
Notes and records

Diet of sympatric African grass owl (*Tyto capensis*) and spotted eagle owl (*Bubo africanus*) in the Bamenda Highlands, NW Cameroon

Jan Riegert^{1*}, Ondřej Sedláček² and Rainer Hutterer³

¹Department of Zoology, Faculty of Biological Sciences, University of South Bohemia, Branišovská 31, CZ-370 05 České Budějovice, Czech Republic, ²Department of Ecology, Faculty of Science, Charles University in Prague, Viničná 7, CZ-128 44 Praha, Czech Republic and ³Section of Mammals, Zoologisches Forschungsmuseum Alexander Koenig, Adenauerallee 160, D-53113 Bonn, Germany

Introduction

African grass owl (*Tyto capensis*) ranges through sub-equatorial Africa with an isolated occurrence in the Cameroon Mts, where it seems to be rare and confined to higher altitudes. The bird is only known from five localities in this area – Mt Cameroon, Mbi Crater (Dowsett & Dowsett-lemaire, 2001), Manenguba Crater, Lake Bambulue (Serle, 1950), Lake Paponoun (Germain *et al.*, 1973) and Lake Oku (Fuelling & Hutterer, unpublished data). It favours moist grasslands up to 3500 m a.s.l. (Benson, 1981; Del Hoyo, Elliott & Sargatal, 1999). Pellet studies conducted mainly in the Cape Province have shown that small rodents (mainly *Otomys*) are the dominant prey, comprising 76–98% of their diet. Other prey groups, such as insectivores, bats, birds, reptiles, frogs and insects comprise only a minority of prey items (Del Hoyo *et al.*, 1999).

Spotted eagle owl (*Bubo africanus*) is widespread in sub-Saharan Africa, avoiding only the forest zone of Central Africa. Its northern race *cinerascens*, sometimes treated as a species (Del Hoyo *et al.*, 1999), has the southern limit of its range in the Cameroon Mts. The study site represents the highest known altitude of its occurrence. It occupies a variety of habitats up to 2100 m a.s.l. with preference to semi-open woodland (Del Hoyo *et al.*, 1999). Spotted eagle owl is an opportunistic raptor and, irrespective of its rela-

tively large size, feeds mainly on small vertebrates and arthropods.

Data on the diet of the two owl species from Central Africa are still scarce. The aim of our study was to investigate the diet of spotted eagle owl and grass owl in a special montane environment and to compare their food preferences in an area of local sympatry.

Study area and methods

The pellets were collected during November 2001 in Bambili volcano craters situated 8 km SE from Bamenda, Bamenda Highlands, Cameroon (5°55'N, 10°14'E, 2400 m a.s.l.). There is a single wet season from March/April to mid-November in Bamenda Highlands, with annual rainfall of about 2100 mm (Tye, 1986). The present vegetation cover of Bamenda Highlands in the area SW of Bamenda city is heavily affected by cultivation. The land is covered by a mosaic of grazed pastures, fields and plantations (potatoes, beans etc.), scrubland (dominated by *Hypericum lanceolatum* and *Lasiosiphon glaucum*), *Pteridium aquilinum* fern growth and alien *Eucalyptus* sp. woods. Formerly dominant montane forests are recently confined to steep valleys and gallery forests along streams (Stuart, 1986). The area suffers from the setting of bush fires during the dry season. Both Bambili calderas of the extinct volcano were flooded by lakes in the past (Anonymous, 1972), but the upper one has been gradually covered by marshes. The slopes of the craters are covered by a mosaic of montane forest, *Lasiosiphon* and bamboo woods and grasslands (Fig. 1). The surroundings of the craters are covered mainly by extensive pastures and open *Lasiosiphon* woods. Fragments of montane forest are confined to steep valleys.

An individual of African grass owl was flushed up from the roosting site situated in the marsh of the lower crater (Fig. 1). We collected 39 pellets. The food remains of spotted eagle owl (pellets not measured because they split together and felted) were collected from a platform in rocks (Fig. 1), probably used for nesting, where an individual has been flushed up.

Pellets and material from nest cavity was dissolved in a solution of NaOH (Schueler, 1972). Small mammals were determined by identification of skulls according to

*Correspondence: E-mail: honza@riegert.cz

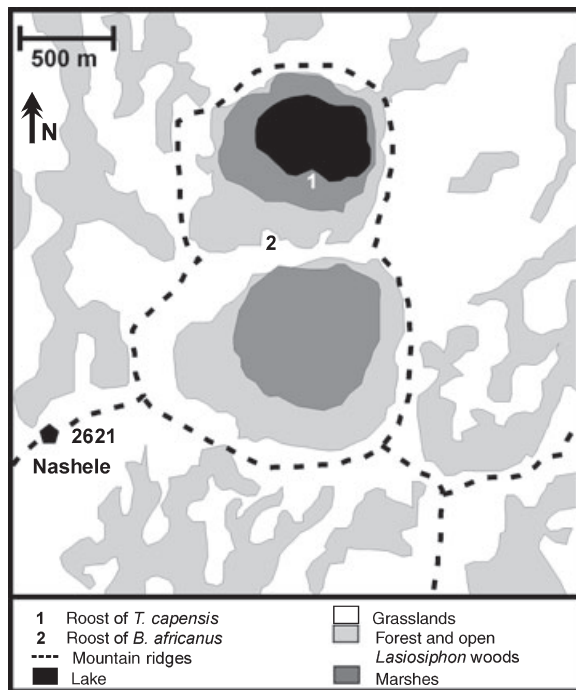


Fig 1 Schematic map of Bambili volcano calderas with the location of roosts of owls

Rosevear (1969), Meester & Setzer (1971) and Eisentraut (1973), and by using our own reference collections. Taxonomic comments and measurements for the small mammal species recorded, including the description of a new species of shrew, will be dealt with in a forthcoming paper. The nomenclature of mammals follows the relevant chapters in Wilson & Reeder (2005). Diversity of diet composition was computed using standardized Gibson Index (Colwell & Futuyma, 1971), diet overlap was assessed after Pianka (1974).

Results and discussion

The average pellet sizes (\pm SD of the mean) of African grass owl were $25.9 (\pm 3.2) \text{ mm} \times 19.1 (\pm 1.6) \text{ mm} \times 35.3 (\pm 4.0) \text{ mm}$ ($n = 35$ complete pellets). In contrast to findings of Vernon (1972), pellets of our grass owl were smaller and thus comparable with those of barn owl (*Tyto alba*).

The diet of African grass owl was dominated by species of the shrew genera *Crocidura*, *Sylvisorex* and *Myosorex* (70.3% by numbers, Table 1). Muridae rodents were not as common in the diet as shown by previous studies from south Africa (Table 2), where the genus *Otomys* formed the

most frequent prey. We suggest that this low proportion of *Otomys* (3% by numbers) is due to its habitat choice in the Cameroon Mountains, as more arid and grassland habitats are preferred (Rosevear, 1969). We recorded a relatively high proportion of endemic species in the diet, such as *Sylvisorex camerunensis* (>15%), *Myosorex okuensis* (>10%) and less frequently *Praomys hartwigi* (2%) and *Otomys occidentalis* (3%). These species seem to be relatively common at higher altitudes of the Bambili Craters area. The fragments assigned to the genus *Crocidura* could not be fully identified but include further local endemics such as *Crocidura virgata* and *Crocidura picea*. We also found remains of a new species of *Sylvisorex*, currently under study by the senior author that may also be confined to the Bamenda Highlands.

The material for diet analysis of spotted eagle owl in our study area was limited. However, as shown in previous studies from South Africa, this species hunted relatively small prey, i.e., mainly insects and rodents (Table 3). The invertebrate prey was dominated by Scarabaeidae beetles, which were common on adjacent pastures. The most numerous items among Muridae rodents were *Dasymys rufulus*, a ground-dwelling rat. Spotted eagle owls in

Table 1 Diet composition of *Tyto capensis* and *Bubo cinerascens* in the Bamenda Highlands, NW Province, Cameroon

Taxa	Item	<i>Bubo cinerascens</i>		<i>Tyto capensis</i>	
		n	%	n	%
Rodentia: Muridae	<i>Dasymys rufulus</i>	9	20.5	1	1.0
	<i>Lemniscomys striatus</i>	1	2.3	2	2.0
	<i>Lophuromys sikapusi</i>	1	2.3		
	<i>Mastomys</i> sp.	4	9.1	11	11.2
	<i>Mus musculoides</i>	4	9.1	1	1.0
	<i>Mus setulosus</i>			4	4.1
	<i>Otomys occidentalis</i>	5	11.4	3	3.0
	<i>Praomys hartwigi</i>	2	4.5	2	2.0
	Muridae indet.			5	5.1
Soricomorpha: Soricidae	<i>Crocidura attila</i>	1	2.3		
	<i>Crocidura virgata</i>			5	5.1
	<i>Crocidura olivieri</i>	1	2.3		
	<i>Crocidura</i> spp.			36	36.7
	<i>Myosorex okuensis</i>	3	6.7	10	10.2
	<i>Sylvisorex camerunensis</i>	2	4.5	16	16.3
	<i>Sylvisorex</i> sp.			2	2.0
Coleoptera:		11	25.0		
Scarabaeidae					
Total		44	100.0	98	100.0

Table 2 Comparison of main diet composition of *Tyto capensis* in different regions of its distribution range

Taxa	Big Island, SAR (1)	Sedgefield, SAR(2)	Natal, SAR (3)	Transvaal, SAR(3)	Transvaal, SAR(4)	Springbok Flats, SAR (5)	Zomba Plateau, Malawi (6)	Bamenda Highlands, Cameroon (7)
Rodentia: Muridae	98.0	82.0	82.0	76.0	96.0	97.0	95.0	29.4
Chiroptera					+			
Soricomorpha: Soricidae	2.0		14.0	12.0	3.0	2.6	5.0	70.6
Other mammals		8.0		4.0	+			
Aves			3.0	4.0	1.0	0.4		
Insecta	+			+	+		+	
Sample size (n)	176	11	297	292	182	781	147	98

Percentages were counted from numbers. References: (1) Earlé, 1978; (2) Dean & Dowsett, 1986; (3) Vernon, 1972; (4) Pocock, 1963; (5) Mendelsohn, 1989; (6) Happold & Happold, 1986; (7) This study. '+' denotes present but not quantified.

Taxa	Kachulu, Malawi (1)	Springbok Flats, SAR (2)	Awash NP, Ethiopia (3)	Bamenda Highlands, Cameroon (4)
Rodentia: Muridae	69.0	91.3	66.3	60.2
Chiroptera	18.0		0.7	
Soricomorpha: Soricidae	13.0	5.6	21.6	14.8
Aves		3.1	2.8	
Other vertebrates			3.1	
Insecta			5.5	25.0
Sample size (n)	148	160	1588	44

Table 3 Comparison of main diet composition of two eagle owl species in different regions of its distribution range

Percentages were counted from numbers. References for *Bubo africanus* (1) Ngonda, 1991; (2) Mendelsohn, 1989; *Bubo cinerascens* (3) Demeter, 1982; (4) This study.

Awash NP (Ethiopia) showed less dependence on Muridae, instead they took mainly '*Tatera*' (now *Gerbilliscus*) and *Gerbillus* species, Gerbillinae (Demeter, 1982) typical for arid woodland savanna. Three other case studies took part in wetlands or grasslands (Mendelsohn, 1989; Ngonda, 1991; our study), where the occurrence of Muridae is more likely.

Although we had limited material, we found marked differences in the diet of the owls studied. Spotted eagle owls preyed upon rodents significantly more frequently than grass owls (60.2% versus 29.4%, $\chi^2 = 10.59$, d.f. = 1, $P = 0.0011$, Table 1). The diet of the spotted eagle owl was indicatively more generalized than the diet of the grass owl ($B_r = 0.501$ versus 0.350, $\chi^2 = 2.68$, d.f. = 1, $P = 0.1011$), and the diet overlap was not pronounced ($O = 0.178$). The differences may be indirectly explained by different home range sizes, and by different hunting habitats. In general, species of the genus *Bubo* have larger home ranges than those of genus *Tyto* (Peery, 2000). Grass owl in the study area con-

sumed a higher proportion of shrews confined to forest patches and marshes (*Sylvisorex*, *Myosorex*, Table 1). Spotted eagle owls are more generalized (Borrow & Demey, 2001) and possibly more often hunt in extensively grazed grasslands.

Acknowledgements

We are grateful to an anonymous referee, who provided useful criticisms on the manuscript. We wish to thank GAČR (206/03/H034), MSM (LC 06073, 6007665801 and 0021620828) and GAAV (IAA601410709 and KJB601110703) for financial support of the research of JR and OS. We further thank A. Riegertová, D. Sedláčková, Š. Janeček and P. Janečková for assistance in the field.

References

- ANONYMOUS (1972) Baffousam NB-32-XI, Carte du Cameroun. L'Institut Géographique National, Yaoundé.

- BENSON, C.V. (1981) Ecological differences between the Grass-owl *Tyto capensis* and the Marsh Owl *Asio capensis*. *Bull. B.O.C.* **101**, 372–376.
- BORROW, N. & DEMEY, R. (2001) *Birds of Western Africa*. Christopher Helm, London.
- COLWELL, R.K. & FUTUYMA, D.J. (1971) On the measurement of niche breadth and overlap. *Ecology* **52**, 567–576.
- DEAN, W.R.J. & DOWSETT, R.J. (1986) A nest of the Grass-owl *Tyto capensis* in the Southern Cape. *Ostrich* **57**, 187–188.
- DEL HOYO, J., ELLIOTT, A. & SARGATAL, J. (1999) *Handbook of the Birds of the World Vol. 5, Barn-owls to Hummingbirds*. Lynx Edicions, Barcelona.
- DEMETER, A. (1982) Prey of the Spotted Eagle-Owl *Bubo africanus* in the Awash National Park, Ethiopia. *Bonn. Zool. Beitr.* **33**, 283–292.
- DOWSETT, R.J. & DOWSETT-LEMAIRE, F. (2001) First records of Scarce Swift *Schoutedenapus myoptilus* and Grass Owl *Tyto capensis* from Mt Cameroon. *Malimbus* **23**, 110–111.
- EARLÉ, R.A. (1978) Observations at a nest of the Grass-owl. *Ostrich* **49**, 90–91.
- EISENTRAUT, M. (1973) Die Wirbeltierfauna von Fernando Poo und Westkamerun unter besonderer Bedeutung der pleistozänen Klimaschwankungen für die heutige Faunenverteilung. *Bonn. Zool. Monogr.* **3**, 1–428.
- GERMAIN, M., DRAGESCO, J., ROUX, F. & GARCIN, H. (1973) Contribution à l'ornithologie du Sud-Cameroun. *Oiseau Rev. Fr. Orn.* **43**, 119–182.
- HAPPOLD, D.C.D. & HAPPOLD, M. (1986) Small mammals of Zomba Plateau, Malawi, as assessed by their presence in pellets of the Grass-owl, *Tyto capensis*, and by live-trapping. *Afr. J. Ecol.* **24**, 77–87.
- MEESTER, J. & SETZER, H.W. (1971) *The Mammals of Africa. An Identification Manual*. Smithsonian Institution Press, Washington.
- MENDELSON, J.M. (1989) Habitat preferences, population size, food and breeding of six owls species in the Springbok Flats, South Africa. *Ostrich* **60**, 183–190.
- NGONDA, J.B. (1991) Food Choice of the Spotted Eagle Owl (*Bubo africanus*) at Kachulu, Bachelor thesis. Chanco College University of Malawi, Zomba, Malawi.
- PEERY, M.Z. (2000) Factors affecting interspecies variation in home-range size of raptors. *The Auk* **117**, 511–517.
- PIANKA, E. (1974) Niche overlap and diffuse competition. *Proc. Natl. Acad. Sci.* **71**, 2141–2145.
- POCOCK, T.W. (1963) Records of bird diets. *Wits. Bird Club News Skeet* **44**, 2–4.
- ROSEVEAR, D.R. (1969) *The rodents of West Africa*. Trustees of the British Museum (Natural History), London.
- SCHUELER, F.W. (1972) A new method of preparing owl pellets: boiling in NaOH. *Bird Banding* **43**, 142.
- SERLE, W. (1950) A contribution to the ornithology of the British Cameroons. *Ibis* **92**, 343–376, 602–638.
- STUART, S.N.(ed.) (1986) *Conservation of Cameroon Montane Forests*. International Council for Bird Preservation, Cambridge.
- TYE, H. (1986) The climate of the highlands of Western Cameroon. In: *Conservation of Cameroon Montane Forests* (Ed. S. N. STUART). International Council for Bird Preservation, Cambridge.
- VERNON, C.J. (1972) An analysis of owl pellets collected in Southern Africa. *Ostrich* **43**, 109–124.
- WILSON, D.E. & REEDER, D.A. (2005) *Mammal Species of the World: A Taxonomic and Geographic Reference*, 3rd Edition. Johns Hopkins University Press, Baltimore, MD.

(Manuscript accepted 6 July 2007)

doi: 10.1111/j.1365-2028.2007.00816.x