

Puku 7, 1973

5243

The Puku, Occ. Papers Dept. of Wildlife, Fisheries and National Parks, Zambia
No. 7, 1973

TICKS OF ZAMBIAN WILD ANIMALS: A PRELIMINARY CHECKLIST

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(Received 8th March, 1972)

SUMMARY

A brief note on the tick (Ixodoidea) fauna of Zambia is given and a list of the 58 species recorded including eight previously unreported from Zambia. A systematic listing of 98 wild hosts, including 10 reptiles, 9 birds and 79 mammals, and their ticks is given.

INTRODUCTION

Ticks of wild hosts in Zambia are relatively poorly known in the literature. From work carried out by MacLeod (1970, unpublished reports to F. A. O. 1966-1967) and by MacLeod, Colbo & Mwanaumo (1970), a large number of wild-host records were accumulated. This paper summarizes this information and earlier literature references into a preliminary checklist. Previous records are from Matthyse (1954), Theiler & Robinson (1954), Theiler (1962), Kohler & Roth (1967), Ansell & Ansell (1969a, 1969b), and Gray (miscellaneous unpublished records in files of Veterinary Department). MacLeod *et al.* (1970) add to earlier records an additional 18 tick species not previously recorded in Zambia bringing the then known total to 50 known species recorded in the country. The old designation of the Zambian fowl ticks as *Argas persicus* is probably incorrect as specimens recently collected were *A. walkerae*. Replacing the inclusive designation *Rhipicephalus pravus* by *R. neavei* and *R. punctatus* (Yeoman & Walker, 1967) and adding *Argas vespertilionis*, *Haemaphysalis orientalis*, (Hoogstraal, personal comm.) and recently collected *Amblyomma marmoratum*, *Ixodes dawesi*, *I. euptecti*, *I. lewisi* and *I. thomasa* bring the present total to 58 named species. At least one species of *Argas* and *Ixodes* in the author's collection have yet to be identified. Other species would be expected on hosts and locations not yet thoroughly examined. Some of these can be anticipated from other worker's findings in East and Central Africa (Arthur, 1965; Elbl & Anastos, 1966a,b,c,d; Yeoman & Walker, 1967; Macleod & Jooste, 1972; Matthyse & Colbo, in press). Nomenclature of wild hosts follows Broadley (1971), Benson *et al.* (1971), and Ansell (1960, 1969, and subsequent unpublished data) for reptiles, birds and mammals respectively.

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RESULTS

The present known tick fauna of Zambia is as follows:—

Superfamily IXODOIDEA

Family ARGASIDAE

Argas walkerae Kaiser & Hoogstraal; *A. vespertilionis* Latreille; *Argas* sp. *Ornithodoros faini* Hoogstraal; *O. moubata* Murray; *Otobius megnini* (Duges).

Family IXODIDAE

Amblyomma hebraeum Koch; *A. lepidum* Dönitz; *A. marmoreum* Koch; *A. nuttalli* Dönitz; *A. pomposum* Dönitz; *A. rhinocerotis* (de Geer); *A. sparsum* Neumann; *A. tholloni* Neumann; *A. variegatum* (Fabricius).

Aponomma exornatum (Koch); *A. latum* (Koch); *A. transversale* (Lucas).

Boophilus decoloratus (Koch); *B. microplus* (Canestrini).

Dermacentor rhinocerinus (Denny).

Haemaphysalis aciculifer Warburton; *H. hoodi* Warburton & Nuttall; *H. leachi* (Audouin); *H. spinulosa* Neumann; *H. orientalis* Nuttall & Warburton.

Hyalomma marginatum rufipes (Koch); *H. truncatum* Koch.

Ixodes alluaudi Neumann; *I. auriculaelongae* Arthur; *I. cavipalpus* Nuttall & Warburton; *I. dawesi* Arthur; *I. euplecti* Arthur; *I. lewisi* Arthur; *I. nchisiensis* Arthur; *I. pilosus* Koch; *I. rhabdomysae* Arthur; *I. thomasaе* Arthur & Burrow. *Rhipicentor bicornis* Nuttall & Warburton.

Rhipicephalus appendiculatus Neumann; *R. capensis* Koch; *R. carnivoralis* Walker; *R. compositus* Neumann; *R. eversti* Neumann; *R. longus* Neumann; *R. masseyi* Nuttall & Warburton; *R. muehlensi* Zumpt; *R. neavei* Warburton; *R. oculatus* Neumann; *R. punctatus* Warburton; *R. reichenowi* Zumpt; *R. sanguineus* (Latreille); *R. sculptus* Warburton; *R. simpsoni* Nuttall, *R. simus* Koch; *R. sulcatus* Neumann; *R. supertritus* Neumann; *R. tricuspis* Dönitz.

Further knowledge of the status of certain species is needed for a better interpretation of the occurrence on wild hosts. *Argas persicus*, a long recognised cosmopolitan species, is now regarded as a complex of species (subgenus *Persicargas*), with birds as hosts. Three have recently been described or recorded from South Africa, including *A. walkerae*, from domestic fowl, and others recognised but as yet undescribed, and these may occur in Zambia. (Hoogstraal, Kaiser & Kohls, 1968; Kaiser & Hoogstraal, 1969). The above records from Zambia are from domestic fowl in the Southern Province, and one specimen of *Argas* sp. from *Bubo africanus*. However, avian collections are few, especially from nests of colonial birds. Another subgenus of *Argas*, *A. (Carios) vespertilionis*, from bats is here recorded for the first time in Zambia (det. Hoogstraal & Kaiser, personal comm.). The genus *Ornithodoros* is poorly known in Zambia and needs more intensive collecting from burrows and caves. *Otobius megnini* is an introduced species originating from North America via South Africa, known in Zambia only from domestic hosts. (MacLeod, Colbo & Pedersen, 1970)—the only recorded wild host in Africa is a tortoise (Theiler, 1962).

The genus *Ixodes* in Zambia primarily parasitizes small mammals and birds, though notable exceptions occur. As noted above, one additional collected species

is still to be determined, and from literature (notably Arthur, 1965) others would be expected to occur here with collections from smaller wild hosts; e.g. Ansell in one collecting trip recovered three species not previously recorded. Thus the genus is not well known in Zambia. In the other genera of Ixodidae, excluding *Rhipicephalus*, probably most species present have been recorded, though immature stages and their hosts are little known.

The genus *Rhipicephalus* contains over a third of the tick species presently known in Zambia. *R. capensis* is a doubtful record (Theiler, 1962) and may have been *R. compositus*, which it closely resembles. *R. pravus (sensu stricto)* may not occur. The species had been synonymized with *R. neavei* and *R. punctatus* (Walker, 1956), but the three species are now regarded as distinct, (Yeoman & Walker, 1967). It has not so far been collected in the present investigation. *R. neavei* will become a synonym of *R. kochi* Dönitz (Matthysse & Colbo, in press).

Additional *Rhipicephalus* species are expected in view of records in surrounding countries, (Theiler, 1962; Elbl & Anastos, 1966c; Yeoman & Walker, 1967). The immature stages of many of the *Rhipicephalus* are poorly known, or unknown, and likely to involve many wild hosts, especially among the small mammals. An example was the finding of large *Rhipicephalus* sp. nymphs resembling *R. appendiculatus* collected from Hartebeest by P. D. H. Ansell during 1969, and also from Grysbok, both near Ngoma in the Kafue National Park. These may be nymphs of *R. supertritus* or *R. sculptus* which are undescribed. Nymphs from *Petrodromus tetradactylus* reported by Ansell & Ansell (1969a) and MacLeod (1970) as probably *R. tricuspis* are now known to be *R. punctatus* or *R. neavei*.

Therefore the following may be regarded at best as an incomplete list of wild hosts of the tick fauna, and of the tick parasites of wild hosts. Much extensive and careful collecting throughout the year is still required.

The following tick species have not been recorded from wild hosts in Zambia: *Argas walkerae*, *Otobius megnini*, *Amblyomma hebraeum* and *Boophilus microplus*. *Argas walkerae* is known in Zambia from domestic chickens. *O. megnini*, *A. hebraeum* and *B. microplus* are all introduced species, known in Zambia only from domestic stock. *A. hebraeum* is rare, and may not be able to establish a viable population; the other two are well established, and may prove to infest wild hosts.

H. aciculifer, *R. capensis* and *R. oculatus* are old records for Zambia and the hosts from which they were collected were not given, though they infest wild animals elsewhere (Theiler, 1962).

Other species, namely *A. variegatum*, *R. appendiculatus* and *B. decoloratus* tend to occur in much higher frequency and numbers on domestic stock, resulting from high concentration of a suitable host in the environmental range of the parasite, though occasionally they are in large numbers on game animals. Moderate to high levels of infestation on both domestic and wild animals are found with *I. cavipalpus*, *H. leachi*, *H. marginatum rufipes*, *H. truncatum*, *R. compositus*, *R. eversti*, *R. neavei*, *R. punctatus*, *R. sanguineus*, *R. simus* and *R. tricuspis*. The remaining species are primarily, or only, known in Zambia from wild hosts, though many are represented by so few records that no conclusions on hosts can be drawn at this time.

Some of the names in the lists have had to be taken from the literature or records, without specimens having been seen by me. Of my specimens certain nymphs were allowed to moult in order to determine the identity, but the identification of others had to be left at generic or species group level. Where known, the stage is given by symbols A,N,L, for adults, nymphs and larvae respectively.

SYSTEMATIC HOST LIST

Class REPTILIA

- Varanus sp., Leguaan: *Aponomma exornatum* A,N.
 Tortoise (sp. not recorded): *Amblyomma marmoratum* A; *A. nuttalli* A,N;
Hyalomma truncatum A; *Rhipicephalus appendiculatus* A.
 Python sebae (Gmelin), Python: *Aponomma latum* A; *A. transversale* A.
 Pseudaspis cana (Linnaeus), Mole Snake: *Aponomma latum* A.
 "Red and Brown Snake" (sp. not recorded): *Aponomma latum* A,N,L.
 Mehelya sp., File Snake: *Aponomma latum* A.
 Causus rhombeatus (Lichtenstein), Night Adder: *Aponomma latum* A.
 Bitis arietans (Merrem), Puff Adder: *Amblyomma sparsum* A; *Aponomma latum* A.
 Naja haje (Linnaeus), Egyptian Cobra: *Aponomma latum* A.
 Naja nigricollis Reinhardt, Black-necked Spitting Cobra: *Aponomma latum* A.

Class AVES

- Numida meleagris (Linnaeus), Helmeted Guineafowl: *Amblyomma variegatum* N,L.
 Burhinus capensis (Lichtenstein), Spotted Dikkop: *Hyalomma* sp. N.
 Centropus senegalensis (Linnaeus), Senegal Coucal: *Haemaphysalis leachi* gp. N,L.
 Bubo africanus (Temminck), Spotted Eagle Owl: *Argas* sp. N; *Hyalomma* sp. N,L.
 Ciccaba woodfordii (A. Smith), Wood Owl: *Amblyomma variegatum* N; *Hyalomma truncatum* N. (one parasitized by Hymenoptera); *Hyalomma* sp. L.
 Mirafra africana A. Smith, Rufous-naped Lark: *Haemaphysalis hoodi* A.
 Cossypha heuglini Hartlaub, Heuglin's Robin: *Ixodes* sp. N.
 Swallow (sp. not recorded): *Hyalomma* sp. N.
 Tchagra sp., Bush Shrike: *Ixodes euplecti* A.

Class MAMMALIA

- Elephantulus brachyrhynchus (A. Smith), Short-snouted Elephant Shrew: *Haemaphysalis leachi* gp. L; *Rhipicephalus pravus* gp. N; *R. punctatus* N.
 Petrodromus tetradactylus Peters, Four-toed Elephant Shrew: *Ixodes nchisiensis* A; *Rhipicephalus pravus* gp. N; *R. punctatus* N.
 Rhynchocyon cirnei Peters, Checkered Elephant Shrew: *Ixodes* sp. A.
 Crocidura bicolor Bocage, Pygmy Shrew: *Ixodes* sp. N.
 Crocidura hirta Peters: *Haemaphysalis leachi* gp. N,L; *H. spinulosa* N; *Ixodes rhabdomysae* N; *Ixodes* spp. N,L; *Rhipicephalus sanguineus* gp. N.
 Crocidura luna Dollman: *Haemaphysalis leachi* gp. N; *Rhipicephalus sanguineus* gp. N; *R. simus* gp. N.
 Crocidura occidentalis Pucheran, Giant Shrew: *Ixodes auriculaelongae* A.
 Bat (sp. not recorded): *Hyalomma* sp. N.

- Rousettus aegyptiacus E. Geoffroy, Egyptian Fruit Bat: *Ornithodoros faini* A,N.
 Eptesicus capensis (A. Smith), Cape Serotine Bat: *Argas vesperilionis* L.
 Miniopterus schreibersi (Kuhl): *Hyalomma* sp. N; *Ixodes* sp. N.
 Papio sp., Baboon: *Ixodes cavipalpus*.
 Manis temmincki Smuts, Pangolin: *Rhipicephalus appendiculatus* N; *R. simus* A.
 Canis adustus Sundevall, Side-striped Jackal: *Amblyomma variegatum* A,L; *Haemaphysalis leachi* A; *H. spinulosa* A; *Rhipicephalus appendiculatus* N; *R. evertsi* N; *R. sanguineus* A; *R. simus* A; *R. sulcatus* A.
 Lyaon pictus Temminck, Wild Dog: *R. simus* A.
 Viverra civetta Schreber, Civet: *Amblyomma* sp. N; *Haemaphysalis leachi* A; *H. spinulosa* A; *Rhipicephalus simus* A.
 Genetta sp., Genet: *Amblyomma* sp. L; *Haemaphysalis spinulosa* A; *Rhipicephalus appendiculatus* A; *R. sanguineus* A.
 Mongoose (sp. not recorded): *Haemaphysalis spinulosa* A.
 Herpestes sanguineus Rueppell, Slender Mongoose: *Haemaphysalis spinulosa* A.
 Helogale parvula (Sundevall), Dwarf Mongoose: *Haemaphysalis leachi* A.
 Mungos mungo (Gmelin), Banded Mongoose: *Rhipicephalus simus* A,N.
 Ichneumia albicauda (G. Cuvier), White-tailed Mongoose: *Rhipicephalus sanguineus* A.
 Felis lybica Forster, African Wild Cat: *Haemaphysalis* sp. N; *H. spinulosa* A; *Rhipicephalus sanguineus* A.
 Felis serval Schreber, Serval: *Haemaphysalis leachi* A; *Rhipicentor bicornis* A; *Rhipicephalus evertsi* N.
 Panthera pardus (Linnaeus), Leopard: *Amblyomma* sp. N; *Haemaphysalis leachi* A; *Ixodes cavipalpus* A; *Rhipicentor bicornis* A; *Rhipicephalus compositus* A; *R. neavei* A; *R. sanguineus* A; *R. simus* A; *R. sulcatus* A.
 Panthera leo (Linnaeus), Lion: *Haemaphysalis leachi* A; *H. spinulosa* A; *Hyalomma marginatum rufipes* A; *H. truncatum* A; *Rhipicentor bicornis* A; *Rhipicephalus appendiculatus* A; *R. carnivorialis* A; *R. compositus* A; *R. masseyi* A; *R. pravus* gp. A; *R. sanguineus* A; *R. simus* A; *R. sulcatus* A; *R. tricuspis* A.
 Orycteropus afer (Pallas), Antbear: *Rhipicephalus simus* A.
 Loxodonta africana (Blumenbach), Elephant: *Amblyomma tholloni* A; *A. variegatum* gp. N; *Hyalomma truncatum* A.
 Dendrohyrax brucei (Gray), Yellow-spotted Dassie: *Haemaphysalis orientalis* A; *Ixodes lewisi* A; *Ixodes* sp. N.
 Dicerus bicornis (Linnaeus), Black Rhinoceros: *Amblyomma rhinocerotis* A; *A. sparsum* A.
 Equus burchelli (Gray), Burchell Zebra: *Amblyomma variegatum* A; *Amblyomma* sp. N; *Boophilus decoloratus* A; *Hyalomma marginatum rufipes* A; *H. truncatum* A; *Rhipicephalus appendiculatus* A; *R. appendiculatus* gp. N; *R. compositus* A; *R. evertsi* A; *R. masseyi* A; *R. neavei* A; *R. sanguineus* A; *R. sculptus* A; *R. simus* gp. A; *R. supertritius* A; *R. tricuspis* A.
 Potamochoerus porcus (Linnaeus), Bush Pig: *Amblyomma* sp. N; *A. pomposum* A; *Hyalomma truncatum* A; *Rhipicephalus compositus* A; *R. longus* A; *R.*

- masseyi* A; *R. neavei* A; *R. reichenowi* A; *R. sanguineus* A; *R. simus* A; *R. tricuspis* A.
- Phacochoerus aethiopicus (Pallas), Wart Hog: *Ornithodoros moubata*; *Amblyomma pomposum* A; *A. variegatum* A; *Amblyomma* sp. N; *Hyalomma truncatum* A; *Rhipicephalus appendiculatus* A; *R. compositus* A; *R. longus* A; *R. masseyi* A; *R. neavei* A; *R. punctatus* A; *R. reichenowi* A; *R. sanguineus* A; *R. simus* A; *R. tricuspis* A.
- Hippopotamus amphibius Linnaeus, Hippopotamus: *Amblyomma rhinocerotis* A; *A. sparsum* A; *A. variegatum* A,N; *Amblyomma* sp. N,L; *Hyalomma truncatum* A; *Rhipicephalus sanguineus*.
- Giraffa camelopardalis (Linnaeus), Giraffe: *Hyalomma truncatum* A.
- Duiker (sp. not recorded, though most likely *Sylvicapra grimmia*): *Ixodes cavi- palpus* A; *Rhipicephalus appendiculatus* A; *R. evertsi* A; *R. neavei* A; *R. punctatus* A; *R. tricuspis* A.
- Sylvicapra grimmia* (Linnaeus), Common Duiker: *Ixodes cavi- palpus*; *Rhipicephalus appendiculatus* gp. N; *R. punctatus* A; *R. tricuspis* A.
- Cephalophus monticola (Thunberg), Blue Duiker: *Ixodes lewisi* A; *Ixodes* sp. L.
- Raphicerus sharpei Thomas, Sharpe's Grysbok: *Rhipicephalus* sp. N; *R. evertsi* A,N; *R. punctatus* A.
- Ourebia ourebi (Zimmermann), Oribi: *Rhipicephalus appendiculatus* A,N; *R. evertsi* N,L.
- Redunca arundinum (Boddaert), Reedbuck: *Ixodes cavi- palpus* A; *Rhipicephalus evertsi* A,N; *R. tricuspis* A.
- Kobus ellipsiprymnus (Ogilby) (sensu lato), Waterbuck: *Amblyomma sparsum* A; *Amblyomma* sp. N; *Haemaphysalis leachi* A; *H. spinulosa* A; *Rhipicephalus neavei* A; *R. sculptus* A; *R. simus* A; *R. sulcatus* A.
- Kobus leche Gray, Lechwe: *Amblyomma variegatum* gp. N; *Rhipicephalus evertsi* A,N,L; *R. sanguineus* A.
- Kobus vardonii (Livingstone), Puku: *Ixodes cavi- palpus* A.
- Aepyceros melampus (Lichtenstein), Impala: *Amblyomma variegatum* A,N; *Amblyomma* sp. N,L; *Boophilus decoloratus* A,N; *Ixodes cavi- palpus* A; *Rhipicephalus appendiculatus* A; *R. appendiculatus* gp. N; *R. evertsi* A; *R. neavei* A; *R. punctatus* A.
- Hippotragus equinus (Desmarest), Roan Antelope: *Amblyomma pomposum* A; *Boophilus decoloratus* A; *Hyalomma truncatum* A; *Ixodes cavi- palpus*; *Rhipicephalus compositus* A; *R. neavei* A; *R. punctatus* A; *R. simus* A; *R. tricuspis* A.
- Hippotragus niger (Harris), Sable Antelope: *Amblyomma pomposum* A; *A. variegatum* A; *Boophilus decoloratus* A; *Hyalomma truncatum* A; *Rhipicephalus appendiculatus* A; *R. evertsi* A; *R. longus* A; *R. neavei* A; *R. punctatus* A; *R. sculptus* A; *R. simus* A; *R. tricuspis* A.
- Damaliscus lunatus Burchell, Tsessebe: *Hyalomma truncatum*.
- Alcelaphus lichtensteini (Peters), Lichtenstein's Hartebeest: *Amblyomma pomposum* A; *Amblyomma* sp. N; *Hyalomma truncatum* A; *Rhipicephalus appendiculatus* gp. N,L; *R. evertsi* A,N; *R. punctatus* A; *R. sulcatus* A; *R. tricuspis* A.

- Connochaetes taurinus (Burchell), Wildebeest: *Amblyomma* sp. N; *Hyalomma truncatum* A; *Rhipicephalus* sp. N; *R. evertsi* A; *R. tricuspis* A.
- Tragelaphus scriptus (Pallas), Bushbuck: *Hyalomma truncatum*; *Ixodes cavi- palpus* A; *Rhipicephalus appendiculatus* A; *R. masseyi* A; *R. neavei* A; *R. punctatus* A; *R. sanguineus*; *R. tricuspis*, A.
- Tragelaphus strepsiceros (Pallas), Kudu: *Amblyomma pomposum* A; *A. variegatum* A; *Boophilus decoloratus* A; *Hyalomma marginatum rufipes* A; *H. truncatum* A; *Rhipicephalus appendiculatus* A; *R. appendiculatus* gp. N; *R. evertsi* A; *R. neavei* A; *R. punctatus* A; *R. simus* A; *R. supertritus* A; *R. tricuspis* A.
- Taurotragus oryx (Pallas), Eland: *Amblyomma pomposum* A; *A. variegatum* A,N; *Amblyomma* sp. N; *Hyalomma truncatum* A; *Boophilus decoloratus* A,N; *Rhipicephalus appendiculatus* A,N; *R. evertsi* A,N; *R. neavei* A; *R. punctatus* A; *R. simus* A; *R. supertritus* A.
- Syncerus caffer (Sparrman), Buffalo: *Amblyomma lepidum* A; *A. pomposum* A; *A. sparsum* A; *A. variegatum* A; *A. variegatum* gp. N; *Amblyomma* sp. N, L; *Hyalomma marginatum rufipes* A; *H. truncatum* A; *Rhipicephalus appendiculatus* A; *R. compositus* A; *R. evertsi* A; *R. longus* A; *R. maculatus* A; *R. neavei* A; *R. punctatus* A; *R. sanguineus* A; *R. sculptus* A; *R. simus* A; *R. tricuspis* A; *Rhipicephalus* sp. L.
- Lepus whytei Thomas, Hare: *Amblyomma* sp. N,L; *Hyalomma marginatum rufipes* N,L; *H. truncatum* A; *Hyalomma* spp. N,L; *Boophilus decoloratus* A; *Rhipicephalus appendiculatus* N,L; *R. evertsi* N,L; *R. neavei* A; *R. punctatus* A; *R. sanguineus* A,N; *R. sanguineus* gp. N; *R. simus* N; *R. sulcatus* A; *R. tricuspis* A.
- Hystrix africaeustralis Peters, Porcupine: *Rhipicephalus simus* A; *R. sanguineus* A.
- Thryonomys sp. Cane Rat: *Rhipicephalus simpsoni* A,N.
- Paraxerus cepapi (A. Smith), Bush Squirrel: *Rhipicephalus* sp. N.
- Paraxerus lucifer Thomas, Nyasa Black & Red Squirrel: *Ixodes* sp. N.
- Pedetes capensis (Forster), Spring Hare: *Rhipicephalus tricuspis* A.
- Graphiurus murinus (Desmarest), Dormouse: *Rhipicephalus* sp. N.
- Grammomys dolichurus (Smuts), Forest Mouse: *Haemaphysalis leachi* gp. N,L; *H. spinulosa* N; *Ixodes* sp. N;
- Aethomys chrysophilus (de Winton), *Haemaphysalis leachi* N; *H. leachi* gp. N,L; *H. spinulosa* A,N; *R. sanguineus* gp. N,L; *R. simus* gp. N; *R.sp.* N,L; *Ixodes rhabdomysae* N.
- Aethomys walambae Wroughton: *Haemaphysalis leachi* gp. N,L; *Ixodes rhabdo- mysae* A; *Rhipicephalus tricuspis* N.
- Thallomys paedulcus (Sundevall), Tree Rat: *Haemaphysalis spinulosa* N; *Rhipi- cephalus* sp. N.
- Praomys delectorum Thomas: *Ixodes alluaudi* A; *I. auriculaelongae* A.
- Praomys natalensis A. Smith, Multimammate Rat: *Haemaphysalis leachi* A,N; *H. leachi* gp. N,L; *H. spinulosa* N; *Ixodes auriculaelongae* A; *I. rhabdomysae* A,N; *I. thomasa* A; *Ixodes* spp. N,L; *Rhipicephalus simus* gp. N,L; *R. sanguineus* gp. N,L; *R. tricuspis* N.

- Pracomys* sp.: *Rhipicephalus sanguineus* gp. N.
Lophuromys flavopunctatus Thomas, Brush-furred Rat: *Haemaphysalis leachi* gp. N.
Mus triton Thomas, Mouse: *Haemaphysalis leachi* gp. L; *Ixodes alluaudi* L; *I. dawesi* N; *Ixodes* spp. N; *Rhipicephalus simus* gp. L; *R. tricuspis* N.
Zelotomys hildegardae Thomas: *Ixodes rhabdomysae* N; *I*.sp. N; *Rhipicephalus sanguineus* gp. N,L.
Pelomys fallax (Peters), Creek Rat: *Haemaphysalis leachi* gp. N,L; *H. spinulosa* N; *Ixodes rhabdomysae* A; *Rhipicephalus sanguineus* gp. N,L; *R. simus* gp. L.
Lemniscomys griselda (Thomas), Single-striped Grass Rat: *Haemaphysalis leachi* gp. L; *Rhipicephalus sanguineus* gp. N,L; *R. simus* gp. N.
Acomys spinosissimus Peters, Spiny Mouse: *Haemaphysalis leachi* gp. N; *Ixodes* sp. N,L.
Saccostomus campestris Peters, Pouched Mouse: *Haemaphysalis leachi* N; *H. leachi* gp. N,L; *Ixodes rhabdomysae* A; *Rhipicephalus appendiculatus* L; *Rhipicephalus* sp. L.
Cricetomys gambianus Waterhouse, Giant Rat: *Ixodes lewisi* A.
Steatomys pratensis Peters, Fat Mouse: *Rhipicephalus tricuspis* N; *R. sanguineus* gp. N,L.
Tatera leucogaster Peters, Gerbil: *Haemaphysalis leachi* gp. N; *Rhipicephalus simus* N,L; *R. sanguineus* gp. N,L.
Tatera valida (Bocage), Gerbil: *Haemaphysalis leachi* gp. N; *H. spinulosa* A; *Rhipicephalus simus* L.

ACKNOWLEDGEMENTS

I am grateful to Dr. J. MacLeod for making available the Tick Unit records and specimens for my examination, and for his encouragement and suggestions. Mr. W. F. H. Ansell has also supplied many important collections and made useful suggestions and corrections. Dr. C. M. Clifford, Dr. H. Hoogstraal and Dr. M. N. Kaiser are thanked for their assistance in the identification of the *Ixodes*, *Haemaphysalis* and Argasidae respectively. A special acknowledgement must be made to the Department of Wildlife, Fisheries and National Parks and the Department of Veterinary and Tsetse Control Services for their cooperation in carrying out this survey.

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