little, if any, empirical support for this contention. It appears the nasal star and dentition of this species are primarily adapted to exploit extremely small prey items. A report in the journal Nature gives this animal the title of fastest-eating mammal, taking as short as 120 milliseconds (average: 227 milliseconds) to identify and consume individual food items. Its brain decides in the ultra short time of 8 ms if a prey is comestible or not. This speed is at the limit of the speed of neurons. They also possess the ability to smell underwater. It is done by exhaling air bubbles onto objects or scent trails and then inhaling the bubbles to carry scents back through the nose.
Chapter 21
The Red Bat, Cave Bat, House Bat, Silvery Bat, Hoary Bat and Big-eared Bat.

Eastern Red Bat

The Eastern Red Bat (Lasiurus borealis) is a species of bat from the Vespertilionidae family. Eastern red bats are widespread across eastern North America, with additional records in Bermuda. It is also scarce but widespread throughout many of the Bahamian islands.

Like most Vespertilionids, eastern red bats are insectivorous. Moths form the majority of the diet, but red bats also prey heavily on beetles, flies, and other insects. Echolocation calls have low minimum frequencies, but calls are highly variable ranging from (35-50 kHz). Eastern red bats are best suited for foraging in open spaces due to their body size, wing shape, and echolocation call structure. However, red bats are frequently captured by researchers foraging over narrow streams and roads.

Mating likely occurs in late summer or autumn and the sperm is stored in the female's reproductive tract until spring when ovulation and fertilization occurs. In June, females usually give birth to three or four young and then roost with their young until they are weaned. Males roost alone throughout the Summer. High temperature demands associated with gestation and rearing young may limit the northern range for reproductive females. Eastern red bats often roost amongst live or dead leaves on the branches of live hardwood trees, but have also been found using lobolly pine trees in pine plantations.

In late summer, eastern red bats from the northern parts of the range may migrate south for the winter, although little is known about migration routes or overwintering range. In winter, red bats forage for insects on warm nights and even warm days. On warm days during the winter, red bats enter torpor while roosting in the canopy of hardwood or coniferous trees, but during cold bouts they crawl underneath dead leaf litter on the ground and use their furred tail as a blanket.
The little brown bat (sometimes called little brown myotis) (Myotis lucifugus) is a species of the genus Myotis (mouse-eared bats), one of the most common bats of North America. As suggested by the bat’s name, its fur is uniformly dark brown and glossy on the back and upper parts with slightly paler, greyish fur underneath.

Little brown bats are insectivores, eating moths, wasps, beetles, gnats, mosquitoes, midges and mayflies, among others. Since many of their preferred meals are insects with an aquatic life stage, such as mosquitoes, they prefer to roost near water. They echolocate to find their prey. Often they will catch larger prey with a wingtip, transfer it to a cup formed by their tail, then eat it - smaller prey are usually just caught in the mouth. They often use the same routes over and over again every night, flying 3–6 meters high above water or among trees. An adult can sometimes fill its stomach in 15 minutes; young have more difficulty. If they do not catch any food, they will enter a torpor similar to hibernation that day, awakening at night to hunt again.

Since little brown bats live in a temperate zone, they must find some way of dealing with winter. Most temperate bats either migrate or hibernate, but little brown bats do both. In summer, the males and females live apart, the females raising young. When fall comes, both sexes fly south to a hibernaculum, where they mate and then hibernate.

Little brown bats undergo a prolonged period of hibernation during the winter due to the lack of food. They hibernate in caves as a community. Little brown bats mate in the autumn, before hibernation begins, and over winter the male's sperm is stored inside the female's body, and the infant is conceived in spring. When they arise in the spring, the females go to nursery colonies which may often be the same place where they were born.

These nursery colonies consist mainly of adult females and their young and can be located in the attics of warm buildings where there is high humidity. These colonies sometimes reach numbers of bats as great as 1,000 per cave/forest.
The Big Brown Bat (Eptesicus fuscus) is larger in size than comparative species of bats, from about 4 to 5 inches (10 – 13 cm) in body length, with a 11-13 inch (28 to 33 cm) wingspan and weighing 1/2 to 5/8 ounce. The fur is moderately long, and shiny brown. The wing membranes, ears, feet, and face are dark brown to blackish in color.

Big brown bats are nocturnal, roosting during the day in hollow trees, beneath loose tree bark, in the crevices of rocks or in man-made structures such as attics, barns, old buildings, eaves and window shutters. Big brown bats navigate through the night skies by use of echolocation, producing ultrasonic sounds through the mouth or nose. Big brown bats are known also to produce audible sound during flight. Its voice is a click or a sound like escaping steam.

Big brown bats are insectivorous, eating many kinds of night-flying insects including mosquitoes, moths, beetles, and wasps which they capture in flight. This causes the sudden, frequent changes in direction.

Big brown bats hibernate during the winter months, often in different locations than their summer roosts. Winter roosts tend to be natural subterranean locations such as caves and underground mines where temperatures remain stable; it is still unknown where a large majority of Big Brown Bats spend the winter. If the weather warms enough, they may awaken to seek water, and even breed. Big brown bats mate sporadically from November through March. After the breeding season, pregnant females separate themselves into maternity colonies.
I. Order Lagomorpha

A. Rabbits

1. Eastern Cottontail (31)
2. Marsh Rabbit (32)

B. Hares

1. Northern Hare (34)
2. Swamp Hare (33)
3. Arctic Hare (36)
4. White-tailed Jackrabbit (39)
5. Antelope Jackrabbit (37)
6. Black-tailed Jackrabbit (38)

C. Pika (25)

II. Order Rodentia (Rodents) A. Squirrels

1. True Squirrels (Sciuridae) a. Tree Squirrels

i. Eastern Gray Squirrel (60) ii. Red Squirrel (67)
iii. Fox Squirrel (61)
iv. Abert’s Squirrel (63)

v. Kaibab Squirrel (64)

b. Rock Squirrels

i. Eastern Chipmunk (45)

c. Ground Squirrels

i. Thirteen-lined Ground Squirrel (50)

ii. California Ground Squirrel (56)

2. Marmots
a. Woodchuck (49)
b. Hoary Marmot (47)

3. Flying Squirrels
a. Northern Flying Squirrel (65)
4. Prairie Dogs
   a. Black-tailed Prairie Dog (58)

**B. Misc. Large Rodents**

1. Mountain Beaver (41) (Family: Aplodontidae) 2. Porcupine (40) (family: Erethizontidae)
3. American Beaver (42) (family: Castoridae)

**C. Superfamily: Muroidea**

1. Cricetidae
   a. Voles, Lemmings & muskrat
      i. Muskrat (88)
      ii. Meadow Vole (Meadow Mouse) (84)
      iii. Banded or Collared Lemming (86)
      iv. Woodland Vole (Pine Mouse) (85)

   v. Southern Red-backed Vole (Red-backed Mouse) (83)

   vi. Red Tree Vole (Rufous Tree Mouse) (82)

   b. truehamsters
   c. NorthAmericanratsandmice
      i. Eastern Woodrat (74)
      ii. White-footed or Deer Mouse (77)
      iii. Grasshopper Mouse (81)
      iv. Harvest Mouse

   d. New World Rats and Mice
      i. Hispid Cotton Rat (73)
      ii. Beach Mouse

2. Muridae
   a. Brown or Norway Rat (91)
   b. House Mouse (90)

3. Nesomyidae
   a. Pinyon Mouse (called Rock Mouse) (79)

**D. Dipodidae**

1. Woodland Jumping Mouse (80)

**E. Heteromyidae**

1. Banner-tailed Kangaroo Rat (70)

2. Silky and Spiny Pocket Mice -- California Pocket Mouse (72) is an example

**F. Geomyidae**

1. Plains Pocket Gopher (71) -- Chapter 10
III. Order Soricomorpha

A. Shrews
1. Least Shrew (3)
2. Short-tailed Shrew (5) 3. Water Shrew (6)

B. Moles (Talpidae)
1. Eastern Mole (7)
2. Hairy-tailed Mole (10) 3. Townsend's Mole (9) 4. Star-nosed Mole (8)

IV. Order Chiroptera (bats)
A. Red Bat (19)

B. Little Brown Myotis (13) C. Big Brown Bat (17)
D. Silver-haired Bat (15) E. Hoary Bat (18)

F. Spotted Bat (21)

V. Order Carnivora
A. Superfamily: Musteloidea
1. Skunks (family: mephitidae)
   1. a) Striped Skunk (138)
   2. b) Hog-nosed Skunk (140)
   3. c) Spotted Skunk (137)

2. Weasels (family: mustelidae) a. Badger (136)
   b. Wolverine (134) c. True Weasels
      i. Ermine (132)
      ii. New York Weasel
      iii. Long-tailed Weasel (133) iv. Least Weasel (131)
   d. Ottersi.
      River Otter (141)
      ii. Sea Otter - (Chapter 40) (142)

   c. Martens
      i. American Marten (128)
      ii. Fisher (129) 3. Black-footed Ferret (135)
4. **Mink** (130)

**B. Dogs (canidae)**

1. **Foxes** (vulpes)
   a. **Red Fox** (119)
   c. **Swift Fox** (called Kit or Swift Fox) (116)
   d. **Kit Fox** (called Desert Fox) (115)
   e. **Arctic Fox** (118)

2. **Gray Fox** (114) (genus: urocyon)
3. **Coyote** (117)
4. **Gray Wolf** (113)

4.

**C. Cats (feline)**

1. **Bobcat** (149)
2. **Lynx** (148)
3. **Mountain Lion** (144)
4. **Jaguar** (143)
5. **Ocelot** (146)
6. **Jaguarundi** (147)

**D. Raccoons**

1. **Racoon** (127)
2. **Ringtail** (125)

**E. Bears**

1. **Black Bear** (120)
2. **Grizzly Bear** (122)
   a. **Alaska Brown Bear** (124)
3. **Polar Bear** (121)

**F. Superfamily: Pinnipedia**

1. **Walrus** (153)
   1. **Eared Seals**
      a) **California Sea Lion** (151)
      b) **Northern Sea Lion** (called Stellar Sea Lion) (152)
      c) **Northern Fur Seal** (150)
      d) **Elephant Seal** (154)
   2. **Earless Seals** (Phocidae)
      a) **Harbor Seal** (159)
      b) **Ringed Seal**
c) Harp Seal (156)  
d) Ribbon Seal (158)

VI. Subclass Metatheria (marsupials)

A. Opossum (1)

VII. Order Artiodactyla

A. Deer

1. White-tailed Deer (167) 2. Black-tailed Deer (166) 3. Mule Deer (165)  
4. Elk (Wapiti) (164)  
5. Moose (168) 6. Caribou  
   a. Woodland Caribou (162)  
   b. Barren Ground Caribou (163)  

B. Pronghorn (called antelope) (169) C. Bovids


D. Collared Peccary (160)

VIII. Order Cingulata

1. Armadillo (2)

X. Order Sirenia

A. Manatee (155)