Suncus murinus 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Insectivora	Soricidae

Common name

brown musk shrew (English), Moschusspitzmaus (German), Ceylon highland shrew (English, Sri Lanka), Indian musk shrew (English), Ryukyu musk shrew (English, Japan), Asian musk shrew (English), Asian house shrew (English), rat musquee (Mauritian Creole), Kandyan shrew (English, Sri Lanka), kirukanjia (Swahili), Indian grey musk-rat (English, Sri Lanka), house shrew (English), common Indian musk-shrew (English, Sri Lanka), grey musk shrew (English, India), money shrew (English, China), white-tailed shrew (English, Bangladesh)

Synonym

Suncus albicauda
Suncus albinus
Suncus andersoni
Suncus auriculata
Suncus beddomei
Suncus blanfordii
Suncus blythii
Suncus caerulaeus
Suncus caerulescens
Suncus caeruleus
Suncus celebensis
Suncus ceylanica
Suncus crassicaudus
Suncus duvernoyi
Suncus edwardsiana
Suncus fulvocinerea
Suncus fuscipes
Suncus geoffroyi
Suncus giganteus
Suncus griffithii
Suncus heterodon
Suncus indicus
Suncus kandianus
Suncus kroonii
Suncus Kuekenthali
Suncus leucera
Suncus luzoniensis
Suncus malabaricus
Suncus mauritiana
Suncus media
Suncus melanodon
Suncus microtis
Suncus mulleri
Suncus muschata
Suncus myosurus
Suncus nemorivagus
Suncus nitidofulva
Suncus occultidens
Suncus palawanensis
Suncus pealana
Suncus pilorides
Suncus riukiuana
Suncus rubicunda
Suncus sacer
Suncus saturatior
Suncus semmelincki
Suncus semmeliki
Suncus serpentarius
Suncus sindensis
Suncus soccatus
Suncus sonneratii
Suncus swinhoei
Suncus temminckii
Suncus tytleri
Suncus unicolor
Suncus viridescens
Suncus waldemarii

Similar species

Summary

Suncus murinus (the Indian musk shrew) is a commensal and adaptable mammal. It is a rapid coloniser and threatens many plant and animal species through predation and competition. Through human agency it has a large and expanding range and, to date, very little work has been done on how to effectively manage the species.

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Species Description

A highly variable species, the Indian musk shrew (*Suncus murinus*) varies widely in colour, size and weight. It is small, secretive and mouse-like with a long pointed nose. The fur is short and velvety, ranging in colour from light grey-brown to black and recorded adult weights vary between 23.5g to 82.0g in females and 33.2g to 147.3g in males (Ruedi *et al*., 1996). The head-to-body length of *S. murinus* is up to 15cm, the tail length up to 8cm (Baker, 2005). A study comparing shrew populations from Guam and Madagascar showed some significant differences in appearance, body weight and length, with female shrews from Madagascar being heavier than females from Guam (Hasler *et al*. 1977). Chang *et al*. (1999a,b) found that the average weight of adult females in Taiwan was 37.4g, and the average weight of juvenile females was 23.2g, while the average weight of adult males was 58.6g, and the average weight of juvenile males was 32.9g. Musk shrews have very small eyes, thick, relatively hairless tails and make frequent shrill high pitched squeaks. The musk glands on its flanks give it a distinctive smell (BBC, 2006).

Olsen (1984) outlines a method of distinguishing the fecal pellets of shrews from those of other commensal rodents.

Lifecycle Stages

Gestation period of around 30 days, weaned at 15-20 days (Hasler *et al*., 1977; Gill & Rissman, 1997). Lifespan in captivity ranges from 1.5 to 2.5 or 3 years (Dryden, 1969; E. Rissman, pers. comm.), with one individual living 3.2 years (AnAge, undated).

Uses

The Indian musk shrew (*Suncus murinus*) may have been deliberately introduced to some areas in an attempt to keep away rats and snakes (Prater, 1947; Murray, 1884; in Taber *et al*., 1967). *S. murinus* has been successfully domesticated for use as a laboratory animal in the USA and Japan (Tsuji *et al*., 1999).

Habitat Description

The Indian musk shrew (*Suncus murinus*) is a robust and highly adaptable species. It has a lower metabolic rate than European shrews and is therefore less susceptible to environmental stress. It is found on many islands, in forests or in agricultural land. It is particularly associated with human activity, and this has undoubtedly assisted its geographic spread. The species poses a growing threat as humans continue to facilitate its range expansion. Yang and Zhuge (1989) found that the home range size averaged 1227m2 for male shrews, and 241m2 for females. In Guam, *S. murinus* nests can be found in open, grassy areas, and beneath or beside large rocks, logs, brush piles and similar materials (Peterson, 1956).

Reproduction
The Indian musk shrew (*Suncus murinus*) has no behavioural oestrus cycle and follicular development and ovulation are both induced by mating (Gill & Rissman, 1997). The family Soricidae have retained a number of primitive features including a cloaca and internal male testes (Churchfield, 1990), which makes distinguishing the sexes difficult in some cases.
Average litter size varies geographically with recorded values ranging from 2.1 to 4.7 correlated with female body weight, and number of offspring per litter varies between 1 and 8 (Hasler *et al*., 1977; Nowak *et al*., 1983). Females reach sexual maturity at around 35 days (Hasler *et al*., 1977; Gill & Rissman, 1997). Breeding takes place throughout the year, with females usually bearing two litters per year (BBC, 2006). Chang *et al*. (1999b) reported that the house shrew in Taiwan is a continuous breeder, with greater activity and intensity occurring in spring and summer. A comparison between breeding populations from Guam and Madagascar showed some significant differences. Shrews from Madagascar had larger litters (average 2.8 young per litter) and shorter gestation periods (29.6 days) than shrews from Guam (2.1 young per litter, gestation 30.3 days). There were also a number of behavioural differences apparent (Hasler *et al*., 1977). A study on shrews in Guam found that food availability was the primary cue for reproduction in males, with social and photoperiod signals playing a modulatory role (Wayne and Rissman, 1990).

Nutrition
Although nominally an insectivore, the Indian musk shrew (*Suncus murinus*) is an opportunistic feeder and in some areas feeds predominantly on plant material (Advani and Rana, 1981). It also eats a wide range of invertebrates, and shrews on Mauritius showed a preference for snails during bait trial experiments (Varnham *et al*., 2002). A Bangladeshi study found that the diet of *S. murinus* was composed of 62% animal food (mostly insects), 29% plant food and 9% miscellaneous food items (Sarker and Parveen, 1986). Laboratory research has shown that *S. murinus* will eat bread, cake, pastry, jellies, peanut butter, boiled rice, boiled potato, boiled egg, and a wide range of insect species (Peterson, 1956). Taber *et al*. (1967) report that *S. murinus* can be easily attracted with peanut butter. *S. murinus* exhibits a definite preference for protein-rich materials in India, with food intake per gram body weight being higher in females than males. Feeding peaks at predawn hours, with a minimum occurring in the afternoon (Balakrishnan and Alexander, 1979b). *S. murinus* are generally solitary and have a high metabolic rate necessitating frequent feeding. Prey is killed by a characteristic neck bite, and the death-shake is seen when *S. murinus* feed on earthworms or rats. *S. murinus* have also been observed hoarding food when a large number of insects was offered (Balakrishnan and Alexander, 1979a).

General Impacts
The Indian musk shrew (*Suncus murinus*) can reach high densities and impact upon a wide range of other species, including plants, invertebrates and vertebrates, either through predation or competition. *S. murinus* is strongly implicated in the extirpation of several island lizard species (Jones 1993, Rodda & Fritts 1992, Fritts & Rodda 1998). It can damage seeds and young plants by digging for food (pers. obs.). *S. murinus* can also act as a reservoir for the plague (Duplantier *et al*., 2005).

Management Info
There has been little research into the control of the Indian musk shrew (*Suncus murinus*) and more research is urgently needed, especially in regard to potential poisons. Very little management work has so far been attempted with this species. Limited studies show this species to be relatively unsusceptible to brodifacoum and 1080 (Morris & Morris, 1991; Bell & Bell, 1996), though it is readily live trapped.
Preventative measures: Rodent-proof structures can exclude shrews (Schmidt, 1994).
Cultural: Mowing around structures may decrease preferred habitat and food for shrews (Schmidt, 1994).
Physical: Shrews can be trapped using mouse traps (snap traps), a small box trap, or pit traps. Pit traps are more useful in assessing the presence or absence of shrews in a particular location, as snap trapping appears to understate the abundance of shrews. Traps can be baited with a mixture of peanut butter and rolled oats. A small amount of bacon grease or hamburger may increase the attractiveness of the bait (Schmidt, 1994). Lee (1997) reported that aluminium live traps caught significantly more *S. murinus* than Japanese plastic snap traps. Live trapping has been used to successfully eradicate the musk shrew from a two hectare island in Mauritius, although a similar attempt failed on the neighbouring island of Ile aux Aigrettes (25 ha) (Varnham *et al*. 2002). A study by Seymour and colleagues (2005) suggests that the best hypotheses to explain the failure of the campaign was probably the survival of trap-shy shrews. It is observed that shrews target very specific prey, and are not attracted to conventional rodent baits; standard traps rarely work for shrews (B. Coblentz, pers. comm., 2003). Pitfall traps are often favoured for catching shrews (F.W. Schueler, pers. comm., 2003). As they nest under rocks and logs, grids of boards or other flat objects might be placed (and then uncovered periodically) to entice shrews. It may be possible to use dogs to track down survivors of trapping programmes. On Saipan (where shrews often raid pet bowls) snake traps baited with dog or cat food are used. The snake trap is a modified minnow trap with a flap over each door. The local boonie dogs are accustomed to hunting shrews as a part of their diet and are effective hunters (C. Kessler, pers. comm., 2003).
Chemical: Anticoagulant poisons such as brodifacoum have been used successfully to eradicate rats from many islands, however, insectivores such as the shrew *S. murinus* are less susceptible to the application of toxins such as brodifacoum or 1080; studies have suggested the toxin would have to be applied at unacceptably high concentrations to kill the animal (Eason *et al*. 2002, Morris and Morris 1991, in Seymour *et al*., 2005). Secondary poisoning of birds, which has occurred in the Seychelles for example, suggests that native or endangered birds may face undue risk because of excess use of such toxins (Shah 2001, Thorsen *et al*., 2000, in Seymour *et al*., 2005).
Biological: Cats may reduce shrew densities around structures - although they seldom eat them. Owls will consume large numbers of shrews. Mowing grass around structures may increase predation of shrews (Schmidt, 1994).

Pathway
Due to it's commensal habit, this species is most likely transported unknowingly in cargoes or personal effects.

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ALIEN RANGE

[1] BAHRAIN
[1] EGYPT
[1] IRAQ
[4] MAURITIUS
[1] OMAN
[1] COMOROS
[1] GUAM
[1] MALDIVES
[1] NORTHERN MARIANA ISLANDS
[1] REUNION

[1] SAUDI ARABIA
[1] YEMEN

[1] TANZANIA, UNITED REPUBLIC OF

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