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Authors: Kopij, Grzegorz, Swardt, Dawied H. De, and Nuttall, Rick N.

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Diet of seven coraciiform species (Coraciiformes) in South Africa

Grzegorz KOPIJ¹, Dawied H. De SWARDT² & Rick N. NUTTALL²

¹Department of Biology, National University of Lesotho, P. O. Roma 180, LESOTHO, e-mail: g.kopij@nul.ls

²Department of Ornithology, National Museum, Bloemfontein 9300, REPUBLIC OF SOUTH AFRICA

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Abstract. A total of 62 stomach contents of four *Merops* and three other coraciiform species from South Africa, were analysed. Hymenoptera constituted the bulk of the diet of all four *Merops* species examined, with Odonata and Coleoptera being supplementary components. *Upupa epops* and *Phoeniculus cyanomelas* fed mainly on insect larvae, while *Coracias caudata* preyed upon Scarabaeidae, Acrididae, Isoptera and Solifugae.

Key words: Coraciiformes, diet, South Africa

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INTRODUCTION

Coraciiformes are characteristic birds of the Afrotropical region; 72%, 67% and 100% of all species of bee-eaters (Meropidae), rollers (Coraciidae) and woodhoopoes (Phoeniculidae) respectively occur in this region (Zimmermann et al. 1996). Being brightly coloured and having an interesting behaviour, these species attract attention. Despite this, their ecology is still not well known. For instance, the diet of most coraciiform species breeding in southern Africa has not been quantitatively analysed (Fry et al. 1988, Fry 1992, Maclean 1993). This note reports on the stomach contents of some members of this interesting order.

MATERIAL AND METHODS

A total of 62 stomach contents of four bee-eater and three other coraciiform species was analysed. Birds were collected in the Free State, South Africa (permission was obtained from the Department of Nature Conservation at Bloemfontein). Most European *Merops apiaster*, White-fronted *M. bullockoides* and Blue-cheeked Bee-eaters *M. persicus*,

as well as Lilac-breasted Rollers *Coracias caudata* were collected in the Kalahari Thornveld in the Bloemhoff/Hoopstad districts.

Collections were made during the years 1986–1990, mainly (n = 32 stomachs) in 1986. Most White-fronted Bee-eaters and Hoopoes *Upupa epops* were collected during the austral winter (April–August, non-breeding season), the remainder — in austral summer (September–March, breeding season).

On collection, stomachs were placed in 70% alcohol and labelled, their contents were sorted, counted and identified to the order or family level. Frequency of occurrence (given in percentage) was calculated as a proportion of the number of stomachs containing given prey taxon relative to the total number of stomachs analysed.

Nomenclature of coraciiform species follows that of Fry et al. (1988).

RESULTS

Hymenoptera constituted the bulk (c. 70% of all prey items identified) of the diet of all bee-eater species examined (Table 1). Apidae were the main hymenopteran prey of the European and Blue-

Table 1. Diet of *Merops* species. F — percentage of frequency of occurrence, N — percentage of the prey taxon in relation to the total number of prey identified.

Taxa	Mean length (mm)	<i>M. apiaster</i>		<i>M. bullockoides</i>		<i>M. persicus</i>		<i>M. hirundineus</i>	
		F	N	F	N	F	N	F	N
Odonata	30	25	6.1	20	5.2	44	8.5	–	–
Dermaptera	40	–	–	–	–	11	2.8	–	–
Mantodea	25	–	–	7	1.3	11	2.8	–	–
Orthoptera	25	–	–	–	–	11	2.8	–	–
Coleoptera	10	42	9.1	33	9.1	31	4.2	100	27.3
Diptera	10	–	–	20	5.2	–	–	25	3.0
Lepidoptera	20	–	–	–	–	11	2.8	–	–
Hymenoptera		100	77.8	100	79.3	77	76.0	100	69.7
Ichneumonidae	20	–	–	33	27.3	–	–	25	6.1
Apidae	15	83	75.8	40	22.1	66	74.6	25	9.1
Formicidae	5	–	–	7	1.3	–	–	25	6.1
Unidentified	10	8	2.0	40	28.6	11	1.4	25	48.5
Grit	4	17	7.1	–	–	–	–	–	–
Number of stomachs		12		15		9		4	
Number of prey items			99		77		71		33

Table 2. Diet of two hoopoe species and *Coracias caudata*. F, N — see Table 1.

Taxa	Mean length (mm)	U. epops		P. cyanomelas		C. caudata	
		F	N	F	N	F	N
Arachnida	5	–	–	–	–	44	6.6
Insecta							
Dermaptera	15	20	1.6	–	–	–	–
Isoptera	15	–	–	–	–	11	29.5
Orthoptera	35	20	1.6	–	–	67	23.0
Blattodea	15	–	–	25	40.1	11	3.3
Heteroptera	8	–	–	–	–	33	9.8
Coleoptera	7	30	8.1	13	13.3	89	27.9
Larvae	20	80	87.1	18	46.7	–	–
Grit	5	20	1.6	–	–	–	–
Stomachs		5		8		9	
Prey items			62		15		61

checked Bee-eaters. In the diet of the White-fronted and Swallow-tailed Bee-eaters *Merops hirundineus* hymenopteran prey were more diverse and were represented by Apidae, Ichneumonidae, Formicidae (alates) and other families. Coleoptera and Odonata

were preyed upon by all bee-eater species. Occasionally, these birds ate other insects (Table 1).

The number of Apidae in bee-eaters' stomachs ranged from one to 30 (\bar{x} = 6.6; SD = 6.51; n = 22). In European Bee-eater stomachs the mean number was 7.5 (SD = 8.63; n = 10), in White-fronted Bee-eater stomachs — 8.8 (SD = 3.76; n = 6), and in Blue-cheeked Bee-eater stomachs – 8.8 (SD = 3.76; n = 6).

Insect larvae (probably mainly Coleoptera) and coleopteran imagoes were the main prey of the Hoopoe and Scimitar-billed Woodhoopoe *Phoeniculus cyanomelas*. The Lilac-breasted Roller preyed upon Coleoptera (mainly Scarabaeidae), Orthoptera (mainly Acrididae), Isoptera and Solifugae (Table 2).

DISCUSSION

If wet mass is taken into consideration, the contribution of Odonata to the diet of all coraciiform species investigated (Table 1 and 2) is probably underestimated, while the contribution of Formicidae, Coleoptera, Diptera and Hymenoptera might be overestimated.

In pellets of European Bee-eaters, collected in Zimbabwe, the proportion between Hymenoptera and other prey groups was calculated as 1.0 : 0.2 (n

= 850 prey items; Fry et al. 1988). That proportion in pellets of the White-fronted Bee-eaters from Tanzania, Zambia and Zimbabwe was 1.0 : 0.1 (n = 1 200 prey items; based on Fry et al. 1988). In South Africa the proportion is slightly higher, viz. 1.0 : 0.3 and 1.0 : 0.3 in the diet of European and White-fronted Bee-eater respectively (this study). In the present study, Odonata were found to be a common prey of the Blue-cheeked Bee-eater. Those insects were also recorded as an important prey of White-fronted Bee-eaters in the western Palearctic (Snow & Perrins 1998).

In this study, Dermaptera, Orthoptera and Coleoptera were recorded for the first time in the diet of African Hoopoe; Isoptera, Blattodea and Heteroptera — in the diet of the Lilac-breasted Roller; and Blattodea and Coleoptera – in the diet of the Scimitar-billed Woodhoopoe (Fry et al. 1988, Maclean 1993).

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STRESZCZENIE

[Pokarm ptaków kraskowych w Republice Południowej Afryki]

Zbadano zawartość żołądków 7 południowoafrykańskich gatunków, należących do rzędu kraskowych: żołąny zwyczajnej *Merops apiaster*, żołąny białoczelnej *Merops bullockoides*, żołąny modroliciej *Merops persicus*, żołąny widłosternej *Merops hirundineus*, kraski liliowopierśnej *Coracias caudata*, czarnodudka większego *Phoeniculus cyanomelas* i dudka *Upupa epops*. Błonkówki, szczególnie pszczoły, stanowiły podstawę wyżywienia wszystkich 4 zbadanych gatunków żołąn (Tab. 1). Dudek i czarnodudek większy odżywiały się przede wszystkim larwami owadów, natomiast kraski liliowopierśne polowały głównie na termity, szarańczaki i chrząszcze (Tab. 2).