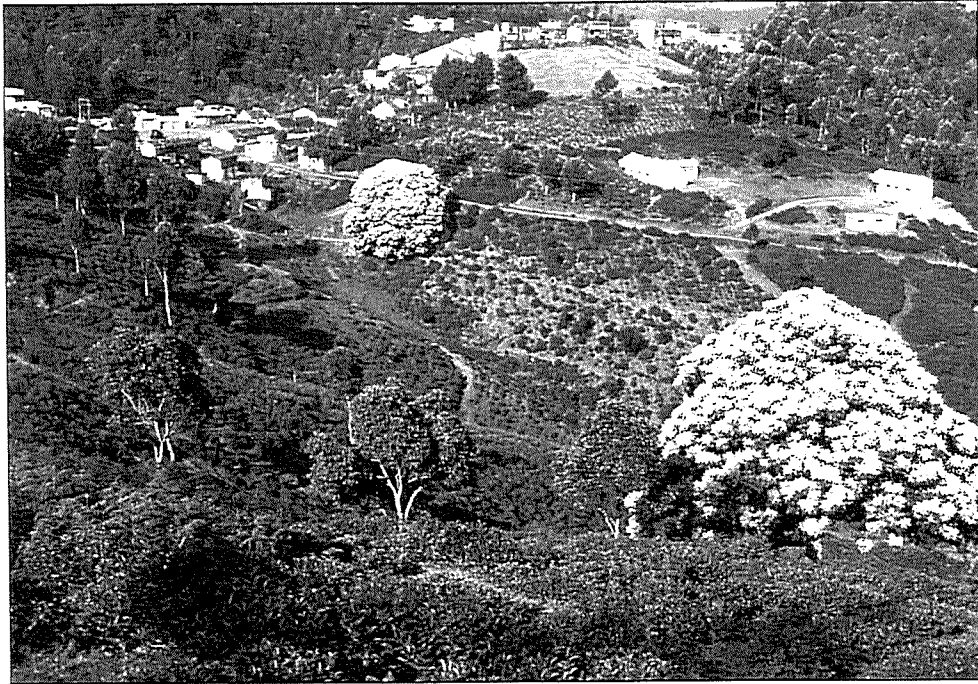


Rats

An appreciation of the rodent communities of the Nilgiris

Text and photographs by Kartik Shanker

There are few remaining tracts of sub-montane evergreen forests remaining in the Nilgiris. The trees are taller than in the montane forests. Four to five rodent and shrew species are common in this habitat, excluding squirrels.



Rattus rattus has successfully colonised our towns and cities. It is able to adapt to an extremely wide array of conditions and is dominant in most habitats where it is found. Urbanisation has resulted in the loss of many species of rodents... and the consequent decline of predators that are dependent on them for food. Seen here in the Upper Nilgiris is *Meliosma pinnata*.

Rodents rule

There can be little doubt that rodents are the most successful of mammalian orders. The group accounts for about 1,700 of 4,000 mammalian species. They vary in size from the pygmy mouse to the capybara, their length ranging from 12 cm. to over 100 cm. and their weight from four gm. to 50 kg. Their ubiquity is staggering, with rodent populations found in every continent except Antarctica. From the tundra to the rainforests, from mountaintops to lakes and swamps and from deserts to cities, there is no habitat that rodents have been unable to invade and occupy. They live on, above and below the ground; they can run, jump, swim, climb, glide; they feed on fruit, seeds, rootstocks, tubers, leaves, grasses, insects, worms, fish and carcasses. Little wonder then that they play such an important role in the world's many ecosystems.

Rodents, by their sheer numbers, form a very important stratum in the pyramid of numbers; they are essentially

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herbivores and form a broad layer of primary consumers, though they may also play a smaller role as secondary consumers. They are known to affect vegetation communities directly by foraging, and indirectly by digging, seed predation and seed dispersal. They can also dislodge large quantities of soil in the process of burrowing and foraging, by which they may substantially alter the microtopography of the soil and change its drainage characteristics. In the food chain, they form the prey base for a wide variety of animals, such as snakes like cobras and rat snakes. Raptors and owls are known to feed largely on rodents. Small carnivores – civets, small cats, and even jackals and wolves – are believed to depend on rodents for most of their diet. In fact, a study on wolves in Alaska showed that the wolves there practically lived on small rodents. Hence, there are no two opinions on the importance of the role of rodents in the world's ecosystems. We need to take a closer look at this fascinating mammalian order.

Rodent features

Rodents are identified by their incisors, which grow throughout their short life span and are shaped like chisels. These are beautifully designed for gnawing



Rattus rattus wroughtoni sub-adults. In the Upper Nilgiris, common rats breed between January and April... the dry season. The rains are very heavy through the rest of the year and conditions are not favourable for breeding. This dry period coincides with the fruiting season and food availability is also the highest.

and nibbling at the vegetative matter that chiefly comprises their diet. As small mammals, rodents need to have a high metabolic rate, which leads to shorter life spans. They are also disadvantaged by the high cost of homeothermy and locomotion, and the need for a high rate of daily intake of food. Moreover, their short life span constrains the evolution of social behaviour. The ease of concealment from predators and a wider range of foods and potential microhabitats offset these disadvantages of small size. Most importantly, they have a high rate of population increase, which favours a quick response to environmental change, making them very adaptable. Their success demonstrates that the advantages are clearly greater; in fact, small mammals have a 33 per cent higher rate of formation of new genera than do large mammals.

Despite constraints, some rodents have managed to evolve social groups. These may be small, comprising the family, or groups with three to four males and four to five females and their offspring as in the house mouse, *Mus musculus*. Some, such as the North American prairie dog have extended family structures, with juxtaposed burrows, and 'colonies' of up to a thousand individuals. Many sciurids and murids tend to be solitary.

Rodent communities

Studies of rodents the world over have shown that, in a given habitat, different species occupy different niches, often based on vegetation structure. Competition also seems to affect the occurrence of species. One clear example is the case of the black rat, *Rattus rattus*, which has out-competed the brown rat, *Rattus norvegicus*, in the tropics, while the latter has been far more successful in the temperate regions. In fact, the former is believed to have arrived first in Europe and England, between 400 and 1,100 A.D. However, *Rattus norvegicus*, though a later entrant in the race to colonise the 'West' soon established itself and has almost driven the black rat extinct there.

Competition is seen as one of the important forces in shaping small mammal communities, though there have been few actual demonstrations of its effect. In the Upper Nilgiris, *Rattus rattus* is the dominant species in the forest, while *Millardia meltdada* is the dominant species in the grassland. Hence, in the natural habitat, these two species are mutually exclusive of each other, which may be explained as competitive exclusion of one species by the other.



Island populations of rodents

One of the most interesting areas of research on rodent populations has been on insular groups. Since the theory of island biogeography was extended to terrestrial islands or forest fragments, it has become part of the mainstream of conservation biology. Rodents have received fair attention in this area, since they are small animals and tend to be restricted to each fragment, in other words, insular.

Island populations of rodents are believed to be more stable than their mainland counterparts. They are also believed to occur at higher densities. These features may have evolved in these populations to counter the threat of extinction on islands. Rodents on islands show very interesting behavioural adaptations and population dynamics.

The fluctuation in rodent numbers has long been of interest from both the ecological and economic standpoints. Rodents cause severe damage to crops and to stored grain and explosions in their numbers have caused astronomical losses. The cyclic fluctuation of their numbers is also interesting ecologically; for example, estimates of house mice in England range from five to 500 per hectare, while desert gerbils in Rajasthan range from five to 800 per hectare. Biological factors such as predation and food availability are known to be important factors in their population dynamics. However, environmental factors – like flood and drought – may also play a significant role in these seasonal fluctuations.

Small mammal communities of the Nilgiris

Forest floor small mammal communities usually include insectivores. Standard traps are used to study these animals, and mammals weighing less than five kg. are usually considered as small mammals. In the Nilgiris, much of the remaining forest is part of the Mudumalai Wildlife Sanctuary, and adjoining tracts. Most of this is dry deciduous, but there are large areas of scrub and thorn, moist deciduous, semi-evergreen and evergreen. The Upper Nilgiris is highly degraded, but there are some intact areas of montane shola-grassland in the Mukurthi National Park.

Speaking of insectivores, *Suncus murinus*, the common or grey musk shrew, is found all over India in all kinds of habitats, and is common in cities as well. It is about 10-12 cm. long with a slightly shorter tail, and

Rattus rattus wroughtoni, the white-bellied subspecies of the common house rat, is found in forest habitat throughout India. The adults are about 15 cm. long with a tail of 20-24 cm. and weigh 100-150 gms; males weigh more than females. In the Nilgiris, common rats are the dominant species in evergreen and montane forests.



Platacanthomys lasiurus is light rufous brown above and dull-white below. The muzzle is pointed, the ears are thin and naked and the hind feet are broad and elongated. It is 13-20 cm. long and weighs about 70 grams. The spiny dormouse inhabits rocky hills and forests at altitudes of 600 metres and above. The long tail, covered with hair, serves as a balancing organ, as the animal is highly arboreal.

weighs about 20 gm. In the Nilgiris, *Suncus montanus*, a similar looking shrew, is more common. *Suncus dayi*, a much smaller shrew, weighing just six to ten gm., is also found in the Nilgiris.

The common giant flying squirrel, *Petaurista petaurista* is found in the forests of Mudumalai, while the giant squirrel, *Ratufa indica* is found in the upper plateau as well. The three-striped palm squirrel, *Funambulus palmarum* is common in Mudumalai, as it is all over South India, in forest and city alike. In the Upper Nilgiris, however, it is replaced by the dusky striped squirrel, *Funambulus sublineatus*. The porcupine, *Hystrix indica* is found throughout the Nilgiris.

There is a distinct difference between communities in different forest types. While the common rat, *Rattus rattus wroughtoni* is common in the moist deciduous and semi-evergreen forests, the white tailed wood rat *Cremnomys blanfordi* is the dominant species in the dry deciduous forests. One also finds the Indian bush rat *Golunda ellioti* and the spiny field mouse, *Mus platythrix* in the drier forests of Mudumalai.

There are very interesting patterns in the Upper Nilgiris

as well. The natural vegetation of the area are shola-grassland systems, sholas being patches of montane stunted evergreen forests. The common rat appears to have established dominance in the forest, and is present in the largest numbers; however, the only rodent that appears to have adapted to the grassland is the soft furred field rat, *Millardia meltada*, which is not found at all in the sholas. Other common rodents of the shola include Bonhote's field mouse, *Mus famulus* and the shrews, *Suncus montanus* and *Suncus dayi*. Though rarer, one also occasionally comes across the Long tailed tree mouse, *Vandeleuria oleracea*, and the Malabar spiny dormouse, *Platacanthomys lasiurus*.

An account of some of the rodents of the Upper Nilgiris

The common rat, about which much has already been said, is a fascinating animal, considering the number of habitats worldwide that it has colonised and dominated. Unlike the ugly black rat of the city, the wild subspecies has pretty, rufous or brown fur, and a pure white underbelly. They are highly arboreal in the wild, which is reflected in their well-known agility in urban conditions. The females are territorial, while the males

Astounding

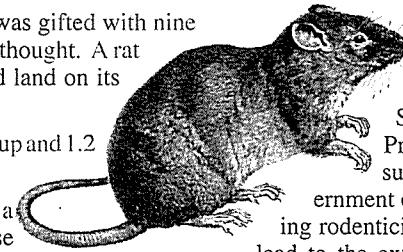
If you thought the cat was gifted with nine lives, just give the rat a thought. A rat may fall 20 metres and land on its feet without injury.

It can jump 0.60 metres up and 1.2 metres horizontally.

It can squeeze through a hole the size of a 25 paise coin and can swim continuously for four days and nights.

Rats can gnaw through wood, mortar, concrete and brick as well as half inch thick, sheet metal.

If the rat does not keep gnawing to keep its teeth in check which grow four to five inches each year, they could potentially curve over and grow into its brain killing it.



The Rodent-Water Connection

The role of rodents in the food chain is best illustrated by an example that was often quoted by the late Kailash Sankhala, the first Director of Project Tiger. He appealed (unsuccessfully) to the State Government of Rajasthan to desist from using rodenticides as these would ultimately lead to the extinction of the desert cat and desert fox. Not only because the toxic poison would creep up the food chain, but because these carnivores depended to a large extent on the water content of rodents such as gerbils to confer desiccation. Quite literally, by wiping out the rodents, the State of Rajasthan had condemned hundreds of carnivores to death by thirst!

appear to be free ranging. Each female occupies a nest on her own and has three or four pups. The adult is about 15-20 cm. long with a 20-25 cm. tail; large males weigh about 150 gm., while adult females weigh 100-120 gm.

The whitetailed wood rat is very similar to the common rat in appearance, except for the tail, which is brown for three-quarters of its length, but white towards the tip. In forests, this too is highly arboreal, makes a large and untidy nest and has litters of two to three young.

The long tailed tree mouse can be distinguished by the fact that the first and fifth toe on all 1.2 metres are partially opposable and have a flat nail instead of a claw. The animal is about seven cm. long with a slightly longer tail. It is an extremely attractive creature, with a reddish coat and white underparts.

Mus famulus is a small mouse with a brown coat and a yellow underside. It is five to eight cm. long and weighs about 20 gm., and is probably less arboreal than the other rats and mice. *Mus platythrix*, a species common all over India, is brownish above and white below. The fur in this species is composed of flattened spines, which is apparent if you pass your hand over it against the direction of the hairs.

The soft furred field rat, *Millardia meltada* inhabits cultivated fields throughout India. In the Nilgiris, it is found exclusively in the grasslands of the upper plateau. It is also the only rodent species found in these grasslands. It has large rounded ears and a hairy tail and a head-body length of 13-15 cm. Its tail is nearly as long. The rodent weighs 50 to 70 grams.

The bush rat has a short rounded head, rounded ears and a hairy tail. The coat is yellowish above, finely speckled with black and fulvous. It favours bush and scrub jungle, but may also be found in cultivated lands.

Millardia meltada, the rat of cultivated fields throughout India, has also laid its claim to the grasslands of the Upper Nilgiris. Its general colour is pale brownish-grey, greyish-white on the underside. It has large rounded ears and a hairy tail, has a head body length of 13-15 cm., a tail nearly as long, and weighs 50 to 70 gm.

Last word

A lot more can be said about the habits of rodents; with 1,700 species worldwide (about 80 in India), their diversity and range is extraordinary. While one can spend substantial time even recovering information on the natural history of these numerous species, it becomes abundantly clear that their role in ecosystems has not been understood or adequately studied. We are still struggling to make estimates of their numbers in the wild and how they fluctuate. They could be crucial to our understanding of forest dynamics and carnivore populations.

Many endangered species probably depend on rodents for food. We must endeavour to bring rodent community ecology into the mainstream of ecological research, to focus scientific and public attention on this exceptional mammalian group, and mostly, to give them the credit they deserve and have long been denied.