

MAMMALS

ALL MAMMALS, from humans to lemmings to muskoxen to whales, share certain physical features. All mammals possess modified sweat glands called mammary glands, which in a female can produce milk. All have body hair, at least at the beginning of their lives, and all have a four-chambered heart, single-boned lower jaw, and a middle ear composed of three bones.

Arctic mammals are warm-blooded, or *endothermic*, creatures. They are able to maintain a constant body temperature despite changing climatic conditions. Their core body temperatures range from 97.7°F to 105°F (36.5°C–40.5°C), this despite the fact that marine species live in seawater of 28°F (–2°C) and land mammals experience winter temperatures averaging –33°F (–36°C).

Most of the northern mammals have developed well-insulated, compact bodies with short appendages, which minimize heat loss and conserve body heat. Mammals that spend most of their time in water usually have a thick layer of *blubber*—a subcutaneous sheet of fat, collagen, and elastin—that sheathes the vital organs, increases buoyancy, and acts as an energy reservoir during periods of fasting.

Terrestrial mammals typically have a dense coat of *fur*. Many have fur on both the upper and lower surfaces of the feet and have a double coat of fur that becomes heavier in winter. Air trapped between the dense inner coat and the outer layer of coarse, long guard hairs provides excellent insulation.

Some marine mammals also have fur for insulation. Sea otters have the greatest hair density of any mammal, ranging from 170,000 to more than 1 million hairs per sq in (26,000–165,000 hairs per sq cm). The highest hair density occurs on the forearms, sides, and rump, the lowest on the chest, legs, and feet. Polar bears have a double coat of fur, which is backed by a 4.5 in (11 cm) layer of fat.

Arctic mammals, particularly pinnipeds, have a complex circulatory system called *counter-current heat exchange*, which minimizes heat loss to the surroundings and also prevents overheating. In this system, each artery carrying warm blood from the body core is surrounded by a network of veins. Warmth transferred from the arterial to the venous blood is carried back into the body rather than being dissipated into the air.

To prevent excessive heat loss from bare or lengthy body parts, pinnipeds, caribou, and beavers maintain two internal temperatures—a high body core temperature and a much cooler temperature in the flippers, legs, or tail, respectively. This is known as *regional heterothermy*, which is made possible through heat exchangers that shunt cooled blood to the extremities before returning it to be warmed in the countercurrent system.

Walruses have a similar heat-exchange mechanism that controls blood flow to the skin capillaries. When a walrus is warm, heat exchangers shunt blood to the skin, where it is air-cooled. The skin becomes flushed with blood, and the walrus acquires a rosy-red color. When a walrus is submerged in cold water, blood flow to the epidermis is reduced, the capillaries contract, the skin pales, and heat loss to the environment is minimized.

Mammals also alter their *behavior* in response to oncoming winter. Many marine mammals migrate south of the ice pack, some to subtropical waters, while others congregate around open areas in the sea ice (polynyas) where food is available. Caribou and sheep move to lower elevations, forested areas, or places with little snow cover in a response to food availability. Many of the smaller mammals such as lemmings and voles have adapted to living and sometimes breeding under the winter snow where they are sheltered from the cold and wind, and where food in the form of seeds and shoots can be found.

Surprisingly few of the arctic mammals hibernate—a condition characterized by low body temperature, slow breathing and heart rate, and low metabolic rate. The only arctic mammals to enter this form of deep winter sleep are arctic ground squirrels, marmots, chipmunks, American black bears, brown bears, and pregnant polar bears. Male and non-breeding female polar bears remain active in winter and “nap” now and then in shallow pits they dig into the snow.

Soricomorpha: Insectivores

Soricomorpha encompasses insect-eating mammals such as shrews, moles, and soledons. These small animals are the descendants of the first primitive placental mammals and are the predecessors of all other placental mammals. The earliest known fossils of shrews date back to 130 million years ago.

FAMILY SORICIDAE

SHREWS

These mouse-like insectivores originated in Europe and later spread throughout Africa, Asia, and the Americas.

The northern species are part of a group known as red-toothed shrews, owing to the presence of reddish-brown teeth. The color comes from iron pigments in the diet, which are deposited in the tooth enamel. Iron serves to harden the tips of the teeth, the parts most subject to wear. Unlike rodents, which have gnawing incisors that grow throughout life, the teeth of shrews are permanent and wear down throughout life. When the teeth are completely worn, a shrew starves to death—a factor contributing to shrews' lifespan of less than 2 years.

Shrews feed on insects, spiders, seeds, nuts, worms, and carrion, and will also attack and eat mice and frogs several times their own weight. Some species specialize in climbing trees, living underground, living under snow, or even hunting in water. Those that forage underground or in dark places rely on touch, smell, hearing, and echolocation to find their prey.

These insectivores have an extremely high metabolic rate and need to consume at least 90 percent of their body weight each day in order to survive. They have to eat every 2–3 hours, day and night, to achieve this goal. The digestive tract is short, and food passes through it without being completely processed. For this reason, shrews ingest their feces to recover nutrients.

Most shrews are active year round. They do not hibernate, but are capable of entering torpor in winter, during which time they can lose from 30 to 50 percent of their body weight, shrinking the size of bones, skull, and internal organs. These small animals are solitary in nature and very territorial. If a shrew enters the home range of another, one will kill and eat the other. They seem to tolerate another's presence only when breeding. Nests are usually made of finely

shredded vegetation, and are set in a burrow or rotted log. Gestation lasts 2–3 weeks. The young are nursed for about 3 weeks. Litter size is 4–9 young, with up to 4 litters produced annually.

GENUS SOREX: The genus *Sorex* encompasses the long-tailed shrews, which inhabit the boreal forests and, more rarely, the arctic tundra. The genus contains some of the world's smallest mammals. Most species weigh less than 1 oz (28 g) and measure less than 5 in (13 cm) from nose to tail tip. The skull is long, narrow, and extremely small, as can be seen here by the skull of a Dusky Shrew juxtaposed next to a US penny. The snout is long, pointed, and mobile. The small ears and beady eyes are almost hidden by facial fur. The feet are plantigrade (i.e., the full length of the foot is placed on the ground) and there are 5 toes on each foot.



Cinereus Shrew

Sorex cinereus

ALSO: American Masked Shrew, Amerikanische Maskenspitzmaus, Musaraigne cendrée, Krattspissmus, Масковья бурозубка. Formerly conspecific with the ST LAWRENCE IS SHREW, *S. jacksoni*, and BARREN-GROUND SHREW, *S. ugyunak*. SN means “ashy gray shrew.” **RANGE:** Found from Alaska to Labrador and Newfoundland, and south to 45° N, in dense leaf litter and around fallen logs in moist deciduous and evergreen forests.

ID: L 3.5–5 in (9–13 cm). WT 0.1–0.25 oz (3–7 g). Dark brown to brownish gray on the back, with pale gray underparts. Bicolored tail.

HABITS: Active day and night, all year. Mostly terrestrial, but can swim well. Feeds on conifer





Eurasian Least Shrew
Sorex minutissimus
N Eurasia
L 2–3 in (5–8 cm)
World's second smallest mammal by weight



American Pygmy Shrew
Sorex hoyi
N Amer
L 3–3.5 in (8–9 cm)
Smallest mammal in N Amer



Eurasian Shrew
Sorex araneus
N Eurasia
L 2.5–3.5 in (6–9 cm)



Arctic Shrew
Sorex arcticus
Alaska, Canada
L 4–6 in (10–15 cm)



Laxmann's Shrew
Sorex caecutiens
N Eurasia
L 3–4 in (8–10 cm)



Tundra Shrew
Sorex tundrensis
N Eurasia, Alaska
L 4–6 in (10–15 cm)



Moving the young to another nest

Cinereus Shrew
Sorex cinereus
N Amer
L 3.5–5 in (9–13 cm)



Montane Shrew
Sorex monticolus
W N Amer
L 4–6 in (10–15 cm)

seeds, salamanders, mice, and invertebrates, including sawflies (*Pristiphora erichsonii*) whose larvae can defoliate a conifer. Builds a spherical nest of dry vegetation. The mother moves her young if the nest is disturbed. She carries one in her mouth, while others grasp her rump fur or tail, or the tail of the sibling in front of them.

American Pygmy Shrew

Sorex hoyi

ALSO: Zwergspitzmaus, Musaraigne pygmée, Бурозубка-крошк. Smallest mammal in N Amer and one of the smallest in the world by weight; adults weigh about the same as a US dime. SN means “Hoy’s shrew,” named after naturalist Philo Romayne Hoy (1816–1892), who aided Spencer Baird of the Smithsonian in investigating the fauna of Racine, Wisconsin.



RANGE: Occurs in Canada and Alaska, south to Appalachia and Rocky Mtns, in boreal forests, swamps, grassy clearings, bogs, and floodplains.

ID: L 3–3.5 in (8–9 cm). WT 0.07–0.25 oz (2–7 g). Grayish brown above, pale gray below. Exudes a strong musky smell.

HABITS: Lives in areas of sphagnum moss, leaf litter, root systems, and stumps. Burrows and forages underground, often in mammal burrows. Very agile; can jump as high as 5 in (13 cm), almost twice its body length.

Montane Shrew

Sorex monticolus

ALSO: Dusky Shrew, Dunkle Rotzahn-spitzmaus, Musaraigne sombre, Горная бурозубка. SN means “mountain shrew.”

RANGE: Occurs in Alaska and wCanada, and



south to wUS in tundra, alpine meadows, forests, and prairies with dense ground cover.

ID: L 4–6 in (10–15 cm). WT 0.2–0.35 oz (5–10 g). Brown to reddish brown upperparts. Gray or silvery underparts. Tail indistinctly bicolored, dark above, paler below. Feet light brown.

HABITS: Forages in damp ground along streams and rivers. Nests in summer in stumps, under logs, and beneath forest litter.

Arctic Shrew

Sorex arcticus

ALSO: Saddleback Shrew, Musaraigne arctique, Арктическая бурозубка.

SN means “Arctic-dwelling shrew.”

RANGE: Occurs in Alaska and Canada, and south to ncUS in grassy clearings in coniferous forests, at edges of tamarack and spruce bogs, and at edges of marshes in tangled vegetation.

ID: L 4–6 in (10–15 cm). WT 0.2–0.5 oz (5.5–14 g). Tricolored pelage; very dark brown to black above, lighter brown sides, and pale grayish brown underparts. Long, bicolored tail.

HABITS: Climbs trees. Clears its own runways and uses those of other small mammals. Forages in short bursts of activity, mainly at night, followed by periods of rest. Feeds mainly on insects, including sawflies (*Pristiphora erichsonii*) whose larvae feed on and defoliate boreal conifers.



Tundra Shrew

Sorex tundrensis

ALSO: Tundra Rotzahnspitzmaus, Тундровая бурозубка, *Sorex arcticus tundrensis*. SN means “tundra-dwelling shrew.”

RANGE: Occurs from wRussia to Chukotka, south to Mongolia and neChina, and from Sakhalin Is east to the Aleutians, Alaskan mainland and Yukon, in riparian meadows with dense vegetation of willows, shrubs, and grasses, and in burned areas and overgrown thickets.

ID: L 4–6 in (10–15 cm). WT 0.2–0.4 oz (5–10 g). Tricolored (summer): dark brown upperparts,



grayish brown flanks, pale gray below. Bicolored (winter): dark brown above, pale gray below.

HABITS: Frequents hillsides with shrubs or grassy vegetation or dry ridges near marshes or bogs. Active day and night year round, burrowing through the snow in winter. Nests under a log or in a rock crevice. Feeds on beetles, earthworms, and flowers of low grasses.

SIMILAR SPECIES: PRIBILOF IS SHREW, *Sorex pribilofensis*, is found only on St Paul Is.

Eurasian Shrew

Sorex araneus

ALSO: Common Shrew, Waldspitzmaus, Musaraigne carrelet, Vanlig spissmus, Обыкновенная бурозубка. SN means “spider [-eating] shrew.”

RANGE: Occurs from the UK and Scandinavia to the Kola Penin, White Sea, and Lake Baikal in Siberia in woodlands, grasslands, and hedges.

ID: L 2.5–3.5 in (6–9 cm). WT 0.2–0.4 oz (5–12 g). Grayish brown to velvety dark brown back; pale underparts.

HABITS: Feeds on insects, slugs, spiders, worms, and carrion. Agile climber. Extremely territorial and becomes aggressive when another shrew enters its home range. Builds its nest underground or under dense vegetation.



Eurasian Least Shrew

Sorex minutissimus

ALSO: Lesser Pygmy Shrew, Knirpsspitzmaus, Musaraigne naine, Knøttspissmus, Крошечная бурозубка. World’s second smallest mammal by weight after the Etruscan Shrew, *Suncus etruscus*. SN means “smallest shrew.”

RANGE: Occurs from nEurope across Siberia to Sakhalin, Kamchatka, and ne Asia, in forests, open fields, and edges of bogs.

ID: L 2–3 in (5–8 cm). WT 0.05–0.1 oz (1.5–3 g). Back chocolate brown (summer) to light brown (winter). Pale gray underside is separated by grayish brown flanks. Bicolored tail, dark above, paler below, with a dark brown tuft at the tip. Feet pale gray, with brown heels.

HABITS: Swims well. Excellent climber.

