THE DORMICE (MYOXIDAE) OF SOUTHERN AFRICA

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ABSTRACT – Very little is known about the dormice of Africa south of the Sahara, even their current classification is suspect. This paper summarises the information available in the literature on the four (probable) species of dormouse found in southern Africa. Mean body masses are approximately >55 g, 50 g, 27 g and <27 g in *Graphiurus ocularis, G. platyops, G. murinus*, and *G. parvus* respectively. All four species are silver-grey dorsally and buffy-white ventrally with varying degress of black around the eyes. G. *ocularis* and *G. platyops* prefer rocky hillsides and koppies while G. *murinus* and *G. parvus* are primarily arboreal. Breeding in southern Africa is probably limited to the warm, wet summer months with a normal litter size of three or four and one or two litters per year. At least in *G. ocularis* breeding pairs appear to be territorial. Torpor can be induced in individuals in captivity but the use and extent of hibernation in the wild depends on local climatic conditions. G. *oculuris* seems to be purely carnivorous while the other three species are omnivores.

Key words: Myoxidae, Dormice, *Graphiurus*, southern Africa.

RIASSUNTO – *I Mioxidi del Sud Africa* – Molto poco e conosciuto sui mioxidi dell'Africa a sud del Sahara, persino la loro classificazione attuale e dubbia. Nel presente lavoro vengono riassunte le informazioni disponibili in letteratura sulle quattro (probabili) specie di mioxidi del Sud Africa. I pesi corporei medi sono approssimativamente superiori a 55 g, 50 g, 27 g ed inferiori a 27 g in *Graphiurus ocularis*, G *platyops, G. murinus e* G. *parvus* rispettivamente. Tutte e quattro le specie presentano una colorazione grigio-argentea dorsalmente e bianco-marrone ventralmente con gradi variabili di nero intorno agli occhi. *G. ocularis* e *G. parvus* sono essenzialmente arborei. La riproduzione in sud Africa e probabilmente limitata ai caldi e umidi mesi estivi con una o due figliate per anno, costituite da tre o quattro piccoli. Almeno in *G. ocularis* le coppie riproduttive sembrano essere territoriali. Il torpore può essere indotto in individui in cattivita ma l'uso ed il grado di letargo in condizioni naturali dipendono da condizioni climatiche locali. *G. ocularis* sembra essere esclusivamente carnivoro mentre le altre tre specie sono onnivore.

Parole chiave: Myoxidae, *Gruphiurus*, Sud Africa.

INTRODUCTION

The genus *Gruphiurus* is geographically separate from the other genera within the family Myoxidae. ***Graphiurus*** are found only in Africa south of the Sahara while the other genera are restricted to the Palearctic and north Africa:

Little is known about *Graphiurus* within southern Africa (South Africa, Namibia, Botswana and Mozambique south of the Zambezi river), and even less throughout the rest of Africa. Most available information is based on incidental observation and small sample sizes though a small number of physiological (Eisentraut, 1962; Lachiver & Petter, 1969; Ellison & Skinner, 1991) and

behavioural (Channing, 1984; Van Hensbergen & Channing, 1989) studies have been undertaken.

TAXONOMY

The taxonomic relationship between *Graphiurus* and the other myoxid genera is still under debate (see Daams & de Bruijn, 1995; Storch, 1995) and no pre-pleistocene fossil Myoxidae have as yet been found in Africa south of the Sahara.

The number and identity of species within this genus has also yet to be satisfactorily established. There are at least 65 different described variants of *Graphiurus* (Meester & Setzer, I971; Genest-Villard, 1978; Bucher, 1982) divided into five (Meester & Setzer, 1971), six (Genest-Villard, 1978; Bucher, 1982) and more recently 14 (Holden, 1993) separate species. Karyotype numbers have been published for only two species (G. *hueti* [2n=40] and *G. murinus* [2n=70]) based on samples from the Ivory Coast (Tranier & Gautun, 1979).

The literature on southern African *Graphiurus* is almost entirely based on the assumption that there are four species present within the subregion; G. *ocularis, G. platyops, G murinus* and *G. parvus* (Skinner & Smithers, 1990). This review therefore follows this assumption. The most likely source of error in taxonomy within the subregion is an uncertainty in the identity of, and differentiation between, individuals allocated to the species *G. murinus* and *G. parvus*.

IDENTIFICATION AND MORPHOLOGY

All four southern African species have silver-grey dorsal and buffy-white ventral surfaces. The presence and extent of dark patches about the eyes is variable in the two smaller species (G. *murinus* and *G. parvus),* intermediate in *G. platyops* and distinctive in G. *ocularis* where they extend below and behind the ears. G. *ocularis* also has patches of pure white hair above the ears and a band of white in front of the shoulder. G. *ocularis* and *G. platyops* both have white cheeks and a distinctly flattened skull, often assumed to be an adaptation to life in rocky crevices. In the southern Africa the upper parts of G. *parvus* may have a trace of sandy colour. G. *murinus* and *G. parvus* are notoriously difficult to separate even on the basis of skeletal measurements. A summary of some morphological parameters is given in Table I.

Key to the four species based on individuals from southern Africa after Meester et al. (1986):

1. P^1 distinctly smaller than other teeth in the molar row
..ocularis

   P^1 scarcely smaller than other teeth in the molar row
...2

2. Head and body length less than 87 mm; hind foot length less than 16 mm; greatest skull length less than 24.5 mm
..parvus

Head and body length equal to or more than 87 mm; hind foot length more than 16 mm; greatest skull length more than 24.5 mm
..3

3. Hind foot length less than 21 mm; interorbital width less than 5 mm; head and body length usually less than 105 mm; greatest skull length usually less than 30.5 mm
...murinus

Hind foot length more than 21 mm; interorbital width more than 5 mm; head and body length usually more than 105 mm; greatest skull length usually more than 30.5 mm
..platyops

DISTRIBUTION

G. ocularis - Only found within southern Africa, occurring widely in the Cape Province with a single record from the southwestern Transvaal (Channing, 1984; Skinner & Smithers, 1990).

G. pfatyops - A discontinuous distribution in eastern Angola, Zambia, Malawi and the Katanga province of Zaire. Within southern Africa they occur in the central plateaux of Namibia, in eastern Botswana, widely in Zimbabwe, and widely in northern and southern Transvaal with two records from Mozambique (Skinner & Smithers, 1990).

G. murinus - Widely distributed from Guinea Bissau through most of the countries in West Africa, eastward to Kenya and south to Zambia, southern Angola and widely in southern Africa (Skinner & Smithers, 1990).

G. parvus - Has been recorded from Mali, Niger, Sierra Leone, Ivory Coast, Ghana, Nigeria, Kenya, Ethiopia, Somalia, Tanzania, Zambia and Malawi. Its distribution in southern Africa is uncertain due to confusion with G. *murinus* (Skinner & Smithers, 1990).

HABITAT

G. murinus and *G. parvus* are both predominantly arboreal though may frequently be found in the roofs and walls of buildings (Shortridge, 1934; Kingdon, 1974). The former are said by Smithers & Wilson (1979) to prefer old gnarled *Acacia* trees though nest sites include tree holes, swallows nests, hollow coconuts, bunches of bananas, beehives, thatched roofs, switch-boxes, water pumps and transformers (Kingdon, 1974; Skinner & Smithers, 1990). G. *murinus* has been reported to 'parachute' from tree tops to the ground from heights as great as 25 m (Shortridge, 1934).

G. ocularis and *G. platyops* may also be found in trees especially in areas where their preferred habitat of rocky hillsides and koppies is limited or absent (Ansell, 1960; Skinner & Smithers, 1990). During the day both species rest mainly in rock cracks and crevices (Skinner & Smithers, 1990). G. *ocularis* has also be associated with old walls and dwelling houses (Shortridge, 1934) and can be a pest in mountain huts (Ansell, 1960).

Tab. 1 – A summary of total length (TL) body mass (BM) combined head and body length(HB) tail length (TL) hindfoot length from the heel to the end of the longest claw (HF) and skull length (SL) in *Graphiurus*. Data taken from Channing (1984). De Graaff (1981), Genest-Villard (1978) and Wirminghaus & Perrin (1993). Measurements were taken from individuals collected all over Africa.

SPECIES	PARAMETER	MEAN	N	RANGE[a]
G. ocularis	TL			
(Spectacled dormouse)	BM	83 g	2	55.0-85.0
(Smith's dormouse)	HB	131 mm	9	120-148
(Namtap)	T	110 mm	8	100-135
(Gemsbokmuis)	HF	23.9 mm	9	20-26
	SL	35.3 mm		34-37 5
G. platyops	TL	180 mm	4	160-190
(Rock dormouse)	BM	48.7 g	7	39.0-65.0
(Klipwaaierstertmuis)	HB	110 mm	49	99-130
	T	83 1 mm	49	60-110
	HF	18.8 mm	64	17-23.2
	SL	30.9 mm		29.5-32.5
G. murinus[b]	TL	153 mm	44	143-177
(Woodland dormouse)	BM	26.8 g	244	14.5-40.9
(Boswaaierstertmuis)	HB	96 mm	368	70-117
	T	75 mm	109	53-94
	HF	17.6 mm	406	14-20
	SL	27.1 mm	361	23.8-30.8
G. parvus	TL			
(Lesser savanna dormouse)	HM			
(Klien savanne-waaierstertmuis)	HB	80 mm	82	64-87
	T	71 mm	59	62-80
	HF	14.9 mm	83	13.5-16.0
	SL	23.3 mm	93	21.4-25.5

[a]The mean values and the range are not necessarily based on the same data set; some data were only available as mean values. hence range may be under-cstimatcd.
[b]Data for *G. murinus* may include some measurements from *G. parvus* individuals.

REPRODUCTION AND LIFE HISTORY

Little is known about reproduction in any of the four southern African species. Normal litter size is probably three to four (Shortridge. 1934; Ansell, 1960; de Graaff, 1981) though up to **six** foetuses have been found in female G. *platyops* (Ansell. 1960) and G. *murinus* (Lynch, 1989). Breeding is probably seasonal with birth of young in southern Africa occurring during the hot, wet summer, possibly as early as October and then throughout November, December, January and February (Ansell, 1960; de Graaff, 1981). Kingdon (1974) estimates gestation length in G. *murinus* to be around 24 days and found body weight, head and body length, and tail length of two neonates to be 3.5 g, 40 mm and **18** mm respectively. Data collected by Channing (1984) suggests that G. *ocularis* produce two litters, six to eight weeks apart each year and that each litter contains four to six young. In the wild G. *ocularis* can live for at least four years whilst individuals up to **six** years old have been maintained in captivity (Channing, 1984). In a southern temperate forest in Natal, Wirminghaus & Perrin (1993) only trapped breeding G. *murinus* between October and February, found a high proportion of juveniles

within the population throughout the year except at midsummer, and categorised this population of *G. murinus* as having a stable, K-selected life history strategy with almost continual recruitment of slow-growing juveniles throughout the year.

BEHAVIOUR, HOME RANGE AND TERRITORIALITY

Though Ansell (1960) claims that both G. *murinus* and *G. platyops* are primarily solitary in the wild, as many as 11 adult G. *murinus* of mixed sex have been found in a single nest at the same time (Kingdon, 1974). In captivity G. *murinus* shows signs of strong territoriality and males may occasionally **kill** and eat one another (Kingdon, 1974).

The only field study of behaviour in *Graphiurus* is that of *G. ocularis* by Clianning (Channing, 1984; van Hensbergen & Channing, 1989) in the Cederberg mountains of the Western Cape. Based on a sample of 30 individuals trapped at the same sight over three years he estimated densities ranging between 1.8 and 3.1 adults.ha^{-1}. Harmonic mean 90% home range size ranged from 1.1 ha to 3.8 ha and was generally larger in males than in females. What were presumed to be territorial encounters resulted in loud vocalisation, open mouths, raised claws and bushy tails. Movements of individuals suggested that scent marking may be important in maintaining territories. Territories were occupied either by breeding pairs which remained together for up to at least 11 months, or by unpaired, normally younger, individuals. Wirminghaus & Perrin (1993) found the mean density of *G.murinus* in a southern temperate forest in Natal to remain relatively stable at a mean of 4.2 animals.ha^{-1} throughout the year.

TORPOR AND HIBERNATION

In a popular account Shortridge (1934) suggests that both G. *murinus* and *G. oculuris* hibernate during the Namibian winter, storing energy during the autumn in the form of body fat and seeds within the nest. Although Eisentraut (1962) was unable to elicit torpor in winter-acclimated *G. murinus* from tropical West Africa, Lachiver & Petter (1969) induced torpor in G. *murinus* from central Africa either by rapid transfer to low ambient temperature or by food deprivation at low ambient temperature, but found that individuals were unable to spontaneously arouse once body temperature had dropped below about 14°C. Channing (1984) found that captive *G. oculuris* would become torpid under conditions of food deprivation or low ambient temperature. Ellison & Skinner (1991) were able to elicit torpor in captive *G. murinus* from South Africa acclimated to 10 or 15°C and winter photoperiod but found no apparent circannual variation in mean body mass of wild-caught *G. murinus* in Transvaal, South Africa. However G. *murinus* trapped in a temperate forest in Natal were significantly leaner in the spring than at other times of the year (Wirminghaus & Perrin, 1993). Wirtninghaus & Perrin (1993) and Channing (1984) were able to trap G. *murinus* and *G. ocularis* respectively in South Africa using live traps throughout the winter months.

DIET

The three smaller species are all apparently omnivorous, feeding mainly on insects and seeds. G. *ocularis* appears to be predominantly carnivorous. The

reddish-plum, red or brown staining often found about the forelimbs, chin and throat of G. *ocularis*, G. *platyops* and G. *murinus* has often been attributed to the consumption of some type of insect (Shortridge, 1934; Smithers, 1971; Skinner & Smithers, 1990). However, this staining can also be found in suckling G. *ocularis* and may therefore **be** genetically induced (Channing, 1984).

G. ocularis preferentially eats meat in captivity (De Graaff, 1981; Shortridge, 1934) and has been reported to have killed 24 captive chickens in a coop (Shortridge, 1934). Lizards, small birds, insects (especially ants), millipedes, spiders and scorpions have all been found in faecal samples (Channing, 1984).

G. platyops stomachs were found by Smithers and Wilson (1979) to contain seeds and the chitinous remains of insects.

G. murinus have been found to eat earwigs, fruit, nuts, seeds, vegetable matter, insects, grasshoppers, crickets, wattle 'bag-worms', possibly the eggs and young of small birds (Shortridge, 1934) and in captivity will eat dead mice, birds and lizards (Kingdon, 1974). Smithers & Wilson (1979) suggest that seeds and insects form the major part of the diet whilst other food items include dead bees, honey and wax (Kingdon, 1974), termites (De Graaff, 1981), the large millipede *Doratogonius flavifilis* (Pienaar et al., 1980), and seeds of the buffalo thorn tree, *Zizyphus mucronata* (Smithers, 1971). Wirminghaus & Perrin (1992) found them to be predominantly insectivorous though to eat some plant material and fruits while of 11 stomachs examined by Rowe-Rowe (1986), all contained insect remains and 82% contained grass seeds.

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