

## Nature Watch

### Will the Meek Inherit the Earth?

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This article gives a brief description about rodents and their impact on natural ecosystems.

Which mammalian order has the largest number of species? The answer, astonishingly, is rodents, derisively known as the feeble folk, because of their insignificant size and strength. However, rats and mice have, as commensals of man or by natural means, invaded every continent except Antarctica. They are found upto altitudes of 5500 metres and occupy almost every type of habitat.

Despite their undisputed success, extensive adaptability, and their use by scientists as laboratory animals, rodents in general and rats in particular have consistently been given bad press. As destroyers of crops, as vectors for disease, and as pests in house and field alike, they have been shunned. Remember Robert Browning:

*Rats!  
They fought the dogs and killed the cats  
And bit the babies in the cradles  
And ate the cheese out of the vats  
And licked the soup from the cooks own ladles  
Split open the kegs of salted sprats  
Made nests inside the men's Sunday hats  
And even spoiled the women's chats  
By drowning the speaking  
With shrieking and squeaking  
In fifty different sharps and flats.*

From: *The Pied Piper of Hamelin*

However, rodents and other small mammals give credence to the 'small is beautiful' thesis. Of the 4200 odd mammal species,



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90 % weigh less than 5 kg. Ten of 16 mammalian orders contain mostly small species. In fact, both in birds and mammals, the below 1 kg class embraces the most successful order; of some 8600 species of birds, 5100 belong to the order Passeriformes and of the 4200 mammal species, about 1700 are rodents.

Rodents are largely herbivorous and their great abundance in most of the world's ecosystems creates a broad layer of primary consumers in the pyramid of numbers. Rodents may affect vegetation communities directly by foraging and indirectly by digging, seed predation and seed dispersal. They can dislodge large quantities of soil which alters its drainage characteristics and modifies its micro-topography. They also play an important role as secondary consumers. And, of course, they form the prey base for snakes, raptors, and small carnivores. The taxonomic and numerous dominance of small mammals shows that the pros clearly outweigh the cons of being small. On an evolutionary timescale, small mammals have 33 % higher rate of formation of new genera than large mammals.

#### The Black Rat and the Brown Rat

Rodents encompass a very wide range of animals such as beavers, squirrels, springhares, porcupines, marmots and capybaras. The suborder including rats and mice, however, is the most widely spread and has the largest number of species. Compared with other rodents, members of the family *Muridae* (true mice) may have evolved recently. One hypothesis suggests that murids evolved in southern Asia, as the earliest fossils of murids have been found in Pakistan. This would have been followed by adaptive radiation to the other continents.

The most common and well known of murid rodents is the common rat, *Rattus rattus*, also known as the black, roof, house or ship rat. The black rat's arrival in Europe is attributed to the increase in trade routes with the East between 400 and 1100 A.D. The brown rat, *Rattus norvegicus*, also called the field or sewer

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Figure 1 The Common Rat with its litter of four. The young are born blind and remain in the nest until they are able to fend for themselves.





rat, seems to have invaded Europe a lot later, and was first recorded in Europe and the United States in the eighteenth century. While the brown rat has successfully colonised temperate countries, the black rat has invaded and rules over most tropical countries, including India. The common albino laboratory rats are a variety of the brown rat. These 'Wistar rats' were first established at the Wistar Institute in Philadelphia, and now more than 20 million rats are used per year for medical and physiological studies.

### Teeth Maketh the Rodent

Rodents are basically herbivorous, their distinctive teeth being specially designed for vegetarianism. They break up their food by nibbling or gnawing with their incisors, which function like chisels; in their incisor, the body of the tooth is soft dentine which, while gnawing, wears more quickly than the resistant enamel, thus maintaining a superb cutting edge. The incisors grow through their life of two to three years.

### The Social Life of Rodents

Many species such as sciurids, kangaroo rats, many murids and jerboas are solitary for most of their lives. In the beaver, the family forms the social group. The house mouse occurs in family groups, usually with two to three males and four or five females and their young. Some rodents like the North American black tail prairie dog have extended family social structure; their burrows are juxtaposed to form a colony of upto a thousand individuals.

### Fluctuating Populations

The populations of many species of rodents are known to fluctuate greatly. The number of the Indian Desert Gerbil (*Meriones hurrianae*) was found to vary between 5 and 800 per hectare depending on the season. Obviously, a number of biological

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factors such as predation and food availability affect this fluctuation in numbers as also environmental factors eg. seasonal floods which cause high mortality of young in nests.

### Pests and Vectors, Beware !

While rodents do play a very important role in natural ecosystems, they have also become a part of human systems, making a significant economic impact. The damage done by rodents to crops in India alone runs into crores of rupees each year. They also cause considerable damage to fruit, vegetable, poultry and other domestic stock. They act as vectors for many diseases and while plague is the watchword, they also spread other diseases such as rabies, leptospirosis, and trichinosis.

### Rodents in India

There are a number of interesting rodents in India. The Common Giant Flying Squirrel (*Petaurista petaurista*) occurs in forests throughout the country, while many other flying squirrels are found in the Himalayas. The Giant Squirrel (*Ratufa indica*) is common in the deciduous and evergreen forests of south India, while the Grizzled Giant Squirrel is rare. There are several species of smaller squirrels, the fivestriped palm squirrel (*Funambulus pennanti*) predominating in North India and the threestriped palm squirrel (*Funambulus palmarum*) in the South. The porcupine (*Hystrix indica*) is another highly adaptable rodent.

There are several species of gerbils, which are distinguished by their long hind feet and the tassel of hair at the end of their tail. Rats found in agricultural fields include the Indian Mole Rat (*Bandicota bengalensis*) and the Short Tailed Mole Rat (*Nesokia indica*). Another common rat found in the fields is the Metad or the Soft Furred Field Rat (*Millardia meltada*), though this has also adapted to the high altitude grasslands of the Nilgiris in the Western Ghats. The Indian Field mouse (*Mus booduga*) and the spiny Field Mouse (*Mus platythrix*) are found in most habitats.



Figure 2 The Indian Giant Squirrel, *Ratufa indica*, inhabits deciduous, mixed deciduous, and evergreen forests of peninsular India south of the Ganges.





Figures (3-5) (left) The Soft Furred Field Rat, *Millardia meltada*, is found in agricultural fields and dry plains. It has, however, also adapted to the montane grasslands of the Upper Nilgiris. (center) Bonhote's Field Mouse, *Mus famulus*, is common in the hills of Southern India. It is a small animal, measuring about 8 cm with a tail as long, and weighing about 20 grams. (right) The White tailed Wood Rat, *Rattus blanfordi*, is found in deciduous forests throughout the country.

The Indian Bush Rat (*Golunda ellioti*) and the White Tailed Wood Rat (*Rattus blanfordi*) inhabit dry and moist deciduous forests throughout India. The Long Tailed Tree Mouse (*Vandeleuria oleracea*) is an attractive little forest species found ubiquitously. The Malabar Spiny Dormouse (*Platacanthomys lasiurus*) inhabits the forested hills of South India at elevations of 600 metres and above.

Many rodent species show interesting colour variations; the ubiquitous Common Rat is an excellent example. In the wild, the animal (*Rattus rattus wroughtoni*) has a lovely rufous coat, with a pure white underbelly. In agricultural fields and plantations, it has a rufous coat and a yellow underbelly (*Rattus rattus rufescens*). The house rat (*Rattus rattus rattus*) is almost uniformly black. Squirrels living in the same area may show marked differences in colour, varying with season and locality.

In cities, one comes across the common rat, the brown rat, the house mouse (*Mus musculus*; found the world over) and the much feared bandicoot (*Bandicota indica*), which measure 30-40 inches from nose to the base of the tail.



Figures (6 - 8) (left) The Malabar Spiny Dormouse, *Platacanthomys lasiurus*, is distinguished by its bushy tail, which helps in maintaining balance in this arboreal animal. (center) The wild subspecies of the Common Rat, *Rattus rattus wroughtoni*, has a pure white underside. These are juveniles; the adults are about 16 cm long with a tail of 20-25 cm, and weigh 120-150 grams. Males are larger than females. (right) *Rattus rattus rufescens*, another subspecies of the common rat, has a yellowish underside and is found in agricultural fields and plantations.

### A Last Word

Despite occurring in such large numbers, rodents have not been studied in great detail in the wild. Though there have been a number of studies on the population dynamics and community ecology of rodents in Europe, North and South America, it has not been possible to study their behaviour and habits since they are largely nocturnal and may live in inaccessible burrows. In India, very little is known about rodent communities in the different forest types throughout the country. Over the last few decades, Ishwar Prakash (Zoological Survey of India, Jodhpur) and his colleagues have studied rodents in Indian agricultural fields extensively. More recently, the Centre for Ecological Sciences has been working on small mammals in the Nilgiris, while others at the Wildlife Institute of India, Dehradun and the Sálím Ali Centre for Ornithology and Natural History, Coimbatore have also initiated small mammal projects in the Western Ghats. More attention must be paid to these 'feeble folk' since their impact on natural ecosystems and on human systems and economics is not in the least feeble.

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