Analysis of viverrid scats from the northern Orange Free State

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The yellow mongoose *Cynictis penicillata* is a reservoir of rabies in southern Africa (Barnard 1979) and may also play an important role in plague ecology. Pirie (1927) and Fourie (1938) reported that *C. penicillata* readily ate rodent carcasses during plague epizootics and that such epizootics could be detected by observing the change in contents of *C. penicillata* scats from insect chitin to rodent hair. Various authors (Snyman 1940; Zumpt 1968; Smithers 1971; Herzig-Straschil 1977; Lynch 1980) have confirmed by analysis of stomach contents that this species is predominantly insectivorous but also regularly consumes vertebrates. The aim of this study was to determine whether small mammal hair could be identified in viverrid scats and possibly provide evidence of plague epizootics in rodents.

During the study it was observed that a high percentage of scats supposedly collected from *C. penicillata* contained identifiable *C. penicillata* hair. It was concluded that this hair resulted from grooming since cannibalism has only been recorded once in *C. penicillata* (Zumpt 1968). Thus identification of hair in scats allows the differentiation of *C. penicillata* scats from those of the suricate *Suricata suricatta*. Lynch (1980) previously observed that nutritional studies from scats of these two species are difficult because they co-exist and their scats have a similar external appearance. This paper reports the results of analyses of viverrid scats collected in the Orange Free State in 1980.

Scats were collected in the Bothaville and Odendaalsrus districts of the Orange Free State from May to December 1980 and sent to the laboratory. After sieving to remove debris and sand, scats were broken up with forceps. Hair, feathers, pieces of arthropod chitin and other articles of interest were preserved in separate bottles containing 70% alcohol. Arthropods were identified using a dissecting stereomicroscope and recorded as either present (<30 fragments per sample) or numerous (≥30 fragments per sample), with the most abundant arthropod group in each sample being noted. Hair was identified by H. Keogh at the South African Institute for Medical Research.

Twenty-four of the 37 viverrid scats received contained *C. penicillata* hair and therefore the presentation of detailed results is limited to these 24. Table 1 presents the frequency of occurrence of all identifiable material from the scats. The most common arthropod orders present were Coleoptera, Orthoptera and Isoptera. Isoptera was the most abundant order in

Table 1 Occurrence of food items in 24 *Cynictis penicillata* scats

	Percentage occurrence	Relative percentage
Coleoptera	100	
Scarabaeidae		35
Unidentified Coleoptera		21
Tenebrionidae		12
Buprestidae		8
Coleoptera larvae		8
Curculionidae		6
Carabidae		6
Elateridae		2
Meloidae		2
Orthoptera	96	
Acrididae		96
Gryllidae		4
Isoptera	92	
Hodotermes mossambicus		46
Trinervitermes trinervoides		33
Odontotermes latericus		8
Odontotermes badius		5
Unidentified Isoptera		5
Odontotermes transvaalensis		2
Mammalia	75	
Muridae		50
(Mastomys coucha)		18
(Rhabdomys pumilio)		14
(Mus minutoides)		14
(Aethomys spp.)		4
Unidentified non-rodent		22
Gerbillinae		18
(Tatera brantsii)		14
(Tatera spp.)		4
Pedetidae		5
(Pedetes capensis)		
Leporidae		5
(Lepus spp.)		
Dermaptera	58	
Hymenoptera	46	
Formicidae		84
Chrysididae		8
Unidentified Hymenoptera		8
Aves	38	
Hemiptera	37	
Pentatomidae		40
Cercopidae		27
Unidentified Homoptera		20
Unidentified Heteroptera		13
Arachnida	25	
Scorpionidae		67
Araneae		33
Lepidoptera	8	
Lepidoptera larvae		100
Chilopoda	4	
Crustacea	4	
Reptilia	4	

Table 2 Relative abundance (%) of most common arthropods in scats. Arthropods were recorded as either present (<30 fragments per sample) or numerous (≥30 fragments per sample), with the most abundant arthropod group in each sample being noted

	Most numerous	Numerous	Present
Isoptera	50	21	21
Coleoptera	21	42	37
Orthoptera	21	21	54
Dermaptera	4	17	37
Hymenoptera	4	0	41

12 (50%) scats while Coleoptera and Orthoptera were most abundant in five (21%) each (Table 2).

Identifiable hair, apart from that of *C. penicillata*, was present in 15 (63%) of the 24 presumed *C. penicillata* scats and 20 (54%) of the total sample of 37 scats. Three samples contained hair of more than one species. The small mammals identified, with number of occurrences in brackets, were *Mastomys* species (6), *Rhabdomys pumilio* (4), *Mus minutoides* (3), *Pedetes capensis* (3), *Tatera brantsii* (3), *Tatera* species (1), *Aethomys* species (1), *Desmodillus auricularis* (1) and *Lepus* species (1). Hair of *S. suricatta* was not identified from any scats examined.

Arthropods, principally Isoptera but also Coleoptera and Orthoptera, were found to be the most abundant food items of *C. penicillata* scats. This is consistent with results of stomach and colon analyses reported by other workers (Snyman 1940; Zumpt 1968; Smithers 1971; Herzig-Straschil 1977; Lynch 1980). Scat analysis recorded higher frequencies of most food items than in surveys based on stomach and colon analyses by Zumpt (1968), Smithers (1971) and Lynch (1980). Stomachs and colons were frequently found empty by these authors. However, scat analysis appears to be less efficient than stomach analysis for detection of food items which are completely degraded by digestion. The low incidence of Lepidoptera larvae (8%) and Coleoptera larvae (8%) and the absence of amphibia in the present study compared to others (Smithers 1971; Lynch 1980) may be due to this fact.

Other workers have reported the presence of one or other of the termite species *Hodotermes mossambicus* (Snyman 1940; Herzig-Straschil 1977) or *Trinervitermes trinervoides* (Lynch 1980) in the stomach or colon of *C. penicillata*. Both of these termite species were found in substantial numbers in this study, confirming the view of Lynch (1980) that an apparent preference for either termite species by *C. penicillata* merely reflects local abundance.

The small number of viverrid scat samples collected each month allow few conclusions to be made regarding rodent mortality in the study area. However, three of four occurrences of *Tatera* hair in scats were in March and all three occurrences of *Mus minutoides* hair were in June. It is unknown whether these occurrences in scats resulted from scavenging or active hunting and therefore the results obtained may reflect either abundance or mortality of a particular species. Either alternative is possible since high rodent populations often precede mortality caused by plague (Davis 1953), or other agents (Shepherd, Leman & Barnett, 1982).

Although plague has declined as a serious threat to health in recent years, the organism persists in South African rodents (Shepherd & Leman 1983). The results of the limited study presented here indicate that calculation of the percentage of viverrid scats containing identifiable hair may supplement serological surveys to detect plague epizootics in wild rodents.

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Food of the large grey mongoose *Herpestes ichneumon* in the south-west Cape Province

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The large grey mongoose has a wide distribution throughout Africa, the Middle East and westwards into Spain, but in the Cape Province was generally believed to only extend as far west as Knysna (Ellerman, Morrison-Scott & Hayman 1953;