

Ticks in the South African Zoological Survey Collection.

Part VI.—Little Known African Rhipicephalids.

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LIST OF AFRICAN RHIPICEPHALIDS WHOSE DESCRIPTIONS ARE NOT INCLUDED IN THIS ARTICLE.

- R. appendiculatus* Neumann 1901.
R. duttoni Neumann 1907 may prove to be a synonym.
- R. ayrei* Lewis 1933.
 Parasitology XXV, p. 269.
- R. bursa* Canestrini and Fanzago 1877.
 Occurs in North Africa.
- R. capensis* Koch 1844.
R. longus Neumann 1907 is to be considered a variety of *R. capensis*.
 Synonym. *R. sulcatus* Neumann 1908.
- R. evertsi* Neumann 1897.
- R. evertsi mimeticus* Dönitz 1910.
 Syn: *R. evertsi-albigeniculatus* Warburton 1916.
- R. glabroscutatum* du Toit 1941.
 Onderstepoort Jnl. Vet. Sc.-Anl. Ind: XVI p. 115.
- R. lundbladi* Zumpt 1942.
 Recorded from Madeira and placed in the *appendiculatus* group.
 Z. parasitk. XII p. 538.
- R. macropis* Schulze 1936.
 (From Aden, a variety of *R. sanguineus*?)
 Z. Parasitenk VIII p. 521 figs.
- R. maculatus* Neumann 1901.
 Syn: *R. ecinctus* Neumann 1908. (Zumpt makes *ecinctus* a synonym of
R. pulchellus).
 See Warburton 1932 Parasitol: XXIV p. 567.
- R. neavei* Warburton 1912.
 Parasitol. V, p. 9.
- R. neavei* var. *punctatus* Warburton 1912.
 Parasitol. V, p. 10.

R. oculatus Neumann 1901.

Var. *R. pravus* Dönitz 1910.

Warburton 1912 thinks *R. pravus* may be the same as *R. naevei* var. *punctatus*. Zumpt 1942 places it in the *appendiculatus* group.

R. pulchellus Gerstäcker 1873.

Syn. R. marmoreus Pocock 1900. See Cunliffe *Parasitol.* VI p. 210.

Var. *humeralis* Rondelli 1926.

R. sanguineus Latreille 1806.

R. simus Koch 1944.

Pterygodus fulvus Neumann 1913.

From North Africa.

See Colas-Belcour. *Arch. Inst. Past. Tunis* p. 430 figs.

LITERATURE REFERENCE.

Keys and/or descriptions of the above will be found in:—

- BEDFORD (1932). Key and check list of S. African Ectoparasites. 18th Report Dir. Vet. Serv. and Anl. Ind., Union of S. Africa.
- BEQUAERT (1931). Synopsis des Tiques du Congo Belge, *Rev. Zool. Bot. Afr.*, Vol. XX, No. 3, p. 209.
- NEUMANN (1911). Ixodidae in *Das Tierreich*, herausg. V. T. E. Schulze, im Auftrage der K. Preuss. Akad. d. Wiss. zu Berlin. Berlin, R. Friedländer & Sohn. 26 Lieferung; figs.
- NUTTALL (1916). Ticks of the Belgian Congo. *Bull. Ent. Research*, Vol. VI, No. 4, p. 313, figs.
- THEILER, G. (1942). Ticks off domestic stock in Portuguese East Africa, *Moçambique documentária trimestral. Lourenço Marques*, Vol. XXXIII, pp. 51-120, figs.

INTRODUCTION.

Frequently the re-editing, recapitulating and the assorting of known facts lead to an increase in knowledge. With this in mind, and in view of the renewed interest which is being taken in the more precise distribution of African ticks, it has been deemed advisable to make available to zoologists and to field veterinarians the descriptions of some of the lesser known African ticks; descriptions scattered during the last forty years in various journals which are not generally available. Nuttall *et al* rendered a great service by issuing monographs on the ixodid genera HAEMAPHYSALIS, IxODES and AMBLYOMMA, but the monograph on the genus *Rhipicephalus* still has to be written. Zumpt 1942 has written a series of Articles under the title of "Vorstudie zu einer Revision der Gattung *Rhipicephalus* Koch". published in *Z. Parasitenk* XI and XII. This work, reviewed in the *Vet. Bulletins* XII and XIII, unfortunately is not procurable at the moment.

REMARKS ON THE CLASSIFICATION OF THE GENUS RHIPICEPHALUS.

Diagnostic Characters.—Usually inornate; palps short; eyes present; basis capituli usually hexagonal dorsally; hypostome 3/3; all coxae with two spurs; tarsi tapering, with two successive ventral terminal spurs; festoons present; the males possess an anal shield, an accessory anal shield may be present or absent; stigma in the male an elongate comma, in the female more compact.

The genus itself is very characteristic and easily recognizable, but the identification of its species is difficult, often extremely difficult. Most rhipicephalids are inornate, so that one cannot rely on *ornamentation* as a confirmatory feature. Then again the *coxae* also resemble one another throughout; or, if there are any variations within the genus, these variations are so inconspicuous as to be negligible, so another classificatory feature falls away. The *legs* too are built to the same plan, with their tarsi tapering gradually and having two terminal spines ventrally, and with their caruncle large; generally the legs are medium in size, occasionally the fourth pair may be enlarged as in *R. appendiculatus*; but usually there is no marked nor appreciable difference between them. So that neither the *coxae* nor the tarsi can be used for purposes of specific identification.

The only features of any classificatory value whatsoever are, in order of importance, (a) *in the male*; the conscutum, the anal plates, the basis capituli and the palps; (b) *in the female*; the scutum, the basis capituli and the palps. The *size* of the specimen may be of some assistance; some species are small; the size of any one species, unfortunately, varies enormously, so that frequently a large species is represented by small individuals; fortunately, however, though a small species can be represented by yet smaller individuals, it will never produce large ones. Variations are also shown by other features used in the identification of the rhipicephalids. Thus the *punctations* though conforming to a certain pattern, may yet vary considerably within that pattern, so that no two individuals will show an identical picture. The range in size, in depth and in distribution of the punctations may be quite great, but the sum total effect yet falls within the typical pattern. The *anal plates* may show slight variations within the species, but on the whole are perhaps more constant in character than are the punctations. In the structure of the *palps*, also, the interspecific differences are but slight, but they do appear to be the most constant and the least variable of the classificatory features; unfortunately, however, but few workers thus far have paid any attention to them.

Hence, in republishing the descriptions of the lesser known rhipicephalids, only those features which are of specific value have been selected from the original articles and the more general features have been studiously omitted. Descriptions of species represented in the Onderstepoort collection have been enlarged and brought up to date, and where available the larva and the nymph has also been described. No effort, however, has been made to evaluate the validity of those species not seen by the author, nor is any opinion expressed on the affinities of any of these species.

“ RHIPICEPHALUS ARMATUS ” Pocock 1900.

Male (Figs. 1 and 2).

5 mm. × 4 mm. Uniformly deep brown; slightly convex, shiny. *Conscutum* twice as broad posteriorly as anteriorly. Eyes, flat, marginal. Cervical groove deep, wide, slightly convergent posteriorly. Lateral groove deep, extending from the eye to the anterior edge of the last festoon, strongly pitted. According to Pocock: “posteriorly there is a pair of deeply pitted grooves, and between them and the lateral groove on each side another similar but curved groove which extends from in front of the middle as far back as the end of the lateral groove.” Punctation: in addition to the punctures in the lateral grooves, there are a few coarse punctations scattered here and there”. According to Neumann: “Punctations very large, deep,

contiguous or almost contiguous in the lateral grooves, continuing the lateral grooves anteriorly, and forming over the rest of the scutum irregular lines somewhat as in *R. simus*. In the largest individuals these linear punctations are in grooves of which there are two short posterior internals, and two externals, somewhat concave and twice as long. (The usual posterior median and posterior lateral grooves appear to be obliterated by the above-mentioned two pairs of heavily punctated lines).

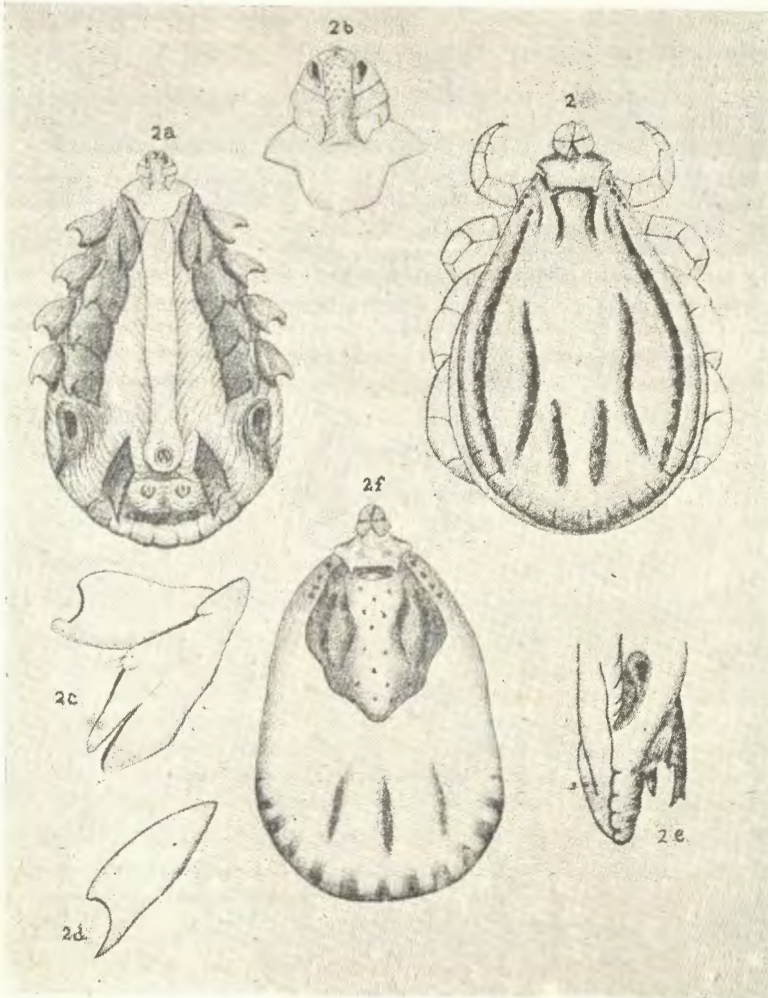


Fig. 1.—*R. armatus*, after Pocock, 1900.

Rostrum.—*Basis capituli* broader than long, lateral angles very salient, in anterior one third. Cornua salient. Two large punctations symmetrical, near straight posterior margin. *Palps* almost as broad as long, flattened dorsally. Articles 2 and 3 the same length, convex externally.

Legs.—Deep brown, strong, stout, with segments punctate.

Ventral Surface.—Anal plates, according to Neumann, punctate, furnished with scattered hairs; triangular, internal margin slightly concave; external shorter and slightly convex; the posterior concave and forming with the internal a long point. Immediately internal to this sharp point a very small triangular plate or spur. Behind the anus and between the anal plates, two small oval plates or sclerites, symmetrical, each situate on a small papilla. No caudal process.

Female (Fig. 2).

Scutum.—"Reddish in middle, blackish at sides", according to Pocock; Neumann gives it as "brownish-reddish": hardly longer than broad. Eyes in posterior $2/5$; postero-lateral margin sinuous. Cervical grooves deep, stopping at level of the eyes. Lateral grooves deep, formed by large punctations. Punctations according to Pocock, "some large punctations along the lateral edge in front of the eye, a few between the cervical grooves, and a few large ones and many smaller ones on the middle of the posterior area". According to Neumann "about a dozen punctations in the median field; some more, larger, also about one dozen on each pre-ocular field."

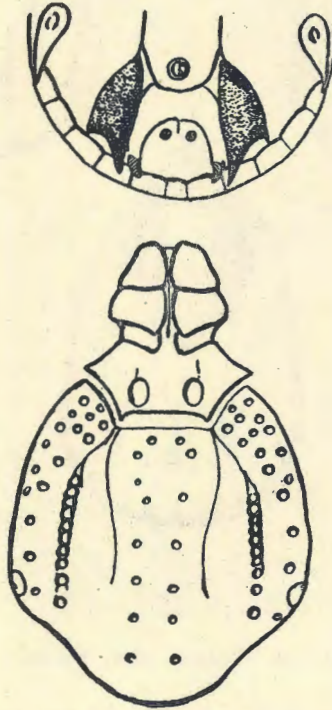


Fig. 2.—*R. armatus*. Top, ♂ ventral view; bottom, ♀ dorsal view, after Neumann, 1901.

Rostrum.—As in the male, with *basis capituli* shorter. Porose areas deep, oval, parallel.

Type.—Collected by Peel 1895 at Bularli, West Somaliland, deposited 1♂, 2♀ in British Museum; 2♂ 1♀ in Hope Museum, Oxford. Neumann's specimens 10♂, 4♀ were collected by Schillings off a lion, British East Africa; deposited in the Berlin museum.

Comments.—Warburton 1912 points out that there are certain rhipicephalids—of which but few examples have ever been found, but which are so peculiar that their claim to specific rank cannot be denied; amongst these he lists *R. armatus*.

LITERATURE.

POCOCK (1900). *Proc. Zool. Soc., London*, p. 50, plate III.

NEUMANN (1901). Révision de la famille des Ixodidae. *Mem. Soc. Zool., France*, Vol. XIV, p. 271, fig. 3.

WARBURTON (1912). *Parasitology*, Vol. V, p. 5.

“ RHIPICEPHALUS AURANTIACUS ” Neumann 1907.

Male. (Fig. 3.)

4.8 × 2.7 mm.; Coxa I not visible dorsally. *Conscutum* slightly convex, shiny reddish brown. Eyes large, flat, light coloured, marginal. Cervical grooves superficial, diffuse; lateral grooves obsolete or superficial, wide, weakly defined along internal edge, short, commencing halfway between eyes and stigmata, including the last festoon. Punctations numerous, fine sub-equal, shallow, non-confluent, slightly closer together in the lateral grooves, or in the region corresponding to the lateral grooves in those cases where they are obsolete; absent in the other depression. Posterior median groove large reaching to level of anus; the laterals shorter and shallower.

Rostrum 0.8 mm. *Basis capituli* twice as broad as long; lateral and posterior angles very salient. *Palps* almost as broad as long, flattened dorsally; Articles II and III about equally long.

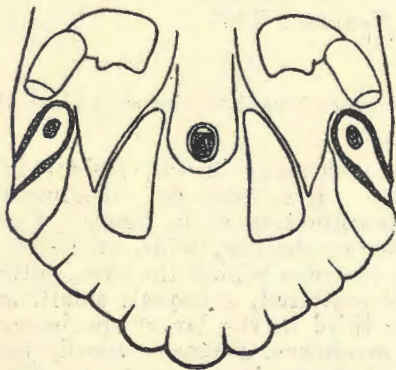


Fig. 3.

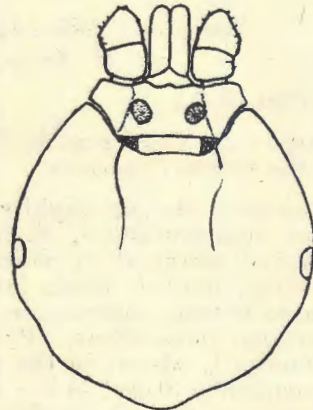


Fig. 4.

Fig. 3.—*R. aurantiacus* ♂, ventral view, after Neumann, 1907.

Fig. 4.—*R. aurantiacus* ♀, dorsal view, after Neumann, 1907.

Ventral surface yellow anteriorly, shading to orange posteriorly. [This orange colouring of the abdomen, which gives the tick its specific name, I have also seen in a batch of *R. evertsi* collected in Namaqualand]. *Anal plates* an inverted comma, internal margin slightly concave, external convex, posterior convex continuing the curve of the external margin and making an angle with the internal. Accessory plates hardly, or not at all, chitinised at their tips.

Female. (Fig. 4).

Body short oval, 5.1 mm. \times 3.25 mm. *Scutum* as wide as long, 2 mm.; postero-lateral margin slightly sinuous. Eyes in middle of the length. Cervical groove shallow at origin, after that wider and very superficial, visible till posterior $\frac{1}{2}$. No lateral groove. Punctations resemble those of male, regularly distributed over entire surface.

Rostrum: Basis capituli at least twice as broad as long; lateral angles salient; cornua not prominent. Porose areas shallow, sub-circular; distance apart equal to their diameter, edged externally by a dorsal ridge. *Palps* longer than broad, otherwise as in the male.

Type.—5♂, 3♀ collected by Büttikofer off *Buffelus pumilus*, Liberia; deposited in the Museum at Leyden.

Geographical distribution.—Also reported by Bequaert 1931 off *Syncerus nana* and off wild pig from Congo Belge and from Liberia; and by Fiasson 1943 off a buffalo and off a *Potamochoerus* from Dolisie, Moyen-Congo.

LITERATURE.

NEUMANN (1907). Quatre espèces nouvelles d'Ixodides. Note XI. *Notes from the the Leyden Museum*, Vol. XXIX, p. 91, figs.

“ RHIPICEPHALUS COMPLANATUS ” Neumann 1910.

Synonym: Rhipicephalus planus Neumann 1910
nec *R. simus planus* Neumann 1907.

Male. (Figs. 5–6.)

A large tick; 4 to 5 mm. by 2.6 to 3.5 mm.; oval in shape, widest at the level of the stigma; inornate.

Conscutum: flat or slightly concave; chestnut brown, lighter in the centre; no ornamentations, slightly shiny. Eyes very flat, medium-sized, yellowish and marginal in position. Emargination as in figure. Cervical grooves short, narrow, deep; lateral grooves shallow, wide, including the penultimate festoon, commencing a short distance behind the eyes; pitted by a few unequal punctations. Punctations scattered, subequal, small, superficial, practically absent in the posterior third in the larger specimens and almost completely absent in the smaller specimens. Festoons sharply marked off from one another, increasing in length from the outermost towards the median, the median is also the largest. No posterior grooves [a posterior median groove figured in the drawing].

Rostrum: 0.85 mm. to 0.95 mm. *Basis capituli* twice as broad as long with three to five punctations; lateral angles not very pronounced, in the

anterior third; posterior cornua strong, but not prominent. *Palps* conform to type; article I visible dorsally; articles II and III equal, internal margin longer than external; twice as broad as long.

Legs: stout, long, dark chestnut brown: Coxa I slightly visible dorsally [only just visible in figure].

Ventral surface: uneven yellowish-brown. Anus towards the anterior quarter of the anal plates. *Anal plates* curved, broad anteriorly, broader still posteriorly; external margin very convex; internal margin forming an obtuse angle opposite the anus, then very concave, then straight and forming a sharp angle at its junction with the posterior margin; posterior margin somewhat concave towards the middle and forming an obtuse angle at either end.

Accessory and plates forming a strong chitinous point.

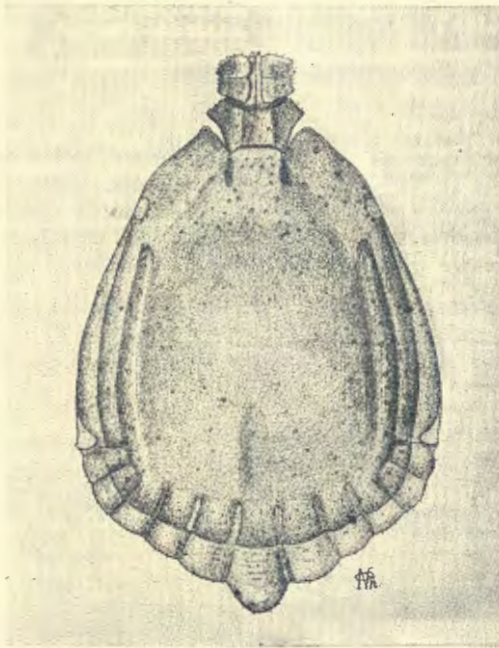


Fig. 5.

Fig. 5.—*R. complanatus* ♂, dorsal view, after Neumann, 1910.

Fig. 6.—*R. complanatus* ♂, ventral view, after Neumann, 1910.

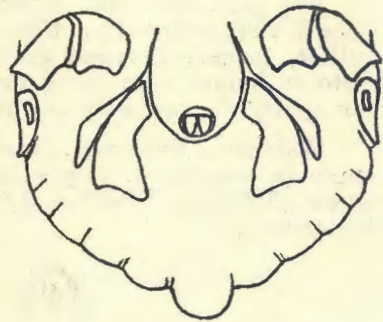


Fig. 6.

Female. (Fig. none.)

5 mm. × 3 mm., oval. *Scutum* wider 1.75 mm. than long 1.50 mm., dark chestnut brown. Eyes as in the male; emargination wide and deep; posterior lateral margin but slightly sinuous. Cervical grooves deep at first, then very superficial; lateral grooves well marked reaching to posterior border. Punctations discrete, small, slightly larger in the median and the lateral fields.

Rostrum: 1.05 mm. long. *Basis capituli*: as in the male; areae porosae small, slightly oval, hardly longer than broad; parallel; the distance apart equal to their greatest diameter. *Palps* longer than in the male; article 1 more visible than in the male.

Type: described from 6 males and one female collected in 1907 by Dr. Gravot, from a dead wild boar, in the Ivindo basin in the South Cameroons and deposited in the Paris Museum.

Geographical distribution.—Also reported by Fiasson, 1943 from *Potamochoerus* off Komono in the Moyen Congo.

LITERATURE REFERENCES.

- R. FIASSON (1943). Contribution à l'étude des Arthropods vulnérants du Moyen-Congo. *Rev. des Sc. Med. Pharm. & Vet. de l'Afrique Fr. Libre*, Vol. II, No. 3, p. 261.
- NEUMANN (1910). Sur quelques espèces d'ixodidae. *Annales Sc. Nat.*, Ser. IX, Vol. XII, p. 165-168.

RHIPICEPHALUS CUSPIDATUS, Neumann 1906.

Male. (Fig. 7.)

4.7 mm. × 3 mm. widest in posterior $\frac{1}{4}$, almost as broad anteriorly. Coxa I visible dorsally. *Conscutum* slightly convex, dark brown. Eyes flat, yellow, large. Cervical grooves deep and very short; no lateral grooves, festoons longer than broad deeply separated; punctations large, equal, rare, far apart, the majority occupying the place of the lateral margins.

Rostrum: 0.95 mm. *Basis capituli*: broader than long, smooth; lateral angle in anterior $\frac{1}{3}$, very salient; cornua salient. *Palps* hardly longer than broad, flattened dorsally; Article 3 as long as Article 2, article 2 projects posteriorly.

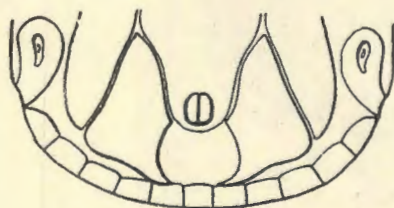


Fig. 7.—*R. cuspidatus* ♂, ventral view, after Neumann, 1906.

Legs.—Stout. *Ventral Surface*: Anal shield quadrilateral, longer than broad; external margin straight; antero-internal margin convex; postero-internal concave, the posterior margin sinuous, forming with the postero-internal a long strong point. Accessory shield hardly chitinous, with numerous hairs. No caudal process.

Female. (No Figure.)

6 mm. × 4 mm. *Scutum*: Chestnut brown, slightly broader than long 2.43 mm. × 2.56 mm., margins slightly sinuous; eyes slightly in front of middle of scutum. Cervical grooves deepest at point of origin, wide and superficial, later reaching almost to posterior border. No lateral grooves.

Punctations about one dozen on either side, large, forming a line of 3-4 beyond the cervical groove; one or two in the median field, the rest along the lateral border in front of the eyes.

Rostrum.—*Basis capituli*: Twice as broad as long, with the same outline as in the male. Porose areas deep, oval, separated by about twice their diameter. *Palps*: as in the male, but slightly longer.

Type.—1♂ and 4♀ collected off *Phacochoerus* in Senegal, deposited in the British Museum.

LITERATURE.

Neumann (1906), Notes sur les Ixodidés IV. *Archives de Parasitologie* X p. 209, fig. 11.

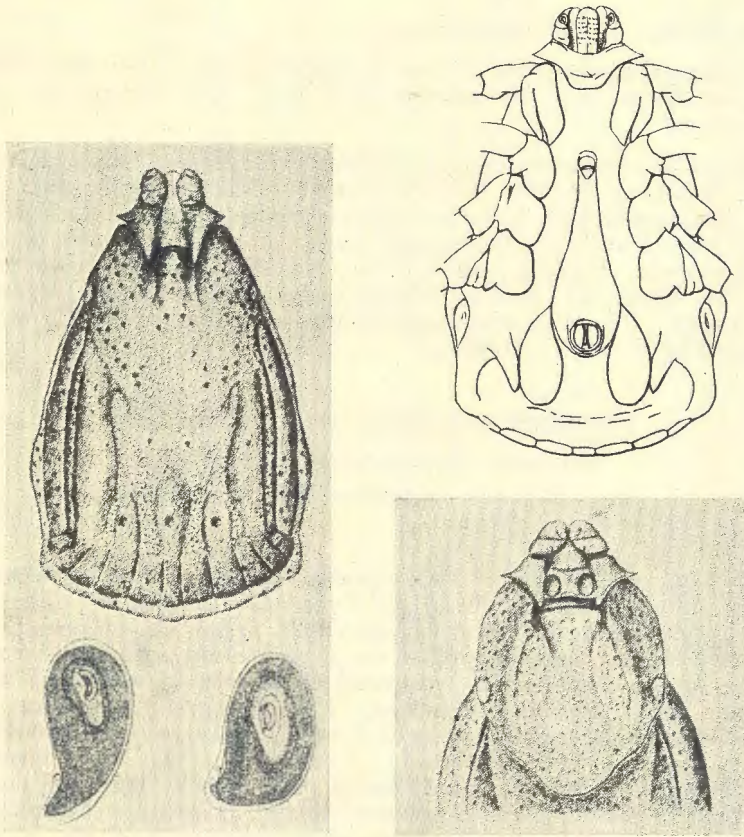


Fig. 8.—*R. deltoideus*. ♂ and ♀, after Neumann, 1910.

RHIPICEPHALUS DELTOIDEUS, Neumann 1910.

Male. (Fig. 8.)

Contour subtriangular, widest behind the middle.

Conscutum.—Eyes flat, surface shiny, uniformly brown. Lateral grooves deep, long, commencing near the eye. Posterior grooves present. Punctations fairly numerous; with fine punctations evenly distributed, and large punctations rare and far apart; three or four smooth longitudinal folds.

Ventral Surface.—Anal plate subtriangular with convex posterior margin.

Legs.—Coxa I not visible dorsally.

Female. (Fig. 8.)

Scutum.—Uniformly brown, oval, longer than broad. The cervical field is sunken. Lateral groove well developed. Punctations very uneven, very fine and very large, far apart.

Rostrum.—*Basis capituli*: Width equals three quarters that of the scutum. Porose areas large, distance apart equal to their longest diameter. *Palps* short.

Type. ♂ and ♀ from Basutoland.

The original description is not available to me; the above diagnostic features are taken from Bequaert's 1931 Key. The figures are from the original article.

Occurrence.—Bequaert records it from wild hares, Ishasa River to the North of Rutshuru in the Belgian Congo. The Onderstepoort collection contains specimens which have been provisionally identified as *R. deltoideus*? off a wild hare from near Richmond, Cape; off *Gazella granti brighti* from Lolito, Kasamoja, Uganda; off *Struthio camelius molydophares* from near Kodide, Jie, Karemoja; and off *Neotis caffra jacksoni* from Unyama river, Gulu, Uganda. The Uganda material was all collected by T. W. Chorley and donated by G. H. E. Hopkins.

RHIPICEPHALUS DISTINCTUS, Bedford 1929.

Synonym: *R. punctatus* Bedford 1929.

nec. *R. neavei-punctatus* Warburton 1912.

Male. (Fig. 9.)

2.26 mm. × 1.5 mm. oval, nearly twice as wide posteriorly as anteriorly. Coxa I visible dorsally. *Conscutum* reddish to light brown in colour; shiny. Emargination deep; eyes flat, yellowish, marginal. Cervical grooves very short. Lateral grooves deep, picked out with large punctations, extending to the first festoon, preceded anteriorly by a row of five to six punctations more internal in position. Posterior grooves median, indicated by a fine line, the laterals by a slight dimple, or the posterior grooves may be obsolete. Festoons well developed. Punctations, very few, large, widely spaced, those in the posterior half being particularly large and deep, a few clustered on the shoulder and a few posteriorly; an odd punctation present on one or other festoon; arising from each punctation there is a minute (caudent) pale hair.

Rostrum.—*Basis capituli*: Wider than long, 0.43 mm. × 0.5 mm. Lateral angle very far forward, prominent; posterior margin very slightly concave without pronounced cornua; two or more large punctations. *Palps*: longer than broad. Articles 2 and 3 wider than long, almost equally long. Article 1 visible dorsally.

Ventral Surface.—Reddish brown, with a few punctations, each with a small pale hair. No caudal process. Anal plate elongate, sides almost parallel, internal margin with a very slight concavity, longer than external,

so that the convex posterior margin meets the inner margin at an angle less than a right angle and the outer margin at an angle greater than a right angle; both angles rounded off. Accessory plates: only the tip of the pronounced fold is chitinized, into a sharp point.

Female. (Fig. 10.)

When unengorged the scutum covers over half the body length.

Scutum slightly wider than long, 1.26 mm. \times 1.36 mm., or as long as broad; dark reddish brown, shiny. Emargination wide and shallow. Eyes flat, yellowish. Cervical grooves very short, bent inwards, followed by a slight cervical depression. Lateral grooves entirely absent. Punctations four to five large punctations limiting the raised lateral border (i.e. in the position of a lateral groove); four to five widely separated in the posterior median field; two to four anteriorly on the central field, a few smaller ones clustered on each shoulder. The general scutal surface covered by fine shallow punctations, not seen in the male.

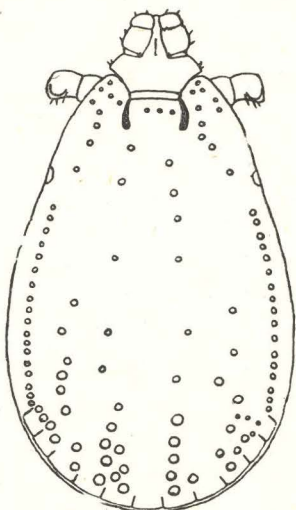


Fig. 9.

Fig. 9.—*R. distinctus* ♂, dorsal view, after Bedford, 1929.

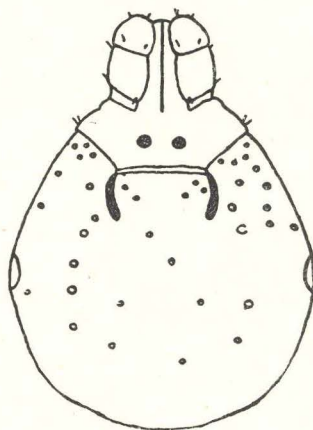


Fig. 10.

Fig. 10.—*R. distinctus* ♀, dorsal view, after Bedford, 1929.

Rostrum.—*Basis capituli*: more than twice as broad as long, lateral angle sharp, far forward, cornua not pronounced. Porose areas rounded, distance apart a little more than their diameter. *Palps.* Articles 2 and 3 about as broad as long, equal in length; Article 1 about three quarter as long as 2.

Nymph. (Fig. 11.)

Closely resembles the female. *Scutum*: 0.48 mm. \times 0.52 mm., slightly broader than long; antero-lateral margin straight, postero-lateral and posterior margin smoothly rounded. Emargination very wide and shallow. Eyes large and conspicuous. Cervical groove bending inwards at first and then diverging to approach the posterior margin; lateral groove straight; edging a well pronounced raised lateral border reaching to posterior margin, forming with the cervical a narrow cervical field.

Rostrum.—*Basis capituli* has the same foreshortened appearance as that of the female, at least three times as broad as long; lateral angle: prominent, forward; cornua weak; postero-lateral margin but slightly concave. *Palps*: longer than broad, articles 2 and 3 about as broad as long, about equally long. Article 1 visible dorsally.

Type.—Off *Procavia capensis coombsi* from Onderstepoort, deposited in the Onderstepoort collection. The nymph is described from the Kalkfelt material listed below.

Occurrence.—The Onderstepoort collection contains batches off the Dassie (i.e. *Procavia*) from Omaruru, South West Africa; 2 lots off *Procavia capensis* from Leeuwkoppie, Hout Bay, near Cape Town; 2 lots off *Heterohydra welwitschi volkmanni* from Kalkfelt and from Kamanjab, S.W.A. collected by the Barlow-Transvaal museum expedition; one batch off *Procavia johnstoni matscheie* from Mwanza, Tanganyika; one batch off sheep, Victoria West, Cape Colony.

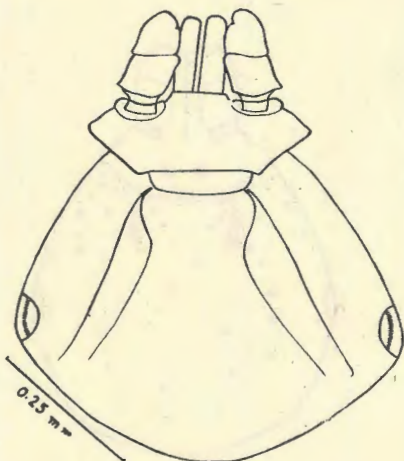


Fig. 11.

Fig. 11.—*R. distinctus* nymph, dorsal view. D. Pringle, del.

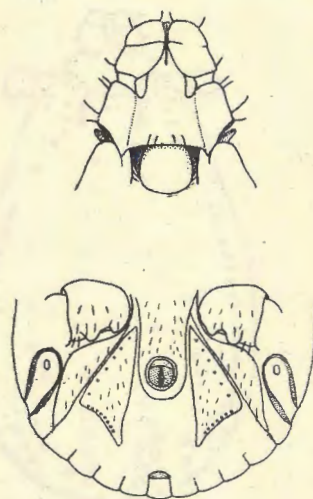


Fig. 12.

Fig. 12.—*R. duttoni*, Rostrum and ventral view, after Neumann, 1907.

The Dassie would thus seem to be its normal host and its distribution is possibly that of its host. Generally speaking, however, Dassies are remarkably free of ecto-parasites, hence the few records, as yet, of *R. distinctus*.

LITERATURE REFERENCES.

- BEDFORD (1912). Notes on some South African ticks with descriptions of three new species. 15th Ann. Rep. Dir. Vet. Serv., Un. of S. Af., p. 495, figs.
 BEDFORD (1932). A synoptic check list and host list of S.A. Ectoparasites. 18th Rep. Dir. Vet. Ser. and Anl. Ind., p. 523.

RIPHICEPHALUS DUTTONI Neumann 1907.

Male. (Fig. 12.)

3.5 mm. × 1.85 mm. Narrow in front, broadest a little posteriorly to the middle. *Conscutum*: slightly convex, chestnut brown. Eye flat,

yellowish, marginal; cervical grooves: very broad and shallow and form elongated depressions; they are not punctated and are continued posteriorly by a narrow superficial groove which extends beyond the middle point of the length; lateral grooves: broad, shallow, slightly and finely punctated, commencing immediately behind the eyes and including the last festoon. Posterior grooves: wide, shallow, unpunctated, the median the longest, festoons longer than broad, slightly punctated. Punctations irregular, coarsest in front, fine and superficial over the remainder of the surface.

Rostrum 0.6 mm. *Basis capituli* almost twice as broad (0.6 mm.) as long. Lateral angles: quite prominent at about the middle of the length; cornua: quite prominent. *Palps*: as broad as long; article 2 scarcely longer than article 3, and retracted into a blunt point dorsally at its posterior border.

Legs.—Relatively strong; Coxa I visible on dorsal surface.

Ventral Surface.—Covered by rather long and abundant whitish hairs. *Anal plates*: in the shape of a scaline triangle forming a long internal posterior spine; the internal margin is longest, rectilinear in its anterior half but is concave behind; external margin slightly convex; posterior margin concave and bordered by punctations. The accessory shields are replaced by a prominent non-chitinous fold. Caudal process present.

Type.—1♂ off a bovine at Zambie, Belgian Congo.

Occurrence.—Howard 1908 records a few specimens from the Northern Transvaal; also from Mozambique.

Comments.—Zumpt 1942 recognized this as a distinct species in his *appendiculatus* group; a group characterized by having the inner angles of the anal plates pointed and the accessory anals absent.

To my mind this species is indistinguishable from *R. appendiculatus*, with its third and fourth legs stouter than the first two, and frequently with the anal plate having its internal margin very elongate forming a very definite spine. However, I am hesitant to sink it as a separate species until the type specimen has been re-examined.

RHIPICEPHALUS DUX Dönitz 1910.

Synonym. R. schwetzi Larrousse 1927.

Male. (Figs. 13a, 13b.)

A large rhipicephalid; fully engorged, 6 mm. × 3.9 mm.; broadest slightly behind the eye, 3.4 mm. at eye level; compact oval in shape. Ornate, dark brown with white centre.

Consutum.—5.1 mm. in length; eyes quite flat; emargination as in figure; cervical pit small but deep followed by a short groove; lateral groove: indicated by a row of fairly close punctations, enclosing the last festoon; festoons as in figure. Punctations: a few larger punctations present next to the lateral groove as also on either side of the elongate median groove (depression); these larger punctations are also present on the scapulae and on the anterior midregion, and are more irregularly distributed and smaller than in *R. simus*; the smaller, fairly regularly distributed punctations on the other hand are markedly larger than in *R. simus*; the marginal field and the

festoons appear very smooth with only fine punctations; the larger punctations as seen on the 1st festoon on the left in the figure are an exception. The posterior grooves shallow, median groove pointed, the lateral grooves almost circular; these grooves do not join with the festoons. The ground colour is reddish-brown, the middle of the shield is lighter and posteriorly practically white. This lighter area ends abruptly at the level of the posterior edge of the lateral grooves. The colour of the median field becomes darker and browner from the middle of the body forwards; this change is most marked just behind the emargination. The foveolae are immediately in front of the pointed median groove; in front of these are two larger, almost circular and darkened depressions, further apart from one another than the foveolae; the nature of these depressions is not clear.

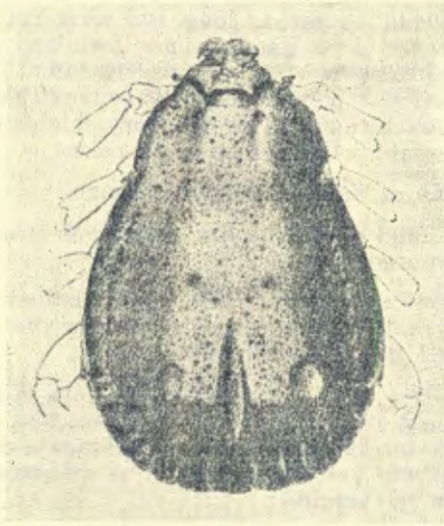


Fig. 13 (a).

Fig. 13 (a).—*R. dux*, ♂ dorsal view, after Dönitz, 1910.



Fig. 13 (b).

Fig. 13 (b).—*R. dux* ♂ anal shield, after Dönitz, 1910.

Rostrum.—*Basis capituli*: twice as broad as long; the cornua not included; 1 mm. × 0.5 mm. The antero-lateral margin is slightly longer than half of the postero-lateral margins. *Palps* as in figure. The ventral basal plate of article I is very broad.

Palps as in figure. The ventral basal plate of article I is very broad.

Legs: *Coxae* [According to the figure coxa I visible when viewed dorsally.]

Ventral surface: *Anal plates* show the closest resemblance to those of *R. bursa*; they are coarser, with fine punctations (see figure) [accessory anals, as judged by the figure, are apparently represented by a thickened fold of the chitin].

Female. (Fig. 14.)

Large, ornate with lighter median field.

Scutum: 2 mm. long and slightly broader than long. Eyes flat. Lateral groove very pronounced, punctations coarser than in male; grooves and punctations much the same as in *R. simus*, the fine punctations, however, are coarser and the large punctations smaller than in *R. simus*. The entire median field, up to the posterior border lighter in colour, the last third more definitely white.

Dorsum: White scales present in the marginal groove and in the large punctations. These, however, are smaller than in *R. simus*. Ornamentations, such as are seen in *R. pulchellus* and *R. maculatus*, absent.

Rostrum: *Basis capituli* twice as broad as long. *Areae porosae* fairly large and their own diameter apart.

Affinities (Dönitz 1910): differs from the other two ornate ticks, *R. pulchellus* and *R. maculatus*, in having a broad *basis capituli*; and in the male *R. dux* the posterior grooves are well developed, whereas in the other two species they are absent.

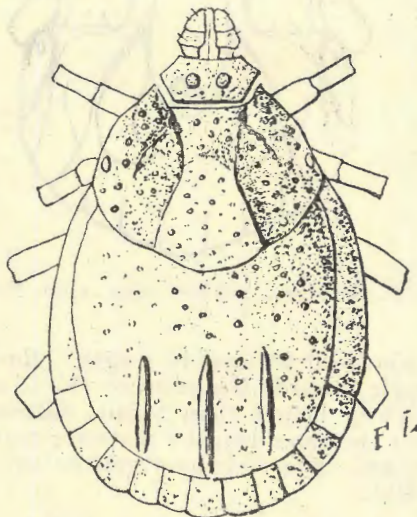


Fig. 14.—*R. dux*. ♀, after Larrouse, 1927.

Type: 1 male and 1 female from the Upper Congo.

Host: Probably the elephant in that the one specimen was included in a container with two *Amblyomma tholloni* and this latter species has thus far only been recorded from the elephant.

Distribution: recorded as *R. schwetzi* off *Hylochoerus itiuriensis* at Kotele, Belgian Congo; Bequaert (1931) reports it off *Syncerus planiceros*, the forest buffalo, at Medje, and off *Potamochoerus porcus* at Avakubi, Belgian Congo.

LITERATURE REFERENCES.

- BEQUAERT (1931). *Rev. Zool. Bot. Afr.*, Vol XX, No. 3, p. 337.
- DÖNITZ, W. (1910). Zwei neue Afrikanische Rhipicephalusarten (*R. dux* B. *glyphis*). *Sitzungsberichte Ges. Naturf. Freunde, Berlin*, No. 6, 1910.
- LARROUSSE (1927). (*R. Schwetzi*.) *Rev. Zool. Afr.*, Vol. XV, p. 214-216, figs.

" RHIPICEPHALUS FALCATUS " Neumann 1908.

Male. (Fig. 15.)

With rostrum 4.3 mm. to 4.8 mm. long by 2.7 to 3 mm. broad, at the level of the stigma; inornate; dark brown.

Conscutum: Slightly convex, not shiny, dark brown, smooth. Eyes medium, flat; yellowish. Emargination as in figure. Cervical groove very short, followed by a narrow depression. Lateral groove pronounced, beginning a short distance behind the eye and forming a continuation of a line further in, interrupted by large punctations; including the penultimate festoon. Festoons pronounced. Punctations: numerous, medium occupying the entire field between the lateral grooves, larger and closer together in the posterior third; practically absent on the festoons and on the marginal field. No posterior grooves (present, but faint, in the Onderstepoort specimens).

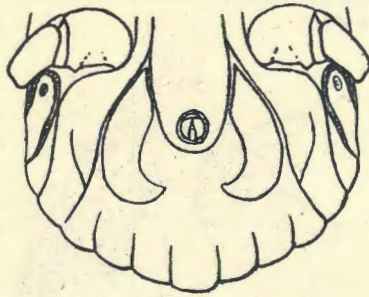


Fig. 15.—*R. falcatus* ♂, dorsal view, after Neumann, 1908.

Rostrum: 0.8 mm. to 0.95 mm. in length. *Basis capituli* broader than long 3:2; lateral angle towards the anterior third; cornua but slightly prominent. *Palps*: slightly longer than broad, flattened dorsally; Article II and Article III about the same length; posterior margin of article II tapering to a large point, and some distance from the basis capituli (i.e. article I partly visible dorsally).

Legs stout. *Coxa I* not visible or but slightly visible dorsally.

Ventral surface: Yellowish-white, glabrous; anus towards the middle of the anal plates. Anal plates sickle-shaped; the internal margin very concave posteriorly, forming a point with the posterior margin. Posterior margin forming a continuous convex curve with the external margin; accessory anals hardly or not at all chitinized. Festoons pronounced, with a dark spot along the free edge; median festoon often more prominent than the rest; the two neighbouring festoons are also enlarged sometimes.

Female.

Body oval, 4 mm. to 6 mm. long by 2 to 3 mm. broad at the level of the stigmata; dark brown.

Scutum: brown, slightly shiny; as broad as long; 2 mm.; posterior margin slightly sinuous. Eyes about halfway, flat, narrow. Cervical grooves not deep at their origin and then broad and very superficial, reaching about halfway back. Lateral grooves pronounced, edged externally by a raised

lateral field reaching to posterior border. *Punctations*: numerous, medium, subequal, absent along the cervical margin, along the posterior margin and practically absent along the preocular margin.

Rostrum: Basis capituli: at least twice as broad as long; lateral angles prominent; posterior angles scarcely prominent. *Areae porosae* oval, longer than broad; parallel, distance apart equal to their length. *Palps*: rather longer than broad, otherwise as in the male.

Type: described from 3 males and 8 females collected by Old, North of Lake Nyassa and deposited in the British Museum; and 4 males and 1 female collected by F. X. Stämpfli in Liberia and deposited in the Leyden Museum.

Comments.—Warburton in 1913 remarks, in connection with punctations on the scutum; "There is certainly for each species a characteristic punctation very recognizable in typical examples, but often widely departed from in individuals or in local varieties, and when this is the case the difference in facies between the ticks otherwise structurally identical may be very great. A striking case is *R. falcatus*, a densely punctate form, which at first glance bears no resemblance at all to *R. simus* where the punctations are few and arranged in linear series. Moreover *R. falcatus* typically possesses very characteristic anal plates quite unlike those we are accustomed to expect in *R. simus*, and there is no anterior prominence on coxa I. Yet we can find no other structural points in which the forms differ, and moreover we possess a tube of ticks from Nyasaland, which we have been quite unable, after repeated attempts, to sort out. There are many undoubted *R. falcatus*, a considerable number of obvious *R. simus* and every intermediate grade of anal plate, prominence of coxa I and punctations."

Warburton (1913) also degrades *R. lunulatus* Neumann 1907 (= *R. tricuspis* Dönitz 1906) to a variety of *R. simus*.

From my experience of South African ticks I find that although anal plates may show some variations within a species, the range is never so great as is assumed here, i.e. so great as to vary from a narrow sickle-shaped plate, through a bean, to kidney-shaped plate, still with convex external and posterior margin, to a plate such as we find in *R. tricuspis*, where the external margin is only slightly convex and where the posterior margin is definitely concave. Hence, since I disagree with the conclusions drawn by Warburton (1913) I am republishing the description of this tick under its original name of *R. falcatus*. A more detailed analysis of *R. simus* and of *R. tricuspis* will be given later, the analysis to be based on the offspring of several individual females.

Distribution.—*R. falcatus* is listed as present North of Lake Nyasa, Neumann 1908; Kenya, Lewis; Liberia, Neumann 1908; the Onderstepoort collection has specimens from a buffalo, Borôr, Portuguese East Africa; and from *Phacochoerus aethiopicus*, Gulu district, Uganda; off buffalo at Mabindi and Hoima, East Africa.

LITERATURE REFERENCES.

- NEUMANN (1908). Notes sus les Ixodidids—XI. *Notes from the Leyden Museum*, Vol. XXX, p. 77.
- WARBURTON (1912). Notes on the Genus *Rhipicephalus*. *Parasitology* V.

RHIPICEPHALUS FOLLIS Dönitz 1910.

Male. (Figs. 16–17.)

A medium-sized, squat tick, brown.

Conscutum: 3.9 mm. to 4.2 mm. \times 2.8 mm. to 3 mm.; convex; broad anteriorly. Eyes 1.9 mm. apart. Cervical groove, see figure; lateral groove well developed, ends at the penultimate festoon. Posterior grooves shallow, deeper in the one specimen than in the other, median groove does not reach the festoons; postero-laterals joined to the fourth festoon by a delicate prolongation; in the one specimen the postero-lateral groove forms a groove, in the other a broad depression which is slightly rugose and shows a few punctations. Punctations are fairly fine, superficial, fairly closely and evenly distributed; larger punctations present as uneven rows in front of the eyes and scattered separately over the scutum. In some places the punctation is denser, in others fine, sharply defined, microscopic punctations are present; but few punctations present on the lateral border.

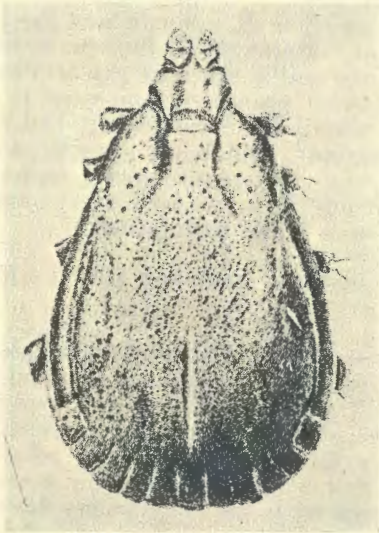


Fig. 16.

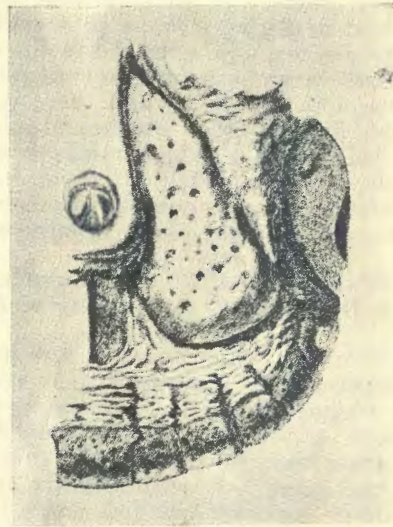


Fig. 17.

Fig. 16.—*R. follis* ♂ dorsal view, after Dönitz, 1910.

Fig. 17.—*R. follis* ♂, ventral view, after Dönitz, 1910.

Rostrum: *Basis capituli*: about .5 mm. long, not twice as broad as long; postero-lateral border about twice as long as the antero-lateral.

Ventral surface: Anal plates very broad posteriorly and resemble those of *R. bursa*; accessory plates well developed. *Festoons*: large, the middle one half as broad again as its neighbours; their posterior margin shows a fairly white edging, which is unknown in any other *Rhipicephalus*; even in the ornamented forms *R. maculatus* and *R. pulchellus* the festoons are uniformly brown.

Legs: Coxa I not visible on the dorsal surface according to the figure

Female. Unknown.

Type.—2 males, origin unknown, probably off domestic stock, South Africa.

Comments.—I have come across a tick off domestic stock from certain parts of the Cape Colony and of the Orange Free State which answers to *R. follis* in every other respect, except that the white band edging the festoons, as given in the diagnostic characters by Dönitz, is absent. If Dönitz had not made the definite comparison with the white enamel-like ornamentation of *R. maculatus* and of *R. pulchellus* one would be inclined to think that what he was describing was not the edge of the scutal festoons, but merely the lighter coloured abdomen which often protrudes beyond the conscutum. His figure of the dorsal surface is not very helpful for he neither shows the white edge to the festoons nor does he show the abdomen protruding beyond the scutum.

If, however, the statement as to the white edging to the festoons is meant to apply to the ventral surface, as may be assumed from its position in the detailed description, then his figure does bear out his detailed description. In the specimens which I have examined, however, I have not seen this lighter band on the ventral surface. The only explanations which I can offer at this stage, without the re-examination of the original material, is that Dönitz was working with dried specimens; in dried specimens, which are full of air, the abdomen sometimes does take on a hard enamel-like appearance.

If the surmise, that Dönitz was working with dried specimens, is correct, then the ticks which I have examined can be taken to be *R. follis*, and this would confirm Dönitz' supposition that the normal hosts are domestic stock, mostly cattle, and that *R. follis* occurs in South Africa.

LITERATURE REFERENCE.

DÖNITZ (1910). Die Zecken Süd Afrika's. L. Schultze Forschungsreise, Bd. IV, Taf. 16. *Jen: Denkschriften*, Bd. XVI.

“ RHIPICEPHALUS JEANNELI ” Neumann 1913.

Male. (Fig. 18.)

5 mm. × 2.7 mm. widest at stigma; oval in shape, narrowing anteriorly; sides convex, posterior margin rounded. Anterior process of Coxa I slightly visible dorsally.

Conscutum: inornate, dark chestnut brown, curved, shiny. Eyes: flat, medium sized, marginal, slightly coloured. Cervical groove: large, very superficial, otherwise almost reduced to a deep anterior pit. Lateral grooves: shallow, narrow, picked out by punctations, beginning a short distance behind the eyes. Festoons well marked; the last one slightly bigger than the others and slightly broader than long; the others longer than broad, the median the largest. No caudal appendage. Dorsal grooves absent, or but merely indicated. Punctations, numerous, fine, unequal; the majority very fine; may be confluent in front of the festoons; scarce on the lateral border and on the festoons.

Rostrum: dark, 0.85 mm. *Basis capituli* broader than long, 0.8×0.56 mm.; lateral angles towards anterior third, only slightly salient; cornua short narrow subacute, a few punctations in the middle. *Palps*: about as broad as long; articles 2 and 3 about equally long; article I relatively long.

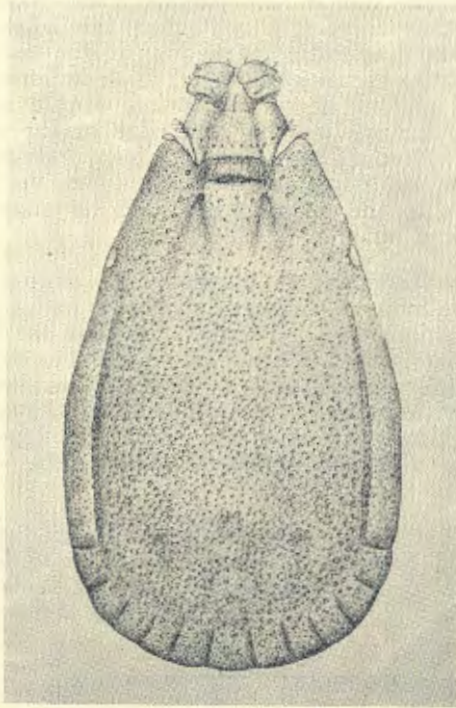


Fig. 18.—*R. jeanneli* ♂, dorsal view, after Neumann, 1913.

Legs: relatively strong; coxa I visible dorsally: *Ventral surface*: dark, with numerous hairs. *Anal plates*: subtriangular; anterior and pointed; internal margin concave opposite the anus, external margin hardly convex; posterior forms a wide curve with a small point at its junction with the internal margin; smooth, hardly punctate. Accessory anals chitinous, dark.

Female. (Fig. 19.)

4.1 mm. \times 2 mm. unengorged; widest about midway, oval, narrowing anteriorly.

Scutum: almost as long as broad, 1.7 mm. Eyes pale, slightly behind midway; postero-lateral margin slightly sinuous. Cervical margins slightly more pronounced than in the male; lateral grooves absent or hardly indicated. Punctations numerous, slightly larger than in the male.

Rostrum: 0.81 mm. in length. *Basis capituli* twice as broad (0.76 mm.) as long (0.4 mm.). Lateral angles rather more pronounced and not as far anteriorly as in the male. Cornua short, narrowed and more pointed than in the male. Porose areas, deep, oval; internal equal to their shortest diameter; a dorsal ridge touching their external margin. *Palps* as in the male.

Legs: more slender than in the male. Coxa I not visible dorsally.

Described from—

4 males, 5 females, Mala; British East Africa, 1912.

1 male, 1 female, Lower Regions of Mt. Kenya, 1912.

2 males, Bismarckhügel, Kilimandjaro, German East Africa, 1912.

1 male, Bismarckhügel, Kilimandjaro, German East Africa, 1913.

LITERATURE REFERENCE.

NEUMANN, L. G. Voyage de Ch. Alluaud et R. Jeannel en Afrique orientale 1911-1912. *Resultats Scientifiques Arachnides II Ixodidae*, p. 31-34.

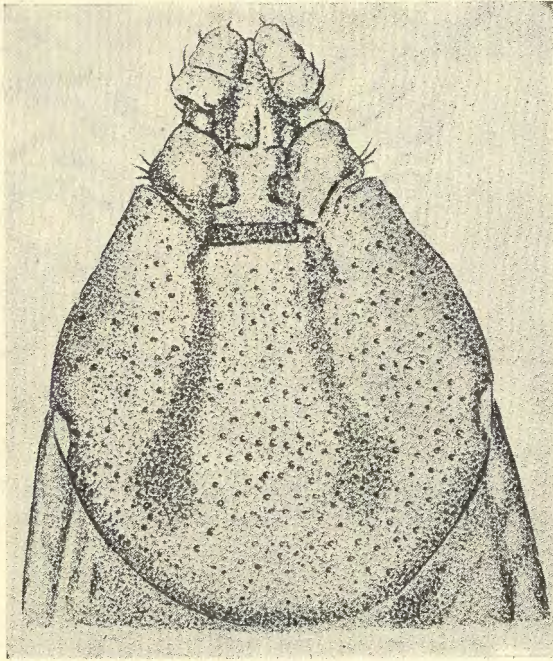


Fig. 19.—*R. feannelli* ♀, dorsal view, copied from Neumann, 1913, by G. E. Laurence.

“ RHIPICEPHALUS KOCHI ” Dönitz 1905.

Male. (Figs. 20-21.)

Size not nearly as broad as *R. ecinctus* (= *R. maculatus*); in shape and size resembles *R. sanguineus* most closely. Inornate; Coxa I visible dorsally.

Conscutum: eyes flat, slightly further back than in *R. sanguineus*. *Emargination*: see figure. Cervical grooves short and deep. Lateral groove absent; in its place are to be found large spots, fairly close together arranged in rows (this feature is not shown in Dönitz' drawing). *Festoons* short. *Punctations* equal, slightly smaller than the large punctations of *R. sanguineus*, evenly distributed and close together; along the margins there may

be an admixture of smaller punctations. The three posterior grooves absent; the median is represented by a fine microscopic line; in place of the two postero-lateral, under higher magnifications, a finely chagrined area may be seen.

Rostrum.—*Basis capituli* broader than long, with prominent lateral angles; antero-lateral border only slightly shorter than the postero-lateral border.

Ventral Surface.—Anal-plates very broad, as in *R. bursa*; the external and internal margins almost equally long; internal with a very slight concavity (hardly indicated in Donitz' drawing).

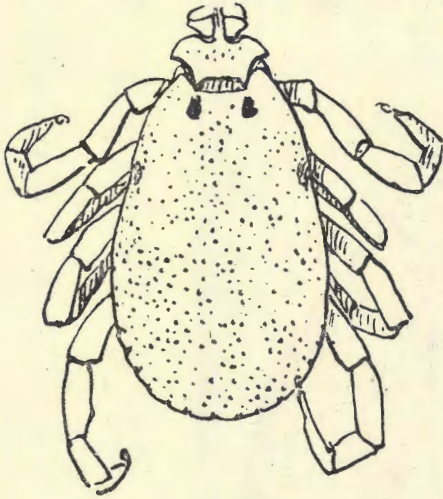


Fig. 20.

Fig. 20.—*R. Kochi* ♂, dorsal view, after Dönitz, 1905.

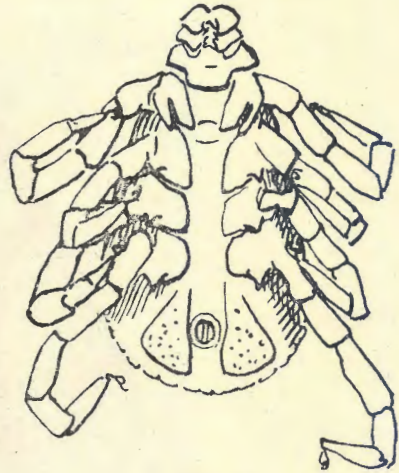


Fig. 21.

Fig. 21.—*R. Kochi* ♂, ventral view, after Dönitz, 1905.

Female. (Fig. 22.)

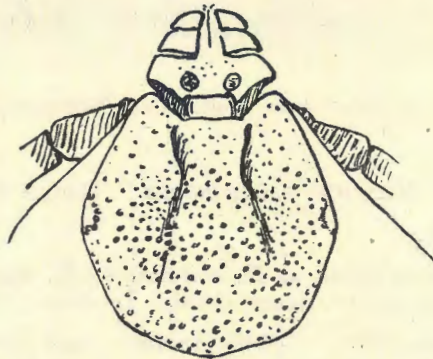


Fig. 22.—*R. Kochi* ♀, dorsal view, after Dönitz, 1905.

Scutum.—Sub-circular, with corners well rounded off; rather longer than broad. Cervical groove as in figure. Lateral groove absent; the raised lateral

field merges gradually with the cervical field. Punctations as in the male, i.e. medium-sized punctations, fairly close together, with a few smaller punctations in the lateral fields.

Rostrum.—*Areae porosae* more than their diameter apart.

Legs.—Weakly developed, but not quite as slender as in *B.decoloratus*.

Type: described from 1 male and 5 females from Soadani and 3 females from Lindi, East Africa, collected on cattle.

Comments.—In many respects *R. kochi* closely resembles the East African *R. neavei* i.e. in the close even punctations, the "hunched" basis capituli, and the small palps; but differs from it in the absence of the lateral groove, well marked in *neavei*; in the triangular anal plates, in *neavei*, the anal plate has a protuberance on the postero-internal angle and the postero-external angle is almost a right angle; the punctations are evenly distributed, in *neavei* they are absent in the region immediately in front of the eye.

LITERATURE REFERENCE.

DÖNITZ (1905). Die Zecken des Rindes als Krankheits-überträger. *Sitzb. Ges. Natf.* Berlin, 1905.

RHIPICEPHALUS LONGICEPS Warburton 1912.

Male. (Fig. 23.)

Inornate. Anterior projection of coxa I strongly prominent anteriorly. *Conscutum* about 3 mm. × 1.8 mm. red brown; cervical grooves nearly circular pits, not continued as posterior depressions; lateral grooves well marked, including one festoon. Posterior grooves deep, linear, nearly parallel, subequal. Punctations very numerous, deep uniform discrete, on every portion of the scutum, including the lateral borders and the festoons. Festoons longer than broad and very punctate. Caudal appendage unusually strong, but without a terminal plaque.

Rostrum.—*Basis capituli* of the *R.appendiculatus* type, not much broader than long; lateral angles distinctly anterior and slightly obtuse; the postero-lateral margin about twice as long as the antero-lateral; posterior margin straight, with fairly marked sharp cornua; numerous punctations. Ventral auricular ridges slight. *Palps*: Rather long, flat or slightly concave dorsally, article 3 longer than 2, and with posterior raised edge; Article 1 fairly visible dorsally.

Legs.—Rather long.

Ventral Surface.—Yellowish white in all specimens. *Anal plates* somewhat clavate, usually with an internally directed point (as in *R.capensis*); they tend to become broader distally in large specimens. Accessory plates long, superficial strips of hard chitin, salient posteriorly.

Female. (Fig. 24.)

Scutum.—Sub-circular, deeply emarginate. Cervical grooves fairly deep and only slightly convergent; lateral grooves fairly well marked for two thirds the length; deeply punctate all over. Dorsum with numerous very large punctations.

Rostrum.—Remarkably long, 0.8 mm. *Basis capituli*: punctate, with straight posterior margin and slight cornua; not much broader than long; lateral angles distinctly anterior and slightly obtuse; porose areas large, the interval rather greater than the diameter. *Palps* with article I long, but partly concealed by article 2, which is very long and produced backward to a point; article 3 long and narrowing distally.

Type.—Described from 18♂ and 3♀ from a Klipspringer, collected by Dr. F. Wellman 1907, in the Benguella Hinterland, Angola. Long. E.15° 05'; lat. 12° 44'; altitude 1,360 M; and 19♂ and 2♀ in a mixed collection from the same district.

Types in Cambridge.

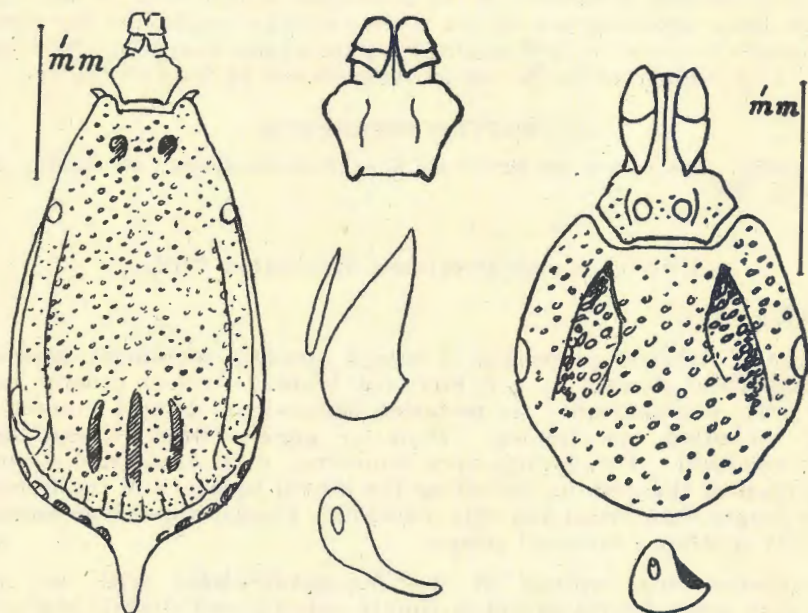


Fig. 23.

Fig. 24.

Fig. 23.—*R. longiceps* ♂, dorsal view, after Warburton, 1912.

Fig. 24.—*R. longiceps* ♀, dorsal view, after Warburton, 1912.

RHIPICEPHALUS LONGICOXATUS Neumann 1904.

Male. (No. fig.)

4.5 mm. × 3 mm. widest towards middle; almost as broad anteriorly as posteriorly. *Conscutum*: slightly convex, shiny, reddish brown. Anterior prolongation of coxa 1 visible dorsally. Eyes flat, yellow, large, not quite marginal and at relatively long distance from the anterior end. Cervical groove deep and short. Lateral groove absent. Fестоons short, ill-defined. [No mention is made of the posterior grooves.] Punctations large, far apart, in irregular rows at the sides, intermixed with numerous fine punctations.

Rostrum.—*Basis capituli*: broader than long; punctate posteriorly; lateral angles in anterior third very salient; cornua broad and not prominent. *Palps*: slightly longer than broad, flattened dorsally; sides parallel, not extending beyond the hypostome, without lateral projection.

Legs.—Stout, segments fully punctate. Coxa I visible dorsally.

Ventral Surface.—No caudal process. Yellowish, reddish with numerous long hairs. Anus at level of anterior third of the anal plates. *Anal plates*: strongly punctate, triangular, internal margin slightly concave; external subrectilinear, the posterior convex and at least half the length of the external. Accessory plates short only slightly chitinized.

Female. (No figs.)

12 mm. × 8 mm. reddish brown.

Scutum.—Slightly longer than broad, 2.6 mm. × 2 mm.; postero-lateral margin slightly sinuous. Eyes as in male half way; cervical grooves deep at point of origin, wider and superficial later, hardly extending beyond level of the eyes. Lateral groove absent. Punctations as in the male, i.e. large, far apart, in irregular rows at the sides, intermixed with numerous fine punctations, almost obsolete.

Rostrum.—*Basis capituli* twice as broad as long.

Porose areas deep, oval, separated by twice their length. *Palps* slightly longer than in the male.

Type.—1♂, 2♀, collected by Schillings in German East Africa.

Comments.—This species has not been recorded again. The description, though meagre, would be adequate if accompanied by drawings. The re-examination of the type specimens seems indicated.

LITERATURE REFERENCE.

NEUMANN (1904). Notes sur les Ixodes, Note III. *Arch: Parasit* IX, p. 225, no figs.

RHIPICEPHALUS MASSEYI Nuttall and Warburton 1907.

Synonym: *Rhipicephalus attenuatus* Neumann 1908.

Male. (Figs. 25, 27, 29.)

2.8 mm. × 1.8 mm. to 4.3 mm. × 2.6 mm.

Conscutum.—Narrow anteriorly, widening behind the level of the eyes, bluntly rounded posteriorly, shiny. Cervical grooves deep crescentic pits, followed by shallow divergent depressions; lateral grooves not well marked, represented anteriorly by punctations. Two pairs of shallow depressions on either side of the posterior median groove. (The Onderstepoort material only shows the usual one pair of postero-lateral grooves). Foveolae visible as small circular pits, far apart between the anterior depressions (indicated by the two black dots on Nuttall and Warburton's figure). Punctations: many shallow, especially on the scapulae, between the cervical grooves, in the marginal grooves, on the festoons and in the posterior region.

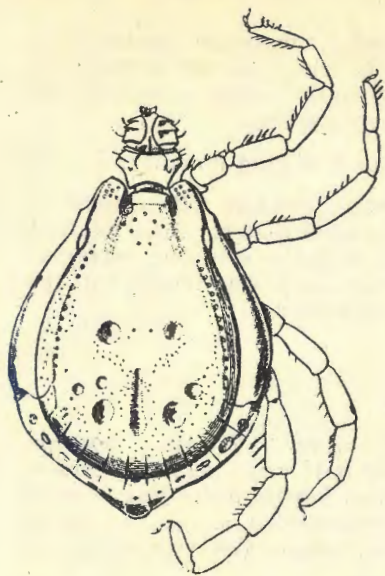


Fig. 25.



Fig. 26.



Fig. 25.—*R. masseyi* ♂, dorsal and ventral views after Nuttall and Warburton, 1908.

Fig. 26.—*R. masseyi* ♀, after Nuttall and Warburton, 1908.

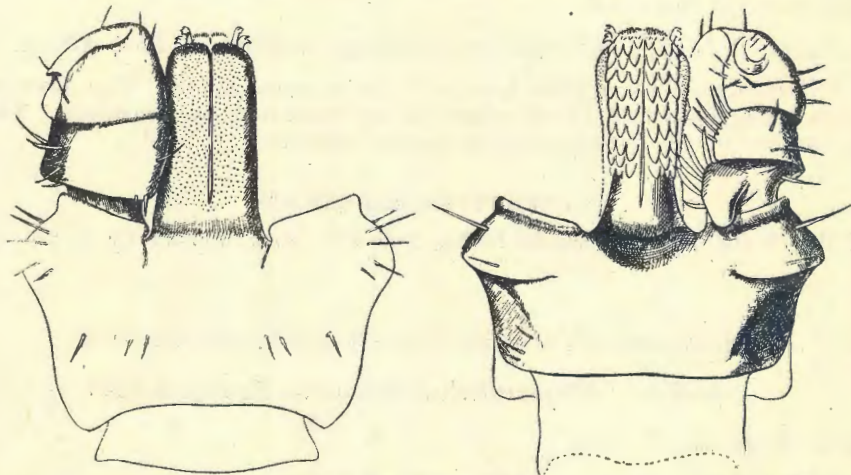


Fig. 27.—*R. masseyi*. Rostrum, dorsal and ventral view, after Nuttall and Warburton, 1908.

Rostrum.—0.7 mm.—0.8 mm. *Basis capituli* rather long, lateral angle somewhat anterior. *Palps*: Article 1 visible dorsally. Articles 2 and 3 as in figure.

Legs.—Rather long and slender. In the Onderstepoort material the anterior protuberance of coxa I visible dorsally.

Ventral surface.—Hairy. Anal plates roughly isosceles with rounded angles, but sometimes protruding at inner angle. Accessory plates small, bluntly triangular, points. Anus about midway. Caudal process blunt.

Female. (Figs 26-28-30.)

3.6 to 11.6 × 8.9 mm.; somewhat square when full fed.

Scutum.—1.4 mm. to 1.7 mm. × 1.3 mm. to 1.8 mm., in some specimens more elongated. Short oval, shiny; postero-lateral margin convex to sinuous. Eyes large, flat. Cervical grooves deep crescentic pits followed by shallow divergent depressions. No lateral grooves but a raised lateral border. Uniformly punctate, rather fewer punctations on lateral border.

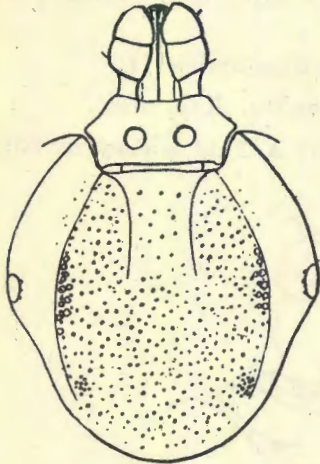


Fig. 28.

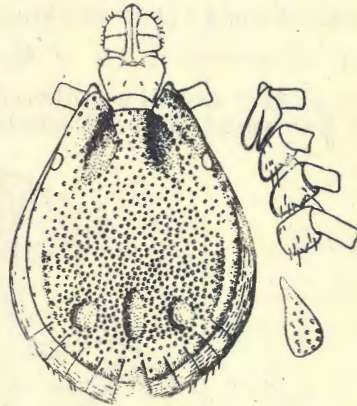


Fig. 29.

Fig. 28.—*R. masseyi*, ♀ dorsal view, after Neumann, 1908.

Fig. 29.—*R. masseyi*, ♂ Bedford, del.

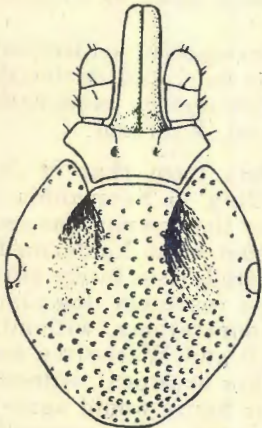
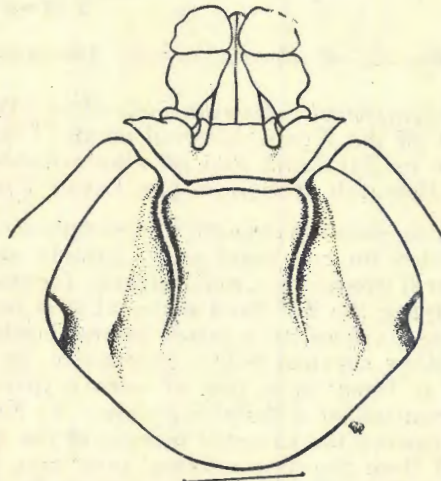


Fig. 30.



0.25 mm
Fig. 31.

Fig. 30.—*R. masseyi* ♀. Bedford, del. Figs. 25-30 show the specific variations very clearly.

Fig. 31.—*R. masseyi*, nymph, dorsal view. D. Pringle, del.

Rostrum.—*Basis capituli*, shorter than in the male with lateral angles more pronounced than in the male. Porose areas oval, medium sized, edged externally by a slight dorsal ridge, which latter terminates in the blunt cornua. *Palps* as in the male.

Nymph. (Figs. 31-32.)

As in figure. *Basis capituli* wider than long; lateral angle swings into a very sharp and well pronounced auricula on the ventral side, also seen in the adults i.e. the widest part of the basis capituli is ventrally displaced; very slight cornua present.

Palps.—Article III if anything wider than article II.

Type.—*Attenuatus*: 1 ♀ of *Equus caballus*, Kansanshi.

Masseyi 31 ♂ and 21 ♀ collected by Dr. A Yale Massey in 1907 off *Bos caffer* at Kansanshi, N.W. Rhodesia.

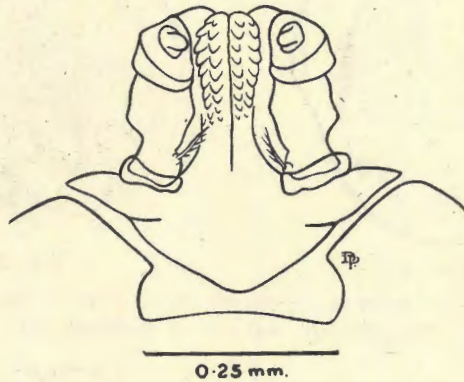


Fig. 32.—*R. masseyi*, nymph. Rostrum, ventral view. D. Pringle, del.

Geographical distribution.—The Onderstepoort collection contains batches off the Nyala collected on the Ubombo flats, and in the Mkuzi game Reserve in Zululand, and off *Phacochoerus aethiopicus sundevalli* from the Tsetse Research station on the Lower Umfolozi, Zululand.

Discussion.—Neumann's description differs from that of Nuttall and Warburton on one point only, namely according to Neumann's description the lateral grooves are well marked; for the rest the descriptions are identical. In studying the Zululand material it is seen that what Neumann figures and describes, is actually a raised lateral border which rises fairly abruptly from the shallow cervical field. Internally, in some instances, the almost smooth border is lined by a row of widely spaced punctations, without, however, the formation of a definite groove. If Nuttall and Warburton had put into their drawing the external margin of the shallow divergent depressions which lead off from the deep cervical pits, then their figure would agree with their description and with the figure given by Neumann. The punctations on the lateral grooves are never as abundant as on the rest of the scutum as is indicated in both their drawings.

The *Rhipicephalus* sp. of Bedford's 1932 key proves to be *R. masseyi*.

LITERATURE.

- BEDFORD (1932). Key and check list South African Ectoparasites, 18th Rep. Dir. Vet. Ser. and. Anl. Ind.
- NEUMANN (1908). Notes sur les Ixodes VI. *Archiv: de Parasitol.* XII, p. 12, fig. 8.
- NUTTALL AND WARBURTON (1907). On a new genus of Ixodoidea, together with a description of eleven new species of ticks. *Proceedings Camb. Phil. Soc.* XIV, p. 405.

" RHIPICEPHALUS SCULPTUS " Warburton 1912.

Male. (Fig. 33.)

A large tick up to 4 mm.; anterior projection of Coxa I visible, though not prominently so, the projection curving outwards.

Conscutum: Lateral grooves and dorsal grooves much the same as in *R. supertritus*; sculpture very characteristic, glossy, raised ridges defining a very distinct pseudo-scutum (female scutum) and outlining the posterior grooves; the rest of the surface consisting of extremely rough shagreened tracts from which arise raised areas which are deeply punctate.

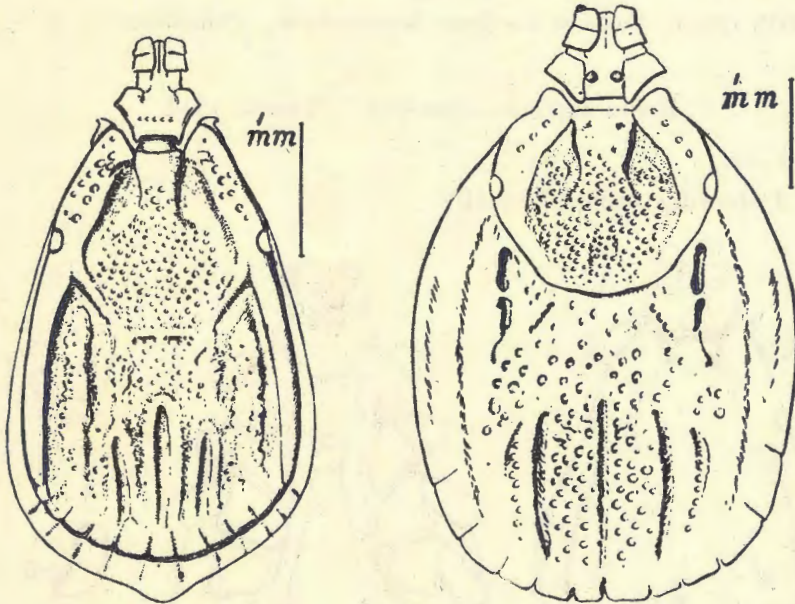


Fig. 33.

Fig. 33.—*R. sculptus* ♂, dorsal view, after Warburton, 1912.

Fig. 34.

Fig. 34.—*R. sculptus* ♀, dorsal view, after Warburton, 1912.

Rostrum: *Basis capituli*: not much broader than long, lateral angles anterior.

Legs: yellowish, contrasting strongly with the dark brown of the conscutum.

Ventral surface: Anal plates much as in *R. supertritus*; accessory anals absent.

Female. (Fig 34.)

Like *R. supertritus* but larger.

Scutum 1.8 × 1.8 mm. Lateral ridges less divergent and longer, converging behind the eyes, so that the whole strongly punctate central area is framed by a glossy, raised border; a raised punctate area or island is present in the region between the cervical grooves and lateral ridges. Dorsum strongly punctate and grooved, with short white hairs, extremely stout and thickest especially along the marginal grooves.

Type: collected from a roan antelope, Mpalali River, Marimba, Nyasaland; from a zebra; S. Rukura Valley, N. Nyasaland; deposited in the British Museum and Cambridge.

Comments: "*R. appendiculatus*, *R. supertritus* and *R. sculptus* are three forms closely allied and in certain structural points practically identical, but presenting a different facies on account of the progressively complicated scutal sculpture in both sexes." Warburton 1912.

LITERATURE.

WARBURTON (1912). Notes on the Genus *Rhipicephalus*. *Parasitology* V, p. 13, figs.

"RHIPICEPHALUS SIMPSONI" Nuttall 1910.

Male. (Fig. 35.)

Coxa I showing slightly dorsally.

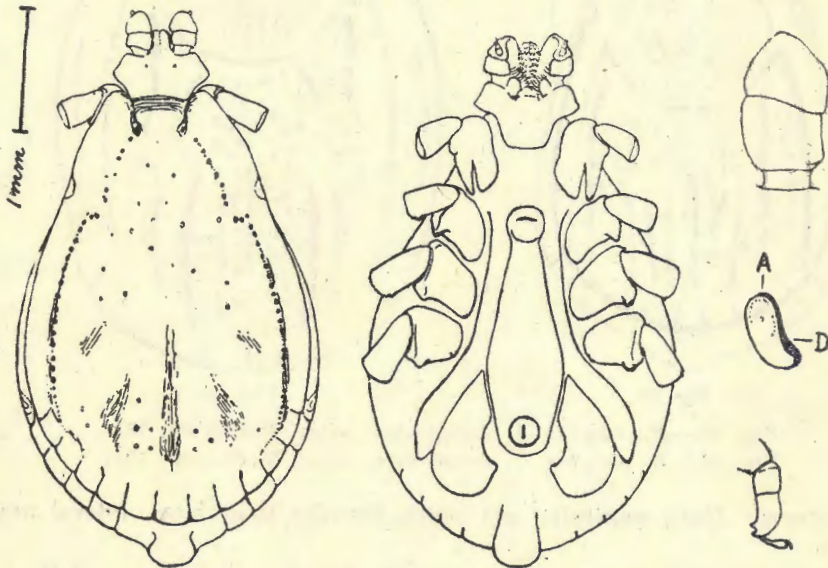


Fig. 35.—*R. simpsoni*, ♂, dorsal and ventral view, after Nuttall, 1910.

Conscutum 2.3 mm. × 1.5 mm. to 3.6 mm. × 2.2 mm.; pear-shaped broadest at $\frac{3}{5}$ body length. Deeply emarginate; cervical groove very short, only forming two deep oblong depressions, directed inwards and backwards; lateral grooves indicated by an irregular row of punctations ending on a line posterior to the eyes, beginning again more outwardly posterior to the eyes and merging rapidly into a well-marked groove, continued so as to include the last two festoons. A few shallow punctations over the back; more distinct punctations on the raised areas between the posterior grooves. Very fine punctations evenly distributed, only few on festoons and on lateral borders. Festoons sharply defined.

Rostrum: *Basis capituli* broader than long, narrow behind, with the posterior and postero-lateral contours concave; antero-lateral margin straight. *Palps*: short, constricted basally; Articles 2 and 3 about equal in length, with article 3 having a slight external angle.

Ventral surface: Anus about midway along the length of the broadly sickle-shaped punctate *anal plates*, where incurved points face each other about $\frac{2}{3}$ along their length; accessory plates only slightly chitinized at their rounded tips. A rounded caudal process present.

Female. (Fig. 36.)

Unengorged 2.5 mm. × 1.5 mm. to 3.75 mm. × 2.5 mm.

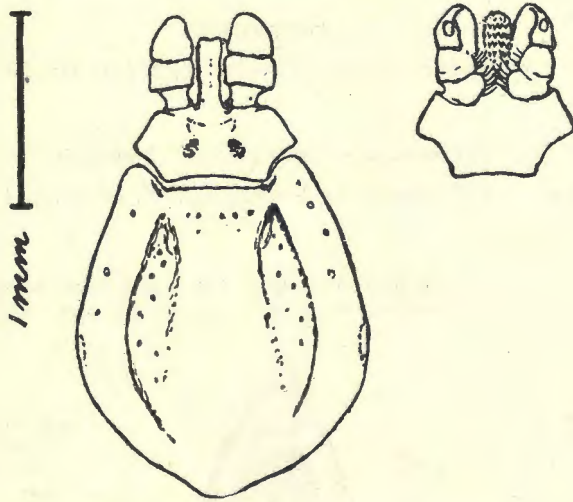


Fig. 36.—*R. simpsoni*, ♀, dorsal view and rostrum, ventral view, after Nuttall, 1910.

Scutum: longer than broad, 1.4 mm. × 1.2 mm. to 1.8 mm. × 1.6 mm., deeply emarginate, antero-lateral border but slightly convex; postero-lateral border sinuous, rounded posterior border with a slight median protrusion. Eyes pale, flat. Cervical and lateral grooves starting together in a deep pointed pit, the cervicals distinct for half the scutum length, then fading into a somewhat fusiform concavity lying between the median field and the raised lateral border, which latter is bounded internally by the lateral groove, this latter disappears near the posterior border. Punctations: a few scattered punctations, some coarser ones accentuating the lateral groove; as in the male fine punctations may be evenly scattered over the scutum.

Rostrum: *Basis capituli* resembles that of the male, but is somewhat broader, cornua faintly marked. Porose areas small, ovoid, directed obliquely forward and inward, distance apart equals twice the diameter.

Type: 5♂, 11♀ collected by J. J. Simpson off a large Rodent at Oshogbo; S. Nigeria.

Comment: Nuttall states " We at first referred the specimens to *R. falcatus* Neumann 1908, but on examining the types in the British Museum, and after consulting Prof. Neumann, we have decided to accord them specific rank. In *R. falcatus* the colour is blackish, the punctations numerous, the body and anal shields narrower. In the ♀ the scutum is as long as broad, 2 mm.; the punctations numerous. Owing, however to the great range of variability which my colleague, Mr. Warburton, and myself have observed in different species of *Rhipicephalus*, it is quite possible that some of the differences which we now regard as specific may ultimately prove to be merely varietal."

Geographical distribution: The Onderstepoort collection contains one batch of ticks off the edible rat *Thronomys swinderianus*, from N'buya, Uganda; and one lot off the same host from Nylstroom in the Transvaal. Bequaert 1931 reports it off *Aulacodus swinderianus* from the Congo da Lemba. The distribution of this species would thus seem to be that of its rodent hosts.

LITERATURE.

NUTTALL (1910). New species of ticks. *Parasitology III*, p. 413, fig. 6.

" RHIPICEPHALUS SUPERTRITUS " Neumann 1907.

Synonym R. coriaceus Nuttall and Warburton 1907.

Male. (Figs. 37, 39.)

3½ mm. × 1½ mm. to 5½ mm. × 3½ mm. A large black species, which upon first sight gives the impression of a very coarse *R. appendiculatus*. Coxa I prominent dorsally.

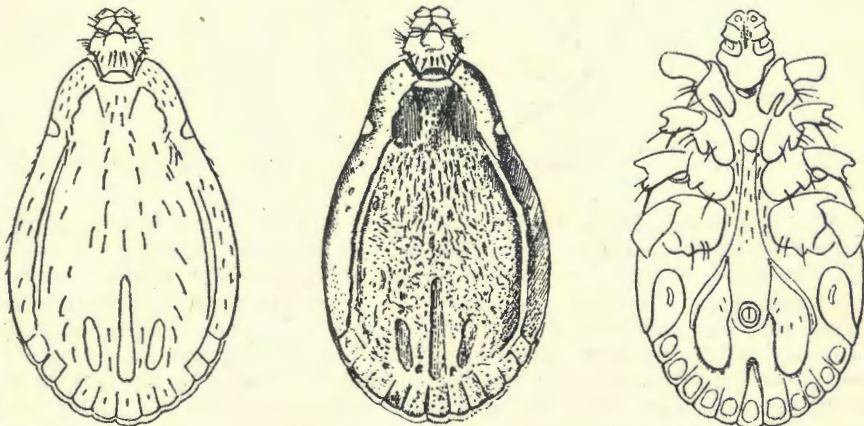


Fig. 37.—*R. supertritus*, dorsal and ventral view, after Nuttall and Warburton, 1907.

Conscutum: elongate, narrow in front, impressed at the level of the eyes. Eyes yellow, small, flat. Emargination fairly deep and narrow, its depth accentuated by the anterior prominence of coxa I. Cervical grooves convergent behind, marking off a narrow central field, their outer limits undefined, merging into a broad, flat, well-depressed area bounded by a ridge which, with an interruption, continues the lateral grooves anteriorly; surface of the depression covered with fine reticulations. Lateral groove clear-cut, deep, not picked out with punctations, usually ending clearly at first festoon, or going on less distinctly to include the second festoon c_1 even part of the third. Posterior depressions: median groove elongate, the postero-laterals slightly broader and shorter; the surface of all three shows the same fine reticulate pattern as is seen in the lateral groove and in the cervical depression. Neumann (1907) mentions seven posterior grooves, but only figures five of about equal size, the two extra being to the outside of the postero-laterals. This tendency to the formation of extra reticulate depressions is also seen in the Lilongwe material, where slight depressions may form beyond the postero-laterals. These secondary depressions, however, are never well-defined, but they do show the fine reticulations. Festoons well-marked, decidedly longer than broad. Punctations: the greater part of the

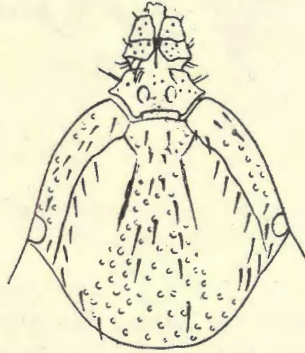


Fig. 38.—*R. supertritus* ♀, dorsal view after Nuttall and Warburton, 1907.

conscutum is covered with rugosities rather than with punctations, these rugosities may show varying degrees of roughness. Ordinary medium-sized punctations are present on the shoulders, on the lateral fields and on the festoons. Fine punctations are present on the ridges between the posterior grooves, and on the lateral strip, which lateral strip is usually quite smooth in *R. appendiculatus*. In some males the outline of the female scutum may be lightly picked out. Hairs on the shoulder, in the groove limiting the cervical field, in the lateral fields and along the lateral groove, and arranged in longitudinal rows in the posterior parts of the scutum, some specimens show a few fine hairs on the festoons. In the majority of specimens, however, most hairs are missing.

Abdomen: In fully engorged specimens the body may extend well beyond the conscutum, thus making visible the dark, ventral plaques, the penultimate being the largest. Beyond these, protruding from the ventral surface, are the threefinger-like protrusions of the body as figured by Neumann 1907. These arise further forward ventrally than does the single caudal appendage so characteristic of *R. appendiculatus*.

Rostrum: Basis capituli: Rather solid, $1\frac{1}{2}$ times as broad as long, cornua strong, postero-lateral margin concave; lateral angle in the anterior half; antero-laterals converging but slightly; a transverse row of long hairs continued on to the entero-lateral margins; surface uneven. *Palps* short and compact, with contour disturbed by the edges of articles 2 and 3; articles 2 and 3 flattened and hollowed dorsally, external margin edged with a raised border giving prominent postero-external angles. Article 1 slightly visible dorsally. Article 2 larger than article 3. The sub-collare (of Schulze 1935) well chitinized (not indicated as a separate element in Nuttall and Warburton's drawing).

Legs: stout. Leg 4 markedly larger than the other three, reddish brown rather than black.

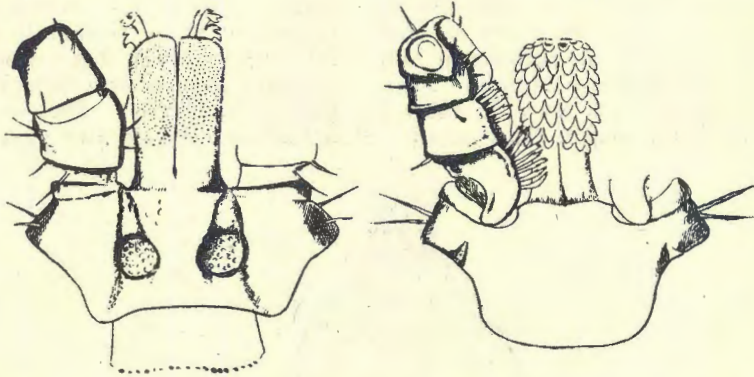


Fig. 39.—*R. supertritus*. Rostrum dorsal and ventral views, after Nuttall and Warburton, 1907.

Ventral surface: variable in colour, the three finger-like structures arising at the base of the anal plates usually somewhat orange. The eleven plaques highly chitinized and dark brown, the penultimate the biggest. *Anal plates:* not unlike those of *R. appendiculatus*, internal margin but slightly concave, external usually markedly convex, posterior margin rounded to bluntly pointed; the longest axis usually not down the centre of the plate as figured by Nuttall and Warburton, but as in *R. appendiculatus* approaching the internal margin. Accessory anals, elongate narrow, chitinized points.

Female. (Fig. 38.)

3.5 mm. × 2.2 mm. to 5 mm. × 3.3 mm., partially engorged.

Scutum: about as broad as long, dark brown; posterior margin slightly sinuous. Eyes flat, yellow, about halfway back. Emargination deep and wide. Cervical grooves short, pronounced, converging; fainter posteriorly and diverging; central field relatively narrow. Lateral groove pronounced reaching posterior margin, cervical depression pronounced, triangular, with reticulate surface, these reticulations forming a wider or narrower band following the lateral groove backwards. This reticulated area not nearly as extensive as indicated in Nuttall and Warburton's figure. Lateral groove seldom disturbed by punctations. Punctations tending to be coarse, coarsest

on the shoulders, present in the lateral field. In the central field they tend to be confluent, giving this central posterior area a rugose appearance. As in the male, short white hairs present.

Rostrum: Basis capituli, wider than long, cornua slight; postero-lateral margin slightly curved, longer than antero-lateral; antero-lateral short, constricted about midway; lateral angle in anterior half. Porose areas small, circular, more than their own diameter apart, touching externally a pronounced ridge; surface of central area uneven. A row of stiff, white hairs on lateral border reaching into antero-lateral margin, as in the male. *Palps*; surface uneven; contour slightly disturbed at junction of articles 2 and 3; dorsal surface slightly flattened, but not hollowed out as it is in the male; Article 2 slightly larger than 3. Article 2 broader than long. Article 3 squarish. Article 1 visible dorsally.

Legs: Not as stout as in the male, equal, reddish brown.

Dorsal and Ventral Surface: with longitudinal rows of sparse hairs; festoons well marked both dorsally and ventrally.

Comments: *R. supertritus*, female, could easily be confused with *R. simus* or with *R. tricuspis*. It can be readily distinguished from these two species by the reticulated cervical field and the reticulated lateral groove, and by the fact that in *R. simus* and *R. tricuspis* the shorter lateral grooves are always picked out with punctations. In *R. supertritus* the surface of the *basis capitulum* is uneven, a row of stiff hairs runs parallel with the postero-lateral margin, whereas the surface is smooth and the row of hairs is absent in the other two species.

Type: *R. supertritus*. 2♂ from a horse on the banks of the Lualaba, Belgian Congo.

R. coriaceus 2♂, 6♀, collected by Dr. Old in North Nyasaland in 1907, and 1♂ collected by Dr. Wellman in the Benguella hinterland in 1907.

Neumann (1908) supplemented his original descriptions after 10♂, 9♀ collected at the North end of Lake Nyasa by Dr. Old, deposited in the British Museum.

The revised description of *R. supertritus* given above is based on three batches most kindly placed at my disposal by S. G. Wilson of the Veterinary Department at Lilongwe, Nyasaland.

Geographical Distribution.—Besides the above four *type* records, Bequaert 1931 records it off *Taurotragus derbianus gigas*, the Eland, from Garamba, Belgian Congo. The Lilongwe batches consist of 12♂ and 15♀ off Buffalo at Chinunka, Songwe River, N. Nyasaland, collected 21.12.44; and 3♂ off a Sable Antelope at Rusa River, Fort Manning, on 30.8.44, all in Northern Nyasaland.

LITERATURE REFERENCES.

- NEUMANN (1907). Notes sur les Iodides V. *Archives de Parasitologie* XI, p. 215.
 NEUMANN (1908). Notes sur les Ixodidae VII. *Notes from the Leyden Museum*, Vol. XXX, p. 79.
 NUTTALL AND WARBURTON (1907). On a new genus of the Ixodidae together with a description of eleven new species of ticks. *Proceedings of the Cambridge Philosophical Society*, Vol. XIV, 1908.

RHIPICEPHALUS THEILERI Bedford and Hewitt 1925.

Male. (Fig 40.)

Body oval, narrow in front, widest at level of coxa IV. 3 mm. × 2 mm.

Conscutum: Reddish brown. Eyes small, flat. Cervical groove short and deep; lateral groove includes one festoon and extends forwards as far as the cervical; posterior median and lateral grooves absent; festoons short, coarsely punctate and thus somewhat obscured. Punctations numerous and large except anteriorly where they are less numerous and mostly fine. On each side of the median line in the middle there is a shallow groove formed of punctations, and besides these in the posterior half of the scutum another but shorter pair of shallow longitudinal depressions more mesially situated, and thereon likewise are numerous punctations, whilst between them the median region presents an incipient ridge free of punctations.

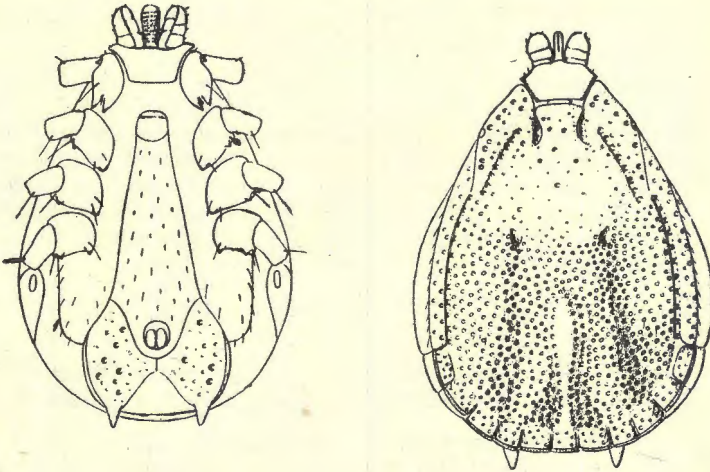


Fig. 40.—*R. theileri* ♂, dorsal and ventral views. Bedford, del.

Rostrum.—*Basis capituli* more than three times as broad as long, lateral angles acute, cornua slight, with a few fine punctations. *Palps*: Article I visible dorsally, article 2 and 3 about the same size.

Legs.—Pale brown, anterior projection of coxa I not prominent when viewed dorsally.

Ventral Surface.—Reddish brown throughout, the whole surface being chitinized more or less strongly. *Anal plates*: extending well in front of anus, large, pointed posteriorly, their apices visible from above, external margin convex; posterior drawn out into a point; internal with a projection inwards behind the anus; surface coarsely punctate. Well developed accessory plates are not present, but the place where such shields often occur is swollen over a considerable area and rather deeply coloured, yet lateral and posterior borders are not defined.

Female. (Fig. 41.)

Body oval, when unengorged gives hairy appearance of *I. pilosus*.

Scutum.—Dark brown, posterior margin rounded, 1 mm. \times 1.5 mm. Cervical groove: the anterior deep portion is elongate, with straight internal edge and convex external edge converging; the cervical groove generally does not show a shallow superficial extension backwards, but may do so; so that in most instances there is no cervical field. Lateral grooves formed of a row of large pits. Punctations scattered, unequal, in central field somewhat superficial, or may be more pronounced giving a fleeting impression of *R. sanguineus*; generally a row of large punctations on lateral border. Scutum at first sight may be mistaken for *R. simus*

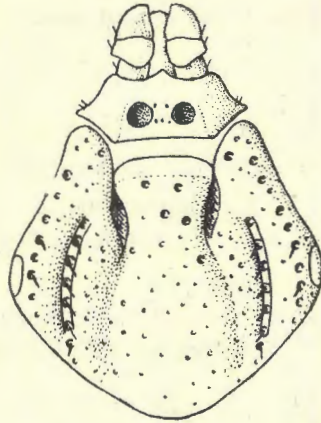


Fig. 41.—*R. theileri*, dorsal view, after Bedford and Hewitt, 1925.

Rostrum.—Most characteristic feature. *Basis Capituli* about three times as broad as long. Posterior edge straight, with short rounded blunt cornua; postero-lateral margins concave; longer than the antero-laterals; widest in anterior third; antero-lateral margins sinuous, concave at first then convex before it meets the base of the palps, meeting with the postero-lateral margin in a fairly sharp point, and forming a ledge, which latter is sometimes even more pronounced than in Bedford's figure. Sometimes antero-lateral margin is almost a straight line (giving the impression of *R. sanguineus*). Ventrally this ledge swings in to form an auricula. *Palps* broad. Article II widest about $\frac{2}{3}$ of the way up, from here to the top of article 3 the internal contour is concave; in some instances, however, it is almost straight.

Ventral surface: sparsely clothed with short white hairs, longest and most numerous along the posterior margin.

Legs: reddish brown.

Type: 1♂, 1♀ from ground squirrel, *Geosciurus capensis*, collected by R. Bigalke at Glen, Orange Free State in 1921. Deposited at Onderstepoort. At present on loan to Dr. Schulze at Rostock.

Occurrence: The Onderstepoort collection has batches of females mostly off small burrowing mammals from the Orange Free State, viz., five batches off *Suricata suricata hameltoni*, meercat, from the farm Vaalbank in the Edenburg district; one batch off a suricate on the farm Rooidam in the Jacobsdal district; two batches off *Cynictis penicillata ogilbeyi*, yellow mongoose, from Vaalbank, Edenburg; one batch off *Geosciurus capensis* from Rooidam, Jacobsdal; 2 batches off the yellow mongoose, also from Rooidam; one male off *Vulpes chama*, silver jackal, from Petrusburg.

The above collections were all made in connection with a drive to eradicate rabies from certain areas in the Free State, and represent the tick catch off a vast number of small carnivores and ground squirrels. From the information thus made available it would seem that the tick is never abundant and that in all probability it is not confined to the Orange Free State, as the above catches seem to indicate, but that its geographical distribution is that of its commoner hosts, the Viverridae, which are frequently found associated with the ground squirrels.

LITERATURE REFERENCE.

EDFORD AND HEWITT (1925). South African ticks. *The S.A. Jnl. Nat. Hist.*, Vol. V, p. 263, fig.

“ RHIPICÉPHALUS TRICUSPIS ” Dönitz 1906.

Synonym: *R. lunulatus* Neumann 1907.

R. glyphis Dönitz 1910.

R. simus var. *lunulatus* Warburton 1912.

Male. (Fig. 42.)

Up to 4 mm. in length; reddish to dark brown. Narrow in front, widening rapidly behind the eyes. Coxa I barely or not at all visible dorsally.

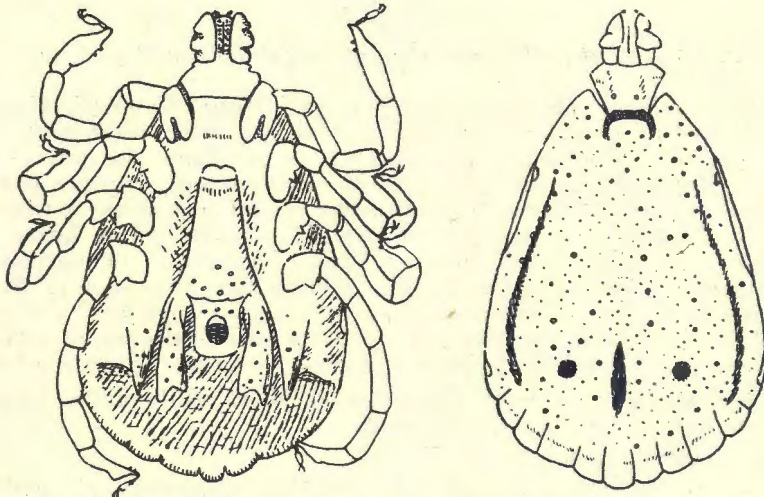


Fig. 42.—*R. tricuspis* ♂, dorsal and ventral views. Dönitz, 1906.

Consutum: Eyes flat, light coloured, small, sometimes difficult to distinguish. Cervical grooves: short deep. Lateral grooves well developed, commencing a short distance behind the eyes; may include the first festoon, picked out with large punctations; preceded anteriorly by a row of 3 to 4 large punctations situated slightly further inwards and extending to level of cervical grooves. Posterior median groove varying in shape from a straight line to a narrow spindle; the laterals are in the form of small circular depressions. In the unfed specimens the posterior portion of the scutum usually

shows three long depressions reaching up to midway; these undoubtedly represent the median and paramedian muscular attachment grooves; depressions are sometimes also seen in the anterior paramedian position. Punctations, small punctations, finer posteriorly than anteriorly distributed fairly evenly, extending on to the lateral border and the festoons, though not so numerous in these last two areas. Large punctations present, six to eight posterior to the grooves, about two external to the postero-laterals; a row of four to five on either side of the median; scattered fairly evenly but very far apart between the posterior grooves and eye level, more closely clustered on the central anterior field and on the shoulders. The punctations give the conscutum an uneven and untidy appearance.

Rostrum: Basis capituli, more than twice as broad as long; postero-lateral margin about twice as long as the antero-lateral. Middle portion of the basis capituli sunken, flanked on either side by a dorsal ridge ending posteriorly in a short broad cornua. *Palps* as broad as long. Article 1 visible dorsally. Article 2 broader than long, internal margin longer than external. Article 3 longer than 2, as long as broad, hollowed out somewhat dorsally.

Ventral surface: Anal plates: external and internal margins almost straight, running practically parallel distally, and usually about equally long; posterior margin concave, forming a point where it meets the external and where it meets the internal margins. The inner points usually heavier and blunter, the external lighter and sharply pointed. These points, however, vary considerably in relative length, they may be equal or the outer or the inner may be decidedly long (in the descendants of one female). Only the tip of the accessory is usually chitinized, mostly as a fairly sharp point.

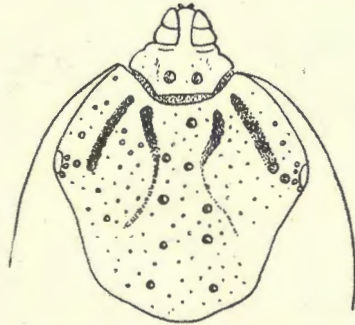


Fig. 43.—*R. tricuspis* ♀, dorsal view after Dönitz, 1906.

Female (Fig. 43.)

Scutum: reddish brown to dark brown; as broad as long, or slightly longer than broad, widest at eye level about midway; postero-lateral margin sinuous, posterior margin frequently slightly pointed. Cervical grooves deep, narrow, converging, followed by shallow divergent depressions extending about two-thirds of the way backwards. Lateral grooves well developed, picked out with large punctations extending almost to the edge of the scutum. Punctations: numerous small punctations, the same size as the anterior punctations of the male, evenly dispersed over the entire scutum, the lateral fields included. A few large punctations scattered over the scutum, somewhat closer together anteriorly and on the shoulders. The cervical field is sometimes finely rugose. The punctations give the scutum an uneven untidy appearance, well illustrated in Dönitz, figure.

Rostrum: short. *Basis capituli*: twice as long as broad, lateral angles prominent, midway; postero-lateral margin concave, antero-lateral straight until it meets the base of palps, then convex; cornua short but stout; central field sunken as in the male, porose areas broad, oval; *Palps* broader than long. Article 2 broader than long; Article 3 longer than 2, about as long as broad.

Nymph. (Figs. 44-45.)

Scutum: as broad as long, widest at eye level in the posterior three-fifths; antero-lateral margin straight, postero-lateral evenly curved. Emargination shallow. Cervical groove and lateral groove long with a depressed cervical field between them.

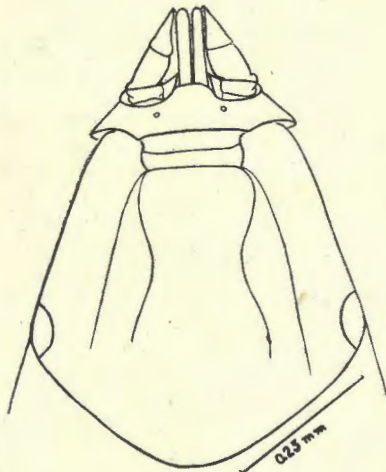


Fig. 44.

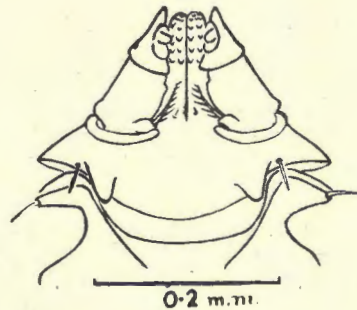


Fig. 45.

Fig. 44.—*R. tricuspis* nymph, dorsal view. D. Pringle, del.
 Fig. 45.—*R. tricuspis* nymph, ventral view. D. Pringle, del.

Rostrum: triangular with base of the triangle greater than its height, in the proportion of 3:2. *Basis capituli*: short, six times as wide as long; lateral angles far back, acute, and giving the appearance of pointing backwards, antero-lateral margin a straight line, postero-lateral but slightly concave; no cornua; basis capituli overlaps anterior margin of the body. On the ventral surface a well developed spur present at the junction between the auricula and the posterior margin. Palps with outer contour a straight line, the two sides converging to form an acute apex; Article 2 and 3 longer than broad, article 2 much longer than article 3, article 3 triangular, with outer margin longer than inner margin. Article 1 not visible dorsally.

Larva. (Figs. 46-47.)

Scutum decidedly broader than long, broadest at eye level, very far back. Emargination shallow. Antero-lateral margin long and straight; postero-lateral and posterior-margins but slightly curved giving the scutum a truncated appearance. Cervical depression reaching fairly far back.

Rostrum: Triangular, broader than long, approximately as 3:2. *Basis capituli* about four times as broad as long; lateral angles vaguely rounded, prominent; postero-lateral margin slightly concave, longer than antero-lateral; antero-lateral slightly sinuous. Ventrally a spur present at the junction of the auricula and the posterior margin. *Palps*: external contour a straight line, palps leaning towards one another; dorsally it is difficult to differentiate between articles 2 and 3; widest at the base. Ventrally article 3 has a retrograde spur.

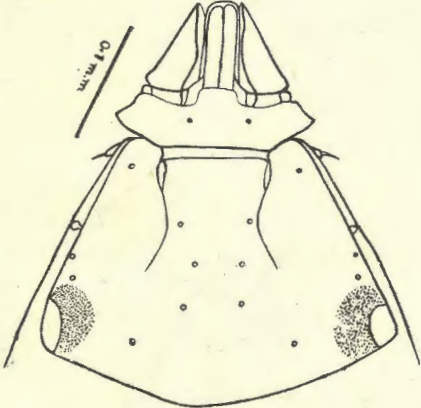


Fig. 46.

Fig. 46.—*R. tricuspis* larva, dorsal view. D. Pringle, del.

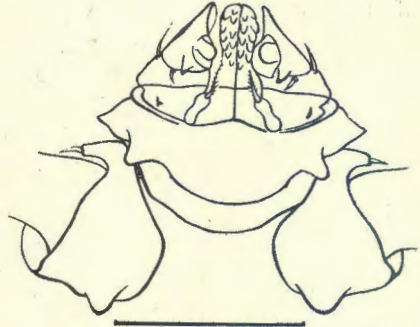


Fig. 47.

Fig. 47.—*R. tricuspis* larva, ventral view. D. Pringle, del.

Type: *Tricuspis*: free at Lehututu Kong in the Kalahari.

Lunulatus: 2♂ off a horse, on the banks of the Lulaba river, Belgian Congo; deposited in the British Museum.

The drawings of the nymph and of the larva are from material reared at Onderstepoort from eggs of a female collected at Pretoria North.

Occurrence: The geographical distribution of *R. tricuspis* is difficult to establish at this stage, since most of the recent workers have considered it as a synonym of *R. simus*. It has, however, been recorded as *R. tricuspis* by Nuttall 1916 and by Schwetz 1927 from the Belgian Congo; as *R. glyphis* by Dönitz 1910 off a *Potamochoerus* from Tanganyika and off cattle from Togoland; the Onderstepoort collection contains batches off *Lepus capensis* from the Hoopstad district in the Orange Free State; off bovines from Chikamula, Southern Province Nyasaland, collected by S. G. Wilson. (Mr. Wilson has since found it is on a wide variety of hosts all over the Northern Province); off bovines from the Mongu area, Borotseland, collected by P. L. le Roux; and off sheep at Pretoria North. Neumann in "Das Tierreich" 1911 lists it as also having been collected off *Erinaceus frontalis*.

The Zoological Survey has records of *R. tricuspis* off domestic stock from farms near Oicolaco, Gravelotte, and Duivelskloof in the Letaba district, Northern Transvaal; from farms on the Sabie- and the White-River Plateaux; in the De Kaap Valley in the Schoemanskloof area, from Kaapschehoop and Schoonoord on the edge of the Highveld, and from the Lowveld near Nelspruit in the Barberton and Nelspruit districts of the

Eastern Transvaal; from the farms Welbedacht, near Paulpietersburg; Waterfalls, near Richmond; Sweetwaters, near Ixopo and from farms in the Entonjaneni district of Natal; from farms in the Bizana district of Pondoland; from Gannaoor in the Vryburg district; from the farms Thanoanche, Nyra end Esperanza in the Kuruman district of Bechuanaland, i.e., it occurs in the warmer parts of South Africa, in areas containing thorn trees, varying from the semi-arid bushveld of the Kalahari to the moister bushveld of the lowveld of the Northern- and of the Eastern-Transvaal and of Natal. It is absent from the scrubveld of the Karroo and from the open grassveld typical of the Orange Free State and also of the middle and of the high-veld of the Transvaal.

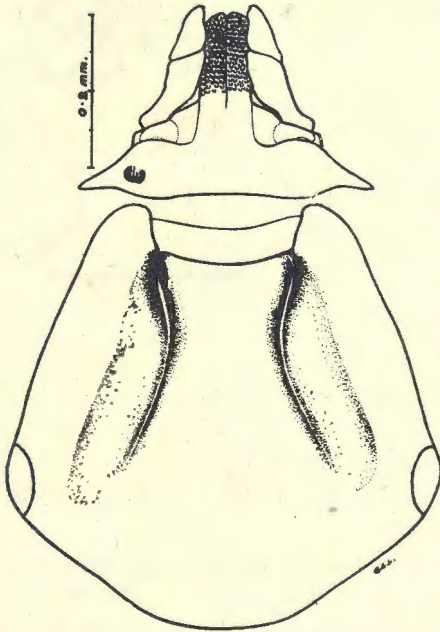


Fig. 48.

Fig. 48.—*R. simus* nymph, dorsal view, after Theiler, 1943.

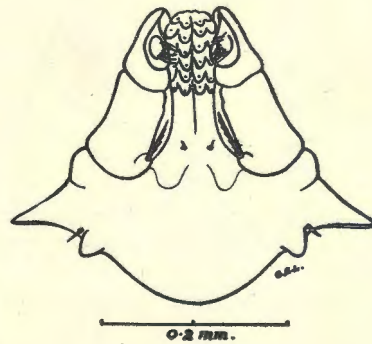


Fig. 49.

Fig. 49.—*R. simus* nymph, ventral view, after Theiler, 1943.

Classification.

Comments: This species was first described as *R. tricuspis* by Dönitz 1906 and as *R. lunulatus* by Neumann 1907. Dönitz 1910 describes his *R. glyphis*. Neumann 1911 in his monograph on the Ixodidae sinks *R. lunulatus* as a synonym of *R. tricuspis* but does not list *R. glyphis* among the known Rhipicephalids. Warburton 1912 overlooks Dönitz' publications as well as Neumann's 1911 monograph and sinks *R. lunulatus* as a variety of *R. simus*, and as such it has remained to most workers

The study of the descendants of one female collected off a sheep at Pretoria North and reared till the F₂ generation at Onderstepoort, however, clearly shows *R. tricuspis* to be a valid species. The descendants all conform to type and show the usual minor differences as seen in the various Rhipi-

cephalid species which have been studied in detail thus far, differences which cover all the variations described for *R. tricuspis*, *R. lunulatus* and *R. glyphis*, but which never approach *R. simus*.

R. simus differs from *R. tricuspis* in that:—

1. *R. simus* ♂ is a larger, heavier tick; *conscutum* shiny, dark brown to black; the cervical and lateral grooves clean and clear cut; the small punctations are fine and superficial or even absent, the large punctations are deep and clear-cut often containing short white hairs; the *basis capituli* is more compact, with the lateral angle blunter. *Anal plates*, external and posterior margin curved, i.e., anal plate bean to kidney-shaped. *Legs* stout.

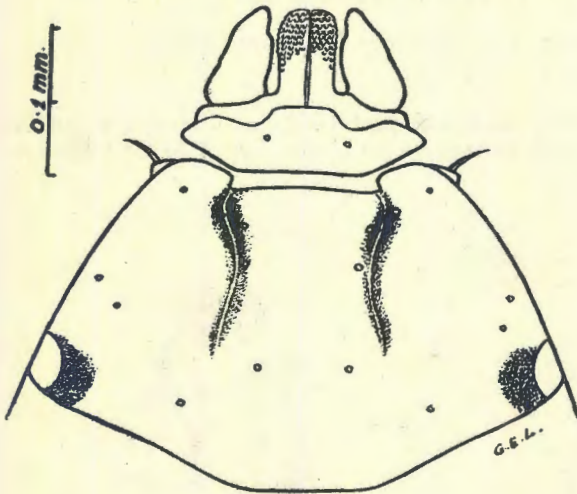


Fig. 50.

Fig. 50.—*R. simus* larva, dorsal view, after Theiler, 1943.

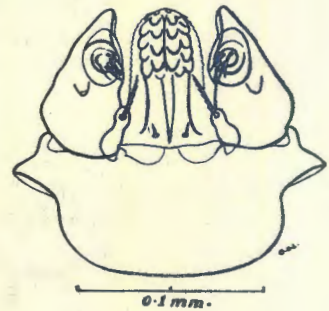


Fig. 51.

Fig. 51.—*R. simus* larva, ventral view, after Theiler, 1943.

2. *R. simus* ♀ is a larger, heavier tick; *scutum* subcircular; shiny, prominent, raised lateral border with but few light punctations; punctations present the same neat picture as in the male, the fine punctations, however, are a little heavier and the large punctations not so prominent. *Basis capituli* heavier with the lateral angles blunter.
3. *R. simus*: *Nymph*: (Figs. 48–49) *basis capituli* relatively broader with the lateral angle sharper and extending well beyond the scutum.
4. *R. simus*: *Larva*: (Figs. 50–51) *basis capituli* relatively broader; no spur attached to ventral surface.
5. S. G. Wilson at Lilongwe, Nyasaland [private correspondence] finds that there is a marked difference in the habits of these two ticks. *R. tricuspis* appears and is found in considerable numbers during late November to early February in collections off cattle, being confined to the tail switch; whereas *R. simus* is not a cattle tick and its main active season appears to be January to May.

LITERATURE REFERENCES.

- DÖNITZ (1906). Über Afrikanische Zecken. (*R. tricuspis*) *Sitzb. Ges. Natf. Freunde, Berlin*, p. 146, figs.
- DÖNITZ (1910). Zwei neue afrikanische Rhipicephalus Arten (*R. glyphis*). *Sitzb. Ges. Natf. Freunde, Berlin*, VI, p. 278, fig.
- NEUMANN (1907). Notes sur les Ixodides V. *Arch. Parasit*, XI, p. 215, fig.
- NEUMANN (1911). Ixodidae. Das Tierreich Berlin, 1911.
- WARBURTON (1912). Notes on the Genus Rhipicephalus. *Parasitology*, V. p. 3.

RHIPICEPHALUS ZIEMANNI Neumann 1903.

Synonym: Rhipicephalus cuneatus Neumann 1908.

Male. (Figs. 52-53.)

Body elongate narrow; twice as broad posteriorly as anteriorly, curved posteriorly: 4.25 mm. long (with rostrum): 2.3 mm. broad behind the posterior third.

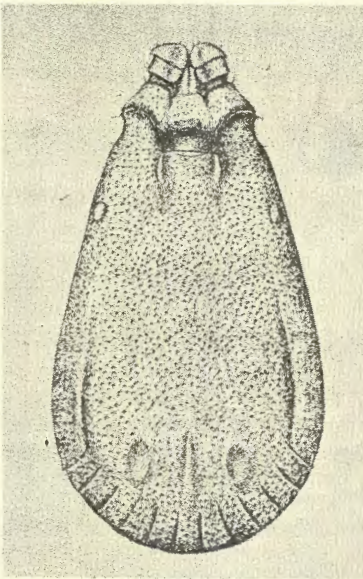


Fig. 52.

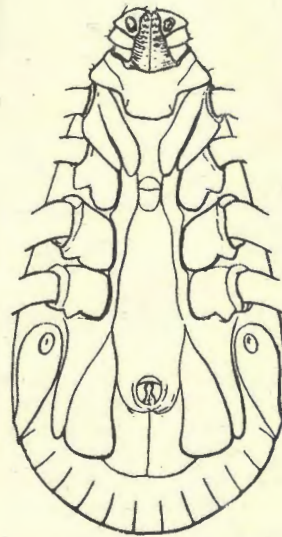


Fig. 53.

Fig. 52.—*R. ziemanni* ♂, dorsal view, after Neumann, 1908.

Fig. 53.—*R. ziemanni* ♂, ventral view, after Neumann, 1908.

Conscutum: slightly convex; as shown in the figure the scapulae are prolonged into a curved protuberance pointing outwardly; shiny; chestnut brown, inornate, festoons slightly lighter in colour. Eyes flat, medium-sized, yellowish; marginal, situated slightly in front on the anterior third. Emargination as in the figure. Cervical groove very short, deep. Lateral grooves

shallow, sometimes almost obsolete, starting slightly in front of the anterior half and ending in the last festoon. Posterior grooves present, short and wide, the median longer. Punctations very numerous, medium, subequal.

Rostrum: 0.65 mm. *Basis capituli* about twice as broad as long, with punctations; lateral angles prominent towards the middle of the margin; cornua prominent (not very distinct in the figure). *Palps*, rather shorter than the basis, hardly longer than broad, flat on the dorsal surface. Article II well separated from the basis (i.e., article I visible dorsally); as long as article III, rectangular.

Legs: strong and long. Coxa I not visible dorsally.

Ventral surface: reddish brown, lighter posteriorly. Anus towards the anterior third of the anal plate. *Anal plates* triangular, numerous punctations, posterior margin slightly convex; external margin slightly convex; internal margin slightly concave. *Accessory* anals chitinous, well developed. No caudal process.

Female. (No. Fig.)

5 mm. × 3 mm. to 8 mm. × 5 mm. engorged. *Scutum* as broad as long, 1.8 mm., with margins but slightly sinuous. Cervical grooves short, deep, narrow, concave internally. Lateral grooves absent. Punctations numerous, fine, subequal, evenly dispersed. Eyes flat, large, yellowish.

Rostrum: *Basis capituli* more than twice as broad as long. Porose areas oval, longer than broad, distance apart equal to their width.

Legs: stout, punctate.

Type: *Ziemanni* 13♂ and 19♀ collected off a cow by Ziemann in the Cameroons.

Cuneatus 3♂ collected off cattle by Pelat at Ngomo on the Ogooué in the French Congo. Deposited with Prof. Galli Valerio at Lausanne.

Comments. Bequaert 1930 records 1 *R. cuneatus* off a monkey in Liberia with this remark: "This specimen agrees in every detail with the original figures and description. I have my doubts, however, as to the specific distinctness of *R. cuneatus* and *R. ziemanni* (off cattle, Cameroons). The latter has also been recorded by Neumann from Liberia, but since it has not been figured, I hesitate to unite the two species."

The only other Rhipicephalid which shows the same peculiar elongation of the scapular region, as is seen in this species, is *Rhipicephalus (Pterygodes) fulvus* Neumann 1913 from Tunis. In *Pterygodes fulvus*, however, the shoulder is very much longer with a more pronounced outwardly curved tip. This elongation of the scapular region is, however, not developed in the female, in the nymph nor in the larva as described by Colas-Belcour 1932. Hence one can assume that this peculiarity will also be absent in the female of *R. cuneatus* or *R. ziemanni*.

Bequaert is somewhat hesitant to sink *R. cuneatus* as a synonym of *R. ziemanni*. The descriptions of the males are, however, so very similar as to make it impossible to find any difference that is of specific importance. So that one can but assume that *R. cuneatus* is the same as *R. ziemanni*.

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- BEQUAERT (1927). Harvard African Expedition, 1927.
COLAS-BELCOUR (1932). (*Pterygodes fulvus*.) *Archiv. Inst. Pasteur. Tunis XX*.
NEUMANN (1903). Notes sur les Ixodides. Note II (*R. Ziemanni*). *Archives de Parasit.* VII, p. 464.
NEUMANN (1908). Notes sur les Ixodides, Note XI (*R. cuneatus*). *Notes from the Leyden Museum*, XXX, p. 76, figs.
NEUMANN (1913). Un nouveau sous-genre et deux nouvelles espèces d'Ixodides (*P. fulvus*). *Bull. Soc. Zool. France, Paris*, XXXVIII, p. 147, figs.

SUMMARY.

1. Omitting unessentials, the descriptions of various little known Rhipicephalids and their geographical distribution have been republished.

2. The descriptions of *R. distinctus*, *R. masseyi*, *R. theileri*, *R. tricuspis*, *R. simpsoni*, *R. supertritus* are brought up to date.

The nymphs of *R. masseyi*, *R. tricuspis*, *R. distinctus* and the larva of *R. tricuspis* are described for the first time.

3. *R. falcatus* and *R. tricuspis* are shown to be valid species.

4. *R. attenuatus* is sunk as synonymous with *R. masseyi*; *R. cuneatus* as *R. ziemanni*; *R. lunulatus* and *R. glyphis* as *R. tricuspis*; *R. schwetzi* as *R. dux*.

5. Dönitz' supposition that the occurrence for *R. follis* is "domestic stock, South Africa", is confirmed with reservations.

6. A list of the commoner African Rhipicephalids, whose descriptions are not included in this article, is given.

LITERATURE REFERENCES.

The relevant publications are given at the end of the description of each species.