Order MACROSCELIDEA

SUBEDITOR: G. B. Rathbun

II. Family MACROSCELIDIDAE Bonaparte, 1838
Elephant-shrews

The elephant-shrews were formerly classified as a family in the Order Insectivora and then in the Order Monotremata, 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; Nishida et al., 2003) strongly suggest that they are part of a clade (the Supercohort Afrotheria) that includes the ardvocts, tenrecs, golden moles, and the Paenungulata (hyracoids, amenianst and elephants). Further confirmation of this is their large functional cecum (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 Erithyphyla), 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, 1993). Butler (1993) divided them into four subfamilies: the surviving Macroscelidinae and Rhynchocyoninae, and the extinct Herodontinae and Myolaginae, with representatives of the Myolagninae (Patterson, 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 Pronasilo 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. intuif and E. rupcris; E. antiqua 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. proscides, 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 Pronasilo and Protothamnotherium and in two living species that occur in the subregion, E. brachyurus and E. fuscus, which are long differentiated on the basis of this character under the genus Nasilio. (Cobert, 1974), however, considered that both belonged to the genus Elephantulus, a treatment followed here.

Myolagnol, a fossil macroscelid from the Late Pliocene from the Taung deposits, West (Province (Broome, 1948) and Sterkfontein, Gauteng (De Graaff, 1963a) 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 Myolagnol in a separate subfamily, the Myolagninae. However, Cobert & Hanks (1968) pointed out that it shows a considerable resemblance to Macroscelides. Myolagnol was known only by jaws from Namibia.

The first member of the family to be discovered was the round-nosed elephant-shrew, Macroscelides protoscoicus, from Rooiwoud 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, und Petrodromus. Macroscelides is represented by a single species, the round-nosed elephant-shrew (M. protoscoicus), which is confined in its distribution to 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. fasciatus and E. rufozon, the Somalian E. intuif, and the North African E. nesrificus. 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. chrysopygas, R. intuif, and R. petesi, none of which has yet been recorded within the subregion. The checkered elephant-shrew (R. c. intuif) was originally collected at Qutelimane, 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 chrysopygas occurs in Kenya while R. petesi 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 exterior 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 discharging 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, unpublished 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 sparingly 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 orbicular mites, which attach firmly to its surface. All species in the subregion have a subcaudal scent gland (Cobert & 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 1-2-1 = 4 except in E. brachyurus and E. fuscus, which have a third lower molar on each 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 view that is not generally

Macroscelides protoscoicus
rainfall as low as 100 mm
confined to riparian
high rainfall areas of
(1978) to be in some respp
shrews. Its early fossil hist
Three species of Elep
neeis - prefer a rocky
overlap in the subregion
E. intuif prefer sandy soil
to lower rainfall areas, be
rainfall as low as 100 mm
tolerate. In Botswana, for
E. brachyurus are at
E. brachyurus in the n
however, E. intuif and E.
Hanks, 1968). Tolliver
noted the difficulty in
between these two spe
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chromosomes (Tolliver
Macroscelides, there are f
located far behind the ot
esses on each of the fore
limbs are much longer t
and slender. This sugg
are capable of prod
is by running on a
and several species of E
quadrupedal bounds.

If suddenly alarmed, t
before escaping into a s
ally out in the open, v
or rock to another with
Elephant-shrews pr
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during agonistic encou
it encounters a predar
rumming is emitted i
consisting of one or m
species has a distinctive
...view that is not generally accepted today (Corbet & Hankins, 1968). *Macroscelides proboscideus* lives in arid country with a more annual rainfall as low as 100 mm, whereas the much larger *P. amplus* 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. edwardi*, and *E. nasuti*—prefer a rocky habitat, though their distributions do not overlap in the subregion. *Elephantulus brachyrhynchus*, *E. fasciatus*, and *E. nasuti* prefer sandy soils. However, *E. myurus* 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. myurus* and *E. brachyrhynchus* are mutually exclusive, with *E. myurus* replacing *E. brachyrhynchus* in the moister and parts of the country. In Namibia, however, *E. myurus* and *E. nasuti* are broadly sympatric (Corbet & Hankins, 1968). Tollever 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 mitochondrial DNA (Tollever et al., 1989). In the genera *Elephantulus* and *Macroscelides*, there are five clawed digits on the hind feet, the first located far behind the other four. In *Macroscelides*, 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 mode 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; Rooper, 1981). This drumming is emitted in a series of one or more beats, each bout consisting of one or more foot strokes, usually 25–50 mm 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.

Dawson & Perrin (1995b) investigated the thermal characteristics of three elephant-shrews, *Elephantulus myurus* and *E. brachyrhynchus* had lower than expected basal metabolic rates and high, narrow thermoneutral zones, in contrast to *P. amplus*, which had a basal metabolic rate close to that expected for its body mass and a broad, low thermoneutral zone.
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 reach around the top of their muzzles to lick their fur clean after eating. All species are predominately herbivorous, having abdominal tests, and spermatogenesis occurs throughout the year in *E. myrus* (Woodland & Skinner, 1989) and *M. proboscidea* (Bernard *et al.*, 1996b). The shape of the glass penis is quite characteristic for each genus and supports the inclusion of Nasillus in Elephantulus (Wooldridge, 1993b).

Corbet (1995) has examined the morphology within the Subfamily Macroscelidinae. He found 12 species extremely similar with the exception of *P. tetraxylus*, which is much larger and has no hallux, and *M. proboscidea*, in which the auditory region is hypertrophied and the teeth are hypodont. Raman & Perera (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... *Macromacrus*

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)...
   - Auditory bullae of normal size; second and third upper incisors not bilobed at their cutting edges (Fig. II.2B)...

**Genus Petrodromus** Peters, 1846

*Petrodromus* seems to be a well-defined genus distinguished from the two genera *Macromacrus* 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 been traditionally allocated to the genus but Corbet & Hinds (1968), after reviewing the genus, concluded that they were all subspecies of the oldest named, *P. tetraxylus*.

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The subspecies are characterised mainly by variation in pelage colour. *Petrodromus t. johannii* 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 (Westhoff & Robinson, 1987).

**Description**

This is the largest species of elephants-shrew occurring in the subregion (Table 19.1). In coastal East Africa there is no statistically significant difference in size, the females may be larger than males (Jennings & Ruthbun, 2001). They vary in pelage colour geographically. *Petrodromus t. tetraxylus* from the extreme north-eastern part of the subregion has a pinky-redish upper part, bordered on the sides from the shoulders to the rump by a broad band of buffy-grey; the sides of the neck, cheeks, forearm, flanks and thighs are orange-buff, while the cricks and tibias 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 stout 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 lower 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 back 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 ramp at the base of the tail.

*Petrodromus t. tetraxylus* from the eastern Capiviri Strip has paler upper parts than in other areas of its distribution. *Petrodromus t. beirei* from Mozambique is slightly larger in size. *Petrodromus t. nagus* from eastern Zimbabwe is darker on the upper parts and skittishly smaller. *Petrodromus t. svarni* from KwaZulu-Natal is paler than *P. t. beirei* and has a shorter muzzle while *P. svarni* from KwaZulu-Natal 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. nagus* from East Africa, are perhaps associated with two-tailed glands. (Sokolov *et al.*, 1989) that may facilitate scent-marking (Ruthbun, 1979).

**Table 19.1**

<table>
<thead>
<tr>
<th>Measure</th>
<th><em>P. t. tetraxylus</em></th>
<th><em>P. t. beirei</em></th>
<th><em>P. svarni</em></th>
<th><em>P. svarni</em></th>
<th><em>P. svarni</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>350</td>
<td>10</td>
<td>324–370</td>
<td>305</td>
<td>10</td>
</tr>
<tr>
<td>E</td>
<td>162</td>
<td>10</td>
<td>160–176</td>
<td>163</td>
<td>10</td>
</tr>
<tr>
<td>Hf cu</td>
<td>59</td>
<td>10</td>
<td>57–67</td>
<td>58</td>
<td>10</td>
</tr>
<tr>
<td>E</td>
<td>35</td>
<td>10</td>
<td>33–37</td>
<td>35</td>
<td>10</td>
</tr>
<tr>
<td>Mass</td>
<td>183.1</td>
<td>8</td>
<td>162.1–202.3</td>
<td>203.6</td>
<td>9</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>48</td>
<td>10</td>
<td>42–52</td>
<td>48</td>
<td>10</td>
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<tr>
<td>E</td>
<td>24</td>
<td>10</td>
<td>24–30</td>
<td>24</td>
<td>10</td>
</tr>
<tr>
<td>Hf cu</td>
<td>9</td>
<td>10</td>
<td>9–12</td>
<td>9</td>
<td>10</td>
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<tr>
<td>E</td>
<td>24</td>
<td>10</td>
<td>24–30</td>
<td>24</td>
<td>10</td>
</tr>
<tr>
<td>Mass</td>
<td>198.6</td>
<td>14</td>
<td>198.6–241</td>
<td>209.2–13</td>
<td>6</td>
</tr>
</tbody>
</table>

**Fig. 19.1** Four-toed elephant-shrew

**Habitat**

They are associated closely with evergreen forests with and scrub. They are generally absent less than about 700 mm.

**Habits**

They are active during most of 1989. They are probably sexes defending overlapping...
by variation in pelage. The bristles are blue, blackish, and white (Ansell et al., 1987).

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 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 southeast. 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 Mozambican 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.

![Four-toed elephant-shrew](image)

**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 aridity and abundance and habitat structure and in Kenya was recorded to be 1.2 ha (SD = ±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 780 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. Lets & 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 macerated 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 may not be able to find such 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. Assell (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 hamuli 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 reduce faecal moisture (Woodall, 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.

![Macroscelides distribution](image)

**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 (1991) recorded ear lengths of up to 29 mm in this species from Namibia, surpassing the maximum recorded for the
eastern rock elephant-shrew (E. mepos) or the bushveld elephant-shrew (E. mesoleuca). In fact, the ears are very broad and expanded, almost circular in shape, and this differentiates them from the other elephant-shrews.

Taxonomic notes
Meeser et al. (1986) listed two subspecies: M. p. protocerus (Show, 1800) from the Nama-Karoo and Succulent Karoo biomes in the Northern and Western Cape, south-east to Stormatowina, the extreme south-western parts of Botswana and south-western Namibia; and M. p. flavicollis Lundholm, 1955 from the northern parts of Namibia in the vicinity of the mouth of the Omursha 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 Dunes 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 Omursha River and northwards having pale cream-yellow upper parts, yellowish-tipped flanks and correspondingly pale tail. 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 sagittal crest of the ear is characteristic, being square at the end and sparsely haired, unlike that in any Elephantulus species (Fig. 2A, 2Aa).

Table 20.1
Linear measurements (mm) and mass (g) of the round-cubed elephant-shrew (Elephantulus procerus)

<table>
<thead>
<tr>
<th>Species</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL (mm)</td>
<td>T x n Range</td>
<td>T x n Range</td>
</tr>
<tr>
<td>234</td>
<td>8</td>
<td>222-245</td>
</tr>
<tr>
<td>233</td>
<td>6</td>
<td>222-248</td>
</tr>
<tr>
<td>Hf (mm)</td>
<td>36</td>
<td>34-39</td>
</tr>
<tr>
<td>36</td>
<td>36</td>
<td>34-37</td>
</tr>
<tr>
<td>E (mm)</td>
<td>25</td>
<td>21-25</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
<td>21-25</td>
</tr>
<tr>
<td>Mass (g)</td>
<td>20.0</td>
<td>32.0-47.0</td>
</tr>
</tbody>
</table>

Skull
The rostrum is short and the teeth are crowded together (Fig. II.2A). The first upper incisor is uncapped, 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 monolophid, 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.

Habitat
Round-cubed 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 safety 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 (Rothbaum, 1979), similar to other elephant-shrews. They are active at dawn and dusk and at night (Woodall et al., 1969). They live among boulders and rocks or in burrows (Sauer & Sauer, 1972), the entrances of which are usually low, lidird 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 insomnious emergency exit. This type of excavation is typical of the burrows of some rodents, e.g. the Cape short-tailed gerbil (Desanophilus algericus). Sauer & Sauer (1972) suggest that they do not make their own burrows, but use those made by rodents, and, like all other Macroscelidae, 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 & Perrins, 1995; Lovgrove, 1999).

Foot-drumming series consist of regular bouts with foot-drumming intervals ranging from 66 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 (Krell, 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 (Bertram et al., 1994b). 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. fusus*, 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 Lateral aspect of the first (right) and second (left) upper premolar of (A) western rock elephant-shrew (Elephantulus excavatus), (B) bush elephant-shrew (E. eyasi) and (C) Cape rock elephant-shrew (Elephantulus gisela) (after Corbet, 1976b).](image)

- **A.** Western rock elephant-shrew (Elephantulus excavatus).
- **B.** Bush elephant-shrew (Elephantulus eyasi).
- **C.** Cape rock elephant-shrew (Elephantulus gisela) (after Corbet, 1976b).

![FIG. II.4 Left ear of the *Malachiusafica* to show supratragus (a) and tragus (t) of (A) rock elephant-shrew (*Malachius fuscus*), (B) Cape rock elephant-shrew (*Elephantulus gisela*), (C) short-snouted elephant-shrew (*E. brachyrhynchus*), and (D) Peters' short-snouted elephant-shrew (*E. jacobii*) (after Corbet & Hanks, 1974b).](image)

- **A.** Rock elephant-shrew (*Malachius fuscus*).
- **B.** Cape rock elephant-shrew (*Elephantulus gisela*).
- **C.** Short-snouted elephant-shrew (*E. brachyrhynchus*).

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

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

2. Supratragus of the ear swollen and twisted backwards on a constricted stalk (Fig. II.4D); pelage darker and greyer in colour  
   Supratragus of the ear not as above; pelage browner, not grey in colour

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

4. Lower second and third premolar with three cusps arranged in a triangle behind the principal cusp; body size larger, upper tooththrow 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
   Lower second and third premolars with only two cusps arranged transversely behind the principal cusp; size smaller, upper tooththrow less than 18.7 mm; tail about 100% of the length of the head and body, not distinctly tufted, speckled on the top; white rings around the eyes conspicuous and unbroken

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; premolaris suture sinuous; upper parts greyish; stiles of hind foot black
   Upper second premolar without a cusp on its inner face (Fig. II.3D); lower first premolar with only one root; supratragus larger and thin; Fig. II.4B; premolaris suture straight; upper parts and stiles of hind feet brown

**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 (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 backwards 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.

**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-nosed elephant-shrew.

No. 22

*Elephantulus brachyrhynchus* (A. Smith, 1836)

Short-nosed elephant-shrew

**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 (Manisculus procerus).

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

**Taxonomic notes**

No subspecies are recognized as the variation from one extreme of the distributional range to the other grades imperceptibly through intermediate stages. The diploid number is 2n = 26 (Sinnon & 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 pale brown under part.

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

A conspicuous feature of all the pelage colour forms is the white, bushy or off-white ring around the eyes, the white upper lip, and the fluffy 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 ear on the upper parts is always deep blue-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. australis*).

**Range**

Inhabited areas are indicated in Table 22.1 in tabular form.

**Habitat**

Although the short-nosed elephant-shrew (*E. brachyrhynchus*) is distributed throughout the savanna biogeographic province, they are more common in the northern region, where shrub savanna and grassland cover with scrubs and termite mounds is present. This habitat is typically characterized by termite mounds near the edges of termite mounds, with abundant vegetation such as mopane trees and other shrubs.

**Females**

The female’s tail is longer than the male’s tail. The pelage of the female is generally darker and greyer than that of the male.

**Young**

Young elephant-shrews are usually found in termite mounds, which are a preferred habitat for this species. They are active during the day and night, and they are known to feed on a variety of insects, including termites and ants.

**Nest**

The nest of the elephant-shrew is usually a burrow in the ground, often near termite mounds. The nest is constructed with vegetation, such as leaves and grasses, and is lined with soft materials such as feathers and fur.

**Behavior**

Elephant-shrews are known to be solitary animals, and they are primarily nocturnal. They are known to be active during the day, but they are most active at night.

**Feeding**

Elephant-shrews are omnivorous, feeding on a variety of insects, including termites and ants, as well as plant material.

**Reproduction**

Elephant-shrews have a gestation period of about 20 days, with a litter size of 1 to 3 young. The young are weaned at about 10 days old.

**Distribution**

They have a widespread distribution in southern Africa, including Botswana, Namibia, South Africa, and Zimbabwe.

**References**


are compared, the distribution of the species of Elephantulus

Bushes are often used for resting places by these species. Although they do not spend much time in them, they use them for protection from predators. In areas with a lot of vegetation, they can be found foraging among the bushes, especially during hot days. In areas with less vegetation, they may use other shelter, such as under rocks or in disused burrows, which are often located in 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 for 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 10–20 foot drums) are classified as irregular bouts. Intervals between bouts of foot-drumming range from 100 to 200 ms, while foot-drumming intervals range from 30 to 40 ms (Faure et al., 1996).

Food

They are omnivorous and analysis of stomach contents revealed 47.5% insects, in particular ants, termites and beetles, 40.4% herbivage, 7.2% fruit and seeds, and 5.7% other food items (Levin et al., 1995).

Reproduction

In the Senega Wildlife Research Area, Zimbabwe, E. bushyphythusi reproduces throughout the year but conception and litter size are significantly reduced in winter. Average litter size as 1987/1988 was 1.60±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 57% in winter and 71–83% in summer (Neal, 1995).

Usually two young are produced, a factor being implanted in both the left and right uterine forms 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.

TABLE 22.1

<table>
<thead>
<tr>
<th>Females</th>
<th>X</th>
<th>n</th>
<th>Range</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>27–33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>18–22</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
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<td>177–230</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>85–118</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>26–31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>17–22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.5</td>
<td>31.0–43.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Habitat

Although the short-mouled elephant-shrew is sympatric with the eastern rock elephant-shrew (E. myurus) and the bushveld elephant-shrew (E. interi), they are segregated by their habitat requirements. This species is associated in the subregion with dense 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, they 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-mouled 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 northwestern parts of the Kalahari Desert.

Although in places their habitats abut onto rocky kopjes 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-mouled 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 for 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.

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The pelage of the short-mouled (E. myurus) and eastern rock (E. interi) species are different. Although the fur is short and dense, it is profusely sprinkled with white tips. The body is grey tinged with brown, the white upper lip, and behind the base of each ear, the upper parts. The base of the blackish-grey, the general colour of the tips of the ears, is buffish-white. This species are brown-tipped (E. myurus).

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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 bars of the under parts giving the whole animal a whiter appearance.

Table 25.1
Linear measurements (mm) and mass (g) of the western rock elephant-shrew (Elephantulus mystax) from (a) Namibia (Maison & Blood, 1997) and (b) throughout the subregion.

<table>
<thead>
<tr>
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<th>Range</th>
<th>Females (n)</th>
<th>Range</th>
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</thead>
<tbody>
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<td>11</td>
<td>255–297</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>146</td>
<td>11</td>
<td>130–161</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>27</td>
<td>11</td>
<td>22–24</td>
</tr>
<tr>
<td></td>
<td>Man</td>
<td>62.8</td>
<td>8</td>
<td>54.0–68.0</td>
</tr>
</tbody>
</table>

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 Kalahari, 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 throughout to the coast in the north-western Northern Cape, in parts of Namaqualand.

Habitat

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

Habits

Very similar to the eastern rock elephant-shrew (E. mystax). A foot-drumming series consists mainly of single foot-drumming bouts containing 30–50 foot drumms 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 mystax (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 recognize any of them.

Table 24.1
Linear measurements (mm) and mass (g) of the bushveld elephant-shrew (Elephantulus mystax) from (a) Botswana (Smithers, 1971), (b) the former Transvaal (Rautenbach, 1982) and (c) Namibia (Maison & Blood, 1997).

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<th>Females (n)</th>
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<td>Man</td>
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</table>

Description

Body measurements of adults are shown in Table 24.1. The upper parts of the pelage from specimens from Limpopo Province and the North West Province are yellowish-buff in colour with a tendency to appear darker along the mid-back owing to long black hairs, which are scattered throughout the body. The face are white, the grey back has conspicuous russet patches with the general colour of their eyes and their tails. They may have conspicuous white specimens from Namibia, and pale yellowish-buff. They are generally a white vein in the greater than in the pectoral and pale brown.

Distribution

Confining to the limits of the semi-desert steppe into south-western Namibia.

African, north of the southern subregion. They occur in south-western South Africa, north in the north-east and parts of central and southern parts of the Northern Cape, and the extreme western.

Fig. 24.1: Bushveld elephant-shrew
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 Kgalagadi 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.

Habitat

The distribution of E. imph shows that they can utilise more arid terrain than any other species of Elephantulus. In Botswana, for example, the short-nosed elephant-shrew (E. imph) occurs in the well-watered Okavango Delta and in the eastern parts of the country, where they have an annual rainfall of 450 mm and above, whereas E. imph 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 patch, in a habit of scrub bush with a thin grass cover and a sandy substrate. They are arid habitat requirements. They are exposed to the raised sandy fringes, where the grass is slightly higher and where there is a scattering of low bush.

Food

Predominantly invertebrates (especially ants), but also consume small quantities of herbage (Kerley et al., 1990). If they catch grasshoppers or any larger than ants when away from cover, they carry them back to the nest to feed them. The number of cases in which the insects are found is often found, which marks the sites where these insects have been consumed.

Reproduction

Skinneridge (1934) observed three females with two foetuses each, which were collected in eastern Namibia in September. 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, Naudea (1982) observed 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 (Rathbun, unpubl. data).

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 & Hannon, 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 slaty-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 than below and darker towards the tip. The upper surfaces of the feet are whitish, while the tacked surfaces of the sole are black. The hair on the upper parts of the body is about 15 mm long, the individual hairs being shiny black for most of their length but 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 forefoot and hind feet, each with a short curved claw and a conspicuous, mottled digital pad. Externally, this species can be distinguished from the western rock elephant-shrew (E. capensis) by its less hairy tail, less conspicuous light-coloured patches behind the ears, and generally greyer pelage colour.

Linear measurements (mm) and mass (g) of the eastern rock elephant-shrew (E. nepomens) from (a) the former Transvaal (Rautenbach, 1982) and (b) north of the Zambezi National Monument (Southern & Wilson, 1979).

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>T</td>
<td>Range</td>
</tr>
<tr>
<td></td>
<td>263</td>
<td>56</td>
</tr>
<tr>
<td>T</td>
<td>137</td>
<td>55</td>
</tr>
<tr>
<td>Hf</td>
<td>39</td>
<td>29–40</td>
</tr>
<tr>
<td>E</td>
<td>25</td>
<td>18–30</td>
</tr>
<tr>
<td>Mass</td>
<td>60.9</td>
<td>60.0–90.0</td>
</tr>
<tr>
<td>k.</td>
<td>Mass (unsexed): T = 47.1 g.  range: 38.0–56.6 g.</td>
<td></td>
</tr>
</tbody>
</table>

Skull

In contrast to the western rock elephant-shrew (E. nepomens) and the bushveld elephant-shrew (E. setifer), this species has no lingual cusps on the upper first premolars. The upper second 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. nepomens (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 kopjes in Hwange National Park. They occur in eastern Botswana and the western parts of Mozambique south of the Zambezi River, south to the north-west parts of Maputo Province. In Southern 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 parts of the northern Cape, south to about Deelwyn and Burgersdorp in the Eastern Cape. They occur in the mountainous parts of north-western KwaZulu-Natal. They are absent in large parts of Limpopo.

Habitat

The eastern rock elephant-shrew is quite uniformly adapted to rocky terrain. It occurs on the rocky slopes or flats of hills and mountains with dense vegetation. It is found on the rocky cliffs and ledges of the Drakensberg Mountains in South Africa, and on the rugged slopes of the Matobo Hills in Zimbabwe.

Reproduction

Information available (Perrin & Leutenegger, 1983) indicates that the species is monogamous and the pregnancy period is approximately 12 weeks. The litter size is usually two, and the young are weaned at about 4 weeks. They are sexually mature at about 12 weeks of age.

Food

The eastern rock elephant-shrew is an omnivore, feeding on a variety of plant and animal materials. They feed on insects, spiders, and small vertebrates, as well as on plant material such as seeds and roots.

Eastern rock elephant-shrews are known to be active during the day, but they are most active during the early morning and late evening. They are also known to be active during the night, but their activity is less intense. The species is known to be diurnal, with a peak activity during the early morning and late evening.

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

Habits

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

![Eastern rock elephant-shrew](image-url)
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 saunter 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 areas 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 morning they sit quietly on exposed rocks sunning themselves, well camouflaged and resembling stones. They are always on the alert and quickly run for shelter when disturbed. Vocalization in a series of high-pitched squeaks, tailing off at the end of the sentence 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 bursts of 2-4 foot drums with intervals of 25-40 ms between foot drums in a burst, and 250-350 ms between foot-drumming bouts. The length of a series may vary from less than one second to several minutes (Faust et al., 1996).

Eastern rock elephant-shrews go into torpor when deprived of food (Lovegrove et al., 2003) and, in the case of free-ranging animals, when ambient temperatures are low (Motlikova 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

Cherubin and Biegerdorp in mountainous parts of northern Lesotho.

Food

Information available from eastern Bovemana (Smithers, 1971), the former Tranuaa (Van der Horst, 1946; Rautenbach, 1982) and KwaZulu-Natal (Taylor, 1998a) indicates that young are born during the warm season, with 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 3-6 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 a longer 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. 20

Elephantulus edwardii (A. Smith, 1839)

Cape rock elephant-shrew

Plat 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 (Mysomys verreauxii), and the black or Verreaux's eagle (Aquila verreauxii). The locality of E. edwardii was given by the Olifants River, which Shorridge (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 (1998) presented evidence from the Oudtshoorn 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 edges of the head and flanks are ash-grey, tinged with pale raven. The underparts 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 ash-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 pale 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 skin-grey at the base, annulated towards the tip with greyish-brown, and narrowly tipped with black.

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

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL (mm)</td>
<td>177</td>
<td>154</td>
</tr>
<tr>
<td>H (mm)</td>
<td>36</td>
<td>27</td>
</tr>
<tr>
<td>Max mass (g)</td>
<td>47.0</td>
<td>36.0-52.0</td>
</tr>
</tbody>
</table>

Skull

In the first and second upper premolars, the anterior latal cusps are well developed, the posterior poorly so, neither having lingual cusps (Fig. IL5D). The first lower premolar is single rooted while that of E. myurus is double rooted.

11JJ
Distribution
Endemic to the
Distribution N’ACl\(SC\) other only
Habitat

The order of the English name to bear

Colloquial name
Although the English name is no way related to bear

Taxonomic notes
Many subspecies have been

FIG. 26.1 Cape rock elephant-shrew

Habitat
Cape rock elephant-shrews were originally recorded from a locality hearing little or no vegetation, except a few dwarf shrubs. There was no suggestion that they were associated with rocky terrain. Dickman (1979) collected them in Gogogo Nature Reserve in Namangaland in the vicinity of low rocky outcrops, where he noted that they formed distinct runways. He also collected them from hard sandy ground sparsely covered with vegetation. In the Cederberg Mountains, Randenbruch & 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 crevices. Verreesen 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 (Roodt, 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 (Léon et al., 1983), with no indication of torpor in other elephant-shrews (Lovesgrove et al., 1999; Lovesgrove 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 *Penta* flowers, which happen 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 immersed in 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. Compensatory for evaporative water loss is accomplished by concentrating their urine (Léon 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).

THE AARDVARK, *Orycteropus afer* (Pallas, 1766)

Aardvark

Plate 3

Colloquial name
Although the English name is no way related to bear

Taxonomic notes
Many subspecies have been...
THIRD EDITION

The Mammals of the Southern African Subregion

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