Diets of two syntopic small mammals in the Inyanga National Park, Zimbabwe

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A study was made of the diets of the dark-footed forest shrew, *Myosorex cafer*, and the striped mouse, *Rhabdomys pumilio*, inhabiting montane grassland in the Inyanga National Park, eastern Zimbabwe in August 1983 using live-traps, break-back traps and faecal analysis. A wide variety of invertebrates was eaten by *M. cafer*, but 44% of dietary occurrences comprised insects, mostly adult coleopterans, isopterans and lepidopteran larvae. Other important prey items were araneids, isopods, lithobiomorphs and lumbricids. The major dietary items of *R. pumilio* were leaves and stems of grasses and dicotyledon seeds, but insects, mostly isopterans, were also taken.

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'n Studie van die voedingsgewoontes van die donkerpoot-bosskeerbek *Myosorex cafer* en die streepmuis *Rhabdomys pumilio* wat in die berggraslande van die Inyanga Nasionale Park in oostelike Zimbabwe voorkom, is in Augustus 1983 uitgevoer deur middel van misanalises. 'n Groot verskeidenheid ongewerweldes is deur *M. cafer* gevreet maar 44% van die dieet het uit insekte, hoofsaaklik volwasse Coleoptera, Isoptera en larwes van Lepidoptera bestaan. Ander belangrike prooi-items was Araneidae, Isopoda, Lithobiomorpha en Lumbricidae. Die vernaamste voedselitems van *R. pumilio* was blare en stingels van grasse en die sade van dikotiele, maar insekte, meestal Isoptera is ook gevreet.

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Small rodents and shrews frequently co-exist in a wide variety of terrestrial habitats. Despite the field studies of small mammals made by such workers as Rautenbach (1976, 1982) and Rowe-Rowe & Meester (1982a & b) there is still very little known about the feeding habits of most African shrews. Shrews have considerable interest as voracious predators of many different invertebrates, including potential pest species (Pernetta 1976; Churchfield 1982a, 1982b). Rodents, while primarily herbivorous, also feed on invertebrates particularly insects (Perrin 1980). Together, these small mammals may have a considerable impact on invertebrate populations but their role as secondary consumers in Africa cannot be quantified since there is insufficient data on their feeding habits in the wild.

This paper presents the results of a brief study of the diets of the dark-footed forest shrew, *Myosorex cafer* (Sundevall, 1846) and the striped mouse, *Rhabdomys pumilio* (Sparrman, 1784) inhabiting montane grassland in the Inyanga National Park, eastern Zimbabwe, an area which has been little studied in terms of its small mammals.

Methods

Study area

The study area comprised 0,95 ha of grassland at an altitude of approximately 1920 m beside Purdon Dam in the Inyanga National Park, eastern Zimbabwe (Grid Ref. 754767). The vegetation was dominated by short grasses (mainly *Agropyron repens*), rushes (*Juncus* spp.), sedges (*Carex* spp.) and *Helichrysum* spp. up to 30 cm in height, interspersed with blocks of tall *Hyparrhenia rufa*. The grassland sloped down towards a small stream which ran through the study area.

Trapping the small mammals

Fifty Sherman live-traps and 18 break-back mouse traps, all baited with peanut butter, were set singly at 5 – 10 m intervals in the study area and examined once daily for captures. Sherman traps were in operation for a total of 334 trap nights and break-back traps for 108 trap nights.

Faecal pellets produced by *M. cafer* and *R. pumilio* in the Sherman traps were collected and preserved in 70% alcohol for examination of food remains. Stomach contents of kill-trapped *M. cafer* were also preserved and examined.

Diet analysis

The diets of *M. cafer* and *R. pumilio* were analysed by microscopic examination of food remains in faecal pellets collected from the traps. Identification was assisted by a reference collection of different potential food types taken from the

study area. For *M. cafer*, as many pellets as possible were collected from each trapped individual which then constituted a single sample. A mean of 12 pellets per sample was collected. *R. pumilio* produced much larger, drier and more discrete pellets which could be collected singly. A single pellet, selected at random, constituted a sample.

The relationship between the number of food types (taxa) found and the number of samples examined is revealed in Figure 1 in which the occurrence of different food types identified is recorded as a cumulative percentage and plotted against the number of samples examined. In both *M. cafer*

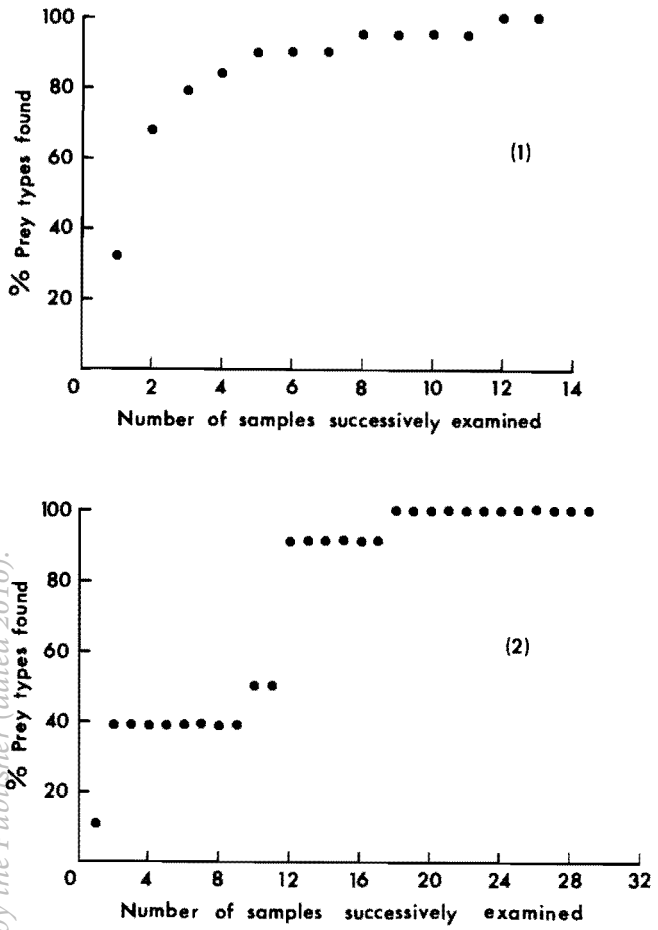

Figure 1 The relationship between the number of faecal samples examined and the number of food types found in the diets of (1) *Myosorex cafer* and (2) *Rhabdomys pumilio*.

and *R. pumilio* there was a rapid initial rise in the number of food types found as increasing numbers of samples were collected, but this soon levelled off. In *M. cafer*, 95% of food types were found by the eighth sample and 100% by the twelfth sample. In *R. pumilio*, 91% were found by the twelfth sample and 100% by the eighteenth sample. This indicates that although the numbers of samples examined may have been small (particularly of *M. cafer*), they were sufficient to give representative data on the diets of these two small mammals. Further analysis and criticisms of the techniques can be found in Churchfield (1982a).

The results of the diet analyses were expressed in terms of the frequency of occurrence (the proportion of the number of samples examined which contained a named food type) and the composition of the diet (the number of occurrences of a named food type divided by the total number of occurrences of all types).

Results

Myosorex cafer

Thirteen samples of faecal pellets from *M. cafer* were collected and analysed. In addition, the stomach contents of two animals caught in break-back traps were examined. All samples contained identifiable remains. Between 2 and 10 different prey types (mean 6) were identified in each faecal sample. The ranges of prey types identified in the stomachs and in the faecal pellets appeared to be practically identical.

The results of faecal analyses are shown in Table 1. Nineteen different food types were recognized and all were invertebrates except for occasional occurrences of vegetable material. The size of prey items ranged from small mites of < 2 mm in body length to the larger lithobiomorphs and lumbricids of over 30 mm in length. The major invertebrate fraction comprised insects which constituted 44% of all occurrences and were mostly adult coleopterans, isopterans and lepidopteran larvae. Other important prey types were araneids, isopods, lithobiomorphs and, despite the drought, lumbricids.

Table 1 The frequency of occurrence of different food types in the diet of *Myosorex cafer* inhabiting grassland in the Inyanga National Park, eastern Zimbabwe (N = 13)

Food type	% Frequency	% Composition
Adult Coleoptera	69,2	10,4
Adult Hemiptera	38,5	5,8
Formicidae	38,5	5,8
Isoptera	53,8	8,2
Blattidae	7,7	1,2
Coleopteran larvae	23,1	3,5
Lepidopteran larvae	53,8	8,2
Dipteran larvae	7,7	1,2
Araneae	69,2	10,4
Opiliones	23,1	3,5
Acari	15,4	2,3
Chelonethi	15,4	2,3
Isopoda	61,5	9,3
Lithobiomorpha	53,8	8,2
Diplopoda	30,8	4,6
Gastropoda	7,7	1,2
Lumbricidae	69,2	10,4
Plant material — seeds	7,7	1,2
— green plant	15,4	2,3

Rhabdomys pumilio

Twenty-nine faecal pellets of *R. pumilio* were examined for food remains and all contained identifiable items. Between two and six different food types were found in each sample (mean 4). The results of the analyses are shown in Table 2. The dominant dietary items were leaves and stems of grasses and dicotyledon seeds but insects were taken in considerable numbers and isopterans ranked third in order of importance, both in terms of percentage frequency of occurrence and composition. The variety of food types eaten was small and only four different invertebrates were found, all insects. Thus, there was little overlap with *M. cafer*. Despite the small variety of invertebrates taken, they did constitute about one quarter of all dietary occurrences. However, in terms of volume, approximately 50% of the diet was green plant material (leaf

Table 2 The frequency of occurrence of different food types in the diet of *Rhabdomys pumilio* inhabiting grassland in the Inyanga National Park, eastern Zimbabwe (N = 29)

Food type	% Frequency	% Composition
Plant material		
Graminae leaf/stem	100,0	35,8
Dicotyledons leaf/stem	10,3	3,7
Dicotyledon seeds	93,1	33,3
Fungi	6,9	2,5
Animal material		
Formicidae	20,7	7,4
Isoptera	34,5	12,3
Lepidopteran larvae	6,9	2,5
Dipteran larvae	6,9	2,5

and stem of grasses and dicotyledons), 45% was seeds and a mere 5% was animal (invertebrate).

Discussion

Shrews of the genus *Myosorex* are generally regarded as inhabitants of forests and scrublands with dense vegetation in southern and eastern Africa (Smithers 1983). *M. cafer* has been reported to feed on insects and small invertebrates (Goulden & Meester 1978; Rautenbach & Nel 1980; Rautenbach 1982; Smithers 1983) but there have been no detailed studies of their diet in the wild. In common with the better-known temperate shrews such as *Sorex* spp. and *Neomys* spp., *M. cafer* is an opportunist, feeding on a wide variety of common invertebrates, although the bulk of the diet comprised insects and their larvae. No evidence of vertebrate prey was found. There is evidence of prey selection, however, for although isopterans were amongst the most numerous of potential prey items and were frequently eaten by shrews, they composed only 8% of all dietary occurrences. Similarly, blattids were very common but were taken infrequently. In contrast, lumbricids were often taken, despite the drought.

R. pumilio has been the subject of several studies in many areas of its range in southern and eastern Africa. It seems to have a preference for dense grassland (Davis 1962; de Graaff 1981; Smithers 1983). *R. pumilio* has been termed an opportunistic omnivore (Perrin 1980). It feeds primarily on seeds but will also eat pods, berries, green plant material, roots and bark (de Graaff 1981). In addition, insects such as acridids, gryllids and isopterans are known to be taken (Brooks 1974; Taylor & Green 1976; Curtis & Perrin 1979; Perrin 1980). The bulk of the diet in the present study was grass stems and leaves and dicotyledon seeds but approximately 25% of dietary occurrences were insects (mostly isopterans). Brooks (1974) and Perrin (1980) found seasonal changes in the diet of *R. pumilio* according to the availability and quality of different food: in summer when insects and seeds were abundant they were taken in large quantities while less preferred herbs and shrubs were eaten in winter. The small variety of invertebrate prey recorded in the diet of *R. pumilio* in the present study may have been due to their low availability coupled with competition for such prey from shrews and the numerous skinks.

Dietary analysis indicates that *R. pumilio* did not eat many different invertebrate prey and thus is unlikely, at least in winter, to have much impact on invertebrate populations. *M. cafer*, however, subsisted almost entirely on invertebrate prey, particularly insects, and many of these (for example, hemipterans, lepidopteran and dipteran larvae and gastropods) may be of economic significance. By virtue of its voracious, predatory habits, its impact as a secondary consumer, particularly in winter when insects are few in number and may be quiescent in a pre-reproductive state may, therefore, be considerable.

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