

Fauna regarded as pests in the Maltese Islands (3)

The Rodents

By Arnold Sciberras

The Europeans' only associations with these creatures are generally negative. For instance, "Rats!" is used as a substitute for various vulgar interjections in the English language. These associations are not drawn, *per se*, from any biological or behavioural trait of these animals, but possibly from the association of rats (and fleas) with the 14th-century medieval plague called the Black Death. Rats for example are seen as vicious, unclean, parasitic animals that steal food and spread disease. Folklore, especially the local one, has also played its part. However, on the other side of the world, in Indian tradition, rats are recognized as the vehicle of Lord Ganesh and a rat's statue is always found in a temple of Ganesh. In the north-western Indian city of Deshnoke, the rats at the Karni Mata Temple are held to be destined for reincarnation as Sadhus (Hindu holy men). The attending priests feed milk and grain to the rats, the pilgrims of which also partake. Eating food that has been touched by rats is considered a blessing from god. The indigenous rats are allowed to run freely throughout the Karni Mata temple.

Rodentia is an order of mammals also known as rodents, characterized by two continuously growing incisors (front teeth), two on the upper and lower jaws respectively, which must be kept short by gnawing. This is the origin of the name, from the Latin word *rodere*, which means to gnaw. These teeth are used for cutting wood, biting through the skin of fruit, or for defence. The teeth have enamel on the outside and exposed dentine on the inside, so they self-sharpen during gnawing. Rodents lack canines, and have a space between their incisors and premolars.

Forty percent of mammal species world-wide are rodents (around 2,277 species). They are found in vast numbers present nearly on all continents and islands, and in all habitats except oceans and Antarctica. Their success is probably due to their small size, short breeding cycle, and ability to gnaw and eat a wide variety of foods. (Lambert, 2000). Common rodents include mice, rats, squirrels, porcupines, beavers, chipmunks, guinea pigs, and voles. Rodents have sharp incisors that they use to gnaw wood, break into food, and bite predators. Most eat seeds or plants, though some have more varied diets.

Many rodents are small; the tiny African pygmy mouse (*Mus minutoides*) can be as little as 6 cm in length and 7 g in weight at maturity. On the other hand, the Capybara (*Hydrochoerus hydrochaeris*) can weigh up to 80 kg, and it is in fact the largest known rodent present today. The extinct One tonne- Rat (*Josephoartigasia monesi*), is estimated to have weighed about 1,000 kg, and possibly up to between 1,534 kg or 2,586 kg.

Nearly all rodents feed on plants, seeds in particular, but there are a few exceptions which eat insects or fish. Some squirrel species are known to eat passerine birds like cardinals and blue jays.

Rodents are important in many ecosystems because they reproduce rapidly, and can function as food sources for predators, mechanisms for seed dispersal, and as disease vectors. Humans use rodents as a source of fur, as pets, as model organisms in animal testing, for food, and even for detecting landmines.

The fossil record of rodent-like mammals begins shortly after the extinction of the non-birdlike dinosaurs 65 million years ago. Some molecular clock data, however, suggests that modern rodents had already appeared around 90 million years ago, although other molecular divergence estimations are in agreement with the fossil record.

In the Maltese Islands four species of rodents are known to occur. These are later divided in 2 species of rats and 2 species of mice. Rats are typically distinguished from mice by their size; rats are generally large rodents, while mice are generally small rodents. The best-known rat species (and these are what we have in our islands) are the Black Rat (*Rattus rattus*) and the Brown Rat (*Rattus norvegicus*). The group is generally known as the Old World rats or true rats, and originated in Asia. Rats are bigger than most Old World mice, which are their relatives, but seldom weigh over 500 grams in the wild. Male rats are generally called *bucks*, unmated females are called *does*, pregnant or parent females are called *dams*, and infants are called *kittens* or *pups*. A group of rats is either referred to as a *pack* or a *mischief*.



In some developed countries, many people keep domesticated rats and mice as pets. Regarding rats, these are of the Brown Rat species which originated in the grasslands of China and have spread to Europe and eventually, in 1775, to the New World. Pet rats are Brown Rats descended from those bred for research, and are often called "fancy rats", but are the same species as the common city "sewer" rat. Domesticated rats tend to be both more docile than their wild ancestors and more disease prone, presumably due to inbreeding.

These common species are opportunistic survivors and often live with and near humans, therefore they are known as commensals. They may cause substantial food losses, especially in

developing countries. Wild rats and mice can carry many different "zoonotic" pathogens, such as *Leptospira*, *Toxoplasma gondii* and *Campylobacter*, and may transfer them to other species, for example to humans. The Black Death is traditionally believed to have been caused by the micro-organism *Yersinia pestis*, carried by the Tropical Rat Flea (*Xenopsylla cheopis*) which parasitized on Black Rat living in European cities during the epidemic outbreaks of the Middle Ages; these rats were used as transport hosts. Today, this cycle still exists in many countries of the world and plague outbreaks still occur every year. Besides transmitting zoonotic pathogens, rats are also linked to the spread of contagious animal pathogens that may result in livestock diseases such as Classical Swine Fever and Foot-and-mouth disease. The normal lifespan of rats ranges from two to five years, and is typically three years.

Although mice may live up to two and a half years in captivity, the average mouse in the wild lives only about four months or so primarily owing to heavy predation. Cats, dogs, birds of prey, snakes and even certain kinds of arthropods have been known to prey heavily upon mice. Nevertheless, due to its remarkable adaptability to almost any environment, the mouse is one of the most successful mammalian genera living on Earth today.

Taking a closer look at our local mice the most common and the most regarded as a nuisance is the House Mouse (*Mus musculus*). This species has an adult body length (nose to base of tail) of 7.5–10 cm and a tail length of 5–10 cm. The weight is typically not more than 10–25 g. They vary in colour from grey to light brown (wild form). They have short hair and a light belly. The ears and tail have little hair. The hind feet are short yet they can jump up to 45 cm at one go. The droppings are blackish, about 3 mm long and have a strong musty smell. There are 5 subspecies scientifically recognised.

House mice thrive under a variety of conditions: they are found in and around homes and commercial outlets 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.

Young males and females are not easily distinguished: females have a significantly smaller distance between their anus and genital opening. Females have 5 pairs of mammary glands and nipples; males have no nipples. When sexually mature the most striking and obvious difference is the presence of testicles on the males. These are large compared to the rest of the body and can be retracted into the body.

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.

Primarily nocturnal animals, mice compensate for their poor eyesight with a keen sense of hearing, and rely especially on their sense of smell to locate food and avoid predators. They live in a wide variety of hidden places that are near food sources and construct nests from various soft materials. Mice are territorial and one dominant male usually lives together with several

females and young. Dominant males respect each other's territory and normally enter another's territory only if it is vacant. 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. They drink water but require little of it, relying mainly on the moisture present in their food. They sometimes eat their droppings to acquire nutrients produced by bacteria in their intestines. House mice, like other rodents, do not vomit.

Mice are afraid of rats, which often kill and (partially) eat them. This rat behaviour is known as muricide. Despite this behaviour, free-living populations of rats and mice do exist together locally. House mice are generally poor competitors and in most areas cannot survive away from human settlements in areas where other small mammals, such as wood mice, are present¹

Female house mice have an oestrous cycle that is 4–6 days long, with oestrus itself lasting less than a day. If several females are held together under crowded conditions they will often not have an oestrus at all. If they are then exposed to male urine, they will have an oestrus after 72 hours. Following copulation, female mice will normally develop a vaginal plug which prevents further copulation. This plug stays in place for some 24 hours. The gestation period is about 19–21 days, and they give birth to a litter of 3–14 young (average 6–8). One female can have some 5–10 litters per year, so their population can increase very quickly. Breeding occurs throughout the year (however, animals living in the wild do not reproduce in the colder months, even though they do not hibernate). The newborn are blind and without fur. Fur starts to grow some three days after birth and the eyes open one to two weeks after birth. Females reach sexual maturity at about 6 weeks and males at about 8 weeks, but both can breed as early as five weeks.

The Wood Mouse (*Apodemus sylvaticus*), is an uncommon species locally and tends to be much harder to locate. If a wood mouse is caught by its tail, it can quickly shed the end of it, which may never re-grow. In spite of its name, it prefers hedgerows to woodland. Wood mice inhabit wood, grasslands, and cultivated fields. Almost entirely nocturnal and terrestrial, Wood Mice burrow extensively, build nests of plants and live in buildings during harsh seasons.

The latter are primarily seed eaters, particularly seeds of trees. 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 night, 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. The gestation period of wood mice is of 25–26 days and each female produces, on average, 5 young. The offspring become independent after about three weeks and become sexually active after two months. It is often confused with the House Mouse and although it is not that much of a pest, since its status is still much unknown locally, it usually ends up with the same fate.

Not to be mistaken as rodent pests, local beneficial species not related to rodents, such as the Pygmy White Toothed Shrew (*Suncus etruscus*) (regarded as the smallest mammal in the world) and the Sicilian Shrew (*Crocidura sicula*) (endemic to Sicily and Gozo), usually also end up with the same fate. These are more closely related to hedgehogs rather than to rats and mice and are beneficial to us as they keep pest insects at bay. They are also protected by law.



As subjects of scientific research, rats and mice have been used in all possible ways and are model organisms for scientific research. The more they are studied, the more we see that their psychology and homology, in many ways, seem to be similar to humans more than we could even imagine.

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