

ECORAT

Development of Ecologically-Based Rodent Management for the Southern African Region



**Key to
small mammals commonly found
in agricultural areas in eastern
and southern Africa**



- This key has been written to identify small mammals, and especially problem rodents, found in agricultural areas in Eastern and Southern Africa. Because it uses only characteristics which can be measured in the field it does not follow standard mammal (phylogenetic) taxonomy.
- Juvenile animals may not key out correctly. Juvenile animals can sometimes be recognised by their large feet, smoother fur, and occasionally by their only partially grown-in teeth.
- Not all mammals occurring in any area will be in the key. If a mammal is not in the key please send it to the nearest natural science museum for accurate identification.
- Starting on page 3, read each choice and make a decision which most closely resembles the animal you are identifying. The picture may not be identical to your mammal but choose whichever best suits.

Page 3 Key to small mammal orders

1. Shrews have long mobile noses, sharp insect-eating teeth and small eyes.

Page 4



2. Elephant shrews have long mobile noses, larger eyes with white ring around them, and long legs.

Page 5



3. Moles all live underground, have small or no ears, small or no eyes, and small or no tails.

Page 6



4. Rodents are all colours and sizes but all have gnawing teeth with a space behind them.

Page 7



Page 4 Shrews



Shrews can be identified by their long mobile noses, sharp insectivorous teeth, small eyes, and aggressive behaviour. They are generally small (mass under 40 g), and often extremely small (the Least dwarf shrew has a head-body length of under 60 mm). Shrews often have a musky smell. Shrews are found throughout Africa.

Shrews are now classified in the Order Soricomorpha. There are 17 species of shrews from 4 genera in Eastern and Southern Africa. Shrews of the genus *Crocidura* (mainly *Crocidura hirta*) are commonly found in agricultural areas.

Because they eat insects, earthworms, and other invertebrates shrews may be useful animals to encourage in agricultural areas. However some species have been implicated in carrying human pathogen and so care should be taken around human habitation.

Page 5 Elephant shrews or Sengis



Elephant shrews (or Sengis as they are called in parts of Africa) belong to the Order Macroscelididae. They can be recognised by their long mobile noses, insectivorous teeth, white ring around the eyes, and long legs.



Although diurnal these animals are rarely seen as they are extremely shy of human disturbance. They run in sheltered runways in long grass.

Because they eat invertebrates elephant shrews are of no concern to agricultural and may be highly beneficial to farmers.

Golden moles (Chrysochloridae)



http://en.wikipedia.org/wiki/Golden_mole



Golden moles are extremely specialised for underground living, having no eyes, no tail, and no external ears. Their front feet are modified into claws for digging. They have short iridescent fur which ranges from a light golden colour to dark brown.

Golden moles do not make molehills but dig subsurface runways which can sometimes be seen as raised areas on the ground above.

Because they eat invertebrates golden moles are of no concern to agriculture and may be highly beneficial to farmers by killing and eating crop pests.

Rodent moles or mole-rats (Bathyergidae)



species.wikimedia.org/wiki/Cryptomys

Mole-rats or rodent moles are rodents with large incisors which are very obvious even when the mouth is closed. They have small but functional eyes and a small tail. They have five digits on their front feet.

Mole-rats make the mole hills which can be seen on mown lawns after rains.

Mole-rats eat tubers and roots and can be problems in cultivated fields where such crops are grown. However they do not breed very fast and except in isolated areas are not rodents of great concern.

Page 7

Key to rodents

1. Mass of more than 1 kg, head-body length over 300 mm
Page 8
2. Mass of under 200 g, head-body length under 250 mm
Page 13

Page 8

Key to rodents which weigh over 1 kg and have a head-body length over 300 mm

1. Head-body length over 500 mm, body mass 10 to 20 kg. Body covered with long black and white spines (quills)

Porcupines (*Hystrix* sp.) – **page 9**



2. Head-body length around 350 mm, hindlegs adapted for bipedal locomotion. General colour yellow with black tip to tail

Springhares (*Pedetes* sp.) – **page 10**



3. Head-body length 300 to 400 mm, rat-like in appearance, general colour grey

Giant rats (*Cricetomys* sp.) – **page 11**



4. Head-body length around 300 mm, stocky body with short legs and short coarse fur

Cane rats (*Thryonomys* sp.) – **page 12**



Page 9 Porcupines (*Hystrix* sp)



http://en.wikipedia.org/wiki/Cape_Porcupine

Porcupines are the largest rodents in Africa with a mass of up to 13 kg. They are instantly recognisable by the long black and white spines on their backs and sides.

Porcupines occur in most countries in sub-Saharan Africa



Porcupines are predominantly vegetarian, eating mostly tubers and roots but also taking fruit, bark, and other plant matter. They are known to carry bones to their burrows to chew, presumably to obtain minerals. Porcupines can be problems in agricultural areas as they will take root vegetables, pumpkins, maize, beans and peas. However they are not fast breeders and are themselves eaten as a protein source by humans.

Ecorat Key to problem rodents in agricultural lands

Page 10 Springhares (*Pedetes* sp.)



<http://en.wikipedia.org/wiki/Springhare>

Springhares are large rodents (overall length up to 900 mm and mass of 2500 to 3800 g) which occur throughout much of sub-Saharan Africa but with a patchy distribution – in some parts they are considered extremely rare.



They eat mainly grass but also roots and rhizomes and can sometimes be found in cultivated areas. However their slow rate of reproduction of usually one young at a time means they are not considered problem species.

Page 11 Giant rat (*Cricetomys gambianus*)



<http://mek.niif.hu/03400/03408/html/595.html>

As their name implies, giant rats are large rat-like rodents. They have a head-body length of 300 to 400 mm and a mass of 1000 to 3000 g. Their coat colour is grey with paler underparts and the legs are relatively long.



Giant rats are mostly found in the tropics although their distribution extends marginally into South Africa.

Giant rats are sometimes found in agricultural lands where they may take human food but they are considered a food source themselves in much of their range. Giant rats tame easily and have been looked at as a farmed source of protein. They are also trained to detect land mines and in some parts of the world are kept as domestic pets.

Page 12 Cane rats or Grass-cutters (*Thryonomys* sp)



<http://www.runetwork.de>

Cane rats are large (mass 3 to 5 kg) stocky rodents with head-body lengths of around 500 mm. They have very short coarse fur. Cane rats live in reeds or long grass where there is plenty of cover.



Cane rats do occasionally eat maize, millet, sorghum, and wheat, but most farmers welcome their presence as they are eaten in most of Africa and are considered a delicacy in many parts.

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Page 13
Key to rodents weighing under 1000 g

1. Tail large and thickly covered with fur (bushy)
Squirrels and dormice – **page 14**



2. Tail not thickly covered with fur, rat- or mouse-like
Page 17



Page 14

Key to rodents with bushy tails

1. Mass under 100 g, generally grey with white underparts
Dormice (*Graphiurus* sp.) – **page 15**



2. Mass over 300 g, all colours but often yellow or reddish brown
Squirrels (Sciuridae) – **page 16**



Page 15 Dormice (*Graphiurus* sp.)



Dormice are attractive small rodents with soft grey fur, white underparts, and a bushy tail. Their head-body lengths are between 75 and 145 mm, mass 24 to 81 g. Being mostly arboreal (tree-living) they are excellent climbers and nest in trees. They are omnivorous but mostly eat insects.

Dormice are found throughout sub-Saharan Africa although they are considered rare in many places



Dormice occasionally come into contact with humans as they sometimes nest in house roofs but they are territorial and so they never build up large numbers. They can, however, be problems in aviaries as they will take bird eggs, and are sometimes minor pests in houses where they will eat human food.

Page 16 Squirrels (Family Sciuridae)



Squirrels are large rodents with masses of 500 to 1000 g and always large bushy tails. They mostly eat plants although some take insects too.

Squirrels can be a problem in maize fields but do not have large population fluctuations or large litters and so are not major agricultural pests.

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Page 17

Key to rodents with normal “rat” tails

1. Animal has non-bending spiny fur (push against the ends of the fur to see if it bends)

Page 18



2. Animal has normal bending fur

Page 19



Page 18 Spiny mice (*Acomys* sp)



Spiny mice are easily recognisable by their spiny hairs instead of fur. They are small (head-body lengths of 80 to 100 mm, mass 8 to 33 g) rodents with tails of 35 to 97 mm. Their colour is smoky-grey to reddish above and white underneath.

There are at present three species of Spiny mice recognised from Africa but as many as 26 have been suggested



Spiny mice are found throughout the wetter Eastern areas of the continent

Acomys are not common and are not considered a problem in agricultural lands.

Page 19

Key to rodents with normal fur

1. One or more stripes on back
Page 20



2. No stripes on back
Page 24



Page 20

Key to rodents with stripes

1. Small size, mass under 15 g, with prehensile tails
Climbing mice *Dendromus* sp



2. Stripes including black and white stripes
Four-striped grass mouse *Rhabdomys pumilio*



3. Usually one stripe only, if more than one stripe then stripes not intermixed with very white stripes
Grass mice *Lemniscomys* sp



Page 21 Climbing mice (*Dendromus* sp)



There are several species of climbing mice but all are small (head-body 60 to 90 mm, mass 6 to 15 g) mice with long (64 to 95 mm) prehensile tails. They are excellent climbers and build nests in long grass to rear their young. The coat colour is chestnut to grey on the back, pale buffy to white underneath. There is nearly always a dorsal dark stripe running the length of the back.

There are at present 11 species of *Dendromus* described but it seems certain that this includes several cryptic species and the taxonomy needs urgent revision



Dendromus species occur throughout the sub-Saharan African continent.

Although found in agricultural lands climbing mice are not considered potential problems and since they are largely insect-eating might be advantageous to farmers.

Page 22 Four-striped grass mouse *Rhabdomys pumilio*



Four-striped grass mice are medium-sized (head-body length 90 to 120 mm, mass 25 to 80 g) rodents with tails of 71 to 100 mm and an overall yellowish-brown colouring. The black and white stripes running from the head to the base of the tail are diagnostic. Unlike many other rodents *Rhabdomys* are active during the day.



***Rhabdomys pumilio* are potential carriers of human pathogens.**

Page 23 Grass mice (*Lemniscomys* sp.)



Grass mice are medium-sized (head-body lengths of 120 to 140 mm, mass 50 to 70 g) rodents with coarse coats which range from pale buffy to dark brown tinged with yellow. There is always at least one dorsal stripe: in Southern Africa *L.rosalia* has one stripe, in Tanzania *L.zebra* has several continuous stripes and *L.striatus* has several broken stripes.



Grass mice are found throughout Eastern and Southern Africa

Although grass mice do not undergo large population explosions they are diurnal and are frequently found in agricultural areas and in suburban gardens. This, combined with the possibility of carrying zoonotic diseases, makes them potential problem animals.

Page 24

Key to rodents without stripes

1. Very small size, weighing under 6 g or having a head-body length under 72 mm
Page 25

2. Weighing more than 10 g or having a head-body length more than 80 mm
Page 26

Page 25 Pygmy mice (*Mus minutoides*,
M.musculoides, *M.indutus*)



Pygmy mice are very small (head-body length less than 72 mm, less than 6 g) rodents with thin tails of 20 to 48 mm, slightly shorter than head-body length. The dorsal colour is brown, dark brown, or pinkish-grey, the ventral pure white, with a clear demarcation between dorsal and ventral colours.

The taxonomic status and distribution of the various species of pygmy mice remains unclear and much work needs to be done on these little rodents.



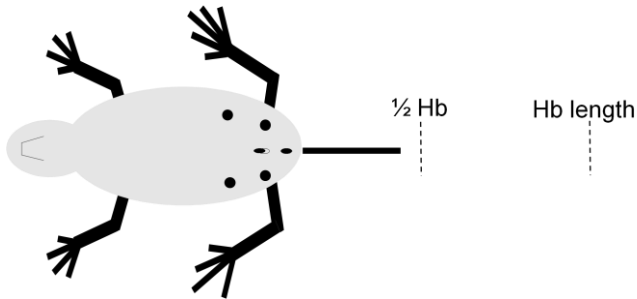
Pygmy mice can undergo population explosions during which time they may become commensal with humans. They have been found to carry zoonotic diseases and thus may be important disease vectors.

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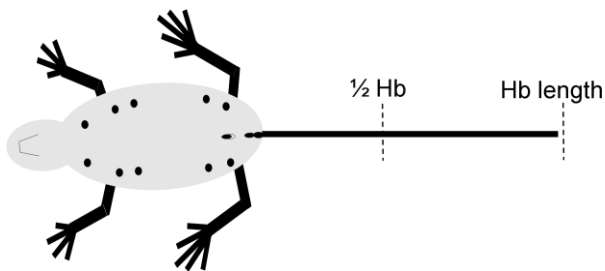
Page 26

Key to rodents with mass more than 10 g and head-body more than 80 mm

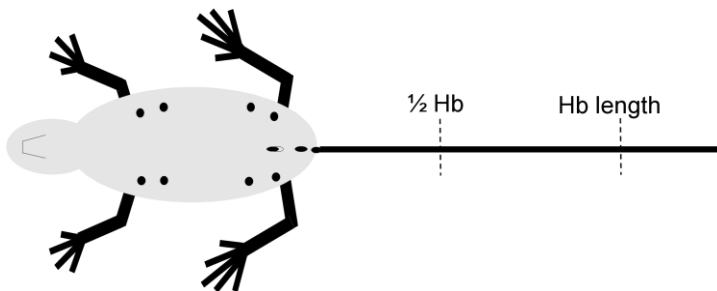
1. Tail very much shorter than head-body – **page 27**



2. Tail equal to or just shorter than head-body – **page 31**



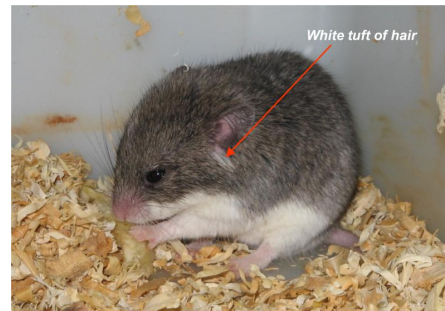
3. Tail longer than head-body – **page 34**



Page 27

Key to rodents with tails very much shorter than head-body

1. Soft grey fur, hamster-like in body shape, head-body length 83 to 145 mm.
Pouched mouse *Saccostomus campestris* – **page 28**



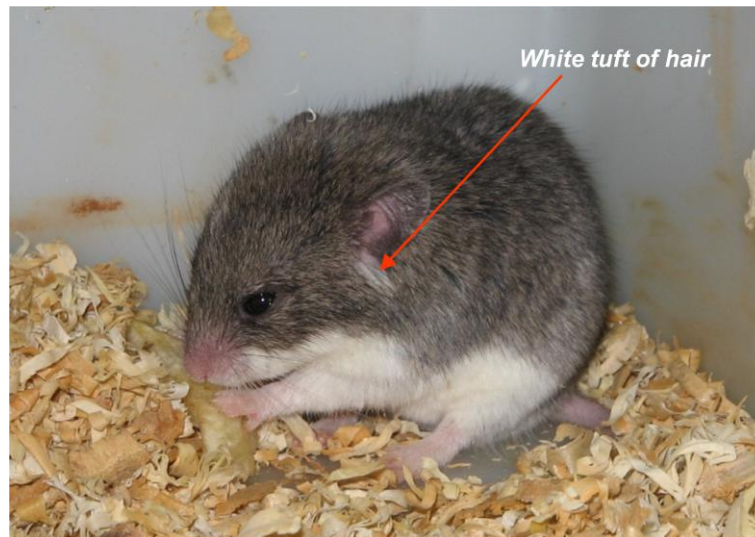
2. Smooth, light brown coat, head-body length less than 110 mm.
Fat mouse *Steatomys pratensis* – **page 29**



3. Rough brown coarse coat, generally found in marshy areas, head-body length over 153 m.
Vlei rats *Otomys* sp. – **page 30**



Page 28 Pouched mouse (*Saccostomus campestris*)



Pouched mice are medium-sized (head-body length of 83 to 145 mm, mass 30 to 70 g) rodents with stout bodies and short tails. Their dorsal colour is grey or greyish-brown, the hair being soft and silky. The ventral colour is white with a clear demarcation between the dorsal and ventral colours. The tail is white to cream-coloured, 32 to 83 mm long, with sparse hair and no rings. These mice have cheek pouches which they use to carry food.

Distribution of *Saccostomus campestris*



Although sometimes found in agricultural areas pouched mice are not known as disease vectors and are not considered problem rodents.

Page 29 Fat mouse (*Steatomys pratensis*)



Fat mice are small (head-body 83 to 106 mm, mass 33 to 55 g) rodents with stout, often very fat, bodies. Their coats are brown to ochre-brown with white underparts and white feet. There is a clear demarcation between the colours of the back and the venter. The hair is short and sleek.



Fat mice have 12 to 16 mammae and under favourable conditions can have litters of up to 9. Although often found in agricultural lands they are not considered major problems to humans.

Page 30 Vlei Rats (*Otomys* sp.)



Vlei rats are large (head-body lengths of 160 mm, mass 160 to 200 g) rodents with stout, shaggy brown or dark grey coats and short tails of 60% of head-body length. There are around 19 species of *Otomys* which are difficult to identify correctly to species level. Vlei rats can also be confused with the rare water rat *Dasymys* but can be distinguished by the grooved front teeth of the vlei rats – *Dasymys* do not have grooves on their front incisors



Vlei rats live in marshy or wetter areas and make recognisable runways through grassy areas.

Because they need longer longer grass as cover vlei rats are not generally a problem in agricultural lands although they can cause damage in pine plantations.



Page 31
Key to rodents with tail lengths equal to or just shorter than head-body length

1. Mass under 70 g, head-body length under 145 mm
Multimammate mice – **page 32**



2. Mass over 90 g, head-body 106 to 204 mm
Arvicantis – **page 33**



A note about distinguishing Multimammate mice from juvenile *Rattus*

Although both rodents can be similar in size they can be easily separated by the size of their feet. *Mastomys* (above) has smaller feet, *Rattus* (below) larger feet.



Page 32 Multimammate mice *Mastomys natalensis* and *Mastomys coucha*



Mastomys natalensis the Natal Multimammate mouse and *Mastomys coucha* the Southern Multimammate Mouse are almost indistinguishable from each other in the field and can only be identified using cellular methods. Both however seem to have similar ecological and life patterns and the following account applies equally to both species.

Multimammate mice are small (head-body under 145 mm, mass under 70 g) rodents with grey or grey-brown coats with paler underparts. Females have 12 to 16 mammae and thus the ability to have litters of up to 20 young every month. Under favourable conditions multimammate mice can undergo enormous population explosions.



Distribution of Multimammate mice in Africa

Multimammate mice are the major problem species of rodent in Africa: they frequently live in close proximity to humans and are implicated in carrying many zoonotic diseases. They also cause large amounts of damage to crops, especially young shoots of agricultural staple crops. Numbers can be reduced by using ploughing instead of slash-and-burn, and the most effective trapping programme is a concentrated kill programme for 3 to 4 months at the end of the dry season or the beginning of the wet season before numbers have built up.

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Page 33 Neumann's Arvicanthis or African
Grass rat *Arvicanthis neumanni*



Neumann's Arvicanthis is a medium-sized (head-body of 110 mm) rodent with a harsh grey coat. With litter sizes of around 6 young it is a fast breeder. It is diurnal (active during the day) and is common in agricultural fields.



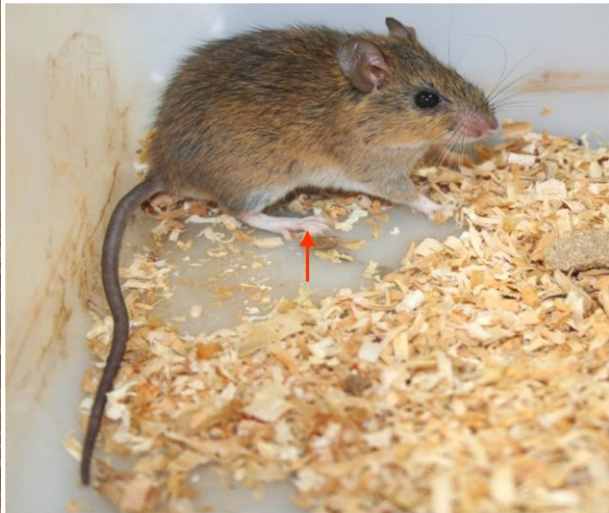
Neumann's Arvicanthis are found in northeastern sub-Saharan Africa but not in Southern Africa.

With an opportunistic and varied diet it can cause serious pre-harvest damage in agricultural fields. It is also a vector for several diseases, including Leishmaniasis.

Page 34

Key to rodents with tails longer than head-body length

1. Overall colour yellowish-brown, never or extremely rarely commensal with humans.
Page 35



2. Overall colour darker brown or grey-brown, frequently commensal with humans
Page 38



Page 35

Key to rodents with tails longer than head-body whose overall colour is yellowish-brown

1. Animal with no obvious scales on the tail, hind legs adapted for moderate bipedal locomotion, and dark on the soles of the feet.

Gerbils *Gerbilliscus* sp – **page 36**



2. Animal with obvious scales on the tail, smaller foot size, and not dark on the soles of the feet.

Rock or Veld Rats *Aethomys* sp. – **page 37**



Page 36 Gerbils (*Gerbilliscus* sp)



The 11 African species of this group were originally in the genus *Tatera* but have recently been placed in their own genus *Gerbilliscus*.

Gerbils are medium-sized (head-body 100 to 160 mm, mass 35 to 60 g) rodents with yellowish-brown to reddish-brown coats and pale to white underparts. Their tails are not visibly scaly and the hind legs are developed for bipedal locomotion: they are thus longer and stronger than the similar-sized *Aethomys*. The hind feet are dark underneath.



Gerbils are found throughout Eastern and Southern Africa.



All gerbils are nocturnal and burrow-living and under normal conditions do not come into contact with humans. However they are carriers of the plague bacillus and in times of population outbreaks can be problematic because the bacillus can be transmitted via fleas to other rodents, including the multimammate mouse which is commensal with humans.

Page 37 Rock or Veld Rats (*Aethomys* sp.)



The 11 species of the *Aethomys* genus are large (45 to 100 g) rodents with yellowish-brown coats and prominent scales on their tails. They can be confused with *Rattus* but are rarely found within human dwellings and are generally smaller.



Aethomys species are found throughout Eastern and Southern Africa.



Although sometimes found in agricultural lands, and occasionally feeding on stored grain, *Aethomys* are not considered major problems in agricultural lands due to their smaller litter sizes (around 3 young at a time) and thus slower rate of reproduction.

Page 38

Key to rodents with tails much longer than head-body and overall colour brown or grey-brown

1. Large (mass up to 180 g) rodents with robust bodies and width of hind feet at widest part (base of toes) over 6 mm. Nearly always commensal with humans.

House rats *Rattus* sp – **page 39**



2. Smaller (mass up to 50 g) rodents with long thin tail 160% of head-body length. Underparts pure white, feet white on top. Rarely commensal with humans.

Thicket Rats *Grammomys* – **page 40**



3. Medium-sized (mass up to 100g) rodents often with black “spectacles” round eyes. Tail 140% of head-body. Width of hind foot at widest part under 5.5 mm.

Acacia or Tree Rats *Thallomys* sp. – **page 41**



4. Small (mass up to 20 g) rodents with brown or grey-brown backs, ventral colour pale brown or grey but never white. Hind feet less than 19 mm.

House mice *Mus musculus* – **page 42**



Page 39 House rats *Rattus rattus*, *Rattus norvegicus*, and *Rattus tanezumi*



Rattus rattus (Black rat, House rat), *Rattus norvegicus* (Norway rat, Brown rat) and *Rattus tanezumi* (Asian house rat, Tanezumi rat) are all large rats found almost exclusively in human dwellings and structures in Africa. Their head-body lengths are up to 200 mm and mass can be up to 180 g. Rats have prominent rings and scales on their tails.

Juvenile rats can be difficult to distinguish from other smaller mice (see multimammate mice on page 32) but they always have large robust hind feet with width at the widest part over 6 mm.

Coat colour can range from black to grey-brown and varies considerably. Their underparts are usually paler, sometimes white, but rarely has a sharp demarcation between back and under colour. There are often long black guard hairs on the back. House rats are omnivorous, eating any foods available.



Rats are found in the wetter parts of Africa near human habitations

Because of their ability to breed throughout the year, having large litters of around 7 young every 6 weeks, rats can quickly become major pests. They have been implicated in the transmission of plague, toxoplasmosis, and other zoonotic diseases. Being nocturnal, rats are often not seen in human habitations but their presence can be detected by their large (10 mm) droppings and chewed foodstuffs.

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Page 40 Thicket Rats (*Grammomys* sp.)



Photo B. Stanley,
Field museum
Chicago
(<http://www.fieldmuseum.org/tanzania/species.asp?ID=520>)

There are several species of Thicket Rats in Southern and Eastern Africa but all have similar identification and ecological characteristics.

Thicket rats are medium-sized (30 to 50 g) rodents with head-body lengths of 100 to 130 mm. They have extremely long thin tails of 145 to 200 mm (160% of head-body size) with tufts of hair on the ends. The body colour varies from tawny to dark slate grey on the back with white underparts sharply demarcated from the back colour. The hands and feet are usually white.

Thicket rats are nocturnal (active at night) and arboreal (tree-living). The long tail is used as a balancing organ when climbing.



Thicket rats are found in the wetter eastern parts of Africa

Thicket Rats are not considered problem rodents in agricultural lands.

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Page 41 Acacia or Tree Rats (*Thallomys* sp.)



There are currently two species of *Thallomys* recognised in Southern and Eastern Africa, the Acacia Rat *Thallomys paedulus* and the Tree Rat *Thallomys nigricauda*, but the taxonomy is in need of revision and there may well be others.

Thallomys are medium-sized (100 g) rodents with head-body lengths of 107 to 144 mm, and long tails of 117 to 151 mm. The tails are long, around 120% of body size, and have small scales and longish bristles. The body colour ranges from brown to light grey, often with a yellow tinge. The underparts are white. There is usually a dark mask around the eyes and down the nose but this is not always obvious on darker animals.

Both Acacia and Tree rats live mostly in trees, often nesting in tree holes, and are competent climbers. They are occasionally found in the rafters of houses.



Distribution of *Thallomys* sp.

Acacia and Tree rats are often found in or near human habitation but are not considered problem animals. They are not known to carry zoonotic diseases.

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Page 42 House mice (*Mus musculus*)



The colour of house mice varies from buffy-brown to dark brownish-grey. The underparts are generally paler but never white. The ears are quite large (when pressed forward they reach the eyes) and round, the rings on the tail are not very prominent, and the fibrissae (whiskers) not very long. The head and body length is 70 to 100 mm, the tail 74 to 95 mm. Average adult mass is 20 g.

In Africa house mice are generally found only in or near human habitation. They are one of the few rodents whose calls can be heard by humans and experienced people can recognise their presence by these twitterings.

Distribution of house mice in Southern and Eastern Africa



House mice can cause severe damage to property and food stocks. They are fast breeders with litter sizes of around 6 young every 20 days. Because they are tolerant of high population densities they can build up to large numbers in ideal conditions. They are omnivorous, feeding mainly on grains and stored seeds but also on human and animal food.

Page 43 Useful references

The following references may be useful if more information is needed on rodents in agricultural lands

The Ecorat project, under whose auspices this key was initiated and developed, was a project which ran from 2007 to 2009 and looked at rodent problems in small-scale and subsistence farms in Namibia, Swaziland, and Tanzania. The website can be found at:

<http://www.nri.org/projects/ecorat/>

The Field Museum of Chicago runs an excellent website which can be used to identify the small mammals of Tanzania and surrounding countries. It can be found at:

<http://www.fieldmuseum.org/tanzania/introduction.asp>

Some books which may also be useful:

Willan, K. 1992. Problem Rodents and their Control. University of Natal, Durban. ISBN 0 620 17125 1

De Graaff, G. 1981. The Rodents of Southern Africa. Butterworths, Pretoria.

F.Kirsten, E.J.Richardson, and C.Peplow. 2010.