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## Basic Information Sheet: European Hedgehog

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## Western European Hedgehog (*Erinaceus europaeus*)

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## Natural history

The European hedgehog (*Erinaceus europaeus*) is commonly associated with humans in rural, suburban, and urban habitats. Its native range spans from Ireland, Great Britain, southern Scandinavia, and Western Europe to the Czech Republic, where its range overlaps with that of the Northern white-breasted hedgehog (*Erinaceus roumanicus*). In addition to its native range, *E. europaeus* was introduced in 1974 to the Scottish island of Uist and in the late 19th Century to New Zealand, where it is considered an invasive pest species.

European hedgehogs are nocturnal animals, and their dominant senses are hearing and olfaction. Hedgehogs prefer habitats that provide cover like hedgerows, shrub borders in suburban gardens, and leaf litter. Hedgehogs tend to avoid thick forests, although they will use forest edge habitat. Adult hedgehogs are solitary, but they may share overlapping home ranges. Each home range is large, and hedgehogs can travel approximately 3-4 km (1.9-2 miles) each night. Each hedgehog builds several nests within its home range, concealing itself in a nearby nest at the end of a night's foraging.

Sharp spines that cover the dorsum and sides as well as the ability to roll up serve as a highly effective defense mechanism against predators. European hedgehogs have few natural predators, with the badger likely serving as their most important. Other known predators include dogs, foxes, snakes and large owls.

## Conservation status

The International Union for Conservation of Nature lists *Erinaceus europaeus* as a species of "Least

Concern” because animals are common and abundant throughout its wide range (Amori 2008).

## Taxonomy

**Class:** *Mammalia*

**Order:** *Erinaceomorpha*: gymnures and hedgehogs

**Family:** *Erinaceidae*

**Subfamily:** *Erinaceinae*: spiny hedgehogs

**Genus:** *Erinaceus*: woodland hedgehogs

**Genus:** *Erinaceus europaeus*

## Physical description

The dorsal surface and sides of the European hedgehog are covered in pale spines that have a wide brown band and a white tip. The spines are relatively long, measuring 1.9-2.5 cm (0.75-1 in) in length. The face, throat, chest, abdomen, and legs are covered with coarse, grey-brown or yellow-brown fur.

Head and body length of the adult hedgehog averages 20-30 cm (7.8-11.8 in). Males are generally larger than females, however the presence of a prepuce on the mid-ventral abdomen is the best means of gender identification.

## Diet

The European hedgehog is primarily insectivorous. Insects frequently eaten by free-ranging animals include beetles, caterpillars, earwigs, flies, and centipedes, however European hedgehogs can be more omnivorous and somewhat opportunistic in their feeding behavior. Therefore the diet also includes snails and slugs, earthworms, woodlice, mollusks, and sometimes small vertebrates like frogs, toads, snakes, birds and their eggs, as well as small mammals in the form of carrion.

The bulk of most captive adult diets consist of a protein source such as meat-based dry or canned cat or dog/puppy food (free of gravy), and/or specialist hedgehog food. Some rehabilitators add a commercially available diet for insect-eating songbirds. Some rehabilitators also mix the protein source with a small amount of crushed, unsweetened cereal (oat, bran, moistened muesli, or whole grain wheat). The diet may also be supplemented with a multivitamin and/or even a pancreatic enzyme supplement to aid digestion and promote a more rapid build-up of body reserves, particularly in underweight juveniles. Offer food once or twice daily to most adults (British Hedgehog Preservation Society 2013, Pfäffle 2010, Robinson 2002, British Hedgehog Preservation Society year unknown). A once daily ration, offered in the evening to these nocturnal animals, may reduce the risk of obesity in healthy animals (Bexton 2003).

Treats can include fresh fruit such as banana, raisins and sultanas, dry cat or hedgehog kibble, unsweetened crushed “digestive biscuits” (hard, cereal-based treats), or small amounts of cooked chicken or raw liver (British Hedgehog Preservation Society 2013, British Hedgehog Preservation Society year unknown).

NEVER offer cow’s milk as hedgehogs cannot digest lactose (Bexton 2003).

## Husbandry

<p><b>Water</b></p>	<p>Provide fresh water daily. Heavy crocks can be offered to prevent tipping. Ensure the water level is shallow enough to prevent accidental drowning and cleaned frequently, as hedgehogs tend to foul water bowls with shavings or other cage bedding materials.</p>
<p><b>Cage design</b></p>	<p>Important housing criteria include:</p> <ul style="list-style-type: none"> <li>• <b>Space:</b> Provide the largest enclosure reasonably possible that affords the hedgehog opportunities to hide, forage, and build nests measuring at least 30-60 cm (1-2 ft.) in diameter. Unless hibernating, long-term patients should ideally not be retained in small pens as a percentage of hospitalized hogs exhibit obsessive caged behaviors (Tim Partridge, email message to author, May 3, 2015).</li> <li>• <b>Nest box:</b> Offer a high-sided nesting box lined with newspaper and filled with abundant, soft, absorbent bedding such as straw, hay, or wood shavings. Avoid cloth or toweling as loose strings can cause injury if ingested or caught on toes or toenails. Facial tissues and paper towels can also be added to the nest box. Shelters can be made from any material that can be sanitized like plastic or disposable cardboard boxes can be provided.</li> <li>• <b>Smooth-walled:</b> Pens should ideally have high, smooth walls to prevent escape. Smooth walls and flooring also reduce the risk of injury to toes or limbs.</li> </ul>



	<ul style="list-style-type: none"> <li>• <b>Escape prevention:</b> Walls should be high and the walls of outdoor pens should be buried approximately 30 cm (1 ft) underground to prevent burrowing and escape.</li> </ul>
<b>Cage furniture</b>	<ul style="list-style-type: none"> <li>• High-sided nest box (see <i>cage design above</i>)</li> <li>• Ceramic radiant heat lamp (see <i>temperature below</i>)</li> <li>• Heavy crock dishes for food and water</li> </ul>
<b>Temperature</b>	<p>Maintain environmental temperatures for adults between 21-30°C (70-85°F) (Tynes 2010). During cool weather, place a ceramic radiant heat lamp over one end of the enclosure to create a temperature gradient. Place the nesting area at the warm end of the enclosure and provide food in a slightly cooler area. Maintain temperature above 10°C (50°F) to prevent the beginning of a hibernation cycle. House hoglets in an incubator set at 30°C (86°F) (Robinson 2002). Gradually reduce the setting to room temperature when body weight is between 150-200 g.</p>
<b>Hibernation</b>	<p>Hibernation in the European hedgehog occurs at temperatures below 8°C (46.6°F). Depending on the region, hibernation begins between September and November and lasts until sometime between March to May. Free-ranging hedgehogs construct a dense hibernaculum to ensure a constant environmental temperature of 1-5°C (34-52°F). Variations in hibernation patterns are primarily related to insufficient storage of fat reserves during late summer and fall. A juvenile hedgehog must weigh approximately 500 g to survive its first hibernation. Up to 80% of free-ranging adults can die during the frigid winter months.</p>

## Behavior

<p><b>Nocturnal</b></p>	<p>European hedgehogs are nocturnal animals and activity during daylight is usually a sign of illness or inability to find enough food during the night.</p>
<p><b>Social structure</b></p>	<p>Hedgehogs are solitary creatures with a social structure that is sometimes compared to the cat. Hedgehogs possess overlapping home ranges that they do not defend. Instead they are theorized to use olfactory cues and a system of mutual avoidance. House captive hedgehogs in individual pens or cages, unless the animals are presented as littermates. When multiple captive hedgehogs must be housed together, aggression can arise but is very uncommon. To minimize the risk of fighting, provide as much space as possible as well as multiple shelters, feeding stations, and water bowls to reduce the likelihood of aggression.</p>
<p><b>Reproductive behavior</b></p>	<p>Hedgehogs are solitary creatures except during their mating season. Sexual behavior begins directly after hedgehogs rouse from hibernation, however most sexual activity takes place between May and August. Fighting is often observed in males during the mating season, however females can also behave aggressively towards courting males. European hedgehogs are polygynandrous (promiscuous ) and polygamous, therefore females mate with more than one male and males breed with more than one female. Males are not involved in raising offspring.</p>
<p><b>Defensive behavior</b></p>	<p>When threatened, hedgehogs will usually display passive defense behavior by freezing and rolling up, thus exposing only their erect spines to a would-be predator. Hedgehogs sometimes display active behavior like jumping with erect spines. Hedgehogs will snort or hiss when disturbed, and this should not be mistaken for respiratory abnormalities.</p>

<b>Self-anointing</b>	Self-anointing or “anting” is an unusual hedgehog habit in which the hedgehog will start to produce copious amounts of foamy saliva that is then slathered onto the spines of the flank and back with its tongue. Although many theories exist, the true purpose of ‘self-anointing’ is still a mystery, although this behavior seems to be triggered by novel scents or flavors (D’Havé 2005)
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## Normal physiologic data

<b>Lifespan</b>	Free-ranging European hedgehogs generally live 3-4 years, however the maximum lifespan reported is 8 years. In captivity, hedgehogs can live up to 10 years.
<b>Body weight</b>	<p>The weight of the average adult hedgehog ranges between 700-1400 g. Pre-hibernation weights between 600-1000 g are common, however bodyweight normally increases dramatically in preparation for hibernation.</p> <ul style="list-style-type: none"> <li>• Adult males range from 800-1200 g (Tynes, 2010, Johnson-Delaney 2008, Johnson-Delaney 2007).</li> <li>• Adult females range from 400-800 g (Johnson-Delaney 2008, Johnson-Delaney 2007).</li> <li>• To survive hibernation, a hedgehog should attain a minimum weight of 450-600 g. Post-hibernation weight loss may reach up to 35% (Pfäffle 2010).</li> </ul>
<b>Body temperature</b>	The European hedgehog rectal temperature averages 35.1°C +/- 1°C (95.2°F).
<b>Heart rate</b>	Heart rate averages 200-280 beats per minute (bpm), however rates as low as 2-48 bpm have been reported during hibernation.
<b>Respiratory rate</b>	25-50 breaths per minute (bpm) is the average respiratory rate. Respirations decreases to approximately 13 bpm during

hibernation (Pfäffle 2010), however hibernating hedgehogs may reportedly be apneic for up to 1 hour (British Hedgehog Preservation Society, year unknown).

## Anatomy/ physiology

<b>Dental formula, adult</b>	I3/2 C1/1 P3/2-3 M3/3*
<b>Integumentary</b>	Hedgehogs possess a specialized coat of approximately 5,000-7,000 spines. Each spine, or modified hair, grows from a follicle in the skin. Each follicle is attached to a small muscle (arrector pili) that is used for piloerection when the hedgehog is threatened. The spines are hollow and sharp, but not barbed. Unlike porcupines, hedgehog spines do not break off readily and they do not bend easily. Hedgehogs generally replace spines in a gradual, continuous process (Tynes 2010).
<b>Musculoskeletal</b>	Well-developed back muscles allow hedgehogs to roll up in a defensive ball. The panniculus carnosus is a sheet of muscle that spreads over the back. The circular orbicularis muscle acts like a purse string to close the ball and protect the vulnerable head, legs, feet, and abdomen. Specialized modifications to the intervertebral disks and vertebral processes also assist the hedgehog in rolling up (Pfäffle 2010, Tynes 2010, Robinson 2002).
<b>Sexual dimorphism</b>	The male is generally larger however the presence of a prepuce on the mid-ventral abdomen is the best means of determining gender.
<b>Reproduction</b>	The vulva is positioned directly anterior to the anus, while the penis sheath of the male lies on the mid-ventral surface of the abdomen. <ul style="list-style-type: none"> <li>• <b>Puberty:</b></li> </ul>



- **Males:** 8 months to 1 year
- **Female:** 8-9 months
- On average, European hedgehogs reach sexual maturity between 9-11 months of age. Body weight may be the best predictor of sexual maturity. In one study of captive European hedgehogs, most females did not become pregnant while weighing less than 600 g and most weighed more than 700 g before becoming pregnant for the first time (Tynes 2010).
- **Reproductive behavior:**  
*See Behavior above*
- **Gestation:** 4-5 weeks (average 35 days) One or two litters are produced annually, one in spring and one in late summer. If a second litter is born, it has a reduced chance of surviving the winter.
- **Litter size:** Litter sizes of four to five are common in European hedgehogs, however up to six hoglets can be born.
- **Birth weight:** A range of 8-25 grams has been reported, with an average of 15 g reported in captivity.
- **Eyes open:** 12-14 days; both eyes and ears should be open by about 15 days of age
- **Deciduous teeth eruption:** 21-23 days (100 g); the last deciduous teeth are lost at 4 months
- **Permanent teeth eruption:** 7-9 weeks (250-300 g)
- **Weaning:** Most young hedgehogs are fully weaned by 40-44 days, although some may be weaned as late as 10 weeks. Weaning weights at 40 days range from 125-345 g (average 200-235 g).

	<p>Youngsters leave the nest and go on foraging expeditions with their mother at 3-5 weeks (100-200 g). Juveniles become independent by 4-6 weeks (&gt; 250 g).</p>
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\*Variations in the dental formula in the European hedgehog have been described in the literature (Asher 2009, Robinson 2002). Here Dr. Timothy Partridge describes dental evaluation of anesthetized healthy, young adults :

*"It appears there are...a total of six premolars and molars on the lower arcades of (almost all) periodontally healthy hedgehogs... However interestingly, one individual had only five [maxillary cheek teeth] and this did not appear to be due to any tooth loss, and the... third premolars are very similar to the adjacent molars on gross visual inspection".-- (Tim Partridge, email message to author, May 3, 2015)*

## Restraint

Always wear leather or rubber gloves when handling European hedgehogs as they are susceptible to several zoonotic diseases. Holding one hand under the rump and the other hand beneath the chin, slowly and gently unroll the hedgehog. Grasp the rear legs and lift them into the air, being careful to leave the forelegs on the table. The hedgehog will be reluctant to take its front legs off the table and will remain stretched out in a "wheelbarrow" position.

In hedgehogs that are well habituated to handling, it is often possible to use one hand to gently scruff the hedgehog as in cats. Once scruffed, the hedgehog can be swiftly examined and some individuals will tolerate nail trims in this position (Tynes 2010).

## Venipuncture

- Cranial vena cava, preferred route
- Femoral vein
- Lateral or medial saphenous vein, with use of a tourniquet for small individuals
- Jugular vein, challenging due to the short neck and generous covering of soft tissue and fat
- Cephalic vein

Hematology and biochemical reference values have been reported in the literature for overwintered European hedgehogs in a rehabilitation setting (Rossi 2014, Lewis 2002).

## Preventive medicine

Physical examinations: monitor body weight, appetite and clinical status

It is illegal to retain a European hedgehog in the United Kingdom as a pet. Therefore non-

releasable hogs are often euthanized or possibly confined in “safe” gardens, from which they cannot escape.

## Zoonotic potential

[Ringworm infection](#) caused by *Trichophyton mentagrophytes* var. *erinacei* is probably the most important zoonosis of hedgehogs, and is certainly the most commonly contracted zoonosis of wildlife rehabilitators in the United Kingdom (Robinson 2002). See *important medical conditions below for additional information*.

Western European hedgehogs also commonly carry *Salmonella enteritidis* phage type 11 (Riley 2005, Robinson 2002).

## Injections

<b>Subcutaneous</b>	Inject into the subcutaneous space underlying the spines on the back or flank, however keep in mind that the dermis underlying the spines is poorly vascularized.
<b>Intramuscular</b>	Intramuscular injections are frequently made into the orbicularis muscle on the dorsum. This route can even be used in a rolled up hedgehog. Intramuscular injections can also be made into the triceps or quadriceps group (anterior surface of the thigh).
<b>Intraosseous</b>	Consider the <a href="#">intraosseous</a> route for rapid absorption of fluids, particularly in emergency situations.

## Important medical conditions

The free-ranging western European hedgehog is perhaps the most rescued and rehabilitated species in western Europe.

### Integumentary disease

- Common ectoparasites:
  - Heavy infestations of the hedgehog flea (*Archaeopsylla erinacei*) can cause anemia and weakness.
  - Tick-induced blood loss, caused by the hedgehog tick (*Ixodes hexagonus*) or the sheep tick (*Ixodes ricinus*) can cause anemia (Pfäffle 2010).
  - Heavy infestations of the mange mite (*Caparinia tripilis*) can cause dry, thickened skin, severe pruritus, and severe loss of hair and spines (alopecia).
  - An infestation of the sarcoptic mange mite (*Sarcoptes scabiei*) leads to severe pruritus,

possible skin lesions and quill loss, and cachexia.

- Approximately 20% of European hedgehogs are asymptomatic carriers of *Trichophyton mentagrophytes* var. *erinacei*. Clinical infection is manifested as alopecia (loss of spines and hair), crusty malformations of the ear margins, and skin lesions. *Caparinia tripilis* can be synergistic with ringworm and this mite has been implicated in transmission of *T. erinacei* infection. Mite infestations combined with fungal infection and subsequent bacterial pyoderma often lead to increased hedgehog mortality (Pfäffle 2010, Bexton 2003, Robinson 2002).
- Fly-strike (myiasis) commonly occurs in injured or debilitated hedgehogs that are targeted by blowflies. Great care must be taken during the summer months when blowflies are present to check for and remove any eggs or maggots.

### Gastrointestinal disease

- Western European hedgehogs commonly carry *Salmonella enteritidis* phage type 11, which causes gastrointestinal infections.
- Coccidiosis (caused by *Eimeria* spp. and *Isospora* spp.) can lead to gastrointestinal disease in unweaned hoglets.

### Respiratory disease

- In one retrospective study, pneumonia was reported in 41% of necropsied European hedgehogs (Johnson 2011). Bronchopneumonia with fibrosis, atelectasis, and lung abscesses resulting from *Pasteurella* or *Bordetella* is a common finding. *Bordetella bronchiseptica* seems to have a geographic distribution in the European hedgehog, as it was commonly isolated from the respiratory tract of hedgehogs in England but was not isolated from animal in New Zealand (Johnson 2011).
- Severe lungworm infection is considered to be the most frequent cause of death in European hedgehogs (Johnson 2011). The nematodes, *Capillaria aerophila* and *Crenosoma striatum*, are often concurrent infestations in the European hedgehog. Severe infections, leading to rhinitis, tracheitis, bronchitis, or bronchopneumonia, are often accompanied by secondary *Bordetella bronchiseptica* infection (Johnson 2011). Clinical signs include mucopurulent and bloody nasal discharge, tachypnea, dyspnea, coughing, wheezing, coarse breath sounds, weakness, anemia, and emaciation.

### Other diseases

Dental disease and obesity are important conditions in captive hedgehogs.

A condition similar to “wobbly hedgehog syndrome” of [African pygmy hedgehogs](#) (*Atelerix albiventris*) has been reported in European hedgehogs (Mayer 2012).

The European hedgehog is susceptible to natural infection with foot-and-mouth viral disease (Pfäffle 2010)

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