

PARC NATIONAL DE LA GARAMBA. — MISSION H. DE SAEGER

en collaboration avec

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G. TROUPIN et J. VERSCHUREN (1949-1952).**

Fascicule 44 (1)

TICKS (1)

BY

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INTRODUCTION

The ticks included in this report were sent by Dr. V. VAN STRAELEN to the Institute of Acarology, University of Maryland, for study. This extensive collection was made from 1949-1952 by the mission of H. DE SAEGER to the National Park of Garamba which is located in the northeastern portion of the Congo near the border of the Sudan.

In all, 24 species, comprising 7 genera, are recorded from Garamba Park (Table 1). All these species but one, *Argas arboreus*, have been recorded previously from the Congo.

Many of the collections were from rodent nests and several fully engorged nymphs were recovered. In certain instances it was possible to dissect away the nymphal skins and determine the almost fully developed adults inside. In such instances the number and sex of the adults are placed in parentheses directly behind the listing of the nymphs. This method permitted us to describe the nymphs of *Rhipicephalus pseudolongus*, *R. senegalensis* and *R. simpsoni*. The nymph of *Dermacentor rhinocerinus* is also described, but the identification of nymphs of this species is based on association with the adults and not on the opening of nymphal skins.

(1) The portion of this project undertaken at the University of Maryland was supported by the Army Medical Research and Development Command, Washington, D. C., under Contract No. DA-49-007-MD-981.

(2) U. S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Institute of Allergy and Infectious Diseases, Rocky Mountain Laboratory, Hamilton, Montana.

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This report gives information on the distribution, hosts, and taxonomic status of each species. All of the localities are either in the park itself or in adjacent areas. For further information on the localities the reader is referred to Vol. 1 : Introduction (1954) and Vol. 5 : Entomology (1956) of the Exploration of the National Park of Garamba by H. DE SAEGER. The host names used are exactly as they appeared on a list that was sent to us by H. DE SAEGER, except for the addition of authors' names in the few instances where these were omitted.

The following abbreviations are used to designate the collectors : GD, G. DEMOULIN; HDS, H. DE SAEGER; PSCH, P. SCHOEMAKER; JV, J. VERSCHUREN.

TABLE I.

List of ticks of Garamba Park.

- Argas arboreus* KAISER, HOOGSTRAAL and KOHLS, 1964.
A. vespertilionis (LATREILLE, 1802).
Amblyomma cohaerens DÖNITZ, 1909.
A. nuttalli DÖNITZ, 1909.
A. rhinocerotis (DE GEER, 1778).
A. variegatum (FABRICIUS, 1794).
Aponomma exornatum (KOCH, 1844).
Ap. latum (KOCH, 1844).
Dermacentor rhinocerinus (DENNY, 1843).
Haemaphysalis hoodi WARBURTON and NUTTALL, 1909.
H. leachii (AUDOUIN, 1827).
H. muhsami SANTOS DIAS, 1954.
H. parmata NEUMANN, 1905.
Ixodes browni ARTHUR, 1956.
I. paradoxus KOHLS and CLIFFORD, 1961.
I. spinae ARTHUR, 1958.
Rhipicephalus pravus DÖNITZ, 1910.
R. pseudolongus SANTOS DIAS, 1953.
R. sanguineus (LATREILLE, 1806).
R. senegalensis KOCH, 1844.
R. simpsoni NUTTALL, 1910.
R. simus KOCH, 1844.
R. supertritus NEUMANN, 1907.
R. tricuspis DÖNITZ, 1906.

Order ACARINA
Suborder IXODOIDEA
Family ARGASIDAE

Genus **ARGAS** LATREILLE, 1795.

ARGAS ARBOREUS KAISER, HOOGSTRAAL and KOHLS.

Argas arboreus KAISER, HOOGSTRAAL and KOHLS, 1964, Ann. Ent. Soc. Amer.,
57, p. 60.

Hosts and Distribution :

HOSTS UNKNOWN.

Nos. 1054, II/e, 6.I.1951, 24 ♂, 15 ♀, 2 N, under the bark of a tree, coll. JV.

Nos. 1959, II/gd/4, 23.VI.1951, 14 ♂, 11 ♀, 1 N, on vegetation, coll. HDS.

A. arboreus was described from rookeries of the Cattle Egret (*Bubulcus ibis ibis*) near Cairo, Egypt.

The Congo specimens were originally determined as *Argas persicus*. After reading the paper by KAISER et al. 3 ♂ and 3 ♀ from each lot that were still in the Rocky Mountain Laboratory collection were re-examined. They possess features that are more like *A. arboreus* than *A. persicus*. Therefore, we have tentatively identified the Congo material as this species.

ARGAS VESPERTILIONIS (LATREILLE).

Caris vespertilionis LATREILLE, 1802, Hist. N. crust. Ins., 3, p. 67.

Hosts and Distribution :

HOST UNKNOWN.

Nos. 2601, II/je/8, 15.X.1951, 1 ♀, on vegetation, coll. HDS.

This species has been reported on bats from several different parts of Africa. HOOGSTRAAL (1956) indicates that this species will eventually be found in many more areas of Africa.

Family IXODIDAE

Genus **AMBLYOMMA** KOCH, 1844.**Amblyomma cohaerens** DÖNITZ.*Amblyomma cohaerens* DÖNITZ, 1909, Sitzungsber, Ges. Naturf. Fr. Berlin, 8, p. 465.

Hosts and Distribution:

MAMMALS.

Nos. 2163, II/gd/4, 1.VIII.1951, 1 N, 1 L ?, *Genetta tigrina aequatorialis* (No. 3662) HEUGLIN, coll. JV; 2444, II/gd/4, 3.IX.1951, 2 N, 1 L ?, murid (No. Z. 3690), coll. HDS; 2582, II/hc/4, 29.IX.1951, 26 ♂, 1 ♀, 2 N, on buffalo, coll. HDS; 2649, II/hd/4, 22.X.1951, 3 N ?, mammal (No. Z. 3542), coll. HDS; 2671, II/gd/8, 27.X.1951, 1 N, 1 L ?, *Thryonomys swinderianus* (TEMMINCK) (No. Z. 3995), coll. HDS; 2971, II/fd/17, 3.I.1952, 10 ♂, 3 ♀, 1 N, on buffalo, coll. HDS; 3991, II/gd/4, 19.VIII.1952, 3 N, 1 L, *Tragelaphus scriptus diana* MATSCHIE, coll. HDS.

BIRD.

Nos. 267, I/c/2, 17.II.1950, 1 N, Bird (No. 670), coll. GD.

HOST UNKNOWN.

Nos. 995, II/e, 18.XII.1950, 1 ♂, on vegetation, coll. HDS; 1048, II/e, 5.I.1951, 1 N, on vegetation, coll. JV; 1439, II/db/4, 23.III.1951, 1 ♀, on ground, coll. HDS; 1458, II/fc/5, 27.III.1951, 2 N, on vegetation, coll. HDS; 1576, II/fb/4, 18.IV.1951, 1 N, on vegetation, coll. JV; 1809, II/id/8, 22.V.1951, 1 N, on vegetation, coll. JV; 1842, II/hd/8, 30.V.1951, 1 ♀, on vegetation, coll. HDS; 1899, II/fd/18, 11.VI.1951, 1 ♂, on vegetation, coll. HDS; 1950, II/fd/17, 18.VI.1951, 1 N, on vegetation, coll. HDS; 2072, II/fd/8, 13.VII.1951, 1 ♂, on vegetation, coll. HDS; 2380, II/fd/17, 4.IX.1951, 1 N, on vegetation, coll. HDS; 2452, II/je/4, 20.IX.1951, 3 N, 34 L, on vegetation, coll. HDS; 2615, PpK/52/g, 16.X.1951, 1 ♀, on vegetation, coll. HDS; 2680, II/PpK/55, 26.X.1951, 1 N, on vegetation, coll. HDS; 2761, II/fd/17, 14.XI.1951, 1 ♀, on vegetation, coll. HDS; 2806, II/fc/18, 24.XI.1951, on vegetation, coll. HDS; 2991, II/fd/17, 3.I.1952, 1 N, on vegetation, coll. HDS; 3547, II/gd/4, 27.V.1952, 1 ♂, on vegetation, coll. HDS; 3769, PpK/12, 14.VII.1952, 18 ♂, 12 ♀, 3 N, 2 L ?, coll. HDS.

A. cohaerens is a buffalo parasite that occurs in East and Central Africa. The above records are from near the northern limit of its range which is in Equatoria Province of the Sudan. Although the buffalo is the chief host for this tick it has been reported from cattle and more rarely from other domestic and wild animals.

The identification of the nymphs is based on careful comparison of these specimens with laboratory reared material kindly furnished by Miss JANE WALKER.

Amblyomma nuttalli DÖNITZ.

Amblyomma nuttalli DÖNITZ, 1909, Sitzungsber. Ges. Naturf. Fr. Berlin, 8, p. 469.

Hosts and Distribution :

MAMMALS.

Nos. 1367, II/ed/17, 1.III.1951, 1 N?, Chiroptera, *Nycteris hispida* (SCHREBER) (No. Z. 2938), coll. JV; 2162, II/gd/4, 1.VIII.1951, 1 N?, *Herpestes (Herpestes) ichneumon* (LINNÉ) (No. 3683), coll. JV; 2443, II/gd/4, 17.IX.1951, 1 N?, mammal (No. Z. 3696), *Thryonomys swinderianus* (TEMMINCK), coll. HDS; 2649, II/hd/4, 22.X.1951, 1 N?, mammal (No. Z. 3542), coll. HDS.

REPTILES.

Nos. 374, région Bagbele, 15.III.1950, 3 ♂, *Kinixys belliana mertseni* (LAURENT) (No. 834), coll. GD; 774, région Bagbele, 15.VI.1950, 2 ♂, *Kinixys belliana mertseni* (LAURENT) (No. 1634), coll. JM; 2868, II/gd/4, 6.XI.1951, 7 N, reptile (No. Z. 3997), coll. HDS; 3045, II/ed/4, 18.III.1951, 1 ♂, 1 ♀, on *Bitis lachesis lachesis* (LAURENT), coll. HDS.

A. nuttalli is widely distributed in Africa south of the Sahara desert. Land tortoises are the chief hosts given for this species by most authors. More extensive information on this species is furnished by HOOGSTRAAL (1956) and THEILER and SALISBURY (1959).

The identification of the nymphs is based on comparison with laboratory reared material kindly furnished by Miss JANE WALKER.

Amblyomma rhinocerotis (DE GEER).

Acarus rhinocerotis DE GEER, 1778, Mem. Hist. Ins., 7, p. 160.

Hosts and Distribution :

HOST UNKNOWN.

Nos. 42-48, Gangala-na-Bodio, X.1949, 1 ♀, coll. GD; 1273, Gangala-na-Bodio, X.1950, 1 ♀, coll. HDS; 1950, II/fd/17, 18.VI.1951, 1 ♀, coll. HDS; 2599, II/je/8, 15.X.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 2615, PpK/52/g, 16.X.1951, 2 ♂, 2 ♀, on vegetation, coll. HDS; 2901, II/gd/8, 13.XII.1951, 1 ♀, on vegetation, coll. HDS.

This species parasitizes the rhinoceros wherever this host is found and it occurs occasionally on other wild and domestic animals.

Amblyomma variegatum (FABRICIUS).

Acarus variegatus FABRICIUS, 1794, Ent. syst., Suppl. p. 572.

Hosts and Distribution:

BIRD.

Nos. 1819, II/fe/6, 23.V.1951, 1 ♂, 1 ♀, *Dendrocygna viduata* (LINNÉ), (No. Z. 3422), coll. JV; 2437, PpK/98, 18.IX.1951, 2 N, bird (No. Z. 3700), coll. HDS; 2853, Ndelele/K/115, 3.XII.1951, 3 N, 36 L ?, *Pseudogyps africanus* (SALVADORI), (No. Z. 3977), coll. HDS; 3636, PFSK/22/3, 10.VI.1952, 1 N, bird (No. Z. 4540), coll. HDS.

MAMMALS.

Nos. 992, II/f, 15.XII.1950, 1 ♀, white rhinoceros, coll. HDS; 1368, II/ge/9, 12.III.1951, 1 N, *Cercopithecus aethiops centralis* NEUMANN (No. Z. 2849), coll. HDS; 1603, II/gc/4, 15.IV.1951, 6 N, *Thryonomys* (No. Z. 1369), coll. JV; 2163, II/gd/4, 1.VIII.1951, 1 N, *Genetta tigrina aequatorialis* HEUGLIN (No. 3662), coll. JV; 2254, II/gd/4, 17.VIII.1951, 1 ♂, *Felis (Leptailurus) serval* SCHREBER (No. Z. 3849), coll. JV; 2443, II/gd/4, 17.IX.1951, 2 N, mammal (No. Z. 3696), *Thryonomys swinderianus* (TEMMINCK), coll. HDS; 2582, II/hc/4, 29.IX.1951, 1 ♂, 2 ♀, buffalo, coll. HDS; 2980, PFK/28/2, 8.I.1952, 7 N, 250+L, mammal (No. Z. 4225), *Ourebia ourebi goslingi* THOMAS & WROUGHTON, coll. HDS; 2981, PFK/8/2, 11.I.1952, 28 N, mammal (No. Z. 4227), coll. HDS; 3043, PFSK/7/2, 25.I.1952, 100+L ?, mammal (No. Z. 4224), coll. HDS; 3044, PFSK/7/2, 25.I.1952, 59 N, *Ourebia ourebi goslingi* THOMAS and WROUGHTON (No. Z. 4224), coll. HDS; 3046, PFSK/11/2, 25.I.1952, 4 N, *Phacochoerus aethiopicus* (PALLAS) (No. Z. 4223), coll. HDS; 3047, PFSK/11/2, 25.I.1952, 23 N, *Phacochoerus aethiopicus* (PALLAS) (No. Z. 4223), coll. HDS; 3390, Ndelele, 28.III.1952, 54 N, *Alcelaphus*, coll. HDS; 3509, PFNK/15, 23.V.1952, 1 ♂, 4 N, *Alcelaphus lelwel lelwel* (HEUGLIN), coll. HDS; 4073, Tori (Sudan), 22.IX.1952, 20 ♂, 5 ♀, buffalo, coll. HDS.

REPTILE.

Nos. 1150, Nakobo, 26.I.1951, 2 N, *Varanus (Polydaedalus) niloticus niloticus* (LINNÉ), (No. Z. 2701), coll. JV; 1744, II/gd/4, 17.V.1951, 1 N, reptile (No. Z. 3394), coll. JV; 3045, II/ed/4, 18.III.1951, 9 N, *Bitis lachesis lachesis* (LAURENT), coll. HDS.

HOSTS UNKNOWN.

Nos. 1443, II/hd/4, 23.III.1951, 1 N, on vegetation, coll. HDS; 2860, PpK/90-115, 3.XII.1951, 2 N, 150 + L, on vegetation, coll. HDS; 3234, II/eb/9, 13.III.1952, 1 N, on vegetation, coll. HDS; 3769, PpK/12, 14.VII.1952, 21 ♂, 2 ♀, coll. HDS.

A. variegatum is widely distributed throughout most of the Ethiopian faunal region north of Angola and the southern portion of southern Rhodesia and parasitizes a wide range of domestic and wild hosts. HOOGSTRAAL (1956) gives an excellent summary of the information on this species.

Identification of the nymphs was accomplished by a comparison with laboratory reared material kindly furnished by Miss JANE WALKER.

Amblyomma sp.**Hosts and Distribution:****BIRDS.**

Nos. 1579, II/gd/4, 10.IV.1951, 1 N, *Lamprocolius* (No. Z. 2253), coll. HDS; 1655, II/hc/4, 2.V.1951, 3 N, on a bird (No. Z. 3251), coll. JV; 1740, II/db/9, 15.V.1951, 1 N, bird (No. Z. 3389/3), coll. JV; 2437, PpK/98, 18.IX.1951, 200+L, bird (No. Z. 3700), coll. HDS; 2462, II/gd/4, 22.IX.1951, 34 L, *Francolinus icterorhynchus icterorhynchus* (No. Z. 3722), coll. HDS; 2932, PpK/50, 18.XII.1951, 200+L, bird (No. Z. 4111/4), coll. HDS; 2933, II/gd/4, 12.XII.1951, 5 L, bird (No. Z. 4108), coll. HDS; 3724, Iso/III, 11.VII.1952, 1 N, bird (No. Z. 4547/7), coll. HDS.

MAMMALS.

Nos. 119, I/b/3, 11.I.1950, 200+L, mammal (No. V. 319), *Tragelaphus scriptus diana* MATSCHIE, coll. HDS; 1698, II/hc/4, 9.IV.1951, 178+L, murid (No. Z. 3361/7), coll. JV; 1714, II/ba/5, 10.V.1951, 81 L, shrew nest (No. Z. 3362/6), coll. JV; 2374, II/gd/4, 6.IX.1951, 2 N, *Felis (Leptailurus) serval* SCHREBER, coll. HDS; 2445, II/gd/4, 14.IX.1951, 2 L, mammal (No. Z. 3687), coll. HDS; 2583, II/hd/4, 10.X.1951, 2 N, *Tragelaphus scriptus diana* MATSCHIE (No. Z. 3714), coll. HDS.

HOSTS UNKNOWN.

Nos., 1 larva, no other data; 995, II/e, 18.XII.1950, 100+L, on vegetation, coll. HDS; 998, II/d, 21.XII.1950, 16 L, on vegetation, coll. JV; 1283, II/gc/8, 22.II.1951, 400+L, on vegetation, coll. HDS; 1842, II/hd/8, 30.V.1951, 200+L, on vegetation, coll. HDS; 1943, II/fd/14, 18.VI.1951, 1 L, on vegetation, coll. HDS; 2773, PpK/55, 19.XI.1951, 200+L, on vegetation, coll. HDS.

It is impossible to give more than generic identification to a few of the nymphs and most of the larvae due to the lack of a definitive study on the immature stages of the *Amblyomma* species that occur in Africa.

Genus **APONOMMA** NEUMANN, 1899.

Aponomma exornatum (KOCH).

Amblyomma exornatum KOCH, 1844, Arch. f. Naturgesch., 10, p. 231.

Hosts and Distribution:**REPTILES.**

Nos. 370, 9.III.1950, 52 ♂, on *Varanus (Polydaedalus) niloticus niloticus* (LINNÉ), (No. 762), coll. GD; 969, I/o/3, 15.XI.1950, 3 ♂, 2 ♀, on *Varanus* sp. (No. 3503), coll. JV; 1020, II/h, 28.XII.1950, 1 ♀, on *Varanus (Polydaedalus) niloticus niloticus* (L.), coll. JV;

1150, Nakobo, 26.I.1951, 19 ♂, 2 ♀, 7 N, on *Varanus (Polydaedalus) niloticus niloticus* (L.) (No. Z. 2701), coll. JV; 1182, Garamba between Kiliwa and Naworoko, 3.II.1951, 25 ♂, 6 ♀, 2 N, on *Varanus (Polydaedalus) niloticus niloticus* (L.), coll. JV; 1348, II/fb/16, 6.III.1951, 20 ♂, 4 ♀, 24 N, on *Varanus (Polydaedalus) niloticus niloticus* (L.) (No. Z. 2745), coll. JV; 2863, II/gd/4, 6.XI.1951, 15 ♂, on reptile (No. Z. 3997), coll. HDS; 3052, II/gd/4, 28.I.1952, 12 ♂, 2 N, on *Varanus (Polydaedalus) niloticus niloticus* (L.) (No. Z. 3891/4), coll. HDS; 3247, II/gd/18, 19.III.1952, 1 ♂, 4 ♀, on *Varanus niloticus* (L.), coll. JV.

HOSTS UNKNOWN.

Nos. 837, region Bagbele, 22.IX.1950, 8 ♂, 2 ♀, 1 N, coll. GD; 1136, II/d, at the source of the Nambirima, 24.I.1951, 1 ♂, on vegetation, coll. JV; 1142, II/d, 20.I.1951, 4 ♂, 4 ♀, on vegetation, coll. HDS.

This species is widely distributed throughout Africa wherever lizards of the genus *Varanus* occur. Other animals are also occasionally parasitized.

These specimens were identified following THEILER (1945) who considers *A. arcanum* to be a synonym of *A. exornatum*.

Dr. SANTOS DIAS identified samples of this material as *Aponomma arcanum* (KARSCH, 1879), following TENDEIRO (1955, 1958). If this opinion is ever accepted, the above statement regarding the distribution of this species will have to be revised.

Aponomma latum (KOCH).

Amblyomma latum KOCH, 1844, Arch. f. Naturgesch., 10, p. 231.

Hosts and Distribution:

REPTILES.

Nos. 375, I/b/1, 29.III.1950, 1 ♀, *Crotaphopeltis hotamboeia hotamboeia* (LAURENT) (No. 913), coll. GD; 2436, II/fd/17, 5.IX.1951, 1 ♂, 1 ♀, *Natriciteres olivacea olivacea* (PETERS) (No. Z. 3775), coll. HDS; 3045, II/ed/4, 18.III.1951, 1 ♀, *Bitis lachesis lachesis* (LAURENT).

HOST UNKNOWN.

Nos. 3626, PFNK 7/9, 28.VII.1952, 2 N, 15 L, coll. HDS.

A. latum occurs on snakes throughout most of the Ethiopian faunal region. According to THEILER (1945), this species has no predilection for any one group of snakes.

Genus **DERMACENTOR** KOCH, 1844.

Dermacentor rhinocerinus (DENNY).

Ixodes rhinocerinus DENNY, 1843, Ann. Mag. nat. Hist., 12, p. 313.

Hosts and Distribution:

MAMMALS.

Nos. 1010, II/e, 20.XII.1950, 1 N, abandoned nests of rodents, coll. JV; 1013, II/f, source Naworoko, 27.XII.1950, 12 N?, rodent nest, coll. JV; 1081, II/i/4, 15.I.1951, 5 N?, rodent nests, coll. JV; 1212, II/i, 26.I.1951, 2 ♀, rodent nest (No. Z. 2702), coll. JV; 1255, II/hc/4, 14.II.1951, 1 ♂, 3 N, rodent nest (No. Z. 1731), coll. JV; 1256, II/hc/4, 14.II.1951, 2 N (?), rodent nest, coll. JV; 1264, II/bb/4, 15.II.1951, 1 ♀, nest inhabited by macroscelid, coll. JV; 1349, Biadimbi, 22.I.1951, 2 ♂, 2 ♀, rodent nest (No. Z. 2684), coll. JV; 3088, II/gd/4, 29.I.1952, 1 ♂, 1 ♀, 10 N (?), abandoned rodent nests, coll. JV.

HOST UNKNOWN.

Nos., 6 ♂, 3 ♀, no other data; 563, I/b/3', 26.V.1950, 1 ♂, 3 ♀, on vegetation, coll. GD; 571, I/o/3, 1.VI.1950, 12 ♂, 6 ♀, on vegetation, coll. GD; 643, I/o/3, 27.VI.1950, 1 ♀, on vegetation, coll. GD; 705, I/a/1, 17.VII.1950, 1 ♂, on vegetation, coll. GD; 1328, II/fd/4, 3.III.1951, 1 ♂, on vegetation, coll. JV; 1412, II/gd/4, 17.III.1951, 1 ♂, on vegetation, coll. HDS; 1439, II/db/4, 23.III.1951, 3 ♂, on ground, coll. HDS; 1444, II/hd/4, 23.III.1951, 96 ♂, 89 ♀, on vegetation, coll. HDS; 1700, II/gd/8, 9.V.1951, 1 ♂, on vegetation, coll. HDS; 1754, II/gc/13^a, 19.V.1951, 1 ♂, on vegetation, coll. HDS; 1809, II/id/8, 22.V.1951, 1 ♂, on vegetation, coll. JV; 1842, II/hd/8, 30.V.1951, 1 ♀, on vegetation, coll. HDS; 2055, II/gd/4, 6.VII.1951, 1 ♀, on vegetation, coll. HDS; 2984, II/gd/4, 4.I.1952, 1 N (?), on vegetation, coll. JV; 3547, II/gd/4, 27.V.1952, 10 ♂, 10 ♀, on vegetation, coll. HDS; 3589, Ndelele/2, 6.VI.1952, 34 ♂, 48 ♀, on vegetation, coll. HDS; 3694, II/fd/4, 3.VI.1952, 28 ♂, 19 ♀, on vegetation, coll. HDS.

D. rhinocerinus is distributed in central, eastern and southern Africa where it parasitizes the black and the white rhinoceros.

Most of the adult specimens listed above were collected from vegetation. However, a smaller number of adults and several nymphs were collected from rodent nests, indicating that these animals are possibly important hosts for the immature stages. The association of nymphs with adults permitted the following description of this stage:

NYMPH.

(Fig. 1, A, B.)

Body. — Unengorged specimens 1,15 mm long; 0,75 mm wide. Widest posterior to midlength. Posterior portion of body covered with long, rather thick setae.

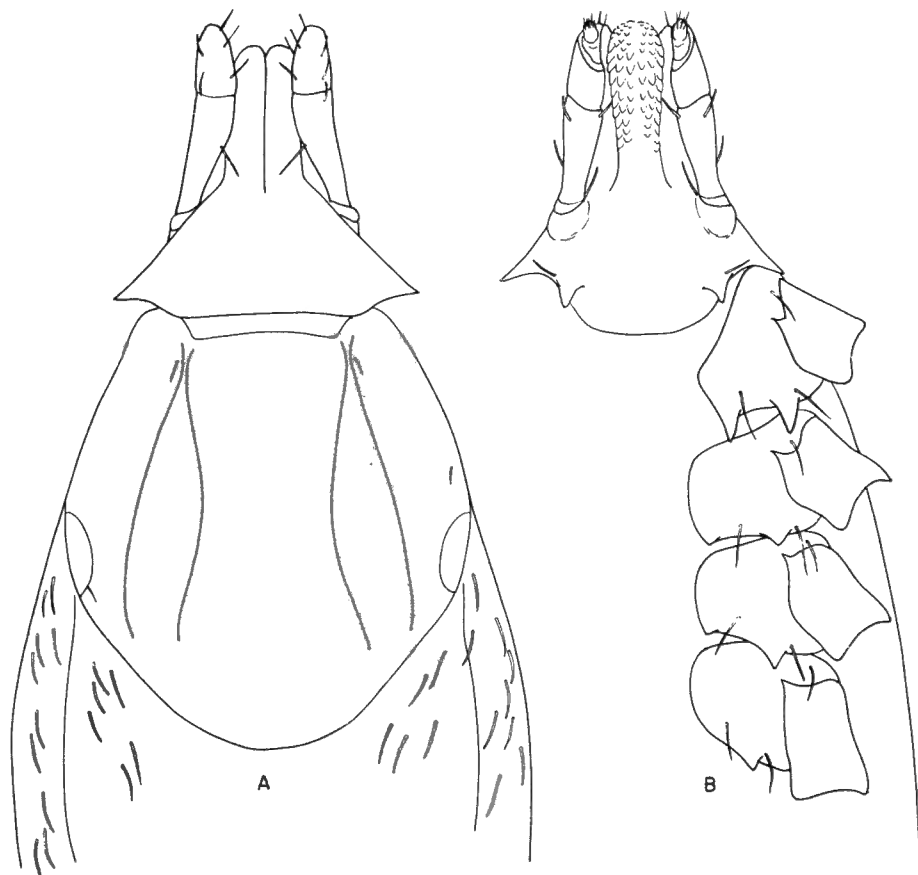


FIG. 1. — *Dermacentor rhinocerinus*, nymph.
A : Dorsal view; B : Ventral view.

Scutum. — Length 0,59 mm; width 0,60 mm. Widest at level of eyes. Eyes flat, located posterior of midlength. Shape as figured. Cervical pits deep, shallower cervical grooves extend almost to posterior margin. Lateral grooves pronounced, running parallel to margin.

Capitulum. — Length 0,39 mm; width 0,35 mm.

Basis capituli. — Length 0,17 mm; width 0,35 mm. Anterolateral and posterolateral margins slightly concave. Posterior margin slightly concave. Cornua absent. Lateral angles sharp and extend beyond the scapulae. Ventrally with long sharp spurs.

Palps. — Length 0,24 mm. Shape as figured. Article 2 about twice as long as article 3.

Hypostome. — Dentition 3/3.

Coxae. — Coxae I with two long, subequal spurs. Coxae II and III with moderate sized external spur and smaller internal spur. Coxae IV with a single moderate sized external spur. All coxal spurs triangular.

Genus **HAEMAPHYSALIS** KOCH, 1844.

Haemaphysalis hoodi WARBURTON and NUTTALL.

Haemaphysalis hoodi WARBURTON and NUTTALL, 1909, Parasitology, 2, p. 62.

Hosts and Distribution:

BIRDS.

Nos. 273, I/a/3, 10.II.1950, 1 N, on bird (No. 561), coll. GD; 3636, PFSK/22/3, 10.VI.1952, 5 ♂, 4 ♀, on bird (No. Z. 4540), coll. HDS.

HOST UNKNOWN.

Nos. 25, Gangala-na-Bodio, X and XI.1949, 1 L, coll. HDS.

This species is widely distributed throughout tropical Africa and is exclusively a parasite of birds. Several other records of this species in the Congo were given in a paper on the ticks of Upemba National Park (CLIFFORD and ANASTOS, 1962).

Haemaphysalis leachii (AUDOUIN).

Ixodes leachii AUDOUIN, 1827, in SAVIGNY, Description de l'Egypt, 2nd Ed., 22, Zool., p. 428.

Host and Distribution:

BIRDS.

Nos. 4063, II/gd/4, 18.IX.1952, 39 ♂, 5 ♀, *Colius passer ardeus concolor* (CASS) (No. Z. 5126), coll. HDS; 4064, II/gd/4, 18.IX.1952, 13 ♂, 3 ♀, *Chrysococcyx cupreus* (BODD), coll. HDS.

MAMMALS.

Nos. 943, I/o/3, 9.XI.1950, 14 N (4 ♀), 1 L, abandoned nest of *Lemniscomys* (?), coll. JV; 947, I/o/1, 9.XI.1950, 1 ♂, 3 ♀, 3 N (1 ♀), nest of rodent (No. Z. 2527), coll. JV; 1008, II/e, 21.XII.1950, 1 ♂, 1 N (1 ♂), rodent nests, coll. JV; 1081, II/i/4, 15.I.1951, 1 ♀, rodent nests, coll. JV; 1211, source Wilibadi, 31.I.1951, 1 ♀, rodent nests (No. Z. 785 ?), coll. JV; 1255, II/hc/4, 14.II.1951, 1 ♂, rodent nests (No. Z. 1731), coll. JV; 1269, II/dg/10, 16.II.1951, 1 ♀, rodent nest, coll. JV; 1368, II/ge/9, 12.III.1951, 1 ♂, *Cercopithecus aethiops centralis* NEUMANN (No. Z. 2849), coll. HDS; 1554, II/gd/4, 12.IV.1951, 7 ♂, 14 ♀. *Crocota crocota* (ERXLEBEN) (No. Z. 2595), coll. PSCH; 1581, II/fd/4, 18.IV.1951, 1 ♀, rodent nest, coll. JV; 1767, II/gd/4, 18.V.1951, 4 ♂, 8 ♀, rodent nests, coll. JV; 1997, II/hc/4, 28.VI.1951, 2 ♂, 3 ♀, 1 N, rodent nest, murid (No. 1509/16), coll. JV; 1999, II/gd/4, 27.VI.1951, 1 ♂, rodent nest, coll. JV; 2234, II/gd/4, 17.VIII.1951, 114 ♂, 7 ♀. *Felis (Leptailurus) serval* SCHREBER (No. Z. 3849), coll. JV; 2270, II/gd/4, 10.VIII.1951, 11 ♂, 3 ♀, *Panthera (Panthera) pardus* (LINNÉ) (No. Z. 3659), coll. JV; 2374, II/gd/4, 6.IX.1951, 7 ♂, 3 ♀, *Felis (Leptailurus) serval* SCHREBER (No. 3686), coll. HDS; 2438, II/gd/4, 16.IX.1951, 10 ♂, 2 ♀, *Genetta trigrina aequatorialis* HEUGLIN (No. Z. 3699), coll. HDS; 2444, II/gd/4, 3.IX.1951, 5 ♂, 2 ♀, murid (No. Z. 3690), coll. HDS; 2588, II/hc/4, 29.IX.1951, 49 ♂, 16 ♀, *Felis (Leptailurus) serval* SCHREBER (No. Z. 3712), coll. HDS.

HOSTS UNKNOWN.

Nos. 800, I/o/1, 4.IX.1950, 1 ♂, on vegetation, coll. GD; 802, I/o/2, 5.IX.1950, 1 ♀, on vegetation, coll. GD; 808, I/o/1, 7.IX.1950, 2 ♂, on vegetation, coll. GD; 832, I/o/2, 20.IX.1950, 6 ♂, 1 ♀, on vegetation, coll. GD; 845, I/o/1, 25.IX.1950, 1 ♂, on vegetation, coll. GD; 866, I/o/2, 3.X.1950, 1 ♀, on vegetation, coll. GD; 873, I/o/2, 6.X.1950, 1 ♂, 1 ♀, on vegetation, coll. GD; 1276, II/gd/11, 19.II.1951, 2 ♂, on vegetation, coll. HDS; 1443, II/hd/4, 23.III.1951, 1 ♂, on vegetation, coll. HDS; 1886, II/gc/6, 8.VI.1951, 1 ♀, on vegetation, coll. HDS; 2061, II/gd/8, 12.VII.1951, 1 ♂, on vegetation, coll. HDS; 2291, II/fe/73, 23.VIII.1951, 1 ♀, on vegetation, coll. HDS; 2615, PpK/52/g, 16.X.1951, 1 ♂, on vegetation, coll. HDS; 2699, II/fc/6, 30.X.1951, 2 ♂, 2 ♀, on vegetation, coll. HDS; 3424, II/fd/7", 5.V.1952, 4 ♂, 4 ♀, on vegetation, coll. HDS.

H. leachii occurs throughout most of the Ethiopian faunal region. Adults are often collected on large carnivores and are less frequently found on small carnivores. HOOGSTRAAL (1956, 1958) summarizes the available data on this species.

As we stated in a previous paper on the Upemba park (CLIFFORD and ANASTOS, 1962), the systematic status of species in the *H. leachii* group is extremely confused at the present time. Therefore, until a definitive study has been completed, we recognize only two species, *H. leachii* and *H. muhsami* and separate them according to the criteria outlined by HOOGSTRAAL (1956). The larger ticks with well developed spurs and narrow scutal outlines we call *H. leachii* and the smaller ticks with less well developed spurs and narrower scutal outlines are labeled *H. muhsami*.

SANTOS DIAS examined samples of material that we call *H. muhsami* and concluded that they were *H. ethiopica* SANTOS DIAS, 1956. As we

stated above, until a definitive study is completed, we prefer the more conservative approach of HOOGSTRAAL. The recognition of species such as *H. ethiopica* must await such a study.

Haemaphysalis muhsami SANTOS DIAS.

Haemaphysalis muhsami SANTOS DIAS, 1954, Mem. Mus. Zool. Univ. Coimbra, 225, p. 3.

Hosts and Distribution:

MAMMALS.

Nos. 172, I/a/2, 16.XII.1949, 5 ♂, 3 ♀, 1 N, *Mungos mungo gotneh* (HEUGLIN and FITZINGER) (Nos. 157 and 158), coll. JM; 781, région Bagbele, 13.VIII.1950, 17 ♂, 12 ♀, *Genetta tigrina aequatorialis* HEUGLIN (No. 2130), coll. JM; 1061, II/f, 8.I.1951, 1 ♀, in the hairs of a rodent (No. Z. 2298), coll. PSCH; 1081, II/i/4, 15.I.1951, 1 ♀, rodent nests, coll. JV; 1134, Kassi-Garamba, 20.I.1951, 1 ♀, rodent nests, coll. JV; 1365, II/fd/4, 3.III.1951, 1 ♀, rodent nests, coll. JV; 1451, II/gd/4, 23.III.1951, 1 ♀, nest of *Lemniscomys striatus*, coll. JV; 1582, II/gd/4, 17.IV.1951, 1 ♀, rodent nest, coll. JV; 1964, II/gd/4, 9.VI.1951, 18 ♂, 7 ♀, *Mungos mungo gotneh* (HEUGLIN and FITZINGER) (No. Z. 3463), coll. JV; 2162, II/gd/4, 1.VIII.1951, 7 ♂, 4 ♀, *Herpestes (Herpestes) ichneumon* (LINNÉ) (No. 3683), coll. JV; 2163, II/gd/4, 1.VIII.1951, 13 ♂, 9 ♀, *Genetta tigrina aequatorialis* HEUGLIN (No. 3662), coll. JV; 2238, II/gd/6, 4.VIII.1951, 19 ♂, 10 ♀, *Genetta tigrina aequatorialis* (No. 3636), coll. JV; 2438, II/gd/4, 16.IX.1951, 4 ♂, 9 ♀, *Genetta tigrina aequatorialis* (No. Z. 3699), coll. HDS; 2439, II/hd/4, 7.IX.1951, 12 ♂, 8 ♀, *Crocota crocota* (ERXLEBEN) (No. Z. 3688), coll. HDS; 2442, II/hd/4, 10.IX.1951, 14 ♂, 11 ♀, *Genetta tigrina aequatorialis* (No. Z. 3685), coll. HDS; 2585, II/gd/4, 1.X.1951, 7 ♂, 15 ♀, *Genetta tigrina aequatorialis* (No. Z. 3711), coll. HDS; 2586, II/hc/4, 5.X.1951, 9 ♂, 6 ♀, murid (No. Z. 3502), coll. HDS; 2587, II/hd/4, 8.X.1951, 6 ♂, 4 ♀, murid (No. Z. 3503), coll. HDS; 2872, II/hd/4, 19.X.1951, 7 ♂, 4 ♀, *Genetta tigrina aequatorialis* (No. Z. 3990), coll. JV; 3087, II/gd/4, 29.I.1952, 1 ♀, rodent nest, « Tula » (No. Z. 4472), coll. JV; 3088, II/gd/4, 29.I.1952, 2 ♂, 5 ♀, 1 N, abandoned rodent nests, coll. JV; 3248, II/gd/6, 26.III.1952, 1 ♀, rodent nest, « Gwa » (No. Z. 4412/2), coll. JV.

HOSTS UNKNOWN.

Nos. 914, I/o/2, 30.X.1950, 1 ♀, on vegetation, coll. HDS; 2984, II/gd/4, 4.I.1952, 1 ♀, on vegetation, coll. JV; 2985, II/gd/4, 4.I.1952, 1 ♀, 5 N?, on vegetation, coll. JV.

This species occurs in all areas of the Ethiopian faunal region and commonly parasitizes small carnivores such as mongooses, genets, civets and wild cats. The above records are in accord with the existing information on this species. For comments on the systematic status of this species and others in the *H. leachii* group see remarks following information on *H. leachii*.

Haemaphysalis leachii or muhsami.**Hosts and Distribution:****MAMMALS.**

Nos. 958, I/o/1, 11 N, 24 L, nest of rodent, murid (No. Z. 2528), coll. JV; 959, I/o/1, 9.XI.1950, 1 N, 1 L, rodent nest with 8 young (No. Z. 2526), coll. JV; 973, I/o/1, 15.XI.1950, 5 N, nests of rodents, coll. JV; 980, I/b/3, 17.XI.1950, 3 N, nest of rodent (No. 1476), coll. JV; 1038, II/d, 3.I.1951, 29 N, 73 L, rodent nests, coll. JV; 1039, II/e, 4.I.1951, 156 L, 23 N, rodent nests, coll. JV; 1051, II/f, 4.I.1951, 1 N, 3 L, rodent nests, coll. JV; 1058, II/e, 6.I.1951, 2 N, rodent nest, coll. JV; 1076, II/d/1, 12.I.1951, 4 N, 13 L, rodent nests, coll. JV; 1081, II/i/4, 15.I.1951, 1 N, rodent nests, coll. JV; 1083, II/g/1, 12.I.1951, 1 N, rodent nests, coll. JV; 1132, Kassi-Garamba, 20.I.1951, 1 N, 1 L, rodent nests, coll. JV; 1159, II/e, 24.I.1951, 1 N, rodent nest, coll. JV; 1878a, II/gd/4, 6.VI.1951, 1 L, rodent nest, coll. HDS; 2027, II/db/6, 29.VI.1951, 1 L, rodent nest (No. 354/8), coll. JV; 2986, II/fd/17, 9.I.1952, 1 N, 8 L, rodent nest (No. Z. 4157/2), coll. JV.

HOSTS UNKNOWN.

Nos. 21, Gangala-na-Bodio, X and XI.1949, 1 N, coll. HDS; 2361, II/ge/13^a, 3.IX.1951, 1 L, on vegetation, coll. HDS; 3127, II/ic/9, 14.II.1952, 1 N, on vegetation, coll. JV;, 1 N, no other data.

At the present time it is impossible to separate the nymphs of *H. leachii* and *H. muhsami*.

Haemaphysalis parmata NEUMANN.

Haemaphysalis parmata NEUMANN, 1905, Arch. de Parasitologie, 9, p. 228.

Host and Distribution:**VEGETATION OR OTHER.**

Nos. 723, I/o/2, 26.VII.1950, 1 ♀, on granite river bank, coll. GD; 2128, II/fd/5, 23.VII.1951, 1 ♀, on vegetation, coll. HDS.

H. parmata is a common central and west African tick and is chiefly a parasite of antelopes and domestic animals. HOOGSTRAAL (1956) provides a summary of the information available on this species.

Genus **IXODES** LATREILLE, 1795.

***Ixodes browningi* ARTHUR.**

Ixodes browningi ARTHUR, 1956, Rev. Zool. Bot. Afr., 54, p. 312.

Host and Distribution:

Nos. 3504, Aka, 14.V.1952, 3 ♀, 2 ♂, sciurid (No. Z. 4698), coll. HDS.

The only previous record of this species is the type lot which consisted of 1 ♂ and ♀ from a squirrel collected at Mt. Mikeno in the Congo.

***Ixodes paradoxus* KOHLS and CLIFFORD.**

Ixodes paradoxus KOHLS and CLIFFORD, 1961, Acarologia, 3, p. 285.

Host and Distribution:

Nos. 1691, II/ba/5, 10.V.1951, 6 ♀, *Tadarida (Mops) condylura* (No. Z. 3369), coll. JV.

During a preliminary study of the Garamba Park material these six female specimens were found to be the same as a new species in the Rocky Mountain Laboratory collection and were, therefore, included in a separate publication.

The distribution reported for *I. paradoxus* in the original description was Malaya, North Borneo and the Congo. Since this time specimens have also been received from New Guinea. This species is exclusively a parasite of bats which helps to explain its extremely broad distribution. The females are exceptional in that porose areas, present in females of all other species of Ixodidae, are apparently lacking.

***Ixodes spinae* ARTHUR.**

Ixodes spinae ARTHUR, 1958, Parasitology, 48, p. 61.

Hosts and Distribution:

MAMMALS.

Nos. 1061, II/f, 8.I.1951, 1 ♀, in the hairs of a rodent (No. Z. 2298), coll. PSCH; 3087, II/gd/4, 29.I.1952, 1 ♀, rodent nest, « Tula » (No. Z. 4472), coll. JV.

In a previous paper (CLIFFORD and ANASTOS, 1962) these specimens were identified as *Ixodes* species nr. *spinae*. Since this time the above specimens.

which are in excellent condition, have been compared in detail with the description and figures of *Ixodes spinae* and they are identical. Therefore, a more precise identification is now possible.

The two previous records from the Upemba Park (CLIFFORD and ANASTOS *supra. cit.*) and the above records expand the distribution and host range of this species considerably.

Ixodes sp.

Host and Distribution:

Nos. 2871, II/gd/4, 30.XI.1951, 1 N, mammal (No. Z. 3986), coll. HDS.

It is impossible to identify the immature stages of most African *Ixodes* at the present time.

Genus RHIPICEPHALUS KOCH, 1844.

Rhipicephalus pravus DÖNITZ.

Rhipicephalus pravus DÖNITZ, 1910, in « Die Zecken Südafrikas », p. 479.

Hosts and Distribution:

MAMMALS.

Nos. 1008, II/e, 21.XII.1950, 1 N, rodent nests, coll. JV.

HOSTS UNKNOWN.

Nos. 789, Napokomweli, 26.VIII.1950, 1 ♀, on vegetation, coll. GD; 2391, II/ic/10, 7.IX.1951, 2 ♀, on vegetation, coll. HDS.

According to HOOGSTRAAL (1956), the semi-dry areas of East Africa are the center of distribution for this species. It extends into central and southern Africa and westward it is recorded from British Cameroons, but not the intervening French colonies. Hosts include a large variety of domestic and wild animals.

Rhipicephalus pseudolongus SANTOS DIAS.

Rhipicephalus capensis pseudolongus SANTOS DIAS, 1953, Mem. Mus. Zool. Univ. Coimbra, 214, p. 1.

Hosts and Distribution:

MAMMALS.

Nos. 993, II/e, 16.XII.1950, 15 N (2 ♀), nest of rodent, coll. JV; 1008, II/e, 21.XII.1950, 4 ♂, 3 ♀, 2 N, rodent nest, coll. JV; 1009, II/f, 23.XII.1950, 1 ♀, 14 N, rodent nests,

coll. JV; 1011, II/f, 20.XII.1950, 11 N (1 ♂), rodent nests, coll. JV; 1051, II/f, 4.I.1951, 5 N, rodent nests, coll. JV; 1076, II/d/1, 12.I.1951, 1 ♂, rodent nests, coll. JV; 1080, II/i/4, 15.I.1951, 1 N, burrows of macroscelids, coll. JV; 1083, II/g/1, 12.I.1951, 3 ♂, 1 ♀, 3 N, rodent nests, coll. JV; 1132, Kassi-Garamba, 20.I.1951, 2 ♂, 2 ♀, 10 N, rodent nests, coll. JV; 1133, Bagunda, 17.I.1951, 1 N, rodent nests, coll. JV; 1134, Kassi-Garamba, 20.I.1951, 7 ♂, 13 ♀, 8 N, rodent nests, coll. JV; 1135, Bagunda, 18.I.1951, 4 ♂, 5 ♀, 1 N, rodent nest, coll. JV; 1159, II/e, 24.I.1951, 1 ♂, 1 ♀, 1 N, rodent nest, coll. JV; 1206, source Wilibadi, 30.I.1951, 5 N, rodent nest, coll. JV; 1208, source Wilibadi, 31.I.1951, 1 ♂, 1 ♀, rodent nest, *Lemniscomys striatus* (No. Z. 790 (?)), coll. JV; 1211, source Wilibadi, 31.I.1951, 3 N (1 ♀), rodent nest, (No. Z. 785 (?)), coll. JV; 1254, II/gd/4, 9.II.1951, 1 N (1 ♂), rodent nest, coll. JV; 1263, II/hc/8, 14.II.1951, 1 N, rodent nest, coll. JV; 1269, II/gd/10, 16.II.1951, 1 ♀, rodent nest, coll. JV; 1580, II/gd/4, 18.IV.1951, 1 N, murid (No. Z. 1374/1), coll. JV; 1581, II/fb/4, 18.IV.1951, 1 ♂, 7 N, rodent nest, coll. JV; 1601, II/hc/4, 24.IV.1951, 2 ♂, rodent nests, coll. JV; 1659, II/hc/4, 2.V.1951, 1 N, rodent nests, coll. JV; 1767, II/gd/4, 18.V.1951, 3 N, rodent nests, coll. JV; 1768, II/gd/4, 18.V.1951, 2 ♂, 2 ♀, 3 N, rodent nests, coll. JV; 1997, II/hc/4, 28.VI.1951, 3 ♂, 6 ♀, 14 N, rodent nests, murid (No. 1509/16), coll. JV; 2000, II/hc/4, 21.VI.1951, 1 N, rodent nest or rodent (No. 1480/2), coll. JV; 2582, II/hc/4, 29.IX.1951, 4 ♂, 4 ♀, buffalo, coll. HDS; 2971, II/fd/17, 3.I.1952, 10 ♂, 3 ♀, buffalo, coll. HDS; 2986, II/fd/17, 9.I.1952, 1 N, rodent nest, coll. JV; 3090, II/id/4, 31.I.1952, 3 N, rodent nest, coll. JV; 4073, Tori (Sudan), 22.IX.1952, 3 ♀, buffalo, coll. HDS.

HOSTS UNKNOWN.

Nos. 208, I/b/1, 15.II.1950, 1 ♀, on vegetation, coll. GD; 305, Mt Ndogo, 15.III.1950, 1 ♀, on vegetation, coll. HDS; 352, I/o/3, 31.III.1950, 1 ♀, on vegetation, coll. HDS; 768, I/c/2'', 23.VIII.1950, 11 ♂, 10 ♀, on vegetation, coll. GD; 806, Napokomweli, 6.IX.1950, 1 ♂, on vegetation, coll. GD; 835, Napokomweli, 22.IX.1950, 1 ♂, on vegetation, coll. GD; 903, I/a/1, 26.X.1950, 1 ♂, on vegetation, coll. HDS; 991, II/f, 15.XII.1950, 2 ♂, 1 ♀, on vegetation, coll. HDS; 1101, II/e, 18.I.1951, 1 ♂, in sand of river bank, coll. HDS; 1136, II/d, source of river, 24.I.1951, 2 ♂, on vegetation, coll. JV; 1137, II/d/4, 24.I.1951, 3 ♀, on vegetation, coll. JV; 1167, II/fc/5, 31.I.1951, 2 ♂, on vegetation, coll. HDS; 1260, II/fc, 16.II.1951, 3 ♂, on vegetation, coll. HDS; 1276, II/gd/11, 19.II.1951, 4 ♂, 1 ♀, on vegetation, coll. HDS; 1328, II/fd/4, 3.III.1951, 7 ♂, 13 ♀, on vegetation, coll. JV; 1361, II/gd/11, 12.III.1951, 2 ♂, 3 ♀, on vegetation, coll. HDS; 1458, II/fc/5, 27.III.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 1474, II/gc/11, 30.III.1951, 1 ♂, on vegetation, coll. HDS; 1481, II/gd/4, 2.IV.1951, 23 ♂, 26 ♀, on vegetation, coll. HDS; 1494, II/fd/17, 4.IV.1951, 7 ♂, 6 ♀, on vegetation, coll. JV; 1576, II/fb/4, 18.IV.1951, 1 ♂, 1 ♀, on vegetation, coll. JV; 1633, II/ee/7, 27.IV.1951, 1 ♂, on vegetation, coll. JV; 1684, II/gd/4, 7.V.1951, 2 ♂, on vegetation, coll. HDS; 1700, II/gd/8, 9.V.1951, 2 ♂, 2 ♀, on vegetation, coll. HDS; 1842, II/hd/8, 30.V.1951, 5 ♂, 5 ♀, on vegetation, coll. HDS; 1872, II/hc/8, 5.VI.1951, 1 ♂, 3 ♀, on vegetation, coll. HDS; 1886, II/gc/6, 8.VI.1951, 4 ♂, 3 ♀, on vegetation, coll. HDS; 1899, II/fd/18, 11.VI.1951, 1 ♂, on vegetation, coll. HDS; 1969, II/gd/11, 23.VI.1951, 2 ♂, on vegetation, coll. HDS; 1988, II/gd/10, 27.VI.1951, 1 ♂, on vegetation, coll. JV; 2055, II/gd/4, 6.VII.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 2061, II/gd/8, 12.VII.1951, 3 ♂, 2 ♀, on vegetation, coll. HDS; 2072, II/fd/8, 13.VII.1951, 2 ♂, 3 ♀, on vegetation, coll. HDS; 2102, II/fc/3, 16.VII.1951, 3 ♂, on vegetation, coll. HDS; 2128, II/fd/5, 23.VII.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 2134, II/gd/4, 20.VII.1951, 1 ♂, on vegetation, coll. HDS; 2158, II/gc/8, 27.VII.1951, 11 ♂, 4 ♀, on vegetation, coll. HDS; 2160, II/gd/11, 28.VII.1951, 1 ♀, on vegetation, coll. HDS; 2172, II/ec/4, 30.VII.1951, 1 ♀, on vegetation, coll. HDS; 2226, II/gd/8, 6.VIII.1951, 2 ♂, on vegetation, coll. HDS; 2291, II/fe/73, 23.VIII.1951, 7 ♂, 13 ♀, on vegetation, coll. HDS; 2315, II/gd/4, 25.VIII.1951, 3 ♀, on vegetation, coll. JV; 2391, II/ic/10, 7.IX.1951, 3 ♂, 6 ♀, on vegetation, coll. HDS; 2397, II/gd/10, 10.IX.1951,

1 ♀, on vegetation, coll. HDS; 2522, II/fd/18, 6.X.1951, 2 ♂, 1 ♀, on vegetation, coll. HDS; 2615, PpK/52/g, 16.X.1951, 2 ♂, 2 ♀, on vegetation, coll. HDS; 2668, II/fd/4, 24.X.1951, 1 ♀, on vegetation, coll. HDS; 2680, II/PpK/55, 26.X.1951, 3 ♂, on vegetation, coll. HDS; 2699, II/fc/6, 30.X.1951, 5 ♂, 3 ♀, on vegetation, coll. HDS; 2717, II/gd/4, 3.XI.1951, 2 ♀, on vegetation, coll. HDS; 2740, II/gd/9, 8.XI.1951, 2 ♂, 3 ♀, on vegetation, coll. HDS; 2757, II/gc/11, 13.XI.1951, 2 ♂, 5 ♀, on vegetation, coll. HDS; 2761, II/fd/17, 14.XI.1951, 2 ♂, 1 ♀, on vegetation, coll. HDS; 2935, II/fd/10, 20.XII.1951, 2 ♂, 6 ♀, on vegetation, coll. HDS; 3127, II/ic/9, 14.II.1952, 1 ♀, 1 N, on vegetation, coll. JV; 3158, II/fd/18, 3.III.1952, 1 ♂, on vegetation, coll. HDS; 3178, II/fd/12, 10.III.1952, 5 ♀, on vegetation, coll. HDS; 3424, II/fd/7", 5.V.1952, 1 ♂, 4 ♀, on vegetation, coll. HDS; 3437, II/fd/16, 6.V.1952, 3 N?, on vegetation, coll. JV; 3547, II/gd/4, 27.V.1952, 5 ♂, 1 ♀, on vegetation, coll. HDS; 3694, II/fd/4, 3.VI.1952, 8 ♂, 4 ♀, on vegetation, coll. HDS; 3769, PpK/12, 14.VII.1952, 100 ♂, 65 ♀, coll. HDS;, 1 ♂, no other data.

A detailed characterization and explanation of the material we identified here as *R. pseudolongus* has been presented by CLIFFORD and ANASTOS (1962). Therefore, only a brief resumé will be given here.

R. pseudolongus was originally described as a subspecies of *R. capensis* by SANTOS DIAS in 1953 on the basis of material from the Cameroon. In 1955 he elevated *R. pseudolongus* to species rank. Then in 1956b, he synonymized this species with *R. longus* and in 1958 reiterated this opinion.

We examined the male holotype of *R. pseudolongus* and found that this species is entirely different from *R. longus* (sensu NEUMANN). This fact was substantiated by a comparison of the immature stages, i.e., the nymphs of the material we are calling *R. pseudolongus* have definite cornua; whereas, the nymphs of *R. longus* (specimens from East Africa furnished by Miss JANE WALKER) lack cornua entirely. Furthermore the genital apertures of the females of these two species are entirely different.

R. pseudolongus is closely related to both *R. capensis* and *R. compositus*. In fact, if the males did not have sickle-shaped adanal shields, it would be very difficult to differentiate these species. A sample of this material was determined by Dr. THEILER as *Rhipicephalus capensis*?

R. pseudolongus is widely distributed in West Africa and ranges across into the Sudan, northern Congo and northern Uganda. The hosts for the adults are larger wild and domestic animals. According to the records given above, various species of rodents are the hosts of predilection for the nymphs of this species.

The following description of the nymph of *R. pseudolongus* is based on material that was positively identified by breaking open the nymphal skin and examining the fully developed adults within :

NYMPH.

(Fig. 2, A, B.)

Body. — Unengorged specimen 1,17 mm long; 0,78 mm wide. Engorged specimen 3,90 mm long; 2,40 mm wide. Broadest posterior to midlength.

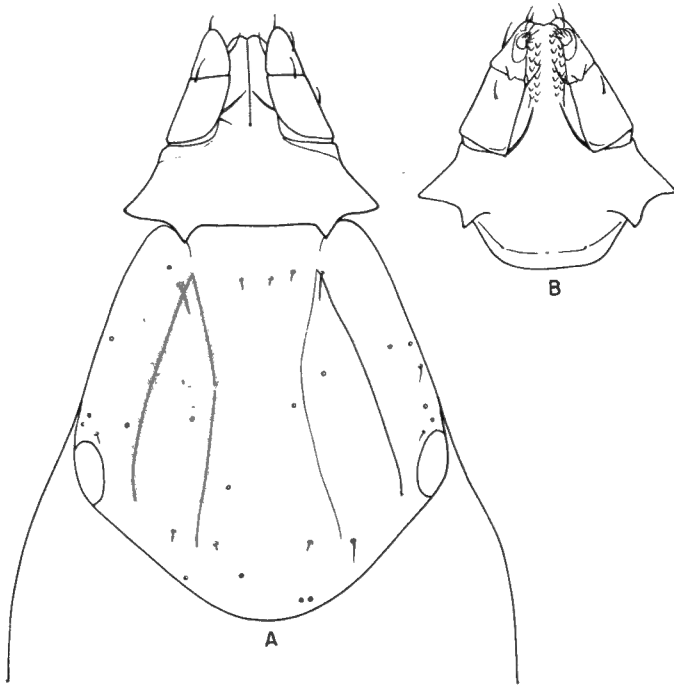


FIG. 2. — *Rhipicephalus pseudolongus*, nymph.
A ; Dorsal view; B : Ventral view of capitulum.

Scutum. — Length 0,53 mm; width 0,54 mm. Broadest at level of eyes which are located at edge of scutum in posterior third of its length. Shape of scutum as figured. Cervical pits deep, shallow cervical grooves almost reach to posterior margin of scutum. Lateral groove pronounced, running parallel to margin.

Capitulum. — Length 0,29 mm; width 0,36 mm. Palps slope toward each other.

Basis Capituli. — Length 0,12 mm; width 0,36 mm. Anterolateral and posterolateral margins slightly concave; posterior margin between the sharp welldefined cornua straight. Lateral angles extend beyond scapulae. Ventrally with long sharp spurs.

Palps. — Length 0,12 mm. Shape as figured. Lateral margins almost straight. Small spur on article III just posterior to insertion of article IV.

C o x a e . — Two large triangular spurs on coxae I; external spur longest. A single smaller, triangular external spur on coxae II, III and IV.

Rhipicephalus sanguineus (LATREILLE).

Ixodes sanguineus LATREILLE, 1806, Gen. Crust. et Ins., 1, p. 157.

Hosts and Distribution:

BIRDS.

Nos. 2853, Ndelele/K/115, 3.XII.1951, 3 ♂, 2 ♀, *Pseudogyps africanus* (SALVADORI). (No. Z. 3977), coll. HDS; 4063, II/gd/4, 18.IX.1952, 3 ♂, *Colius passer ardeus concolor* (CASS) (No. 5126), coll. HDS; 4064, II/gd/4, 18.IX.1952, 10 ♂, 21 ♀, *Chrysococcyx cupreus* (BODD) (No. Z. 5126), coll. HDS.

MAMMALS.

Nos. 2254, II/gd/4, 17.VIII.1951, 1 ♂, *Felis (Leptailurus) serval* SCHREBER (No. Z. 3849), coll. JV; 2270, II/gd/4, 10.VIII.1951, 12 ♂, 11 ♀, *Panthera (Panthera) pardus* (LINNÉ) (No. Z. 3659), coll. JV; 2438, II/gd/4, 16.IX.1951, 12 ♂, 5 ♀, *Genetta tigrina aequatorialis* HEUGLIN (No. Z. 3699), coll. HDS; 2583, II/hd/4, 10.X.1951, 11 ♂, 8 ♀, *Tragelaphus scriptus diana* MATSCHIE (No. Z. 3714), coll. HDS; 2585, II/gd/4, 1.X.1951, 1 ♀, *Genetta tigrina aequatorialis* (No. Z. 3711), coll. HDS; 2986, II/fd/17, 9.I.1952, 1 ♂, rodent nest (No. Z. 4157/2), coll. JV; 3044, PFSK/7/2, 25.I.1952, 1 ♂, *Ourebia ourebi goslingi* THOMAS and WROUGHTON (No. Z. 4224), coll. HDS; 3772, II/gd/4, 11.VII.1952, 8 ♂, 2 ♀, mammal (No. Z. 4951), coll. HDS; 3875, II/gd/4, 5.VIII.1952, 3 ♂, 3 ♀, *Tragelaphus scriptus diana*, coll. HDS; 3991, II/gd/4, 19.VIII.1952, 20 ♂, 3 ♀, *Tragelaphus scriptus diana* (No. 5098), coll. HDS; 4073, Tori (Sudan), 22.IX.1952, 2 ♀, buffalo, coll. HDS.

HOSTS UNKNOWN.

Nos., 1 ♀, no other data; 729, Akam, 28.VII.1950, 1 ♀, on vegetation, coll. GD; 763, I/o/1, 19.VIII.1950, 1 ♀, on vegetation, coll. GD; 800, I/o/1, 4.IX.1950, 1 ♀, on vegetation, coll. GD; 808, I/o/1, 7.IX.1950, 1 ♂, on vegetation, coll. GD; 812, I/o/1, 11.IX.1950, 2 ♂, on vegetation, coll. GD; 817, I/o/1, 13.IX.1950, 1 ♂, on vegetation, coll. GD; 866, I/o/2, 3.X.1950, 1 ♀, on vegetation, coll. GD; 884, I/o/2, 11.X.1950, 1 ♀, on vegetation, coll. HDS; 1902, II/gd/4, 12.VI.1951, 1 ♀, on vegetation, coll. HDS; 2158, II/gc/8, 27.VII.1951, 1 ♂, 2 ♀, on vegetation, coll. HDS; 2172, II/ec/4, 30.VII.1951, 1 ♀?, on vegetation, coll. HDS; 2291, II/fe/73, 23.VIII.1951, 3 ♀, on vegetation, coll. HDS; 2315, II/gd/4, 25.VIII.1951, 1 ♀, on vegetation, coll. JV; 2419, II/id/10, 11.IX.1951, 2 ♂, 1 ♀, on vegetation, coll. HDS; 2452, II/je/4, 20.IX.1951, 6 ♂, 5 ♀, on vegetation, coll. HDS; 2740, II/gd/9, 8.XI.1951, 1 ♂, on vegetation, coll. HDS; 2806, II/fc/18, 24.XI.1951, 1 ♂, on vegetation, coll. HDS; 4025, II/gd/4, 3.X.1952, 1 ♀, on vegetation, coll. HDS.

R. sanguineus is widely distributed in Africa and parasitizes a variety of mammals and birds. HOOGSTRAAL (1956) gives an excellent summary of the distribution and host range of this species in Africa.

Rhipicephalus senegalensis KOCH.

Rhipicephalus senegalensis KOCH, 1844, Arch. f. Naturgesch. 10, p. 238.

Hosts and Distribution:

BIRDS.

Nos. 1819, II/fe/6, 23.V.1951, 47 ♂, 26 ♀, *Dendrocygna viduata* (LINNÉ) (No. Z. 3422), coll. JV; 2246, II/gd/4, 10.VIII.1951, 2 N, bird (No. Z. 3640), coll. JV.

MAMMALS.

Nos. 372, 9.III.1950, 4 ♂, 2 ♀, *Manis (Smutsia) gigantea* ILLIGER (No. 765), coll. GD; 373, ?Ndojo, 15.III.1950, 14 ♂, 12 ♀, *Phacochoerus aethiopicus* (PALLAS) (No. 781), coll. GD; 1008, II/e, 21.XII.1950, 1 ♀, rodent nests, coll. JV; 1009, II/f, 23.XII.1950, 1 ♂, rodent nests, coll. JV; 1011, II/f, 20.XII.1950, 3 ♂, 1 ♀, rodent nests, coll. JV; 1036, II/f, 29.XII.1950, 1 N, rodent nest with 4 young (No. Z. 2270), coll. JV; 1072, II/f/3, 9.I.1951, 1 N, *Mungos mungo gotneh* (HEUGLIN and FITZINGER) (No. Z. 1702), coll. JV; 1134, Kassi-Garamba, 20.I.1951, 5 ♂, 2 ♀, rodent nests, coll. JV; 1160, II/g, 25.I.1951, 1 N, rodent nest (No. Z. 772), coll. JV; 1206, source Wilibadi, 30.I.1951, 4 N, rodent nest, coll. JV; 1208, source Wilibadi, 31.I.1951, 1 N, rodent nest, *Lemniscomys striatus* (No. Z. 790 ?), coll. JV; 1211, source Wilibadi, 31.I.1951, 1 ♀, rodent nest (Z. 785 ?), coll. JV; 1212, II/1, 26.I.1951, 1 ♂, rodent nest (No. Z. 2702), coll. JV; 1254, II/gd/4, 9.II.1951, 1 ♀, rodent nest, coll. JV; 1269, II/gd/10, 16.II.1951, 1 N, rodent nest, coll. JV; 1365, II/fd/4, 3.III.1951, 1 ♂, 1 ♀, rodent nest, coll. JV; 1451, II/gd/4, 23.III.1951, 1 ♂, nest of *Lemniscomys striatus*, coll. JV, 1496, II/id/4, 30.XI.1950, 1 N, macroscelid (No. Z. 2609), *Elephantulus* sp., coll. JV; 1597, II/hc/4, 23.IV.1951, 1 N?, rodent nest, coll. JV; 1601, II/hc/4, 24.IV.1951, 1 ♀, rodent nest, coll. JV; 1768, II/gd/4, 18.V.1951, 1 N (1 ♀), rodent nests, coll. JV; 1818, II/db/4, 29.V.1951, 2 N, rodent nest, coll. JV; 1878a, II/gd/4, 6.VI.1951, 3 N, rodent nest, coll. HDS; 2192, II/gd/4, 29.VII.1951, 1 N, rodent nest, *Lemniscomys*; 2240, II/hc/4, 1.VIII.1951, 14 N (1 ♂), rodent nest, murid, (No. 3627/1), coll. JV; 2582, II/hc/4, 29 IX.1951, 12 ♂, 2 ♀, buffalo, coll. HDS; 2671, II/gd/8, 27.X.1951, 2 N, *Thryonomys* (No. Z. 3995), coll. HDS; 3090, II/id/4, 31.I.1952, 1 N, rodent nest (No. Z. 4237/1), coll. JV; 4073, Tori (Sudan), 22.IX.1952, 2 ♂, buffalo, coll. HDS.

HOSTS UNKNOWN.

Nos. 422, I/a/3, 17.IV.1950, 1 ♂, on vegetation, coll. HDS; 548, I/o/1, 22.V.1950, 12 ♂, 5 ♀, on vegetation, coll. HDS; 563, I/b/3', 26.V.1950, 3 ♂, 4 ♀, on vegetation, coll. GD; 639, I/a/1, 26.VI.1950, 1 ♂, on vegetation, coll. GD; 643, I/o/3, 27.VI.1950, 9 ♂, 10 ♀, on vegetation, coll. GD; 649, I/b/2, 28.VI.1950, 1 ♂, 1 ♀, on vegetation, coll. GD; 686, I/a/1, 10.VII.1950, 1 ♀, on vegetation, coll. GD; 705, I/a/1, 17.VII.1950, 1 ♂, 1 ♀, on vegetation, coll. GD; 723, I/o/2, 26.VII.1950, 1 ♀, on granite river bank, coll. GD; 753, I/o/1, 10.VIII.1950, 3 ♂, 1 ♀, on vegetation, coll. GD; 763, I/o/1, 19.VIII.1950, 1 ♂, 1 ♀, on vegetation, coll. GD; 766, I/o/1, 21.VIII.1950, 1 ♂, on vegetation, coll. GD; 768, I/c/2'', 23.VIII.1950, 1 ♂, on vegetation, coll. GD; 790, I/o/2, 30.VIII.1950, 1 ♀, on vegetation, coll. GD; 800, I/o/1, 4.IX.1950, 1 ♀, on vegetation, coll. GD; 808, I/o/1, 7.IX.1950, 1 ♀, on vegetation, coll. GD; 824, Napokomweli, 15.IX.1950, 1 ♂, on vegetation, coll. GD; 1276, II/gd/11, 19.II.1951, 1 ♀, on vegetation, coll. HDS; 1361, II/gd/11, 12.III.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 1443, II/hd/4, 23.III.1951, 1 ♂, 1 ♀, on

vegetation, coll. HDS; 1458, II/fc/5, 27.III.1951, 1 ♂, 2 ♀, on vegetation, coll. HDS; 1487, II/gc/11, 30.VII.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 1494, II/fd/17, 4.IV.1951, 2 ♀, on vegetation, coll. HDS; 1842, II/hd/8, 30.V.1951, 1 ♀, on vegetation, coll. HDS; 1872, II/hc/8, 5.VI.1951, 1 ♂, on vegetation, coll. HDS; 1886, II/gc/6, 8.VI.1951, 3 ♂, 1 ♀, on vegetation, coll. HDS; 1902, II/gd/4, 12.VI.1951, 5 ♂, 7 ♀, on vegetation, coll. HDS; 1903, II/gd/11, 12.VI.1951, 2 ♂, on vegetation, coll. HDS; 1969, II/gd/11, 23.VI.1951, 2 ♂, 1 ♀, on vegetation, coll. HDS; 1988, II/gd/10, 27.VI.1951, 1 ♂, on vegetation, coll. JV; 2013, II/gd/4, 27.VI.1951, 2 ♀, on vegetation, coll. JV; 2052, II/gd/4, 5.VII.1951, 2 ♂, 9 ♀, on vegetation, coll. HDS; 2055, II/gd/4, 6.VII.1951, 2 ♂, 6 ♀, on vegetation, coll. HDS; 2061, II/gd/8, 12.VII.1951, 4 ♂, 4 ♀, on vegetation, coll. HDS; 2072, II/fd/8, 13.VII.1951, 1 ♂, 3 ♀, on vegetation, coll. HDS; 2102, II/fc/3, 16.VII.1951, 9 ♂, 5 ♀, on vegetation, coll. HDS; 2128, II/fd/5, 23.VII.1951, 3 ♂, 3 ♀, on vegetation, coll. HDS; 2134, II/gd/4, 20.VII.1951, 1 ♂, on vegetation, coll. HDS; 2158, II/gc/8, 27.VII.1951, 1 ♂, 4 ♀, on vegetation, coll. HDS; 2160, II/gd/11, 28.VII.1951, 2 ♂, 1 ♀, on vegetation, coll. HDS; 2172, II/ec/4, 30.VII.1951, 2 ♂, 2 ♀, on vegetation, coll. HDS; 2181, II/gd/4, 31.VII.1951, 1 ♀, on vegetation, coll. JV; 2236, II/gd/14^s, 9.VIII.1951, 2 ♂, 1 ♀, on vegetation, coll. HDS; 2380, II/fd/17, 4.IX.1951, 1 ♂, on vegetation, coll. HDS; 2391, II/ic/10, 7.IX.1951, 1 ♀, on vegetation, coll. HDS; 2452, II/je/4, 20.IX.1951, 4 ♂, 3 ♀, on vegetation, coll. HDS; 2615, PpK/52/g, 16.X.1951, 1 ♀, on vegetation, coll. HDS; 2668, II/fd/4, 24.X.1951, 1 ♀, on vegetation, coll. HDS; 2680, II/PpK/55, 26.X.1951, 1 ♂, 3 ♀, on vegetation, coll. HDS; 2717, II/gd/4, 3.XI.1951, 4 ♂, 2 ♀, on vegetation, coll. HDS; 2740, II/gd/9, 8.XI.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 3127, II/ic/9, 14.II.1952, 1 ♂, 1 ♀, 1 N, on vegetation, coll. JV; 3178, II/fd/12, 10.III.1952, 1 ♀, on vegetation, coll. HDS; 3424, II/fd/7ⁿ, 5.V.1952, 1 ♂, on vegetation, coll. HDS; 3547, II/gd/4, 27.V.1952, 7 ♂, 16 ♀, on vegetation, coll. HDS; 3589, Ndelele/2, 6.VI.1952, 1 ♂, 2 ♀, on vegetation, coll. HDS; 3694, II/fd/4, 3.VI.1952, 17 ♂, 11 ♀, on vegetation, coll. HDS; 3769, PpK/12, 14.VII.1952, 22 ♂, 18 ♀, 1 N, coll. HDS;, 3 ♂, 1 ♀, 1 N, no other data.

In a previous paper on the ticks of the Upemba National Park (CLIFFORD and ANASTOS, 1962), we gave a summary of our views on the rhipicephalid species whose males have sickle-shaped adanal shields. At that time, the above specimens were considered to be *R. senegalensis*; however, attention was directed to some of the similarities that existed between these specimens and the material that we were identifying as *R. longus*, and it was pointed out that future studies on laboratory reared material using all stages may show these specimens to be nothing more than lightly punctate *R. longus*. If this proved to be true, *R. senegalensis* would be essentially a West African species.

At the present time our distribution picture for *R. senegalensis* includes West Africa, the northern edge of the Congo and parts of the Sudan and Uganda. Adults feed on a variety of animals and from the information presented above it would appear that rodents are the primary hosts for the immature stages. The identity of some of these nymphs was confirmed by breaking open the nymphal skins and examining the fully developed adults which were present inside. The following description is based on nymphs that were identified by this procedure :

NYMPH.

(Fig. 3, A, B.)

The measurements given below represent an average of 5 measurements except where otherwise stated.

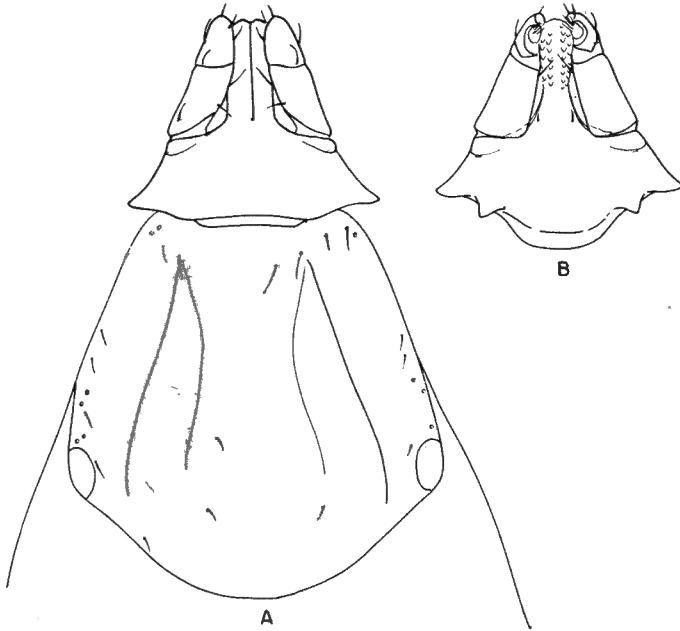


FIG. 3. — *Rhipicephalus senegalensis*, nymph.
A : Dorsal view; B : Ventral view of capitulum.

Body. — Unengorged specimen 1,22 mm long; 0,68 mm wide. Engorged specimen 3,70 mm long; 2,40 mm wide. Widest posterior to midlength.

Scutum. — Length 0,51 mm; width 0,50 mm. Widest at level of eyes. Eyes elongate, slightly raised above surface of scutum. Shape of scutum as figured. Cervical pits deep with shallower cervical grooves which extend about $\frac{3}{4}$ the length of scutum. Lateral groove pronounced, running parallel to margin.

Capitulum. — Length 0,28 mm; width 0,34 mm. Palps slope toward each other.

Basis Capituli. — Length 0,14 mm; width 0,34 mm; shape as figured. Anterolateral margin concave, posterolateral margin only slightly indented. Posterior margin slightly concave. Cornua absent. Lateral angles extend beyond scapulae. Ventrally with long sharp spurs.

Hypostome. — Dentition 2/2.

Palps. — Length 0,19 mm. Shape as figured. Lateral margins slightly concave.

Coxae. — Coxa I with two large triangular spurs. Coxae II-IV each with single rounded external spur, decreasing progressively in size.

Rhipicephalus simpsoni NUTTALL.

Rhipicephalus simpsoni NUTTALL, 1910, Parasitology, 3, p. 413.

Hosts and Distribution:

BIRDS.

Nos. 1050, II/f, 4.I.1951, 1 ♀, *Hypochera amauropteryx camerunensis* GROTE (No. Z. 2286), coll. JV.

MAMMALS.

Nos. 1132, Kassi-Garamba, 20.I.1951, 1 ♂, 1 ♀, 1 N (1 ♀), rodent nests, coll. JV; 1134, Kassi-Garamba, 20.I.1951, 1 ♂, rodent nests, coll. JV; 1159, II/e, 24.I.1951, 6 ♂, 15 ♀, rodent nest, coll. JV; 1211, source Wilibadi, 31.I.1951, 1 ♂, rodent nest (No. Z. 785 ?), coll. JV; 1254, II/gd/4, 9.II.1951, 1 ♀, 3 N, rodent nest, coll. JV; 1365, II/fd/4, 3.III.1951, 1 ♂, 2 ♀, 1 N, rodent nests, coll. JV; 2649, II/hd/4, 22.X.1951, 6 ♂, 4 ♀, mammal (No. Z. 3542), *Arvicanthis* sp., coll. HDS; 2671, II/gd/8, 27.X.1951, 2 ♂, *Thryonomys* (No. Z. 3995), coll. HDS; 3014, II/gd/4, 11.I.1952, 1 ♂, rodent burrow, coll. JV.

HOSTS UNKNOWN.

Nos. 260, I/b/2, 1.III.1950, 1 ♂, vegetation, coll. HDS; 1032, II/e, 3.I.1951, 1 ♂, on vegetation, coll. JV; 2280, II/ge;7", 20.VIII.1951, 1 ♀, on vegetation, coll. HDS.

This species has been reported from several widely scattered localities in the Ethiopian faunal region. Its distribution appears to be closely allied to that of its chief hosts, the cane rats. The above record from a bird is unusual and requires confirmation. CLIFFORD and ANASTOS (1962) also record a single ♂ off a bird.

The following description is based on a single nymphal skin from which a fully developed female of this species was removed. Because the posterior area of the skin was badly damaged it was not possible to get an accurate measurement of the body size.

NYMPH.

(Figs. 4, A, B.)

Scutum. — Length 0,48 mm; width 0,46 mm. Widest at level of the eyes. Eyes indistinct, not raised above level of scutum. Cervical pits deep, shallower cervical groove extends about $\frac{3}{4}$ the length of the scutum. Lateral groove only slightly indicated, running parallel to margin.

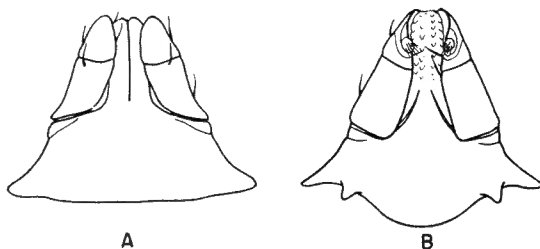


FIG. 4. — *Rhipicephalus simpsoni*, nymph.

A : Dorsal view of capitulum; B : Ventral view of capitulum.

Capitulum. — Length 0,26 mm; width 0,35 mm. Palps slope toward each other.

Basis Capituli. — Length 0,40 mm; width 0,35 mm. Shape as figured, anterolateral margin concave, postero-lateral margin only slightly concave. Posterior margin straight. Cornua absent. Lateral angles extend well beyond scapulae. Ventrally with sharp spurs.

Hypostome. — Dentition 2/2.

Palps. — Length 0,16 mm. Shape as figured. Lateral margins of palpal article 2 concave.

Coxae. — Coxae I with two large spurs, internal spur more rounded and shorter than external spur. Coxae II and III each with a single, rounded external spur, decreasing progressively in size. Coxae IV damaged on single available specimen.

Rhipicephalus simus KOCH.

Rhipicephalus simus KOCH, 1844, Arch. f. Naturgesch., 10, p. 238.

Hosts and Distribution :

MAMMALS.

Nos. 1009, II/f, 23.XII.1950, 14 N?, rodent nests, coll. JV; 1038, II/d, 3.I.1951, 2 N (1 ♂, 1 ♀), rodent nests, coll. JV; 1051, II/f, 4.I.1951, 11 N?, rodent nest, coll. JV; 1134, Kassi-Garamba, 20.I.1951, 4 N, rodent nests, coll. JV; 1135, Bagunda, 18.I.1951, 1 N, rodent nests, coll. JV; 1159, II/e, 24.I.1951, 14 N (*simus* group) (1 ♀, *R. simus*), rodent nest, coll. JV; 1206, source Wilibadi, 30.I.1951, 2 N?, rodent nest, coll. JV; 1211, source Wilibadi, 31.I.1951, 2 ♀, 4 N (2 ♂), rodent nest (No. Z. 785?), coll. JV; 1601, II/hc/4, 24.IV.1951, 3 N, rodent nests (No. Z. 1390/2), coll. JV; 1878a, II/gd/4, 6.VI.1951, 1 N?, rodent nest, coll. HDS; 2986, II/fd/17, 9.I.1952, 3 N?, rodent nests (No. Z. 4157/2), coll. JV; 3014, II/gd/4, 11.I.1952, 3 N?, rodent burrow, coll. JV; 3087, II/gd/4, 29.I.1952, 1 N?, rodent nest, « Tula » (No. Z. 4472), coll. JV; 3089, II/hd/8 Nduma, 30.I.1952, 1 N?, nests of *Tatera* sp. (No. Z. 4246/4), coll. JV; 3248, II/gd/6, 26.III.1952, 1 N, rodent nest, « Gwa » (No. Z. 4412/2), coll. JV.

HOSTS UNKNOWN.

Nos. 214, I/b/2, 22.II.1950, 1 ♀, vegetation, coll. HDS; 763, I/o/1, 19.VIII.1950, 2 ♂, on vegetation, coll. GD; 766, I/o/1, 21.VIII.1950, 2 ♂, 2 ♀, on vegetation, coll. GD; 827, I/o/1, 16.IX.1950, 1 ♀, on vegetation, coll. HDS; 903, I/a/1, 26.X.1950, 1 ♂, 1 ♀, on vegetation, coll. HDS.

R. simus is widely distributed throughout Africa. Adults parasitize a variety of large and medium sized wild and domestic animals, while the immature stages feed chiefly on burrowing rodents. For further information on this species see HOOGSTRAAL (1956).

Rhipicephalus supertritus NEUMANN.

Rhipicephalus supertritus NEUMANN, 1907, Arch. de Parasitologie, 11, p. 216.

Hosts and Distribution :

MAMMALS.

Nos. 2582, II/hc/4, 29.IX.1951, 8 ♂, 5 ♀, buffalo, coll. HDS; 4073, Tori (Sudan), 22.IX.1952, 26 ♂, 13 ♀, buffalo, coll. HDS.

HOSTS UNKNOWN.

Nos. 55, Bagbele, 16.XII.1949, 1 ♀, coll. HDS; 563, I/b/3', 26.V.1950, 8 ♂, 8 ♀, on vegetation, coll. GD; 705, I/a/1, 17.VII.1950, 1 ♂, 1 ♀, on vegetation, coll. GD; 808, I/o/1, 7.IX.1950, 1 ♂, on vegetation, coll. GD; 991, II/f, 15.XII.1950, 1 ♂, 1 ♀, on vege-

tation, coll. HDS; 997, II/g, 18.XII.1950, 1 ♀, on vegetation, coll. HDS; 1003, II/f, 26.XII.1950, 1 ♂, on vegetation, coll. JV; 1458, II/fc/5, 27.III.1951, 3 ♂, 5 ♀, on vegetation, coll. HDS; 1494, II/fd/17, 4.IV.1951, 1 ♂, on vegetation, coll. HDS; 1684, II/gd/4, 7.V.1951, 1 ♀, on vegetation, coll. HDS; 1887, II/gd/7^{'''}, 8.VI.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 1902, II/gd/4, 12.VI.1951, 2 ♀, on vegetation, coll. HDS; 1903, II/gd/11, 12.VI.1951, 1 ♂, on vegetation, coll. HDS; 1969, II/gd/11, 23.VI.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 1988, II/gd/10, 27.VI.1951, 1 ♂, on vegetation, coll. JV; 2013, II/gd/4, 27.VI.1951, 1 ♂, 1 ♀, on vegetation, coll. JV; 2052, II/gd/4, 5.VII.1951, 2 ♂, on vegetation, coll. HDS; 2055, IIgd/4, 6.VII.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 2061, II/gd/8, 12.VII.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 2102, II/fc/3, 16.VII.1951, 2 ♂, 2 ♀, on vegetation, coll. HDS; 2128, II/fd/5, 23.VII.1951, 11 ♂, 13 ♀, on vegetation, coll. HDS; 2134, II/gd4, 20.VII.1951, 1 ♀, on vegetation, coll. HDS; 2172, II/ec/4, 30.VII.1951, 2 ♂, 2 ♀, on vegetation, coll. HDS; 2181, II/gd/4, 31.VII.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 2226, II/gd/8, 6.VIII.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 2236, II/gd/14^s, 9.VIII.1951, 2 ♂, on vegetation, coll. HDS; 2391, II/ic/10, 7.IX.1951, 1 ♀, on vegetation, coll. HDS; 2452, II/je/4, 20.IX.1951, 2 ♂, 2 ♀, on vegetation, coll. HDS; 2615, PpK/52/g, 16.X.1951, 7 ♂, 16 ♀, on vegetation, coll. HDS; 2668, II/fd/4, 24.X.1951, 1 ♂, on vegetation, coll. HDS; 2680, II/PpK/55, 26.X.1951, 8 ♂, 8 ♀, on vegetation, coll. HDS; 2717, II/gd/4, 3.XI.1951, 1 ♂, 1 ♀, on vegetation, coll. HDS; 2761, II/fd/17, 14.XI.1951, 1 ♀, on vegetation, coll. HDS; 3547, II/gd/4, 27.V.1952, 11 ♂, 20 ♀, on vegetation, coll. HDS; 3589, Ndelele/2, 6.VI.1952, 7 ♂, 5 ♀, on vegetation, coll. HDS; 3694, II/fd/4, 3.VI.1952, 22 ♂, 17 ♀, on vegetation, coll. HDS;, 1 ♂, 1 ♀, no other data.

The specimens identified here as *R. supertritus* agree with the description given by THEILER (1947) and the characteristics presented by HOOGSTRAAL (1956). This species has a spotty distribution in east, central and parts of southern Africa. It parasitizes larger wild animals and occasionally domestic animals.

Rhipicephalus tricuspis DÖNITZ.

Rhipicephalus tricuspis DÖNITZ, 1906, Sitzungsber. Ges. Naturf. Fr. Berlin, 5, p. 146.

Hosts and Distribution :

BIRD.

Nos. 1819, II/fe/6, 23.V.1951, 35 ♂, 15 ♀, *Dendrocygna viduata* (LINNÉ) (No. Z. 3422), coll. JV.

MAMMALS.

Nos. 1134, Kassi-Garamba, 20.I.1951, 1 ♀, rodent nests, coll. JV; 1365, II/fd/4, 3.III.1951, 1 ♂, rodent nests, coll. JV; 1767, II/gd/4, 18.V.1951, 1 ♂, rodent nests, coll. JV; 2582, II/hc/4, 29.IX.1951, 11 ♂, 4 ♀, buffalo, coll. HDS; 3509, PFNK/15, 23.V.1952, 1 ♀, *Alcelaphus lelwel lelwel* (HEUGLIN) (No. 4673), coll. HDS.

HOSTS UNKNOWN.

Nos. 548, I/o/1, 22.V.1950, 1 ♀, on vegetation, coll. HDS; 643, I/o/3, 27.VI.1950, 1 ♂, on vegetation, coll. GD; 686, I/a/1, 10.VII.1950, 2 ♂, on vegetation, coll. GD; 753,

I/o/1, 10.VIII.1950, 4 ♀, on vegetation, coll. GD; 789, Napokomweli, 26.VIII.1950, 1 ♀, on vegetation, coll. GD; 790, I/o/2, 30.VIII.1950, 1 ♀, on vegetation, coll. GD; 1443, II/hd/4, 23.III.1951, 2 ♂, on vegetation, coll. HDS; 1809, II/id/8, 22.V.1951, 1 ♂, on vegetation, coll. JV; 1886, II/gc/6, 8.VI.1951, 1 ♂, on vegetation, coll. HDS; 1902, II/gd/4, 12.VI.1951, 1 ♀, on vegetation, coll. HDS; 1903, II/gd/11, 12.VI.1951, 1 ♂, on vegetation, coll. HDS; 1969, II/gd/11, 23.VI.1951, 1 ♀, on vegetation, coll. HDS; 1988, II/gd/10, 27.VI.1951, 1 ♂, on vegetation, coll. JV; 2052, II/gd/4, 5.VII.1951, 1 ♀, on vegetation, coll. HDS; 2102, II/fc/3, 16.VII.1951, 1 ♂, on vegetation, coll. HDS; 2128, II/fd/5, 23.VII.1951, 3 ♂, 2 ♀, on vegetation, coll. HDS; 2134, II/gd/4, 20.VII.1951, 1 ♀, on vegetation, coll. HDS; 2158, II/gc/8, 27.VII.1951, 1 ♂, on vegetation, coll. HDS; 2172, II/ec/4, 30.VII.1951, 1 ♀, on vegetation, coll. HDS; 2397, II/gd/10, 10.IX.1951, 1 ♀, on vegetation, coll. HDS; 2419, II/id/10, 11.IX.1951, 1 ♂, on vegetation, coll. HDS; 2452, II/je/4, 20.IX.1951, 9 ♂, 5 ♀, on vegetation, coll. HDS; 2615, PpK/52/g, 16.X.1951, 2 ♀, on vegetation, coll. HDS; 2740, II/gd/9, 8.XI.1951, 1 ♂, on vegetation, coll. HDS; 3547, II/gd/4, 27.V.1952, 1 ♂, 2 ♀, on vegetation, coll. HDS; 3589, Ndelele/2, 6.VI.1952, 1 ♀, on vegetation, coll. HDS; 3694, II/fd/4, 3.VI.1952, 3 ♂, 4 ♀, on vegetation, coll. HDS;, Garamba Park, 2 ♂, 1 ♀, no other data.

The material listed above was identified according to the criteria presented by THEILER (1947) and HOOGSTRAAL (1956). Several specialists including TENDEIRO and SANTOS DIAS would not agree with this identification and would call these specimens *R. lunulatus* (see TENDEIRO, 1959). However, until such time as a study of variation that occurs in the morphological features of *R. tricuspis* is completed, we prefer to follow the reasoning of THEILER and HOOGSTRAAL and consider *R. lunulatus* as a synonym of *R. tricuspis*.

R. tricuspis is scattered throughout most of Africa and parasitizes a variety of domestic and wild animals. For host and distribution information where *R. tricuspis* and *R. lunulatus* are considered as separate species the reader is referred to TENDEIRO (1959).

Rhipicephalus spp.

Hosts and Distribution :

BIRD.

Nos. 1030, II/h, 28.XII.1950, 3 N, *Treron culva wellensis* (REHW), (No. Z. 2266), coll. JV.

MAMMALS.

Nos. 1072, II/f/3, 9.I.1951, 1 N, rodent nest of *Mungos mungo gotneh* (HEUGLIN and FITZINGER) (No. Z. 1702), coll. JV; 1134, Kassi-Garamba, 20.I.1951, 1 N, rodent nests, coll. JV; 1878a, II/gd/4, 6.VI.1951, 3 L, rodent nest, coll. HDS; 2671, II/gd/8, 27.X.1951, 7 L, *Thryonomys* (No. Z. 3995), coll. HDS; 3014, II/gd/4, 11.I.1952, 2 N, rodent burrow, coll. JV.

HOSTS UNKNOWN.

Nos. 2160, II/gd/11, 28.VII.1951, 1 ♀, on vegetation, coll. HDS; 3127, II/ic/9, 14.II.1952, 1 L, on vegetation, coll. JV; 3437/3, Namberima-Garamba, 6.V.1952, 2 L, on vegetation, coll. JV.

At the present time it is impossible for us to furnish specific determination for the above specimens.

CLASSIFIED HOST LIST

REPTILES.

ORDER TESTUDINATA.

TESTUDINIDAE.

Kinixys belliana mertensi *Amblyomma nuttalli*.

ORDER SQUAMATA.

VARANIDAE.

Varanus niloticus niloticus *Amblyomma variegatum*.
Aponomma exornatum.
Varanus sp. *Aponomma exornatum*.
 Reptile *Amblyomma nuttalli*.
Amblyomma variegatum.
Aponomma exornatum.

COLUBRIDAE.

Crotaphopeltis hotamboeia hotamboeia *Aponomma latum*.
Neusterophis olivaceus olivaceus *Aponomma latum*.

VIPERIDAE.

Bitis lachesis lachesis *Amblyomma nuttalli*.
Amblyomma variegatum.
Aponomma latum.

MAMMALS.

ORDER PRIMATES.

CERCOPITHECIDAE.

Cercopithecus aethiops centralis *Amblyomma variegatum*.
Haemaphysalis leachii.

ORDER PHOLIDOTA.

MANIDAE.

Manis gigantea *Rhipicephalus senegalensis*.

ORDER CHIROPTERA.

MOLOSSIDAE.

Tadarida condylura *Ixodes paradoxus*.
 Chiroptera *Amblyomma nuttalli*.

ORDER CARNIVORA.

FELIDAE.

- Felis serval* *Amblyomma variegatum.*
Amblyomma sp.
Haemaphysalis leachii.
Rhipicephalus sanguineus.
Panthera pardus *Haemaphysalis leachii.*
Rhipicephalus sanguineus.

VIVERRIDAE.

- Genetta tigrina aequatorialis* *Amblyomma cohaerens.*
Amblyomma variegatum.
Haemaphysalis leachii.
Haemaphysalis muhsami.
Rhipicephalus sanguineus.

HERPESTIDAE.

- Herpestes ichneumon* *Amblyomma nuttalli.*
Haemaphysalis muhsami.
Mungos mungo gotneh *Haemaphysalis muhsami.*
Rhipicephalus senegalensis.
Rhipicephalus spp.

HYAENIDAE.

- Crocotta crocuta* *Haemaphysalis leachii.*
Haemaphysalis muhsami.

ORDER UNGULATA.

SUIDAE.

- Phacochoerus aethiopicus* *Amblyomma variegatum.*
Rhipicephalus senegalensis.

BOVIDAE.

- Alcelaphus lelwel lelwel* *Amblyomma variegatum.*
Rhipicephalus tricuspis.
Alcelaphus *Amblyomma variegatum.*
Buffalo *Amblyomma cohaerens.*
Amblyomma variegatum.
Rhipicephalus pseudolongus.
Rhipicephalus sanguineus.
Rhipicephalus senegalensis.
Rhipicephalus supertritus.
Rhipicephalus tricuspis.
Ourebia ourebi goslingi *Amblyomma variegatum.*
Rhipicephalus sanguineus.
Tragelaphus scriptus diana *Amblyomma cohaerens.*
Amblyomma sp.
Rhipicephalus sanguineus.

RHINOCEROTIDAE.

- White rhinoceros *Amblyomma variegatum.*

ORDER RODENTIA.

MURIDAE.

<i>Lemniscomys striatus</i>	<i>Haemaphysalis muhsami.</i> <i>Rhipicephalus pseudolongus.</i> <i>Rhipicephalus senegalensis.</i>
<i>Lemniscomys</i> (?)	<i>Haemaphysalis leachii.</i> <i>Rhipicephalus senegalensis.</i>
<i>Tatera</i> sp.	<i>Rhipicephalus simus.</i>

ECHIMYIDAE.

<i>Thryonomys</i>	<i>Amblyomma cohaerens.</i> <i>Amblyomma variegatum.</i> <i>Rhipicephalus senegalensis</i> <i>Rhipicephalus simpsoni.</i> <i>Rhipicephalus</i> spp.
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Burrows of macroscelid <i>Elephantulus</i> sp. ..	<i>Rhipicephalus pseudolongus.</i> <i>Rhipicephalus senegalensis.</i>
Murid	<i>Amblyomma cohaerens.</i> <i>Amblyomma</i> sp. <i>Haemaphysalis leachii.</i> <i>Haemaphysalis muhsami.</i> <i>Haemaphysalis leachii</i> or <i>muhsami.</i> <i>Rhipicephalus pseudolongus.</i> <i>Rhipicephalus senegalensis.</i>
Rodent hairs	<i>Haemaphysalis muhsami.</i> <i>Ixodes spinae.</i>
Rodent nests	<i>Haemaphysalis leachii.</i> <i>Dermacentor rhinocerinus.</i> <i>Haemaphysalis leachii</i> or <i>muhsami.</i> <i>Rhipicephalus pravus.</i> <i>Rhipicephalus pseudolongus.</i> <i>Rhipicephalus sanguineus.</i> <i>Rhipicephalus senegalensis.</i> <i>Rhipicephalus simpsoni.</i> <i>Rhipicephalus simus.</i> <i>Rhipicephalus tricuspis.</i> <i>Rhipicephalus</i> spp.
Rodent nest « Gwa »	<i>Haemaphysalis muhsami.</i> <i>Rhipicephalus simus.</i>
Rodent nest « Tula »	<i>Haemaphysalis muhsami.</i> <i>Ixodes spinae.</i> <i>Rhipicephalus simus.</i>
Shrew nest	<i>Amblyomma</i> sp.
Sciurid	<i>Ixodes browningi.</i>
Mammals	<i>Amblyomma cohaerens.</i> <i>Amblyomma nuttalli.</i> <i>Amblyomma variegatum.</i> <i>Amblyomma</i> sp. <i>Ixodes</i> sp. <i>Rhipicephalus sanguineus.</i> <i>Rhipicephalus simpsoni.</i>

BIRDS.

ORDER ANSERIFORMES.

ANATIDAE.

Dendrocygna viduata *Amblyomma variegatum.*
Rhipicephalus senegalensis.
Rhipicephalus tricuspis.

ORDER ACCIPITRIFORMES.

AEGYPTIIDAE.

Pseudogyps africanus *Amblyomma variegatum.*
Rhipicephalus sanguineus.

ORDER GALLIFORMES.

PHASIANIDAE.

Francolinus icterorhynchus icterorhynchus. *Amblyomma* sp.

ORDER COLUMBIFORMES.

COLUMBIDAE.

Treeron calva wellensis *Rhipicephalus* spp.

ORDER CUCULIFORMES.

CUCULIDAE.

Chrysococcyx caprius *Haemaphysalis leachii.*
Rhipicephalus sanguineus.

ORDER MACROCHIRIFORMES.

COLIIDAE.

Colius passer ardeus concolor *Haemaphysalis leachii.*
Rhipicephalus sanguineus.

ORDER PASSERIFORMES.

STURNIDAE.

Lamprocolius *Amblyomma* sp.

PLOCEIDAE.

Hypochera amauropteryx camerunensis ... *Rhipicephalus simpsoni.*
 Bird *Amblyomma cohaerens.*
Amblyomma variegatum.
Amblyomma sp.
Haemaphysalis hoodi.
Rhipicephalus senegalensis.

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INDEX
ARRANGED ALPHABETICALLY

GENUS.

	Pages.		Pages.
<i>Amblyomma</i> KOCH	6	<i>Haemaphysalis</i> KOCH	13
<i>Aponomma</i> NEUMANN	9	<i>Ixodes</i> LATREILLE	17
<i>Argas</i> LATREILLE	5	<i>Rhipicephalus</i> KOCH	18
<i>Dermacentor</i> KOCH	11		

SPECIES.

	Pages.		Pages.
<i>arboreus</i> KAISER, HOOGSTRAAL and KOHLS (<i>Argas</i>)	5	<i>parmata</i> NEUMANN (<i>Haemaphysalis</i>) ..	16
<i>browningi</i> ARTHUR (<i>Ixodes</i>)	17	<i>pravus</i> DÖNITZ (<i>Rhipicephalus</i>)	18
<i>cohaerens</i> DÖNITZ (<i>Amblyomma</i>)	6	<i>pseudolongus</i> SANTOS DIAS (<i>Rhipicephalus</i>)	18
<i>exornatum</i> (KOCH) (<i>Aponomma</i>)	9	<i>rhinocerotis</i> (DE GEER) (<i>Amblyomma</i>)	7
<i>hoodi</i> WARBURTON and NUTTALL (<i>Haemaphysalis</i>)	13	<i>rhinocerinus</i> (DENNY) (<i>Dermacentor</i>) ..	11
<i>latum</i> (KOCH) (<i>Aponomma</i>)	10	<i>sanguineus</i> (LATREILLE) (<i>Rhipicephalus</i>)	22
<i>leachii</i> (AUDOUIN) (<i>Haemaphysalis</i>) ...	13	<i>senegalensis</i> KOCH (<i>Rhipicephalus</i>) ...	23
<i>leachii</i> or <i>muhsami</i> (<i>Haemaphysalis</i>) ..	16	<i>simpsoni</i> NUTTALL (<i>Rhipicephalus</i>) ...	26
<i>muhsami</i> SANTOS DIAS (<i>Haemaphysalis</i>)	15	<i>simus</i> KOCH (<i>Rhipicephalus</i>)	28
<i>nuttalli</i> DÖNITZ (<i>Amblyomma</i>)	7	<i>spinae</i> ARTHUR (<i>Ixodes</i>)	17
<i>paradoxus</i> KOHLS and CLIFFORD (<i>Ixodes</i>)	17	<i>supertritus</i> NEUMANN (<i>Rhipicephalus</i>) .	28
		<i>tricuspis</i> DÖNITZ (<i>Rhipicephalus</i>) ...	29
		<i>variegatum</i> (FABRICIUS) (<i>Amblyomma</i>)	8
		<i>vespertilionis</i> (LATREILLE) (<i>Argas</i>) ..	5

TABLE OF CONTENTS

	Pages
INTRODUCTION	3
FAMILY ARGASIDAE	5
Genus <i>Argas</i>	5
FAMILY IXODIDAE	6
Genus <i>Amblyomma</i>	6
Genus <i>Aponomma</i>	9
Genus <i>Dermacentor</i>	11
Genus <i>Haemaphysalis</i>	13
Genus <i>Ixodes</i>	17
Genus <i>Rhipicephalus</i>	18
CLASSIFIED HOST LIST	32
REFERENCES	37

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