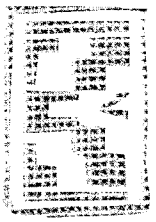

Parasites of domestic and wild animals in South Africa. XXXVI. Arthropod parasites of yellow mongooses, *Cynictis penicillata* (G. Cuvier, 1829)

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ABSTRACT

HORAK, I.G., CHAPARRO, F., BEAUCOURNU, J.-C. & LOUW, J.P. 1999. Parasites of domestic and wild animals in South Africa. XXXVI. Arthropod parasites of yellow mongooses, *Cynictis penicillata* (G. Cuvier, 1829). *Onderstepoort Journal of Veterinary Research*, 66:33–38

Eighty yellow mongooses, *Cynictis penicillata*, from five localities in South Africa were examined for arthropod parasites. Ten ixodid tick species, of which *Haemaphysalis zumpti* was the most abundant, prevalent and widely distributed, were collected. The mongooses were also infested with two mite species. *Echidnophaga gallinacea* was the most abundant of the eight flea species collected. It and *Ctenocephalides connatus* were present at every locality. A single biting louse species, *Felicola cynictis*, was recovered and it was the most prevalent ectoparasite on the mongooses.

Keywords: *Cynictis penicillata*, fleas, ixodid ticks, lice, mites, yellow mongooses

INTRODUCTION

Yellow mongooses, *Cynictis penicillata* (G. Cuvier, 1829), are inhabitants of the South West Arid zone of southern Africa (Skinner & Smithers 1990). Their distribution, however, also extends into the savannas of the North West, Northern, Gauteng and Mpumalanga Provinces of South Africa and also into northwest KwaZulu-Natal. They do not occur in desert, or in thick bush or forest, but prefer open country such as that in the Free State Province and the Karoo. They are gregarious animals, living in warrens in colonies of up to 20 individuals or more. According to Lynch (1980) they share these warrens with Cape ground squirrels, *Xerus inauris*, and also with suricates, *Suricata suricatta*, in much of their habitat. Because of the close physical association of these three small mammal species it is not surprising that they harbour several ectoparasites in common.

The ixodid ticks collected from yellow mongooses have been listed by Theiler (1962) and Lynch (1980). They are preferred hosts of *Haemaphysalis zumpti* and of *Rhipicephalus theileri* (Theiler 1947; Hoogstraal & El Kammah 1974). They also harbour the mite, *Nihelia cynictis* (Fain 1979). In addition several flea species and a single biting louse species, *Felicola cynictis*, have been collected from yellow mongooses (De Meillon, Davis & Hardy 1961; Ledger 1980; Segerman 1995).

Yellow mongooses are of considerable veterinary importance in South Africa. They are not only the main cause of viverrid rabies in this country but also serve as a maintenance host of the rabies virus (Swanepoel 1994). A survey to determine the prevalence of antibodies to rabies in yellow mongooses necessitated the killing of 96 animals (Chaparro 1996). In order to make the maximum use of these mongooses, arthropods were collected from 80 individuals and the present paper describes the results of this survey.

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Accepted for publication 22 January 1999—Editor

MATERIALS AND METHODS

Survey localities

Mongooses were collected from around Ermelo (26°32′S, 29°59′E), Mpumalanga Province; Kuruman (27°28′S, 23°26′E), Northern Cape Province; Kroonstad (27°40′S, 27°14′E) and Bloemfontein (29°08′S, 26°10′E), north and central Free State Province respectively; and Queenstown (31°54′S, 26°53′E), Eastern Cape Province. The vegetation around Ermelo is classified as north-eastern Sandy Highveld; that around Kuruman as Kalahari Thorn and Shrub Bushveld; and that around Kroonstad, Bloemfontein and Queenstown as dry *Cymbopogon-Themeda* veld (Acocks 1988).

Parasite collection

The mongooses were caught in baited boxtraps which were placed close to inhabited burrows. The traps were checked in mid-morning and at dusk as the animals have been reported to feed mainly in the early morning and the late afternoon (Skinner & Smithers 1990). Each mongoose captured was restrained by placing a loop of thin rope around its neck. It was then pulled to the side of the trap and injected intramuscularly with 15 mg of ketamine (Ketalar: Warner-Lambert S.A.) and 1 mg of xylazine (Rompun: Bayer Animal Health). After collecting a blood sample the animal was killed by injecting 150 mg of pentobarbitone sodium (Euthatal: Maybaker S.A.) into its heart. Thereafter its skull was opened and the whole brain collected. The blood and the brain samples were used in the concurrent rabies research project which was being conducted on the mongooses (Chaparro 1996).

The dead mongooses were skinned and the skin of each animal was placed separately in a sturdy polythene bag into which the tick-detaching agent amitraz (Triatix: Hoechst Roussel) was poured. After 3–4 h in the bag the skin was removed and thoroughly washed and scrubbed in a large plastic tray using a brush with stiff metal bristles. The contents of the polythene bag and the plastic tray were sieved over a sieve with 150 µm apertures. The material remaining in the sieve was collected, transferred to a labelled bottle and preserved with 10% formalin. The contents of the bottle were later examined for arthropod parasites under a stereoscopic microscope and these were collected, identified and counted.

RESULTS AND DISCUSSION

The species and numbers of ixodid ticks collected and the presence of mites on the mongooses are summarized in Table 1. The flea and louse species taken from the mongooses are summarized in Table 2, and the locality prevalences of the most abundant tick and flea species as well as those of the mites and the biting louse, *F. cynictis*, are summarized in Table 3.

Ixodid ticks

The ten tick species present on the mongooses can be divided into two distinct groups, those that are warren or burrow associated and those that are encountered while the animals are foraging. The former group comprises *H. zumpti* and *R. theileri*. All parasitic stages of development of these ticks utilize yellow mongooses as hosts (Hoogstraal & El Kammah 1974; Table 1). They are also found on Cape ground

TABLE 1 Ixodid ticks and mites collected from 80 yellow mongooses at five localities in South Africa

Acarid species	Numbers of acarines collected					No. of animals infested
	Larvae	Nymphs	Males	Females	Total	
Ixodid ticks						
Amblyomma hebraeum	2	0	0	0	2	2
Amblyomma marmoreum	11	0	0	0	11	3
Boophilus sp.	1	0	0	0	1	1
Haemaphysalis zumpti	136	69	116	42	363	48
Hyalomma marginatum rufipes	5	0	0	0	5	4
Rhipicephalus evertsi evertsi	1	0	0	0	1	1
Rhipicephalus exophthalmos	2	0	0	0	2	1
Rhipicephalus follis/simus	3	0	0	0	3	2
Rhipicephalus theileri	12	30	1	2	45	19
Rhipicephalus turanicus	1	0	0	0	1	1
Mites						
Androlaelaps sp.	Life stages, sexes and numbers not determined					39
Nihelia cynictis	Life stages, sexes and numbers not determined					35

TABLE 2 Fleas and lice collected from 80 yellow mongooses at five localities in South Africa

Flea or louse species	Numbers of fleas or lice collected			No. of animals infested
	Males	Females	Total	
Fleas				
Ctenocephalides connatus	97	157	254	45
Ctenocephalides damarensis	1	9	10	6
Echidnophaga bradyta	14	42	56	22
Echidnophaga gallinacea	340	881	1 221	39
Synosternus caffer	15	33	48	8
Xenopsylla cryptonella	4	6	10	9
Xenopsylla erilli	0	2	2	1
Xenopsylla piriei	0	1	1	1
Lice				
Felicola cynictis	Sexes not determined		6 887	78

TABLE 3 The prevalence of ticks, mites, fleas and lice on yellow mongooses at five localities in South Africa

Arthropod species	Percentage of animals infested at each locality				
	Ermelo (n = 38)	Kuruman (n = 20)	Kroonstad (n = 12)	Bloemfontein (n = 4)	Queenstown (n = 6)
Ixodid ticks					
Haemaphysalis zumpti	60	20	92	100	100
Rhipicephalus theileri	0	70	17	50	17
Mites					
Androlaelaps sp.	26	85	75	25	33
Nihelia cynictis	37	80	33	0	17
Fleas					
Ctenocephalides connatus	47	45	83	75	83
Ctenocephalides damarensis	0	20	0	0	33
Echidnophaga bradyta	47	0	33	0	0
Echidnophaga gallinacea	3	95	92	100	67
Synosternus caffer	0	40	0	0	0
Xenopsylla cryptonella	0	20	33	25	0
Lice					
Felicola cynictis	97	100	100	75	100

n = number examined

squirrels and suricates (Theiler 1962; Hoogstraal & El Kammah 1974). This multi-host/parasite relationship could only be possible if the ticks themselves and the free-living phases of their life cycles are warren associated. Apparently *H. zumpti* prefers the moister, cooler climate of the Mpumalanga, Free State and Eastern Cape Provinces in contrast to *R. theileri* which seems to thrive in the hotter, more arid climate of the Northern Cape Province around Kuruman.

Yellow mongooses are subject to infection with the haemoparasite *Babesia cynicti*, which was first described by Neitz (1938). In a recent survey, Penzhorn & Chaparro (1994) recorded *B. cynicti* in blood smears from 50 of 56 yellow mongooses at Rooiwal, north of Pretoria, Gauteng Province, 13 of 18 animals from near Ermelo, Mpumalanga Province, and 22 of 23 mongooses at Potchefstroom, North West Province. As the preferred vectors of most *Babesia* spp. are ixodid ticks, the vector of this protozoan is likely

to be either *H. zumpti* or *R. theileri*, or perhaps both. Circumstantial evidence favours the former species as none of the mongooses examined near Ermelo in the present survey was infested with *R. theileri*, while the majority of animals examined at this locality were infested with *H. zumpti* and infected with *B. cynicti* (Table 3; Penzhorn & Chaparro 1994).

The adults of the second group of ticks collected from the mongooses prefer either cattle (*Amblyomma hebraeum, Boophilus* sp., *Hyalomma marginatum rufipes, Rhipicephalus evertsi evertsi, Rhipicephalus exophthalmos* and *Rhipicephalus follis/simus*); tortoises (*Amblyomma marmoreum*); or scrub hares, *Lepus saxatilis* (*Rhipicephalus turanicus* and *R. exophthalmos*) (Theiler 1962; Walker 1991; Keirans, Walker, Horak & Heyne 1993; Horak, Spickett, Braack, Penzhorn, Bagnall & Uys 1995). The eggs laid by these ticks, and consequently their larvae, would therefore be most abundant in localities frequented by their preferred hosts. The mongooses probably become infested with larvae of these species during their foraging excursions, which for some individuals can range from 600–3 000 m from their warrens (Zumpt 1976). All the latter infestations should be regarded as accidental. This assumption is supported by the small numbers of animals infested and the small numbers of larvae collected from individual animals. Furthermore not a single nymph of any of these ticks was collected from a mongoose.

The present results indicate that within the regions in which the surveys were conducted yellow mongooses play virtually no role in the maintenance of ixodid tick populations of veterinary importance.

Mites

Because of the time it took to arrive at a specific identification for each mite we did not critically examine all the *Androlaelaps* sp. mites collected. Those we did examine were all *Androlaelaps capensis*. Mites of the genus *Androlaelaps* parasitize mainly rodents and more specifically gerbils, mice, rats and mole-rats [Zumpt 1961 (as *Haemolaelaps* and *Androlaelaps*); Till 1963]. Mites provisionaly asigned to *Androlaelaps marshalli* have, however, been collected from suricates at Queenstown, Eastern Cape Province and from zorillas, *Ictonyx striatus*, from Muguga, Kenya, as well as from various rodents (Till 1963). The recorded hosts of *A. capensis* are various species of mole-rats (Till 1963). Mongooses at each of the survey localities were infested with *Androlaelaps* sp., and infestation appeared to be particularly prevalent at Kuruman and at Kroonstad.

Nihelia cynictis, which was present on 35 animals, is a specific parasite of the yellow mongoose (Fain 1979) and was originally collected from an animal at Bloemhof in the North West Province. Judging by the number of mongooses infested at Kuruman, in the adjacent province, conditions in this region are particularly suitable for this mite.

Fleas

Eight flea species were recovered. The yellow mongoose, suricate and Cape ground squirrel are preferred hosts of the same three flea species (De Meillon *et al.* 1961; Segerman 1995), namely *Ctenocephalides connatus, Echidnophaga bradyta* and *Xenopsylla cryptonella*, all of which were collected in the present survey. Ermelo is a new locality record for both *C. connatus* and *E. bradyta* and Kuruman for *X. cryptonella*. Kuruman is also the most westerly record for the latter flea (Segerman 1995). These records do not represent a recent increase in the various fleas' distributions but rather a dearth of collections from the principal hosts at these localities.

Beaucournu & Ménier (1998) have recently reaffirmed that *Ctenocephalides damarensis*, as described by Jordan (1936), is a valid species, not merely a subspecies of *Ctenocephalides felis*. The small number of mongooses infested with *C. damarensis* indicates that it is probably an accidental parasite. Its preferred hosts are the non-colonial species of small carnivores and hares (De Meillon *et al.* 1961; Louw, Horak & Braack 1993). It has been suggested that its comparative scarcity on yellow mongooses could be due to competition with *C. connatus* (De Meillon *et al.* 1961). However, it may also be because it breeds more successfully in lairs or in the forms of hares than in the mongoose warrens.

Only one animal at Ermelo, compared to nearly all those around Kuruman and in the Free State, was infested with *Echidnophaga gallinacea*. The principal host of this flea is the domestic fowl (De Meillon *et al.* 1961). It is also found on a number of wild birds, many of the small mammals, including yellow mongooses, and some of the larger carnivores, and can probably survive on any bird or mammalian host (Segerman 1995). Nine of the 39 animals infested with *E. gallinacea* each harboured more than 50 fleas of this species. The large numbers collected in this study and its widespread occurrence indicate that it is probably well-adapted to the warren ecology of the mongooses. It might even compete with *E. bradyta* to the detriment of that species.

The principal host of *Synosternus caffer* is the springhare, *Pedetes capensis*. De Meillon *et al.* (1961) ascribe its presence on yellow mongooses to "straggling" as springhare warrens are frequently associated with those of the mongooses. Seven of the eight mongooses infested in the present survey carried one, two or three fleas each but the eighth harboured 11 males and 23 females. The collection of *S. caffer* solely from mongooses around Kuruman supports the assertion of De Meillon *et al.* (1961) that this flea only thrives under dry sandveld conditions.

Although suricates and ground squirrels are preferred hosts of *Xenopsylla erilli* this flea has apparently not been recorded previously on a yellow mongoose (Segerman 1995). The two fleas of this species collected now, from a single animal, must be regarded as an accidental infestation probably resulting from the communal use of warrens.

The short-tailed gerbil, *Desmodillus auricularis*, is the preferred host of *Xenopsylla piriei* but it has also been recorded on other gerbils as well as on the yellow mongoose (Segerman 1995).

Lice

The close association between the biting louse *F. cynictis* and the yellow mongoose, its type host (Bedford 1928), is amply demonstrated by its presence on nearly every animal at each of the collection localities. The intensity of infestation was fairly similar at Ermelo, Kroonstad, Bloemfontein and Queenstown, with mean burdens varying between 25 and 75 lice. At Kuruman, however, the mean louse burden was 237, with one animal harbouring 788 lice. As the mongooses at each of the localities were examined between the second week of July and the first week of October these differences cannot be ascribed to variations in seasonal abundance at the times of collection. The large burdens on the animals at Kuruman suggest that the immunity of the mongooses was possibly compromised because of unidentified adverse environmental factors. Stressed animals generally harbour increased lice burdens (Kettle 1984). The same factors are probably also responsible for the high prevalence of mite infestations on these animals.

ACKNOWLEDGEMENTS

The assistance of Messrs S.G. Horak and A.C. Uys with the collection of the parasites from the processed material is gratefully acknowledged. Dr E.A. Ueckermann of the ARC-Plant Protection Research Institute, Pretoria, assisted with the mite identification. This research was supported by a grant from the Foundation for Research Development, and the capture of the mongooses was partially supported by the Price Forbes Chair of Wildlife Diseases, Faculty of Veterinary Science, University of Pretoria.

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