

Order MACROSCELIDEA

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II. Family MACROSCOLIDIDAE Bonaparte, 1838

Elephant-shrews

THE ELEPHANT-SHREWS were formerly classified as a family in the Order Insectivora and then in the Order Menotyphla, but are now placed in the separate Order Macroscelidea (Butler, 1956, 1972; Patterson, 1965; Meester *et al.*, 1986; Schlitter, 1993c). Based largely on morphological traits, they were considered to be related to the lagomorphs and rodents (Novacek & Wyss, 1986; Sarich, 1993), but more recent evidence from fossils (Simons *et al.*, 1991) and molecular data (Liu *et al.*, 2001; Helgen, 2003; Nikaïdo *et al.*, 2003) strongly suggest that they are part of a clade (the Supercohort Afrotheria) that includes the aardvark, tenrecs, golden moles, and the Paenungulata (hyracoïds, sirenians and elephants). Further confirmation of this is their large functional caecum (Woodall & Mackie, 1987; Spinks & Perrin, 1995), which supports the contention that they evolved from ancestral herbivores, and aspects of the male reproductive system, such as abdominal testes (Patterson, 1965; Rathbun, 1979; Woodall, 1995a) and a long ventral penis (Woodall, 1995b). Because they are not closely related to the true shrews (Family Soricidae in the Order Eulipotyphla), many authors have adopted the use of the common name 'sengi' for elephant-shrews (e.g. Kingdon, 1997; Jennings & Rathbun, 2001; Rathbun & Woodall, 2002).

The Macroscelididae is a small family comprising four genera and 15 species (Schlitter, 1993c) whose members occur only on the African continent. Their fossil record, also restricted to Africa, dates back to the Eocene (Butler, 1995). Butler (1995) divided them into four subfamilies: the surviving Macroscelidinae and Rhynchocyoninae, and the extinct Herodontinae and Myohyracinae, with representatives of the Mylomygalinae (Peterson, 1965) being included in the Macroscelidinae. Of the two extant subfamilies, only the Macroscelidinae is represented in the subregion.

The oldest representative of the Subfamily Macroscelidinae is *Pronasilio* from the Middle Miocene of Kenya. By the Pliocene, the main radiation had taken place. Both *Macroscelides* and *Elephantulus* are well differentiated in the Makapansgat cave breccias (Butler, 1978). The fossil species *E. broomi* was regarded as related to the living *E. intufi* and *E. rupestris*; *E. antiquus* is more distinct, but nearest to *E. myurus* and *E. rufescens*. A fossil *Macroscelides* was described from Makapansgat (Butler & Greenwood, 1976) as only subspecifically distinct from the living *M. proboscideus*, although Pocock (1987) argues for it to be treated as a full species.

The lower third molars are absent in most Macroscelidinae, but are present in the fossils *Pronasilio* and *Palaeothentoides* and in two living species that occur in the subregion, *E. brachyrhynchus* and *E. fuscus*, which were long differentiated on the basis of this character under the genus *Nasilio*. Corbet (1974b), however, considered that both belonged to the genus *Elephantulus*, a treatment followed here.

Mylomygale, a fossil macroscelid of the Late Pliocene from the Taung deposits, North West Province (Broom, 1948) and Sterkfontein, Gauteng (De Graaff, 1960a) has been placed historically in various subfamilies and remains a taxonomically problematic species whose relationships need to be determined (Butler, 1978, 1995). A distinctive feature is the high-crowned cheek dentition, which wears off to produce a grinding occlusal surface with folded enamel. Patterson (1965) allocated *Mylomygale* in a separate subfamily, the Mylomygalinae. However, Corbet & Hanks (1968) pointed out that it shows a considerable resemblance to *Macroscelides*.

The extinct Subfamily Myohyracinae is known from the Early Miocene of East Africa and Namibia. *Myohyrax oswaldi* is common near Lüderitz Bay, Namibia and *Prottyotheroides beetzi* is known only by jaws from Namibia.

The first member of the family to be discovered was the round-

eared elephant-shrew, *Macroscelides proboscideus*, from Roodewal in the Oudtshoorn District, Western Cape (Roberts, 1951). As further species were discovered, it was realised that they could be placed in two natural groups or subfamilies. The first, the Macroscelidinae, is well represented in the subregion by the genera *Macroscelides*, *Elephantulus* and *Petrodromus*. *Macroscelides* is represented by a single species, the round-eared elephant-shrew (*M. proboscideus*), which is confined in its distribution to within the limits of the subregion. *Elephantulus* is represented by six species, and has a wide distribution in other parts of Africa, with an additional four species: the East African, *E. fuscipes* and *E. rufescens*, the Somalian, *E. revoili*, and the North African, *E. rozeti*. The largest member of the family occurring in the subregion, the four-toed elephant-shrew (*Petrodromus tetradactylus*), extends northwards to East Africa, with an isolated population westwards in the Democratic Republic of Congo.

The second subfamily, the Rhynchocyoninae, includes only one genus, *Rhynchocyon*, with three species, *R. chrysopygus*, *R. cirnei*, and *R. petersi*, none of which has yet been recorded within the subregion. The checkered elephant-shrew (*R. c. cirnei*) was originally collected at Quelimane, Mozambique, which is just north of the limits of the subregion, and there remains the possibility that it may be found in forests south of the Zambezi River. *Rhynchocyon chrysopygus* occurs in Kenya while *R. petersi* occurs in Kenya and Tanzania.

As the colloquial name suggests, their characteristic feature is the possession, by all members of the family, of an elongated, trunk-like, and exceedingly mobile snout on the extremity of which is a tiny rhinarium, enclosing the nostrils. This snout is constantly in motion, twisting up and down and from side to side as the individual sniffs. Several glands discharge their secretions at the tip of the snout, which may protect the rhinarium from the chemical defences of ants and termites (Kratzing & Woodall, 1988). The broad, upright ears are as mobile as the snout and are expressive of the animal's mood. In infrequent conspecific encounters observed in captivity the ears were folded back, but in the seated individual they were held upright and twitched and turned continually (G. Rathbun, unpubl. data). The eyes are large for the size of the head and they are keen-sighted, quickly spotting the slightest movements of the ants and other small insects that are their principal food. They have nictitating membranes that can be passed over the surface of the eyes to protect them. All southern African species examined in detail are active at varying levels during the day and at night (Woodall *et al.*, 1989), and only *Rhynchocyon* seems to be exclusively diurnal (Rathbun, 1979).

In all members of the family the tail is covered sparsely with hair and is usually fairly long. Characteristically there is a naked patch on the rump at the base of the tail, and in some individuals this area tends to become covered with tiny, bright orange oribatid mites, which attach firmly to its surface. All species in the subregion have a subcaudal scent gland (Corbet & Hanks, 1968). The bullae are well developed, exceptionally so in *Macroscelides*, where they are so large that they are visible when the skull is viewed from above as two rounded, bony domes lying on either side of the posterior end of the braincase (Fig. II.1A).

The dental formula is:

$$I_{3}^{2} C_{1}^{1} P_{4}^{4} M_{2}^{2} = 40$$

except in *E. brachyrhynchus* and *E. fuscus*, which have a third lower molar on each side of the lower jaw, a tiny simple tooth, much smaller than the molar immediately in front of it. For a long time, the possession of this tooth was considered to be of sufficient taxonomic importance to separate the genera *Elephantulus* and *Nasilio*, a

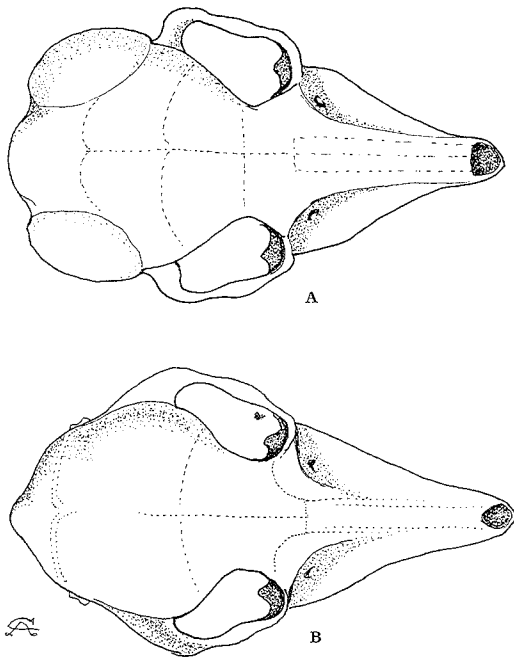


FIG. II.1 Dorsal view of skulls of (A) round-eared elephant-shrew (*Macrosclides proboscideus*) and (B) eastern rock elephant-shrew (*Elephantulus myurus*)

view that is not generally accepted today (Corbet & Hanks, 1968).

Macrosclides proboscideus lives in arid country with a mean annual rainfall as low as 100 mm, whereas the much larger *P. tetradactylus* is confined to riparian thickets and forest, dense woodlands, and forest in high rainfall areas of over 1 000 mm, and is believed by Butler (1978) to be in some respects the most primitive of all our elephant-shrews. Its early fossil history is unknown.

Three species of *Elephantulus* – *E. myurus*, *E. edwardii* and *E. rupestris* – prefer a rocky habitat, though their distributions do not overlap in the subregion. *Elephantulus brachyrhynchus*, *E. fuscus*, and *E. intufi* prefer sandy soils. However, *E. intufi* is generally confined to lower rainfall areas, being able to exist in areas with a mean annual rainfall as low as 100 mm, conditions the other two species cannot tolerate. In Botswana, for example, the distributions of *E. intufi* and *E. brachyrhynchus* are mutually exclusive, with *E. intufi* replacing *E. brachyrhynchus* in the more arid parts of the country. In Namibia, however, *E. intufi* and *E. rupestris* are broadly sympatric (Corbet & Hanks, 1968). Tolliver *et al.* (1989) and Matson & Blood (1997) noted the difficulty in using external morphology to differentiate between these two species that often occur in the same habitat. They can, however, be reliably distinguished using allozymes and chromosomes (Tolliver *et al.*, 1989). In the genera *Elephantulus* and *Macrosclides*, there are five clawed digits on the hind feet, the first located far behind the other four. In *Petrodromus*, there are only four toes on each of the forefeet and hind feet. In all species, the hind limbs are much longer than the forelimbs, and the hind feet are long and slender. This suggests movement by hopping but, although they are capable of prodigious leaps, the normal means of locomotion is by running on all four feet. The four-toed elephant-shrew and several species of *Elephantulus* form paths that are the result of quadrupedal bounds.

If suddenly alarmed, they sometimes jump straight up into the air before escaping into a shelter. They are all very fast movers, especially out in the open, where they run from the shelter of one bush or rock to another with lightning speed.

Elephant-shrews produce acoustic signals by rapidly tapping their hind feet on the substrate. In the wild, foot-drumming occurs during agonistic encounters, when the animal is agitated, and when it encounters a predator (Rathbun, 1979; Roeper, 1981). This drumming is emitted in a series of one or more bouts, each bout consisting of one or more foot drums, usually 25–50 ms apart. Each species has a distinctive foot-drumming pattern (Faurie *et al.*, 1996),

although field observations of several species (G. Rathbun, unpubl. data) suggest that variation in foot-drumming is often a graded response that depends on the intensity of the stimulus rather than on species-specific characteristics.

Downs & Perrin (1995b) investigated the thermal characteristics of three elephant-shrews. *Elephantulus intufi* and *E. brachyrhynchus* had lower than expected basal metabolic rates and high, narrow thermoneutral zones, in contrast to *P. tetradactylus*, which had a basal metabolic rate close to that expected for its body mass and a broad, low thermoneutral zone.

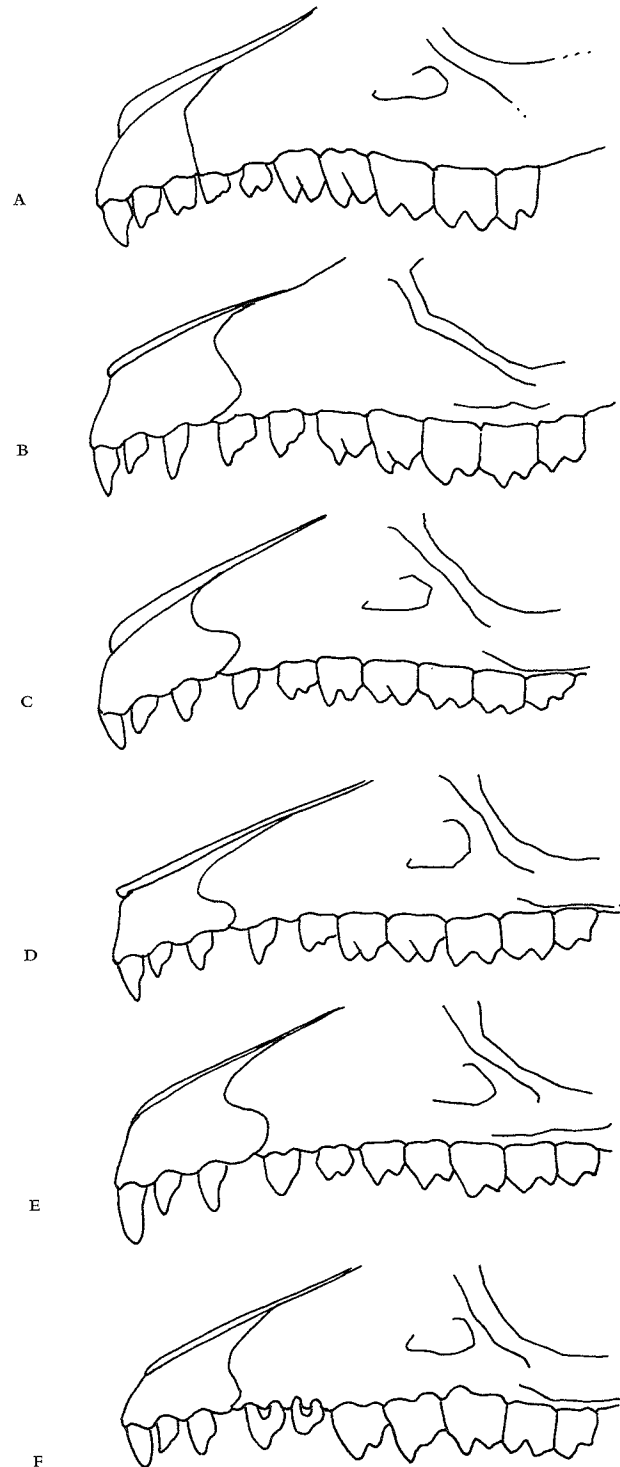


FIG. II.2 Lateral view of left upper tooththrow and profile of rostrum of (A) round-eared elephant-shrew (*Macrosclides proboscideus*), (B) short-snouted elephant-shrew (*Elephantulus brachyrhynchus*), (C) bushveld elephant-shrew (*E. intufi*), (D) western rock elephant-shrew (*E. rupestris*), (E) eastern rock elephant-shrew (*E. myurus*) and (F) Cape rock elephant-shrew (*E. edwardii*) (after Corbet & Hanks, 1968)

All species have exceedingly long, thinly tapering, pink tongues that are used to flick small prey from the substrate. Their tongues are so long that they can curl them around the top of their muzzles to lick their fur clean after eating. All species are testiconda, having abdominal testes, and spermatogenesis occurs throughout the year in *E. myurus* (Woodall & Skinner, 1989) and *M. proboscideus* (Bernard *et al.*, 1996b). The shape of the glans penis is quite characteristic for each genus and supports the inclusion of *Nasilio* in *Elephantulus* (Woodall, 1995b).

Corbet (1995) has examined the morphology within the Subfamily Macroscelidinae. He found the 12 species extremely similar with the exception of *P. tetradactylus*, which is much larger and has no hallux, and *M. proboscideus*, in which the auditory region is hypertrophied and the teeth are hypsodont. Raman & Perrin (1997) agreed with Corbet's classification and found that allozyme analysis is a good marker for identifying each species.

Key to the genera (Corbet, 1974b)

1. Four toes on the hind feet; larger, length of head and body over 160 mm; two pairs of mammae ... *Petrodromus*
 Five toes on the hind feet; smaller, length of head and body less than 160 mm; three pairs of mammae ... 2
2. Auditory bullae enormously inflated, to the extent that, in life, they can be seen as rounded swellings at the back of the skull (Fig. II.1A); second and third upper incisors broad and bilobed at their cutting edges (Fig. II.2A) ... *Macroscelides*
 Auditory bullae of normal size; second and third upper incisors not bilobed at their cutting edges (Fig. II.2B) ... *Elephantulus*

Genus *Petrodromus* Peters, 1846

Petrodromus seems to be a well-defined genus distinguished from the two genera *Macroscelides* and *Elephantulus* by the absence of the hallux and by their larger size. The females also have two pairs of mammae as compared to three pairs in the other two genera. Eleven species have traditionally been allocated to the genus but Corbet & Hanks (1968), after reviewing the genus, concluded that they were all subspecies of the oldest named, *P. tetradactylus*.

No. 19

Petrodromus tetradactylus Peters, 1846

Four-toed elephant-shrew

Plate 2

Colloquial name

The name emanates from the fact that, unlike all other members of the family, they have only four toes on their hind feet.

Taxonomic notes

Nine subspecies are listed from the continent by Corbet (1974b), of which six occur in the subregion: *Petrodromus t. beirae* Roberts, 1913 from central Mozambique south of the Zambezi River; *P. t. schwanni* Thomas & Wroughton, 1907 from coastal southern Mozambique; *P. t. swynnertoni* Thomas, 1918 from the Chimanimani district, Zimbabwe; *P. t. tetradactylus* Peters, 1846 from central Mozambique, originally collected from Tete on the Zambezi River; *P. t. warreni* Thomas, 1918 from coastal northern KwaZulu-Natal, and *P. t. occidentalis* Roberts, 1913 that was recorded from the eastern Caprivi Strip, Namibia (Shortridge, 1934).

The subspecies are characterised mainly by variation in pelage colour. *Petrodromus t. schwanni* has knobs on the bristles under the tail that differentiate it from all the other subspecies in the subregion. The diploid number is $2n = 28$ (Wenhold & Robinson, 1987).

Description

This is the largest species of elephant-shrew occurring in the subregion (Table 19.1). In coastal East Africa there is no statistically significant sexual dimorphism, but inland and further south, females may be larger than males (Jennings & Rathbun, 2001). They vary in pelage colour geographically. *Petrodromus t. tetradactylus* from the extreme north-eastern parts of the subregion has rusty-reddish upper parts, bordered on the sides from the shoulders to the rump by a broad band of buffy-grey; the sides of the neck, cheeks, forearms, flanks and thighs are orange-buff, while the cheeks are tinged with brown. They have a conspicuous white ring around the eyes. The upper lip, chin, throat and the middle of the under parts are white, but tinged buffy in some individuals. In front of the eyes the snout is a darker reddish colour, and behind the eyes, below the white extension of the eye ring, there is a black line bordered by chestnut-red, the black line broadening below the ears. The ears are rusty-brown, with pure white hair on the bases of the inner margins. The upper surfaces of the feet are buffy-yellow; the tail is blackish on the upper surface and buffy on the under surface, darkening in the middle and black towards the tip, with bristles in some forms. The under parts of the hind feet are naked and there is a naked patch on the rump at the base of the tail.

Petrodromus t. tetradactylus from the eastern Caprivi Strip has paler upper parts than in other areas of its distribution. *Petrodromus t. beirae* from Mozambique is slightly larger in size. *Petrodromus t. swynnertoni* from eastern Zimbabwe is darker on the upper parts and slightly smaller. *Petrodromus t. warreni* from KwaZulu-Natal is paler than *P. t. beirae* and has a shorter muzzle while *P. t. schwanni* from the Inhambane province of Mozambique has knobs on the tips of the ventral tail bristles, the posterior foramina of the palate are closed, and they have a short skull. They are closely confined to forest habitat. The club-shaped hairs on the ventral surface of the tail, which are similar to those of *P. t. sultan* from East Africa, are perhaps associated with specialised glands (Sokolov *et al.*, 1980) that may facilitate scent-marking (Rathbun, 1979).

Table 19.1

Linear measurements (mm) and mass (g) of the four-toed elephant-shrew (*Petrodromus tetradactylus*) from (a) Zimbabwe (Smithers & Wilson, 1979), (b) KwaZulu-Natal (Taylor, 1998a) and (c) Arabuko-Sokoke Forest, Kenya (FitzGibbon, 1995)

	Males			Females		
	\bar{x}	<i>n</i>	Range	\bar{x}	<i>n</i>	Range
a.						
TL	350	10	324–370	355	10	330–380
T	162	10	160–176	163	10	162–170
Hf cu	59	10	57–67	58	10	55–62
E	35	10	33–37	35	10	32–37
Mass	182.1	8	160.2–202.3	203.6	9	176.0–280.0
b.						
TL	–	2	319–335	342	5	323–359
T	–	2	147–157	155	5	140–165
Hf cu	–	2	52–53	54	4	50–57
E	–	2	32–34	35	3	33–36
c.						
Hf cu	42.8 ± 0.314	–	43.2 ± 0.56	–	–	–
Mass	198 ± 6.0	14	–	208 ± 11	6	–

Skull

The first upper incisors are large and canine-like, the second are small and close behind them, the third are isolated and much larger than the second, while the canines resemble the third incisors. The first premolar resembles the canine, the second is double the size, the

third is molariform, while the fourth resembles the first premolar. They have two molars. The lower incisors are bifid. FitzGibbon (1995) reported on a canine length of 2.9 ± 0.1 mm ($n = 14$) for males and 2.7 ± 0.1 mm ($n = 6$) for females from Kenya but these lengths are not statistically different from each other.

Distribution

Their occurrence depends on the availability of forest or woodland with dense underbrush and is consequently discontinuous throughout the distributional range.

Africa, north of the southern African subregion

Recorded from Kenya, Tanzania, Uganda, the Democratic Republic of Congo, Congo, Angola, Namibia, Zambia, Malawi, and Mozambique north of the Zambezi River.

Southern African subregion

The isolated population in the eastern Caprivi Strip in Namibia has not been recorded during recent faunal surveys (G. Rathbun, unpubl. data). In Zimbabwe they are known only from the south-eastern parts. In South Africa there is an isolated population in the north-east Limpopo Province, occurring in the riparian forests of the Limpopo River and adjacent thickets, and extending westwards along the Limpopo valley to near Beit Bridge. However, they have not yet been shown to occur on the northern bank of the river, although there is suitable habitat in parts. They also occur marginally in north-eastern KwaZulu-Natal near the Mozambique border, with isolated populations occurring as far south as Lake St Lucia. In Mozambique south of the Zambezi River, they occur widely, except in the northern parts of Manica province along the Zimbabwe border, and in the drier western parts of the Gaza and Inhambane provinces. Their distribution in the south is predominantly coastal, continuing to the northern KwaZulu-Natal border.

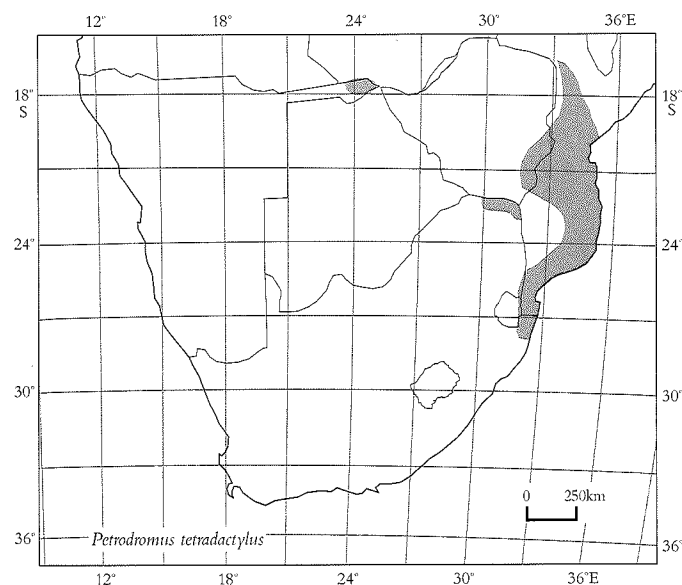


FIG. 19.1 Four-toed elephant-shrew

Habitat

They are associated closely with well-developed riparian thickets and evergreen forests with dense underbrush, and in coastal forests and scrub.

They are generally absent in areas with a mean annual rainfall of less than about 700 mm.

Habits

They are active during the day and at night (Woodall *et al.*, 1989). They are probably monogamous (Rathbun, 1979), both sexes defending overlapping territories. Territory size is inversely

correlated with dry season ant abundance and habitat structure and in Kenya was recorded to be 1.2 ha ($SD = \pm 0.2$; $n = 14$), using the minimum convex polygon method (FitzGibbon, 1995).

They shelter in holes, under roots of trees, in termite mounds, under fallen logs, in hollow logs or in patches of dense underbrush, but they do not build or use nests (Jennings & Rathbun, 2001). Activity is highest in the early morning and evening (FitzGibbon, 1995). Distinct runs are formed from their sheltering places, radiating to areas where food is available. These runs are marked by bare patches in the ground litter, about 240 mm long and about 700 mm between their centres (Ansell & Ansell, 1969) and mark the take-off and landing points as they proceed in bounds along the runs. Where low obstacles lie across these paths, they jump over them. Their normal method of locomotion is to walk, or to run on all four feet; contrary to widespread belief, they do not hop like kangaroos (Rathbun, 1979).

When alarmed they rapidly stamp their hind feet on the substrate, the sound of which can be heard from many metres away, and they may utter a loud shrill squeak when in distress.

Food

Four-toed elephant-shrews are omnivorous, although they prey mostly on invertebrates (Rathbun, 1979; FitzGibbon, 1995) that are 2–5 mm in length (H. Leirs & M. R. Perrin, *in litt.*). Stomachs of specimens from the forests of eastern Zimbabwe were crammed with ants, as well as smaller amounts of other insects, which were masticated so finely that their accurate identification was impossible. In captivity, they consume crickets and grasshoppers, which are captured more readily if they move. This indicates that, although they smell potential food items with their long snouts, sight may also be important in locating food.

Reproduction

The meagre information available from the subregion indicates that the young are born just before and at the commencement of the rains from about August to October. Ansell (1960a) recorded foetuses in Zambia in January, July and October, and it may be that when further information is available a more extended breeding season will become evident. One or at most two young are produced at birth. These are precocial, being fully haired like the adults, and have their eyes open.

Genus *Macroscelides* A. Smith, 1829

Members of the genus are characterised by an inflated auditory region, where the bullae are enlarged to the extent that they are visible when the skull is viewed from above. Adaptations for an arid habitat include a relatively long intestine, probably to reabsorb faecal moisture (Woddall, 1987), and long renal papillae similar to those of desert rodents. The females, like those of the genus *Elephantulus*, have three pairs of mammae (two pairs pectoral and one abdominal), while those of the genus *Petrodromus* have two pairs of pectoral mammae.

No. 20

Macroscelides proboscideus (Shaw, 1800)

Round-eared elephant-shrew

Plate 2

Colloquial name

The former colloquial name, short-eared elephant-shrew, widely used for this species, is unfortunate because the ears are not shorter when compared with those of other smaller species of elephant-shrew. Roberts (1951) recorded ear lengths of up to 29 mm in this species from Namibia, surpassing the maximum recorded for the

eastern rock elephant-shrew (*E. myurus*) or the bushveld elephant-shrew (*E. intufi*). In fact, the ears are very broad and expanded, almost circular in shape, and this differentiates them from the other elephant-shrews.

Taxonomic notes

Meester *et al.* (1986) listed two subspecies: *M. p. proboscideus* (Shaw, 1800) from the Nama-Karoo and Succulent Karoo biomes in the Northern and Western Cape, south-east to Grahamstown, the extreme south-western parts of Botswana and south-western Namibia; and *M. p. flavicaudatus* Lundholm, 1955 from the northern parts of Namibia in the vicinity of the mouth of the Omaruru River and northwards to about 18° S. The diploid number is $2n = 26$ (Wenhold & Robinson, 1987).

Description

Body measurements of adults are shown in Table 20.1. The pelage colour varies throughout their distributional range. Specimens from the Northern, Western and Eastern Cape are buffy-grey on the upper parts of the body, the flanks are lighter, and the under parts are white, with dark grey bases to the hairs showing through irregularly. The tail is dark and tends to be darker towards the tip. The ears are dark with a fringe of white hairs on their inner edges and towards the base of the outer edges.

Some specimens have a richer brown pelage colour, with light buffy-brown flanks. The pelage has a sprinkling of long black hairs interspersed throughout the guard coat and, where these tend to lie together as they do on the rump, they give the coat a dark wash of colour. However, specimens from Namibia are much paler, with a series from the mouth of the Omaruru River and northwards having pale creamy-buff upper parts, yellowish-tinged flanks and correspondingly pale tails. They have no white ring around the eyes, which is a feature in all species of *Elephantulus* from the subregion. The under surfaces of the feet are naked to the ankle, and the skin is paler in the lighter-coloured specimens from Namibia than in those from the Northern, Western and Eastern Cape.

The shape of the supratragus of the ear is characteristic, being square at the end and sparsely haired, unlike that in any *Elephantulus* species (Fig. II.4A).

Table 20.1

Linear measurements (mm) and mass (g) of the round-eared elephant-shrew (*Macroscelides proboscideus*)

	Males			Females		
	\bar{x}	<i>n</i>	Range	\bar{x}	<i>n</i>	Range
TL	234	8	222–245	235	6	222–248
T	120	8	114–128	122	6	115–129
Hf cu	36	8	34–39	36	6	34–37
E	23	8	21–23	25	6	20–29
Mass	38.0	4	32.0–47.0	38.4	5	31.0–47.0

Skull

The rostrum is short and the teeth are crowded together (Fig. II.2A). The first upper incisor is unicuspid, the second upper incisor and the first premolar are bicuspid. The incisors have one root, while the canines have two. The second upper premolar is molariform, with two lingual cusps. In the lower jaw, the second and third premolars are narrow and sectorial.

Distribution

Confined to a comparatively narrow part of the south-western subregion in the Nama-Karoo and Succulent Karoo biomes.

Southern African subregion

They occur in the eastern and southern part of Namibia, in the extreme south-western parts of Botswana, and widely throughout the Northern Cape, Western Cape and Eastern Cape.

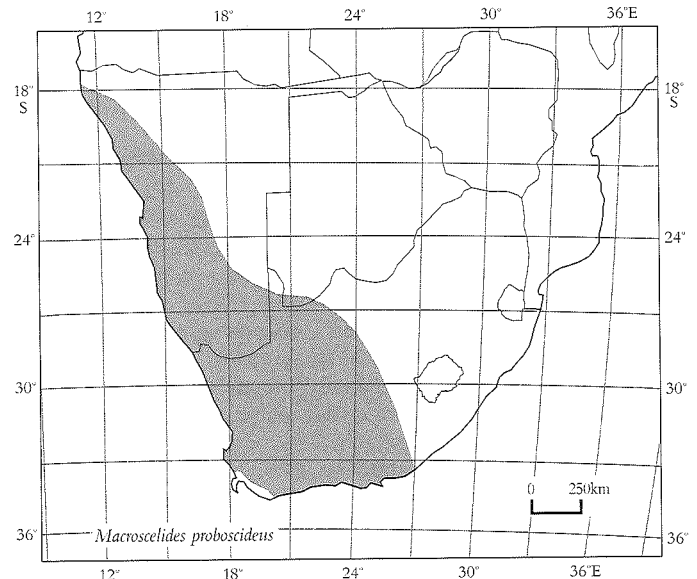


FIG. 20.1 Round-eared elephant-shrew

Habitat

Round-eared elephant-shrews are a species of open country with a preference for shrub bush and sparse grass cover. They are not confined to any particular type of ground, occurring on hard gravel plains with scattered boulders for shelter as well as on loose sandy soils, provided there is some bush cover. Boulders or bush cover are essential habitat requirements.

Habits

They are solitary (Sauer & Sauer, 1972) but more likely occur in facultative pairs (Rathbun, 1979), similar to other elephant-shrews. They are active at dawn and dusk and at night (Woodall *et al.*, 1989). They live among boulders and rocks or in burrows (Sauer & Sauer, 1972), the entrances of which are under low, karroid scrub bushes. Shortridge (1934) recorded that, in captivity, they are adept burrowers, from which it may be reasonably assumed that they excavate their own burrows in the wild. He stated that these burrows have an entrance and an inconspicuous emergency exit. This type of excavation is typical of the burrows of some rodents, e.g. the Cape short-tailed gerbil (*Desmodillus auricularis*). Sauer & Sauer (1972) suggest that they do not make their own burrows, but use those made by rodents, and, like all other Macroscelidinae, do not build or use nests.

Like other elephant-shrew species, such as the bushveld elephant-shrew, they tend to use the cover of bushes or boulders, avoiding exposure in the open. When disturbed, they move rapidly from bush to bush, eventually diving into their burrows. Like other elephant-shrews, they like the sun and sit on the fringe of bush cover sunning themselves in the early mornings. On the other hand, they employ torpor in response to low ambient temperatures, particularly during food deprivation (Lawes & Perrin, 1995; Lovegrove, 1999).

Foot-drumming series consist of regular bouts with foot-drumming intervals ranging from 50 to 80 ms (Faurie *et al.*, 1996).

Food

Omnivorous, consuming insects, herbage and seeds. Plant matter makes up 45% of their diet, varying seasonally and peaking in winter, when it may make up to 97%. The contribution of insects to their diet is not related to insect abundance (Kerley, 1995).

Reproduction

Reproduction occurs throughout the year in the Karoo, with a decline in pregnancy in early winter as reflected by the appearance of young animals (77% caught) in summer (Bernard *et al.*, 1996b). The gestation period is about 76 days (Sauer & Sauer, 1973). The 1–2 young are precocial, being born fully haired with eyes open.

Genus *Elephantulus* Thomas & Schwann, 1906

This genus is represented in the subregion by six species, two of which, *Elephantulus brachyrhynchus* and *E. fuscus*, can be distinguished from the remainder by the possession in the adults of three molars, giving a total of 11 teeth on either side of the lower jaw compared with the remainder, which have only two molars and a total of 10 teeth. The remaining species can be distinguished from each other by the possession or absence of lingual cusps on their first and second upper premolars (Fig. II.3), the form of the second upper premolars (that may be molariform or sectorial), and the form of the supratragus of the ear (Fig. II.4).

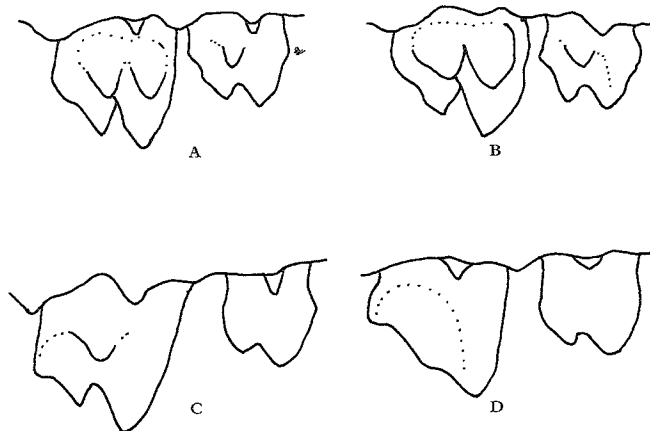


FIG. II.3 Lingual aspect of the first (right) and second (left) upper premolar of (A) western rock elephant-shrew (*Elephantulus rupestris*), (B) bushveld elephant-shrew (*E. intufi*), (C) eastern rock elephant-shrew (*E. myurus*) and (D) Cape rock elephant-shrew (*E. edwardii*) (after Corbet, 1974b)

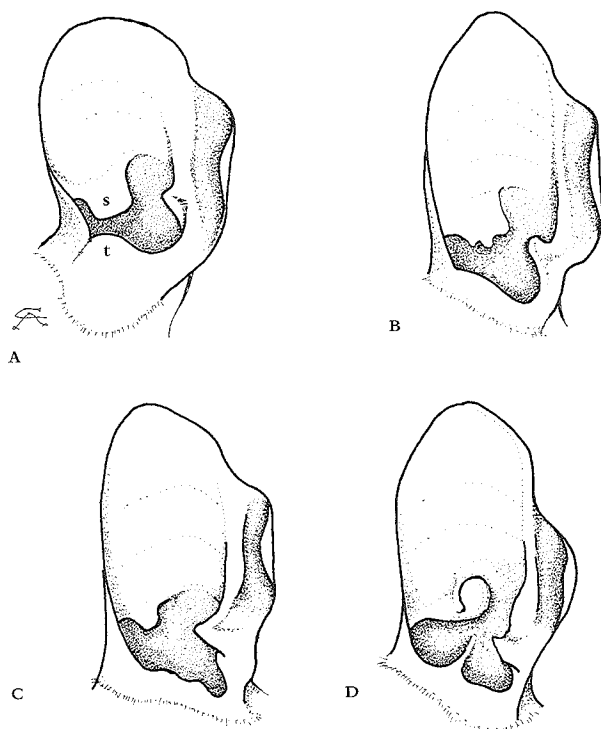


FIG. II.4 Left ear of the Macroscelididae to show supratragus (s) and tragus (t) of (A) round-eared elephant-shrew (*Macroscelides proboscideus*), (B) Cape rock elephant-shrew (*Elephantulus edwardii*), (C) short-snouted elephant-shrew (*E. brachyrhynchus*) and (D) Peter's short-snouted elephant-shrew (*E. fuscus*) (after Corbet & Hanks, 1968)

Key to the species (adapted from Corbet, 1974b)

1. Eleven teeth on each side of the lower mandible in adults ... 2
- Ten teeth on each side of the lower mandible in adults ... 3

2. Supratragus of the ear swollen and twisted backwards on a constricted stalk (Fig. II.4D); pelage darker and greyer in colour ... *Elephantulus fuscus*

Supratragus of the ear not as above; pelage browner, not grey in colour ... *E. brachyrhynchus*

3. First upper premolar with a cusp on its inner face, second upper premolar molariform with two well-developed cusps on its inner face (Figs II.3A & II.3B); under parts whitish ... 4

First upper premolar without a cusp on its inner face, second upper premolar sectorial, with or without small cusps on its inner face (Figs II.3C & II.3D); under parts greyish ... 5

4. Lower second and third premolar with three cusps arranged in a triangle behind the principal cusp; body size larger, upper toothrow over 18.7 mm; tail 115% of the length of the head and body, distinctly tufted and black on the top; a narrow white ring around the eyes, broken above and below ... *E. rupestris*

Lower second and third premolars with only two cusps arranged transversely behind the principal cusp; size smaller, upper toothrow less than 18.7 mm; tail about 106% of the length of the head and body, not distinctly tufted, speckled on the top; white rings around the eyes conspicuous and unbroken ... *E. intufi*

5. Upper second premolar with one, occasionally two cusps on its inner face (Fig. II.3C); lower first premolar with two roots; supratragus small and thick; premaxillary suture sinuous; upper parts greyish; soles of hind feet black ... *E. myurus*

Upper second premolar without a cusp on its inner face (Fig. II.3D); lower first premolar with only one root; supratragus large and thin (Fig. II.4B); premaxillary suture straight; upper parts and soles of hind feet brown ... *E. edwardii*

No. 21

Elephantulus fuscus (Peters, 1852)

Peters' short-snouted elephant-shrew

Very little is known about the ecology of this species, which has only a marginal distribution in the subregion. Its life history is probably similar in many respects to that of the short-snouted elephant-shrew (*E. brachyrhynchus*). Both species occur together near Tete, Mozambique, where a comparative study would be interesting to undertake.

Colloquial name

Named after the naturalist W. C. H. Peters.

Taxonomic notes

Corbet & Hanks (1968) included *fuscus* in *brachyrhynchus*, but Corbet (1974b) treated them as a distinct species after noting their sympatric occurrence around Tete, Mozambique (Meester *et al.*, 1986).

Description

No reliable external measurements are available, but Corbet & Hanks (1968) estimated that they are about 210 mm in total length, with tails that are shorter than the length of the head and body. Their

pelage colour is darker and greyer than that of the slightly smaller *E. brachyrhynchus* from the same area. The tail is lighter below than in *E. brachyrhynchus*, with some wholly black hairs in a mid-dorsal line (Corbet, 1974b). The supratragus is characteristic in shape, swollen and twisted backward on a narrow base (Fig. II.4D).

Skull

The infra-orbital foramen is diagonal in lateral view and triangular when viewed from the front, whereas in *E. brachyrhynchus* it is oval, the longer axis lying vertically.

Distribution

Africa, north of the southern African subregion

Recorded from Zambia, Malawi, and Mozambique north of the Zambezi River.

Southern African subregion

Occurs in Mozambique south of the Zambezi River, in the central parts of Manica and Sofala provinces, and in Tete province.

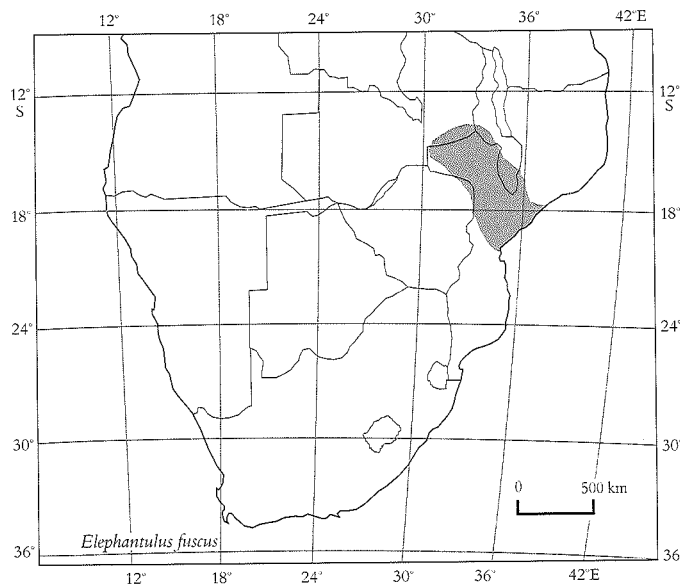


FIG. 21.1 Peters' short-snouted elephant-shrew

Habitat

They are found in grassland with scattered bushes and trees on a sandy substrate.

Food

Insects, including termites and ants.

Reproduction

No information is available on the breeding of this species. However, it is likely to be very similar to that of the short-snouted elephant-shrew.

No. 22

Elephantulus brachyrhynchus (A. Smith, 1836)

Short-snouted elephant-shrew

Plate 2

Colloquial name

The name refers to the fact that the snout is shorter than in the other species of *Elephantulus*, and in this respect they more closely resemble the round-eared elephant-shrew (*Macroscelides proboscideus*).

This feature is reflected when the skulls are compared, the rostrum of this species being shorter than in other species of *Elephantulus* (Fig. II.2B).

Taxonomic notes

No subspecies are recognised as the variation from one extreme of the distributional range to the other grades imperceptibly through intermediate stages. The diploid number is $2n = 26$ (Stimson & Goodman, 1966).

Description

Body measurements of adults are shown in Table 22.1. The pelage colour is very variable, with specimens from Namibia and northern Botswana having reddish-yellow upper parts and a profuse sprinkling of black hairs throughout. Those from the former Transvaal are darker, yellowish-brown to dark brown, while those from Mozambique are greyer.

The under parts are white, the upper surface of the tail is deep brown in the darker specimens to yellowish-grey in the lighter specimens, and the under surface of the tail is paler.

A conspicuous feature of all the pelage colour forms is the white, buffy or off-white ring around the eyes, the white upper lip, and the buffy-yellow or white patch of hair behind the base of each ear, which contrasts with the pelage colour of the upper parts. The base of each hair on the upper parts is always deep slate-grey, the general colour of the individual depending on the colour of the tips of the hairs.

The naked soles of the hind feet in this species are brown as opposed to black in the eastern rock elephant-shrew (*E. myurus*).

Table 22.1

Linear measurements (mm) and mass (g) of the short-snouted elephant-shrew (*Elephantulus brachyrhynchus*) from (a) Botswana (Smithers, 1971) and (b) the former Transvaal (Rautenbach, 1982)

	Males			Females		
	\bar{x}	<i>n</i>	Range	\bar{x}	<i>n</i>	Range
a.						
TL	210	25	200–227	210	23	200–222
T	99	24	89–108	97	24	90–105
Hf cu	30	25	28–34	30	25	27–33
E	21	25	19–23	20	26	18–22
Mass	44.5	20	33.0–52.0	42.7	10	30.0–52.0
b.						
TL	206	16	185–230	212	28	177–230
T	96	16	85–112	98	28	85–108
Hf cu	28	16	26–30	29	29	26–31
E	21	16	19–23	20	28	17–22
Mass	43.6	8	39.0–55.0	45.9	20	31.0–53.0

Distribution

They have a wide distribution in Africa south of the Sahara.

Africa, north of the southern African subregion

Recorded from Kenya, Tanzania, Uganda, the Democratic Republic of Congo, Angola, Zambia, Malawi, and Mozambique north of the Zambezi River.

Southern African subregion

In Namibia they are confined to the north-east. In Botswana they occur widely in the north, north-east and eastern parts of the country, south to the border with North West Province in South Africa. In South Africa, they occur in Limpopo Province, North West Province, Gauteng, and Mpumalanga southwards to north-eastern Swaziland. In Mozambique south of the Zambezi River, they occur in the western parts south to the west of Maputo province but not as far as the border with northern KwaZulu-Natal, which marks their southernmost limit on the continent.

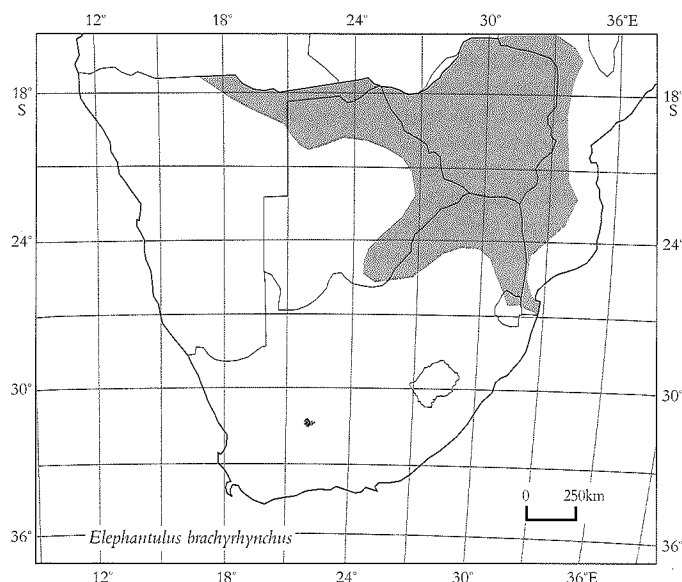


FIG. 22.1 Short-snouted elephant-shrew

Habitat

Although the short-snouted elephant-shrew is sympatric with the eastern rock elephant-shrew (*E. myurus*) and the bushveld elephant-shrew (*E. intufi*), they are segregated by their habitat requirements. This species is associated in the subregion with denser cover than the bushveld elephant-shrew. They occur in areas where there is a dense grass cover with scrub bush and scattered trees. They use the cover of the underbrush of riparian woodland and, in Limpopo Province, are found more generally in this type of habitat. This segregation is marked in Botswana in the southern extremity of the Okavango Delta, where the short-snouted elephant-shrew is associated with the richer vegetation of the well-watered delta, while the bushveld elephant-shrew is associated with the adjacent dry, open grassland and scrub of the northern parts of the Kalahari Desert.

Although in places their habitat abuts onto rocky koppies or rocky hillsides, they do not use the cover of rocks and are replaced there by the eastern rock elephant-shrew. Where these diverse types of habitat lie adjacent to each other, this species and the eastern rock elephant-shrew are often found living within a few metres of each other.

Although in parts of their distributional range they occur on sandy ground or sandy alluvium, they are also found on the hard substrate of mopane scrub. The nature of the ground does not seem to be a factor in limiting their occurrence as it does in the case of the bushveld elephant-shrew, which has a marked preference for sandy soils.

Habits

Short-snouted elephant-shrews are active both during the day and at night, with most activity at dawn (Woodall *et al.*, 1989). On cold, cloudy days they are much less in evidence and during rain they tend to remain under cover.

While generally solitary, pairs may temporarily occupy resting places or holes under the cover of bushes, fallen trees, thorn fences, termite mounds or piles of debris. It is not known whether they excavate these holes themselves or whether they are using disused rodent burrows, which are often located in their preferred habitat. In captivity they use the cover of grass tussocks or piles of dry grass, and in the wild they may use similar cover. Except in the immediate vicinity of the holes or cover, they do not form the defined runways that are a feature of the bushveld elephant-shrew. This may be a factor of the type of substrate on which they often occur, which does not mark as clearly as the looser sandy substrate on which the bushveld elephant-shrew is found. Like other members of the family they are fast movers, running quickly from the cover of one

bush to another and avoiding areas with no overhead cover. When disturbed, they remain motionless in the shade of a bush and are difficult to see.

Foot-drumming consists of one to several regular bouts, the longest of these comprising 10–30 foot drums, as well as short, irregular bouts. Intervals between bouts of foot-drumming range from 100 to 200 ms, while foot-drumming intervals range from 30 to 40 ms (Faurie *et al.*, 1996).

Food

They are omnivorous and analysis of stomach contents revealed $47 \pm 5.3\%$ insects, in particular ants, termites and beetles, $40 \pm 4.9\%$ herbage, $7 \pm 2.1\%$ fruit and seeds, and $5.7 \pm 1.5\%$ other food items (Leirs *et al.*, 1995).

Reproduction

In the Sengwa Wildlife Research Area, Zimbabwe, *E. brachyrhynchus* reproduces throughout the year but conceptions and litter size are significantly reduced in winter. Average litter size in 1987/1988 was 1.6 ± 0.49 ($n = 51$). Adult females can produce 5–6 litters per year for an annual production of 8.3 pups per female. The interval between litters was calculated to be 90 days in winter and 60 days during the warmer part of the year when food is plentiful. This is reflected in the pregnancy rate of 51% in winter and 71–83% in summer (Neal, 1995).

Usually two young are produced, a foetus being implanted in both the left and right uterine horns of the reproductive tract, but there are a number of records of a single foetus. Neonates are highly precocial, being born fully haired and with their eyes open. They move around soon after birth and very soon thereafter begin to feed independently.

No. 23

Elephantulus rupestris (A. Smith, 1831)

Western rock elephant-shrew

Plate 2

Colloquial name

Three species of elephant-shrew live in a rocky habitat: this species, the Cape rock elephant-shrew (*E. edwardii*), and the eastern rock elephant-shrew (*E. myurus*).

Taxonomic notes

Many subspecies have been described, but Corbet (1974b) stated that few of these are likely to be valid. Until a revision is undertaken none are recognised. Great confusion was caused by Andrew Smith's type specimen of *E. rupestris*, which later turned out to be an eastern rock elephant-shrew, *E. myurus*. As a result, subsequent authors referred all the named subspecies of *E. rupestris* to *E. intufi* and all the subspecies of *E. myurus* and *E. edwardii* to *E. rupestris*. This confusion was resolved by Corbet (1974b) and is the basis of the present treatment of the family. The diploid number is $2n = 26$ (Wenhold & Robinson, 1987).

Description

Body measurements of adults are shown in Table 23.1. In the Northern and Eastern Cape, the upper parts of the body and forehead are yellowish-brown, profusely pencilled with black, caused by the narrow black tips of individual hairs lying in juxtaposition. The most conspicuous feature of the upper parts is the broad patch of rufous-yellow hair at the base of each ear, which extends to the nape of the neck on either side. The flanks and sides of the face are light grey tinged with yellow, while the under parts are greyish-white. The lower parts of the limbs are whitish on the upper surface, while the naked portion of the hind feet is black. The ears are brown and naked behind with white hair on their inner margins. There

are indistinct whitish rings around their eyes. The proboscis has a narrow dark line on top and is tawny-greyish on the sides. The tail is dark on its upper surface, slightly lighter towards its base on the under surface and from about its middle is covered profusely with dark bristly hair that lengthens towards the tip, where it forms an elongated brush.

In Namibia they are much paler in colour, the broader white tips to the hairs of the under parts giving the whole animal a whiter appearance.

Table 23.1

Linear measurements (mm) and mass (g) of the western rock elephant-shrew (*Elephantulus rupestris*) from (a) Namibia (Matson & Blood, 1997) and (b) throughout the subregion

	Males			Females		
	\bar{x}	<i>n</i>	Range	\bar{x}	<i>n</i>	Range
a.						
TL	269	11	—	263	9	—
T	146	11	—	142	9	—
Hf	36	11	—	36	9	—
E	27	11	—	26	9	—
TL skull	37.0	11	—	35.8	9	—
CB skull	34.4	11	—	33.2	9	—
ZB skull	20.3	11	—	20.0	9	—
IB skull	7.0	11	—	6.8	9	—
b.						
TL	275	9	251–297	278	4	269–288
T	147	9	130–161	147	4	139–154
E	27	9	22–31	27	4	24–28
Mass	62.8	8	54.0–68.0	70.0	4	63.0–77.0

Skull

The first upper premolars have a single lingual cusp, while the second has two (Fig. II.3A).

Distribution

Not found beyond the borders of the subregion, occurring in a narrow area that runs from Kaokoland, in the north-west of Namibia, through to South Africa in the central parts of the Northern Cape to the coast of the Eastern Cape in the vicinity of East London. They do not occur in the Namib Desert, the north-eastern part of Namibia, or the south-western part of the Western Cape. They occur through to the coast in the north-western Northern Cape, in parts of Namaqualand.

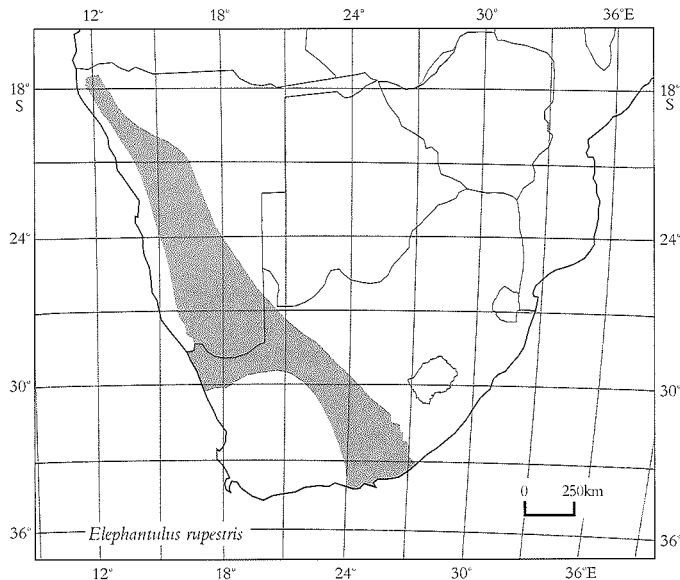


FIG. 23.1 Western rock elephant-shrew

Habitat

They are closely confined to rocky koppies, rocky outcrops, or piles of boulders, where these offer sufficient holes and crannies for refuge.

Habits

Very similar to the eastern rock elephant-shrew (*E. myurus*). A foot-drumming series consists mainly of single foot-drumming bouts containing 30–50 foot drums very closely spaced (15–25 ms apart). Bouts may taper off. Each series lasts about 1.0–1.5 seconds (Faurie *et al.*, 1996).

Food

Insects, particularly ants and termites.

Reproduction

In Namibia, Shortridge (1934) recorded females with one and two foetuses in September.

No. 24

Elephantulus intufi (A. Smith, 1836)

Bushveld elephant-shrew

Plate 2

Colloquial name

Bushveld is used to indicate the type of habitat in which this species lives, as opposed to others that are associated with a rocky habitat.

Taxonomic notes

A number of subspecies have been described, but Meester *et al.* (1986) did not recognise any of them.

Table 24.1

Linear measurements (mm) and mass (g) of the bushveld elephant-shrew (*Elephantulus intufi*) from (a) Botswana (Smithers, 1971), (b) the former Transvaal (Rautenbach, 1982) and (c) Namibia (Matson & Blood, 1997)

	Males			Females		
	\bar{x}	<i>n</i>	Range	\bar{x}	<i>n</i>	Range
a.						
TL	230	14	211–248	242	25	222–272
T	120	14	97–132	125	25	113–142
Hf cu	35	14	33–37	36	25	34–37
E	24	14	23–25	24	25	21–26
Mass	47.0	8	41.0–56.0	52.0	10	42.0–56.0
b.						
TL	230	14	212–249	235	20	204–256
T	115	14	102–128	117	20	103–129
Hf cu	31	14	29–34	31	19	29–34
E	23	14	21–24	23	19	20–25
Mass	46.0	9	35.0–55.0	52.0	10	40.0–74.0
c.						
TL	235	39	—	237	36	—
T	121	39	—	121	37	—
E	24	38	—	24	35	—
TL skull	34.0	43	—	34.0	37	—
CB skull	31.4	43	—	31.3	36	—

Description

Body measurements of adults are shown in Table 24.1. The upper parts of the pelage of specimens from Limpopo Province and the North West Province are yellowish-buffy in colour with a tendency to appear darker along the mid-back owing to long black hairs, which

are scattered throughout the coat and lie irregularly juxtaposed in this part of the body. The flanks are pale buff, and the under parts and chin are white, the grey bases of the hair showing through. They have a conspicuous russet patch at the posterior base of the ears that contrasts with the general colour of the body. They have white rings around their eyes and their tails are dark above and buffy underneath. The ears have conspicuous white hairs on their inner margins.

Specimens from Namibia are much paler than those from Limpopo Province and the North West Province, being an overall pale yellowish-buff, while those from Kaokoland are much greyer. They all have a white ring around the eyes, which is more conspicuous in the greyer than in the paler specimens. The soles of the hind feet are naked and pale brown in colour, not black as in *E. myurus*.

Distribution

Confined to the limits of the subregion, except for a marginal extension into south-western Angola.

Africa, north of the southern African subregion

They occur in south-western Angola.

Southern African subregion

They occur widely in Namibia, excluding the coastal Namib Desert, the north-east and parts of the south, extending eastwards into the central and southern parts of Botswana and into South Africa in parts of the Northern Cape, the north-west of Limpopo Province, and the extreme western parts of the North West Province.

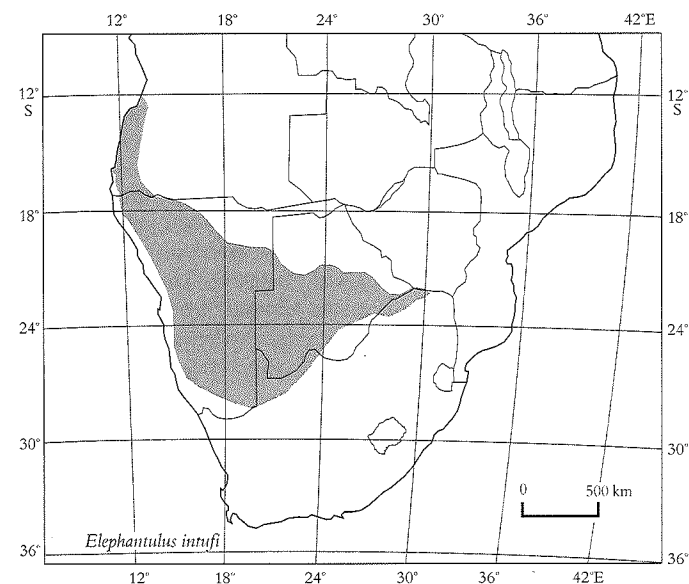


FIG. 24.1 Bushveld elephant-shrew

Habitat

The distribution of *E. intufi* shows that they can utilise more arid terrain than any other species of *Elephantulus*. In Botswana, for example, the short-snouted elephant-shrew (*E. brachyrhynchus*) occurs in the well-watered Okavango Delta and in the eastern parts of the country, which have a mean annual rainfall of 450 mm and above, while *E. intufi* occupies the dry central areas, where the mean annual rainfall is less than 450 mm and, to the west of the delta, it occupies areas where the mean annual rainfall is below 200 mm.

They are the only species of elephant-shrew in the central Kalahari and live in a habitat of scrub bush with a thin grass cover and a sandy substrate. The area is devoid of surface water except seasonally, where it may lie temporarily in pans.

Cover is an essential habitat requirement and is provided by the low bushes that lie scattered in the open grassland. They occupy far thinner cover than *E. brachyrhynchus*, but are not found in open areas around pans where the grass is short. In such habitats, they tend to

use the raised sandy fringes, where the grass is slightly higher and where there is a scattering of low bush.

Habits

The bushveld elephant-shrew is facultatively monogamous, with members of a pair sharing greatly overlapping home ranges that are essentially exclusive of other pairs (G. Rathbun, unpubl. data). They are active during the day and at night, with peaks at dawn and dusk (G. Rathbun, unpubl. data). A captive individual was also active during the day and at night (Woodall *et al.*, 1989).

They live in burrows, the entrances situated under bushes, but whether they excavate these themselves or utilise disused rodent burrows has not been determined. In Namibia, G. Rathbun (unpubl. data) found that radio-collared animals rarely used burrows, preferring to shelter in relatively exposed sites at the base of dense bushes or in piles of rocks. They did not build or use nests. Like the short-snouted elephant-shrew, they tend to move and feed in the shelter of bushes, avoiding spending time in the open. Where ground litter is plentiful, clearly defined runs can be seen that radiate out from their shelter sites or burrow entrances, leading from bush to bush or between piles of rocks. If they are disturbed while away from their shelter sites, they seek cover by crossing open ground at high speed. They are very difficult to see while in the shade, their presence usually being detected by the slight movements of their ears and snout, which seem rarely to remain completely motionless. They run on all four feet but jump over obstacles.

They show regular and irregular foot-drumming patterns. Regular foot-drumming bouts have widely spaced taps (200–300 ms), whereas the irregular bouts are of shorter duration and consist of groups of foot drums of varying lengths but with predominantly small foot-drumming intervals. Series lengths may last up to several seconds or possibly minutes (Faurie *et al.*, 1996). They often utter a high-pitched squeak.

Food

Predominantly insectivorous (especially ants), but also consume small quantities of herbage (Kerley *et al.*, 1990). If they catch grasshoppers or anything larger than ants when away from cover, they carry the prey back to the safe shelter of bushes to be eaten. Small scatterings of chitinous wing cases of insects are often found, which mark the sites where these insects have been consumed.

Reproduction

Shortridge (1934) recorded three females with two foetuses each, which were collected in eastern Namibia in November. In Botswana gravid females were collected between August and February, the average number of foetuses per female being 1.9 (range = 1–3; $n = 9$) (Smithers, 1971). In the former Transvaal, Rautenbach (1982) recorded gravid females in August and March, the average number of foetuses per female being 1.6 (range = 1–2; $n = 6$). From this it appears that they are seasonal breeders, the young being born during the warm, wet summer months from about August to March. In Namibia, however, they probably breed all year round (G. Rathbun, unpubl. data).

No. 25

Elephantulus myurus Thomas & Schwann, 1906

Eastern rock elephant-shrew

Plate 2

Colloquial name

So named from their close association with rocky habitat.

Taxonomic notes

While a number of subspecies have been recognised in the past their validity is doubtful and Meester *et al.* (1986) did not recognise any of them. The diploid number is $2n = 30$ (Ford & Hamerton, 1956).

Description

Body measurements of adults are shown in Table 25.1. The upper parts of the body are buffy-grey, being greyer towards the rump. The flanks are paler and grayer than the upper parts. They have buffy patches behind the bases of the ears, but these do not contrast with the colour of the upper parts to the same extent as they do in other species. The head is buffy-grey, the forehead is washed with paler buff, the eyes are conspicuously ringed with white. The ears are brown with a fringe of white hairs on their inner margins. The under parts are white, with the slate-grey bases of the hair showing through. The tail is slightly longer than the length of the head and body, and is sparsely haired, darker above than below and darker towards the tip. The upper surfaces of the feet are whitish, while the naked under surfaces of the hind feet are black. The hair on the upper parts of the body is about 13 mm long, the individual hairs being shiny black for most of their length with buffy ends, and many of the hairs have narrow black tips. Interspersed throughout the coat are a series of long black hairs that might have a tactile function. They have five digits on the forefeet and hind feet, each with a short curved claw and a conspicuous, swollen digital pad. Externally, this species can be distinguished from the western rock elephant-shrew (*E. rupestris*) by its less hairy tail, less conspicuous light-coloured patches behind the ears, and generally greyer pelage colour.

Table 25.1

Linear measurements (mm) and mass (g) of the eastern rock elephant-shrew (*Elephantulus myurus*) from (a) the former Transvaal (Rautenbach, 1982) and (b) near the Zimbabwe National Monument (Smithers & Wilson, 1979)

	Males			Females		
	\bar{x}	<i>n</i>	Range	\bar{x}	<i>n</i>	Range
a.						
TL	263	56	202–291	263	58	219–290
T	137	55	104–153	136	59	101–156
Hf cu	37	59	29–40	36	61	31–40
E	25	59	18–30	25	61	19–29
Mass	60.9	60	48.0–80.0	60.0	59	41.0–98.0
b.						
Mass (unsexed):	$\bar{x} = 47.1$ g, range = 38.0–56.0 g.					

Skull

In contrast to the western rock elephant-shrew (*E. rupestris*) and the bushveld elephant-shrew (*E. intufi*), this species has no lingual cusps on the upper first premolars. The second upper premolars usually have a single lingual cusp, but sometimes two cusps set very close together and less than half the height of the labial cusps. The posterior labial cusps of the second upper premolars are distinctly smaller than the anterior, the difference being more marked than in *E. rupestris* (Fig. II.3C).

Distribution

They only occur where there is suitable habitat in their distributional range.

Africa, north of the southern African subregion

They occur in Mozambique north of the Zambezi River.

Southern African subregion

In Zimbabwe they are widespread in the southern and eastern parts and are absent in the north and north-west except for an isolated population on granite koppies in Hwange National Park. They occur in eastern Botswana and the western parts of Mozambique south of the Zambezi River, south to the north-western parts of Maputo province. In South Africa they occur widely in Limpopo Province, Gauteng, Mpumalanga, the eastern North West Province and the Free State, where they are absent from grassland but otherwise have a wide distribution throughout. They also occur in the eastern

Northern Cape, south to about Deelfontein and Burgersdorp in the Eastern Cape. They occur in the mountainous parts of north-western KwaZulu-Natal. They are absent in large parts of Lesotho.

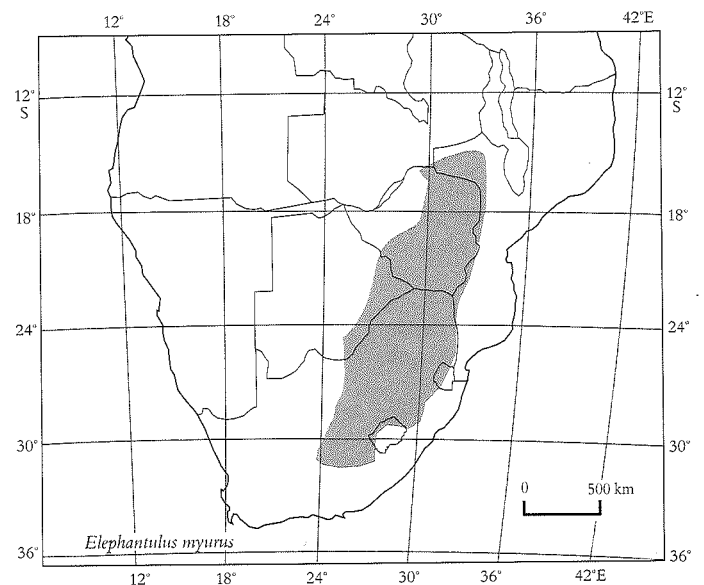


FIG. 25.1 Eastern rock elephant-shrew

Habitat

Eastern rock elephant-shrews, as the name suggests, are confined to rocky koppies or piles of boulders. They only occur in this type of habitat if there are sufficient holes and crannies for refuge. In granite formations, where the boulders or *dualas* rise from ground level and do not provide this type of shelter, they are absent, yet they may be present in adjacent parts of the rocky terrain where the formation is more broken or exfoliated. They have a preference for those parts of their rocky habitat that have overhanging ledges or vegetation providing cover from aerial predators. They occasionally occur on flat ground, using the cover of isolated boulders or small rocky outcrops.

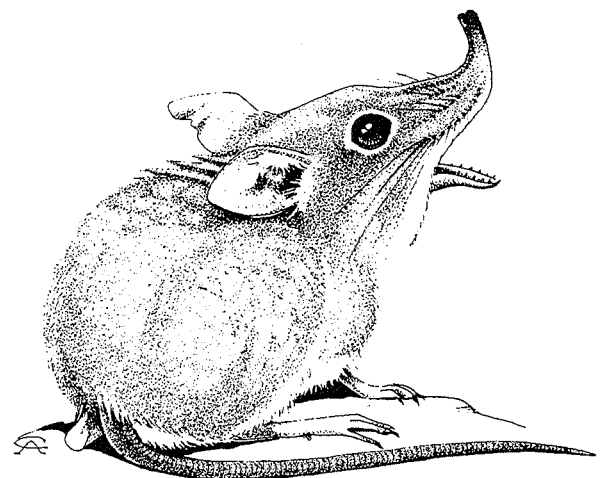


FIG. 25.2 Eastern rock elephant-shrew vocalising

Although they are sympatric with the short-snouted elephant-shrew (*E. brachyrhynchus*), the two species are segregated by their habitat requirements, this species being confined to rocky parts, the short-snouted elephant-shrew to the adjacent sandy, flat ground.

Habits

The eastern rock elephant-shrew has a social organisation that is very similar to the bushveld elephant-shrew, whose monogamous pairs occupy largely exclusive home ranges (Ribble & Perrin, 2005).

Eastern rock elephant-shrews are predominantly diurnal, with a peak of activity at dawn, but they are also active at night (Woodall *et al.*, 1989). However, they are noticeably more active during the warmer hours of the day, this activity tailing off during the cooler hours just before sunset.

Characteristically, they tend to keep to the shady cover of overhanging rocks or the shade of bushes or trees overhanging their rocky habitat, where they blend into the background and are difficult to see. Often only the twitching of their nose and ears reveals their presence. From this cover they sally forth with lightning-quick bounds to seize their prey, which, if it is the size of a grasshopper or larger, they carry back to the shade for subsequent consumption. They are very quick in their movements and leap with agility from boulder to boulder over distances of up to about a metre. If disturbed, they run for the cover of their refuges but, when left undisturbed, they soon reappear. In the early mornings they sit quietly on sheltered rocks sunning themselves, well camouflaged and resembling stones. They are always on the alert and quickly run for shelter when disturbed. They vocalise in a series of high-pitched squeaks, tailing off at the end of the sequence to one that is barely audible. In doing so the head is held high, the trunk curled back over the top of the muzzle while the mouth is wide open (Fig. 25.2).

This species produces regular foot drums in short bouts of 2–4 foot drums with intervals of 25–40 ms between foot drums in a bout, and 250–350 ms between foot-drumming bouts. The length of a series may vary from less than one second to several minutes (Faurie *et al.*, 1996).

Eastern rock elephant-shrews go into torpor when deprived of food (Lovegrove *et al.*, 2001) and, in the case of free-ranging animals, when ambient temperatures are low (Mzilikazi *et al.*, 2002). Free-ranging females become torpid more frequently than males, and the lowest body temperature recorded was 7.5 °C at an ambient temperature of 2.7 °C.

Food

Churchfield (1987) studied the diet by faecal analysis. Isopterans and formicids comprised 42% of the diet, coleopterans, including tenebrionid and curculionid beetles, ranked third, while the remaining prey were all arthropods. Invertebrate prey contributed 90% by volume of the total diet, the remainder being made up of plant material.

Reproduction

Information available from eastern Botswana (Smithers, 1971), the former Transvaal (Van der Horst, 1946; Rautenbach, 1982) and KwaZulu-Natal (Taylor, 1998a) indicates that young are born during the warm, wet summer months between September and March. The gestation period, given by Van der Horst (1946) as eight weeks, seems long for the size of the species. Usually two young are born, but there are numerous records of only one young being born. At birth the length of the head and body is about 50 mm. They are precocial, being born fully haired with the eyes open and are able to walk soon after birth. They apparently remain in the rock shelter for a time as very small individuals are not seen with the adults. By the time they are about a third of the size of the adults, however, they move about freely and independently and feed with them. Females become sexually mature at 5–6 weeks of age.

During their short lives, the females may have up to three litters. Most of them have only one litter, there being a small drop in the number of those having a second litter, and a substantial drop in those having a third. The optimum possibility of a female having six offspring during her breeding period rarely happens, and Van der Horst (1946) reported the mean number of offspring from a pair to be 4.5. However, other species of *Elephantulus* live considerably longer (Rathbun, 1979; G. Rathbun, unpubl. data) and recent field studies of *E. myurus* indicate greater longevity (Ribble & Perrin, 2005), which suggests that fecundity may have been underestimated by Van der Horst (1946).

Male rock elephant-shrews have relatively small, abdominal testes

with active spermatogenesis throughout the year, but with a significant reduction in testis and prostate size, as well as sperm numbers and viability, in winter (Woodall & Skinner, 1989).

No. 26

Elephantulus edwardii (A. Smith, 1839)

Cape rock elephant-shrew

Plate 2

Colloquial name

The first specimen of this elephant-shrew was collected by Edward Verreaux and named after him by Andrew Smith. His brother, Pierre Jules Verreaux, was a well-known naturalist after whom a number of mammals and birds are named, including Verreaux's mouse (*Myomyscus verreauxi*), and the black or Verreaux's eagle (*Aquila verreauxii*). The locality of *E. edwardii* was given as the Olifants River, which Shortridge (1934) and Roberts (1951) decided was the river by this name in the Oudtshoorn district. They are associated with rocky terrain, as is the eastern rock elephant-shrew (*E. myurus*). Because they are confined in their distribution to the Northern Cape, Western Cape and Eastern Cape, it is perhaps appropriate to distinguish them under the name Cape rock elephant-shrew.

Taxonomic notes

No subspecies are recognised by Corbet (1974b). Rautenbach & Nel (1980) presented evidence from the Cedarberg Mountains that there is variation in dental characters (lingual cusps and the number of roots) that had previously been used to separate them from the eastern rock elephant-shrew.

Description

Body measurements of adults are shown in Table 26.1. The upper parts of the body and forehead are greyish-brown, tinged yellowish and grizzled with blackish-brown. The sides of the head and flanks are ashy-grey, tinged with pale tawny. The under parts are white, with the dark grey bases of the hairs showing through. The chin and the eye rings are greyish-white, while the legs are light ashy-grey. There are patches of tawny-rufous hair behind the bases of the ears. The whiskers are black, and the proboscis is black on the top and whitish on the sides. The large ears are broad at the base and rise to rounded tips. The tail is proximally black above and paler below but completely black towards the tip. It is densely covered with short, dark-coloured hair that is longer towards the tip, where it forms a small tuft. The fur is long, soft and silky, the individual hairs on the upper parts being slate-grey at the base, annulated towards the tip with greyish-brown, and narrowly tipped with black.

Table 26.1

Linear measurements (mm) and mass (g) of the Cape rock elephant-shrew (*Elephantulus edwardii*)

	Males			Females		
	\bar{x}	<i>n</i>	Range	\bar{x}	<i>n</i>	Range
TL	252	7	235–261	260	9	220–288
T	130	7	120–140	136	9	126–144
Hf cu	34	7	33–36	35	9	34–36
E	27	7	25–30	29	9	25–31
Mass	47.0	7	36.0–52.0	53.0	9	40.0–65.0

Skull

In the first and second upper premolars, the anterior labial cusps are well developed, the posterior poorly so, neither having lingual cusps (Fig. II.3D). The first lower premolar is single rooted while that of *E. myurus* is double rooted.

Distribution

Endemic to the subregion. Although they were considered to occur only in two discrete areas – one on the west coast between around Yzerfontein, Western Cape and Port Nolloth, Northern Cape, the other area roughly between Richmond, Northern Cape and Port Elizabeth, Eastern Cape – it is now known that they occur between these two areas.

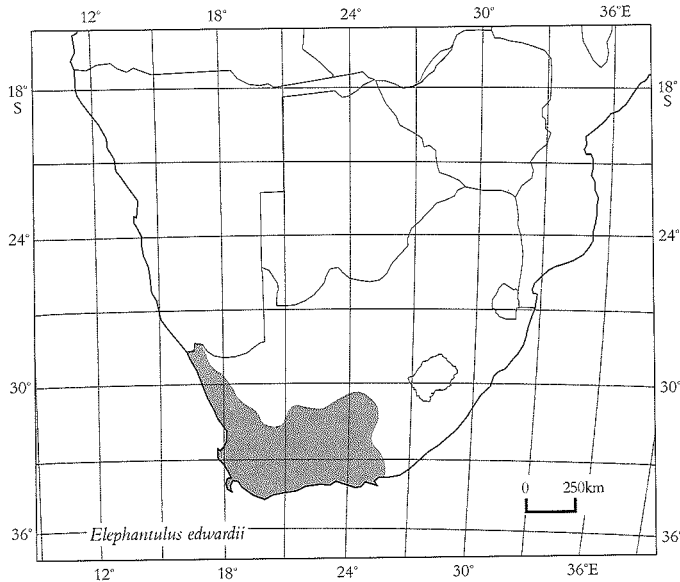


FIG. 26.1 Cape rock elephant-shrew

Habitat

Cape rock elephant-shrews were originally recorded from a locality 'bearing little or no vegetation, except a few dwarf shrubs'. There was no suggestion that they were associated with rocky terrain. Dieckmann (1979) collected them in Goegap Nature Reserve in Namaqualand in the vicinity of low rocky outcrops, where he noted that they formed indistinct runways. He also collected them

from hard sandy ground sparsely covered with vegetation. In the Cedarberg Mountains, Rautenbach & Nel (1980) recorded them from rocky slopes, with or without vegetation cover. It seems that, unlike the eastern rock elephant-shrew, this species uses quite small rocky outcrops provided they have shelter in the form of cracks and crannies. Verreaux may have missed the significance of this type of habitat in his original description.

Habits

This species is predominantly nocturnal, with much reduced activity during the day (Rickart, 1981; Woodall *et al.*, 1989) and occurs independently or in pairs. They show more irregular foot-drumming patterns than other species of *Elephantulus*, with foot-drumming intervals ranging from 30 to 50 ms and bouts that are usually less than two seconds in length, but also variable (Faurie *et al.*, 1996). Although they occur in mountainous regions with sub-zero temperatures, this species is apparently homeothermic (Leon *et al.*, 1983), with no indication of torpor as in other elephant-shrews (Lovegrove *et al.*, 1999; Lovegrove *et al.*, 2001).

Food

Insects, predominantly ants and termites. Fleming & Nicolson (2002) show that the Cape rock elephant-shrew is one of the more important pollinators of *Protea* flowers, which happens while they forage for insects attracted to the flowers. In captivity they feed on locusts and cockroaches, as well as dry seeds and grain, discarding the more heavily chitinised parts of the insects (Woodall & Currie, 1989). Although they are assured of a constant water supply through their diet, the protein-rich food causes a relatively high urinary loss. In addition, in their arid environment, water conservation is necessary. Compensation for evaporative water loss is accomplished by concentrating their urine (Leon *et al.*, 1983).

Reproduction

Five pregnant females were recorded in September in the Nieuwoudtville district of the Northern Cape, with nine pups and a mean litter size of two. Precocial young had a birth mass of 11.9 ± 0.5 g ($n = 5$). Growth rate was 0.6 g/day (Dempster *et al.*, 1992b).

THIRD EDITION

The Mammals of the Southern African Subregion

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