

rabbit, any of 29 species of long-eared mammals belonging to the family Leporidae, excluding hares (genus *Lepus*).

Frequently the terms rabbit and hare are used interchangeably, a practice that can cause confusion. Jackrabbits, for instance, are actually hares, whereas the rockhares and the hispid hare are rabbits. Rabbits differ from hares in size, life history, and preferred habitat. In general, rabbits are smaller and have shorter ears than hares. They are born without fur and with closed eyes after a gestation period of 30–31 days. They prefer habitats composed of trees and shrubs, where they live in burrows dug into the soil. Hares, in contrast, are larger in size, and they are born fully developed with fur and open eyes after a gestation period lasting about 42 days. They prefer open areas such as prairies, where they make their nests in small open depressions.

Rabbits are ground dwellers that live in environments ranging from desert to tropical forest and wetland. Their natural geographic range in the Western Hemisphere encompasses the middle latitudes. In the Eastern Hemisphere rabbits are found in Europe, portions of Central and Southern Africa, the Indian subcontinent, Sumatra, and Japan. The European rabbit (*Oryctolagus cuniculus*) has been introduced to many locations around the world, and all breeds of domestic rabbit originate from the European. Nearly half of the world's rabbit species are in danger of extinction; many are among the most vulnerable of all mammals.

The long ears of rabbits are most likely an adaptation for detecting predators. In addition to their prominent ears, which can measure up to 6 cm (more than 2 inches) long, rabbits have long, powerful hind legs and a short tail. Each foot has five digits (one reduced); rabbits move about on the tips of the digits in a fashion known as digitigrade locomotion. Full-bodied and egg-shaped, wild rabbits are rather uniform in body proportions and stance. The smallest is the pygmy rabbit (*Brachylagus idahoensis*), at only 20 cm (7.9 inches) in length and 0.4 kg (0.9 pound) in weight, while the largest grow to 50 cm (19.7 inches) and more than 2 kg (4.4 pounds). The fur is generally long and soft, and its colour ranges through shades of brown, gray, and buff. Exceptions are the black Amami rabbit (*Pentalagus furnessi*) of Japan and two black-striped species from Southeast Asia. The tail is usually a small puff of fur, generally brownish but white on top in the cottontails (genus *Sylvilagus*) of North and South America.

Natural history

While the European rabbit is the best-known species, it is probably also the least typical, as there is considerable variability in the natural history of rabbits. Many rabbits dig burrows, but cottontails and hispid hares do not. The European rabbit constructs the most extensive burrow systems, called warrens. Nonburrowing rabbits make surface nests called forms, generally under dense protective cover. The European rabbit occupies open landscapes such as fields, parks, and gardens, although it has colonized habitats from stony deserts to subalpine valleys. It is the most social rabbit, sometimes forming groups in warrens of up to 20 individuals. However, even in European rabbits social behaviour can be quite flexible, depending on habitat and other local conditions, so that at times the primary social unit is a territorial breeding pair. Most rabbits are relatively solitary and sometimes territorial, coming together only to breed or occasionally to forage in small groups. During territorial disputes rabbits will sometimes "box," using their front limbs. Rabbits are active throughout the year; no species is known to hibernate. Rabbits are generally nocturnal, and they also are relatively silent. Other than loud screams when frightened or caught by a predator, the only auditory signal known for most species is a loud foot thump made to indicate alarm or aggression. A notable exception is the volcano rabbit (*Romerolagus diazi*) of Mexico, which utters a variety of calls.

Instead of sound, scent seems to play a predominant role in the communication systems of most rabbits; they possess well-developed glands throughout their body and rub them on fixed objects to convey group identity, sex, age, social and reproductive status, and territory ownership. Urine is also used in chemical communication (see animal communication). When danger is perceived, the general tendency of rabbits is to freeze and hide under cover. If chased by a predator, they engage in quick, irregular movement, designed more to evade and confuse than to outdistance a pursuer. Skeletal adaptations such as long hind limbs and a strengthened pelvic girdle enable their agility and speed (up to 80 km [50 miles] per hour).

Rabbits must consume plant material in large quantities to ensure proper nutrition, and thus they have large digestive tracts. Their diet, consisting primarily of grasses and forbs (herbs other than grasses), contains large amounts of cellulose, which is hard to digest. Rabbits solve this problem by passing two distinctive types of feces: hard droppings and soft black viscous pellets, the latter of which are immediately eaten (see coprophagy). Chewed plant material collects in the large cecum, a secondary chamber between the large and small intestine containing large quantities of symbiotic bacteria that aid in the digestion of cellulose and also produce certain B vitamins. The soft feces form here and contain up to five times the vitamins of hard feces. After being excreted, they are eaten by the rabbit and redigested in a special part of the stomach. This double-digestion process enables rabbits to utilize nutrients that they may have missed during the first passage through the gut and thus ensures that maximum nutrition is derived from the food they eat.

Most rabbits produce many offspring (kittens) each year, although scarcity of resources may cause this potential to be suppressed. A combination of factors allows the high rates of reproduction commonly associated with rabbits. Rabbits generally are able to breed at a young age, and many regularly conceive litters of up to seven young, often doing so four or five times a year. In addition, females (does) exhibit induced ovulation, their ovaries releasing eggs in response to copulation rather than according to a regular cycle. They can also undergo postpartum estrus, conceiving immediately after a litter has been born.

Newborn rabbits are naked, blind, and helpless at birth (altricial). Mothers are remarkably inattentive to their young and are almost absentee parents, commonly nursing their young only once per day and for just a few minutes. To overcome this lack of attention, the milk of rabbits is highly nutritious and among the richest of all mammals' milk. The young grow rapidly, and most are weaned in about a month. Males (bucks) do not assist in rearing the kittens.

Both wild and domestic rabbits are of economic importance to people. Wild lagomorphs are popular with hunters for sport as well as for food and fur. Rabbit meat, known for its delicate flavor, remains an important source of protein in many cultures. Domestic rabbits are raised for meat and skins, the latter being used as pelts and for making felt.

The timing of rabbit domestication is a matter of some debate. Fossil and archaeological records suggest that wild rabbits have been hunted for meat and furs since the Pleistocene Epoch (2.6 million years to 11,700 years ago). The oldest historical record of rabbits being kept as livestock appears in the writings of Roman author and satirist Marcus Terentius Varro in the 1st century BCE. Fossil records and other evidence also suggest that rabbits were delivered on ships to several islands in the Mediterranean (such as the Balearic Islands by the 14th century BCE, Malta by the 3rd century CE, and the islands of the eastern Mediterranean by the Middle Ages). A comparison of the genomes (the entire set of chromosomes and their genes) of domesticated European rabbits and their wild counterparts in France suggests that the two groups became effectively isolated from one another between 17,700 and 12,200 years ago, possibly in connection with the retreat of continental ice sheets and mountain glaciers in southwestern Europe during this time.

The combination of fossil and written records and DNA analysis points to rabbit domestication originating sometime between the retreat of the ice sheets and the 1st century BCE in southwestern Europe. Studies suggest that the process of rabbit domestication occurred over hundreds if not thousands of years, because it depended upon a number of natural and human-driven factors acting together rather than a single discrete event. Nevertheless, a legend persists—popular though untrue—that European rabbits became domesticated about 600 CE after monks from southern France bred them for meat because the Roman Catholic Church supposedly allowed the flesh of young rabbits to be consumed during Lent.

Today there are more than 50 established strains of domestic rabbits, all selectively bred from this one species. Their attractive appearance and quiet manner have made domestic rabbits good and relatively undemanding pets. Because they are easily raised in captivity, rabbits are also important as laboratory animals for medical and scientific purposes. However, rabbits may also carry and transmit to humans diseases such as tularemia, or rabbit fever.

Because of their frequent local abundance, rabbits (and hares) are important in many terrestrial food chains. They are preyed upon by a wide variety of mammals and birds that rely upon them as dietary staples. Wolves, foxes, bobcats, weasels, hawks, eagles, and owls all take their toll. Rabbits can also exert profound influence on native and cultivated vegetation, which causes them to be considered pests in some circumstances. Extreme examples have occurred where the European rabbit has been introduced. Wild European rabbits were introduced to Australia in 1859, and within 10 years they were causing extensive agricultural damage, prompting the development of a series of largely ineffective rabbit-proof fences in the late 19th and early 20th centuries to keep rabbits in the eastern parts of Australia from invading the western regions. Early rates of spread were phenomenal (up to 350 km [220 miles] per year), and within 60 years the southern half of the continent had been occupied, with widespread damage to crops and decreases—even extinctions—of native Australian flora and fauna the result. Attempts to control the rabbit have been largely futile. For instance, a viral disease (myxomatosis) naturally existing in certain South American cottontails was found to be lethal to European rabbits. The virus was introduced to the Australian population during the early 1950s, and, although the initial wave of infection killed nearly all rabbits in Australia (99 percent), subsequent waves proved to be less effective, as the rabbits quickly developed immunity and the virus became less virulent. Ongoing research in Australia continues to seek biological solutions (including the introduction of rabbit hemorrhagic disease and other diseases and parasites)—in addition to poisoning, fumigation, hunting, and warren destruction—for controlling the rabbit population.

Diversity and conservation status

There is no single taxonomic group that constitutes the rabbit. Rather, the name refers to an accumulation of 10 genera in the family Leporidae whose characteristics are intermediate between hares and pikas, the other members of order Lagomorpha. The best-known and most-recognizable of the 28 rabbit species are the European rabbit and the 16 or so species of North and South American cottontails. The European rabbit originally occupied the Iberian Peninsula and northwestern Africa, but it was widely introduced throughout western Europe 2,000 years ago. More recently this species has been introduced to oceanic islands throughout the world, parts of Chile and Argentina, and also New Zealand and Australia, where it thrives. Most cottontails are North American and prefer open or brushy habitats, although some live in tropical forests and others are semiaquatic (the swamp rabbit, *S. aquaticus*, and the marsh rabbit, *S. palustris*). Two other genera of rabbit also live in North America. The volcano rabbit, or zacatuche, inhabits dense undergrowth of bunchgrass in pine forests in the high mountains surrounding Mexico City. A population

of only about 6,000 remains in fragments of habitat. The pygmy rabbit (*Brachylagus idahoensis*) is closely related to the cottontails and occupies mature sagebrush habitat throughout the northern Great Basin of the western United States.

Five rabbit species live in Africa. The bunyoro rabbit (*Poelagus majorita*) has a broad range in Central Africa, while the three species of rockhares (genus *Pronolagus*) are all found in Southern Africa. Each is locally common and inhabits rocky areas associated with grass or woodlands. The riverine rabbit (*Bunolagus monticularis*) is endemic to the Karoo region of South Africa, where it inhabits dense vegetation along seasonal rivers. The International Union for Conservation of Nature (IUCN) considers the species to be critically endangered, with possibly fewer than 250 breeding pairs remaining worldwide, because of habitat destruction throughout its range.

In Asia the hispid hare (*Caprolagus hispidus*), which is classified as an endangered species by the IUCN, occupies the dense, tall grassland (commonly referred to as elephant grass) along the southern Himalayan foothills of Nepal, Bangladesh, and India. The Amami rabbit lives only in forests on two small islands (Amami and Tokunoshima) of southern Japan. Its fragmented population of about 5,400 animals is declining owing to habitat destruction and predation by introduced mongooses and by feral dogs and cats. The rabbits most threatened with extinction, however, are found in Southeast Asia. The Sumatran rabbit (*Nesolagus netscheri*) is known to live in the island's southwestern montane forests. Only two sightings of the species have occurred in the 21st century. Although its population size is unknown, the IUCN has considered the Sumatran rabbit critically endangered since 1996. Another striped rabbit (*N. timminsi*) distantly related to the Sumatran rabbit was discovered in the Annamite mountains of Laos and Vietnam during the late 1990s; however, information related to its conservation status remains incomplete.

Evolution and classification

The family Leporidae (rabbits and hares) has been relatively unchanged since the Eocene Epoch about 40 million years ago, when its fossil record first became well documented. Rabbits had entered North America by that time, and they underwent most of their development there. By about seven million years ago (the Miocene Epoch), they had become reestablished in Asia and had moved into Europe, which led to the present distribution.

The family Leporidae is clearly separable from the family Ochotonidae (the pikas), the only other family in the order Lagomorpha. Morphologically, rabbits and hares have a more arched skull correlated with development of bounding locomotion and a relatively upright posture of the head. Strengthened hind limbs and pelvic girdle and elongation of the limbs are also evident.

- RABBITS

29 species in 10 genera found on all continents except Antarctica; introduced to Australia. Fossils dating to the Eocene Epoch.

- *Sylvilagus* (cottontails)

17 species of North and South America.

- *Pronolagus* (rockhares)

3 African species.

- Nesolagus (striped rabbits)
2 Southeast Asian species.
- Brachylagus (pygmy rabbit)
1 species of the United States.
- Bunolagus (riverine rabbit)
1 African species.
- Caprolagus (hispid hare)
1 species of India, Nepal, and Bangladesh.
- Oryctolagus (European rabbit)
1 European species, introduced to Australia and numerous other countries.
- Pentalagus (Amami rabbit)
1 Japanese species.
- Poelagus (bunoro rabbit)
1 African species.
- Romerolagus (volcano rabbit, zacatuche)
1 Mexican species.
-