

TICKS IN THE SOUTH AFRICAN ZOOLOGICAL SURVEY COLLECTION:  
PART VIII: TWO EAST AFRICAN TICKS.

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RHIPICEPHALUS AYREI, LEWIS, 1933.

Male (Fig. 1).

Size: 4.87 mm.—2.8 mm. × 3.4 mm.—1.8 mm. (Lewis:  
4.8 mm.—3 mm. × 3.5 mm.—2.0 mm.)

*Conscutum*.—Somewhat narrower anteriorly, widest just in front of the spiracles, broadly rounded posteriorly, slight constriction at the level of the eyes. Very dark brown to black, usually shiny; legs, a rich chestnut brown; anterior projection of coxa I visible. Eyes flush with surface, only slightly picked out dorsally by a few small punctations. Emargination deep. Short deep cervical pit; definite marginal groove present, including festoon two, floor with a jumbled row of punctations; well defined festoons. The lateral folds and the festoons form a clear raised edge to the glossy, pitted central field. Punctations on the central field medium, closely packed and evenly arranged, discrete or more or less contiguous, may be angular rather than circular in outline, extending but a short way onto the festoons; on the shoulders a variable number of discrete medium-sized punctations interspersed with very fine punctations; the cervical fields may be more heavily punctate than indicated in fig. 1; lateral folds and festoons with small scattered punctations. The whole conscutum presents a picture of extreme neatness disturbed only, in some specimens, by the slightly small and more irregularly spaced punctations forming the shallow median and paramedian grooves and by two slight irregularities in front of the two paramedians. In some specimens these grooves and irregularities are practically obsolete. A narrow strip adjoining the marginal groove may be almost clear of punctations. (Punctations in fig. 1 should have been indicated as relatively larger and closer together.)

*Rostrum*.—About as broad as long. *Basis capituli* twice as broad as long, widest ventrally; auriculae pointed, in anterior quarter, postero-lateral margin long and concave; cornua sharp; posterior margin usually practically straight; centre sunken; edged by a row of hairs. *Palps* longer than broad, article II broader than long; article III almost as long as II. Article I short. *Subcollare* present.

*Legs*.—Rich chestnut brown, contrasting with the darker scutum, increasing in size from leg II to IV. Leg IV almost as stout as in *appendiculatus*.

*Ventral Surface*.—*Anal plates* (fig. 2) in large specimens broad, well developed, highly chitinized, heavily punctate. The straight external margin meeting the convex posterior margin at a wide curved angle, the antero-internal angle approximating a right angle, a small point may be present. With decrease in size of specimens antero-internal angle becomes progressively less pronounced and in the smallest males sides of plates may be almost parallel posteriorly. *Accessory anals* well developed, reaching up to coxa IV, also heavily punctate.

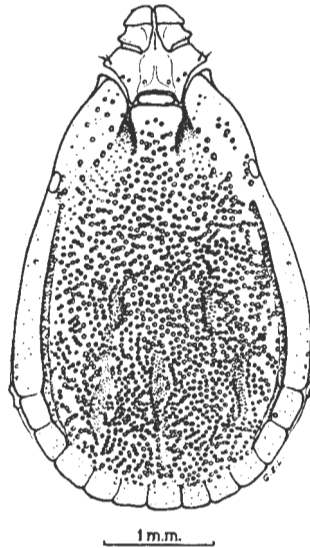


FIG. 1.—*R. ayrei*. Male. Scutum. The punctations should have been drawn rather larger and nearer together. Line of demarcation between cervical field and lateral folds may be sharper. (Del. G. E. Laurence.)

According to Lewis in well-fed males there is a conspicuous protuberance of the body contour opposite the three lateral festoons, second festoon attaining a dome-like appearance. Each ventral festoon is provided with a heavy chitinous plate.



FIG. 2.—*R. ayrei*. Male. Anal Plate. (Del. G. E. Laurence.)

*Female* (Fig. 3).

*Size*: Unengorged females: 5 mm.—2·45 mm. × 3 mm.—1·4 mm.  
(Lewis: 7·54 mm. × 5 mm. average.)  
7·54 mm. × 5 mm. average.)

No visible projection to coxa I. Dark brown to black with chestnut legs.

*Scutum*.—Shiny, black, circular, very slightly broader than long. Eyes flush with surface at the widest part of the scutum. Emargination deep.

Cervical pit short, deep, curved; cervical groove rather faintly indicated in some specimens, absent in others; lateral groove represented by the sharp edge of the lateral fold, reaching to the posterior edge of the scutum. Punctations medium, closely packed and evenly dispersed over the central field, discrete or more or less contiguous, sometimes angular rather than circular in outline, usually reaching practically to the posterior edge of the scutum. Lateral fold raised, broad, shiny; medium and small punctations clustered on the shoulders, a few scattered further back.

*Dorsum*.—A row of short stiff white hairs along the edge of the dorsum and along the marginal groove, the hairs over the rest of the dorsum are caducous, in some specimens, but few are present.

*Rostrum*.—As broad as long. *Basis capituli* one and a half times as broad as long; auriculae in anterior quarter, postero-lateral margin long, concave; cornua at end of ridge, short and strong; posterior margin straight. Central field sunken, areae porosae large, oval, with a shallow gutter running to anterior margin, their own longest diameter apart. A few small punctations scattered over the surface. Ventrally a small thickening in the position of the ventral spur. *Sub collare* present. *Palps* slightly broader than long. Palp II broader than long. Palp III smaller than II.

*Legs*.—Show a slight increase in size from before backwards.

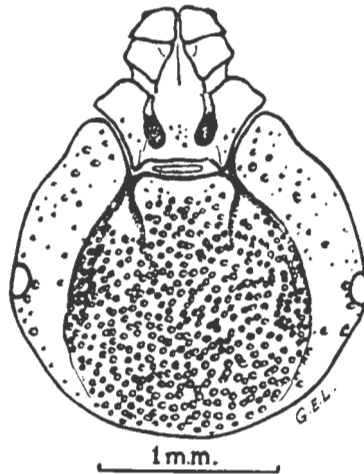


FIG. 3.—*R. ayrei*. Female. Scutum. (Del. G. E. Laurence.)

*Nymph* (Figs. 4-6).

*Size*: Unengorged 1.5 mm.—1.58 mm. × .81 mm.—.84 mm.

*Scutum*.—Slightly broader than long (.53 mm.—.56 mm. × .56 mm.—.61 mm.). Eyes far back at widest part of the scutum, emargination wide and shallow. Cervical pit deep with but a short cervical groove. The rise to the lateral fold very pronounced, running parallel to the margin. It is these elongate, pronounced lateral folds which give the scutum the appearance of being longer than broad.

*Rostrum* (Figs. 5-6).—Roughly triangular; three-quarter as long as broad. *Basis capituli* four to five times as long as broad, auriculae long and sharp; cornua pronounced and sharp; posterior margin straight. Ventrally a short rounded ventral spur. *Palps* elongate sloping inwards markedly, external margin a straight line, interrupted slightly at base of article III. Article II twice as long as broad. Article II almost one and a half times as long as article III. Ventrally a short rounded spur posterior to the insertion of article IV.

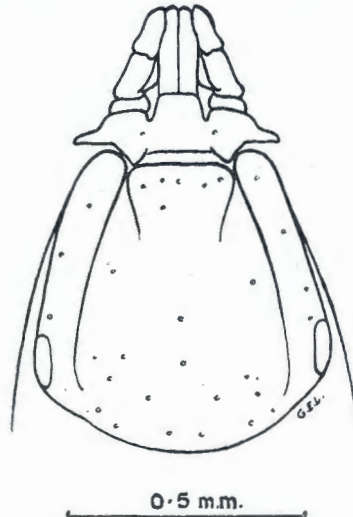


FIG. 4.—*R. ayrei*. Nymph. Scutum. Postero-lateral margin of basis capituli not quite as angular as drawn. Cf. fig. 5. (Del. G. E. Laurence.)

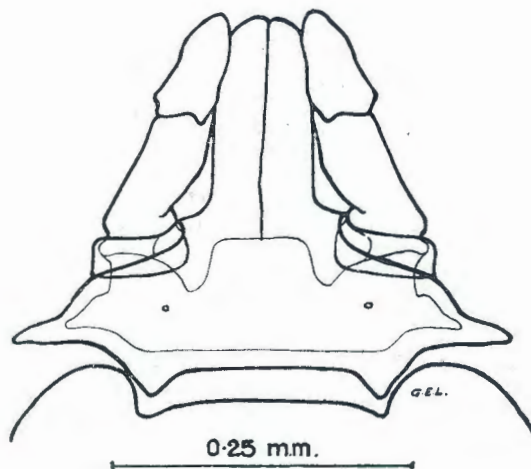


FIG. 5.—*R. ayrei*. Nymph. Rostrum, dorsal view. (Del. G. E. Laurence.)

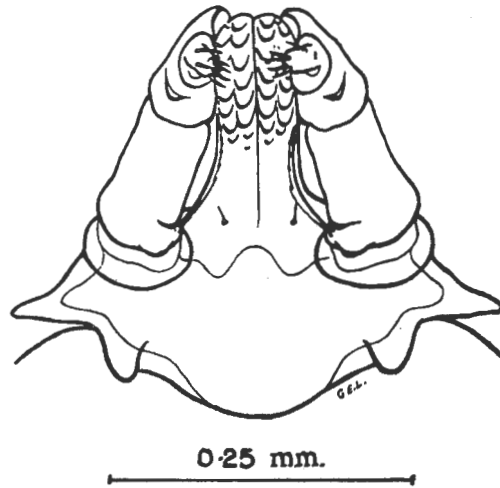


FIG. 6.—*R. ayrei*. Nymph. Rostrum, ventral view. (Del. G. E. Laurence.)

*Larva* (Figs. 7-8).

*Size*: 715—730 $\mu$   $\times$  467—500 $\mu$ .

*Scutum*.—Broader than long, 372-386 $\mu$   $\times$  229-243 $\mu$ . Latero-anterior margin convex, postero-lateral slightly sinuous, posterior margin widely rounded. Eyes about mid-way back.

*Rostrum*.—Slightly broader than long (179—184 $\mu$   $\times$  126—131 $\mu$ ). *Palps*, sloping towards one another. *Basis capituli*, about four times as long as broad. Auricula bluntly pointed in anterior one-third; antero-lateral margin convex, short; postero-lateral convex, slightly longer; posterior margin concave. Ventrally a rounded spur on the basis capituli. *Palps*, short, widest at base, tapering to a blunt point. Palps II and III fused. Ventrally a short spur postero-externally to the base of article IV (fig. 8), much as in *appendiculatus*.

The above descriptions are based on the F<sub>2</sub> generation of a female off a buffalo, Thompson's Fall, Kenya, bred at the Kabete Veterinary Research Station by Miss J. B. Walker.

*Type Specimens R. ayrei*.—10 males, 20 females, off a buffalo at Kiagu, in the Meru District, collected by A. F. Ayre in 1930. Types were placed in the Veterinary Research Laboratory, Kabete, *cotypes* at the Imperial Bureau of Entomology, British Museum, Molteno Institute at Cambridge, and Coryndon Museum, Nairobi.

#### *Host List and Geographical Distribution.*

Lewis, 1933, lists buffalo, rhinoceros and lion.

The Onderstepoort records include cattle and buffalo.

Kenya records at the Vet. Lab., Kabete, now include buffalo, eland, lion and rhinoceros.

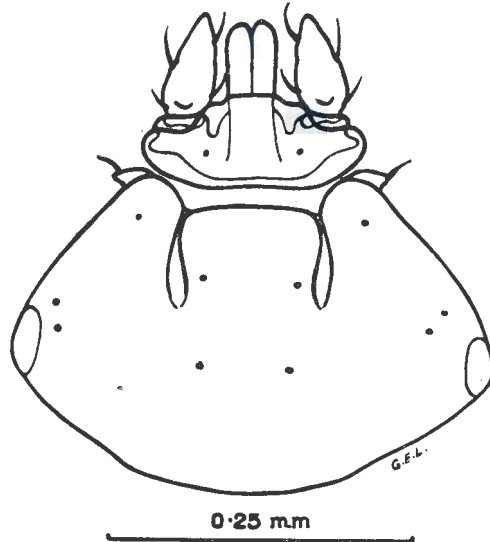


FIG. 7.—*R. ayrei*. Larva. Scutum. (Del. G. E. Laurence.)

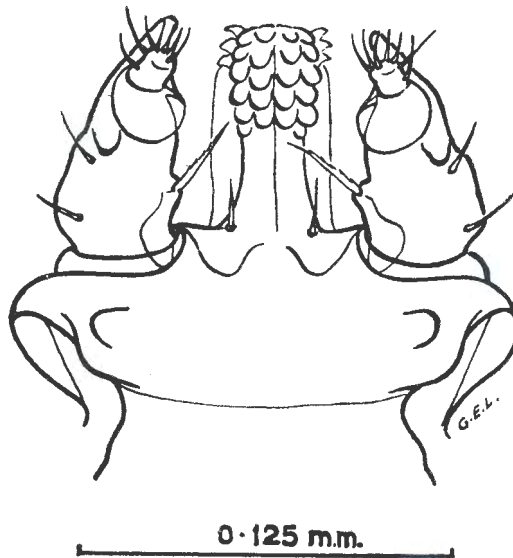


FIG. 8.—*R. ayrei*. Larva. Rostrum, ventral view. (Del. G. E. Laurence.)

As *R. capensis compositus* it is recorded off a hartebeest, *Alcelaphus lichtensteini* buffalo and a dog, by Santos Dias.

From the records available the preferred host would appear to be the buffalo. In some areas the tick apparently transfers very readily to cattle when these are present, though in Kenya this has not so far been found to occur, the buffalo here being the usual host. Other wild game appear, thus far, only as incidental hosts.

It is recorded from—

*Nigeria*, where the species is chiefly to be found in the Bauchi Province, where it often forms the bulk of the collections, e.g. Bauchi, Geidam, Dutse, Gombe, Misau and Zungor. In the Plateau Province it has been taken in small numbers at Bokkos, Jos, Shendam and Vom; it occurs also in the Cameroons at Ntumbeau, in the Niger Province, at Kontagora and Abuja, in the Zaria Province, at Yelwa and at Zangwan-Katab. Unsworth, 1952;

*Belgian Congo*, off cattle at Kingogo, Kisenyi, Bushiru, Usumbura, Katabo, in the Ruanda-Urundi; further north at Aru-Dema as also at Costermansville and Mulungu; also odd records from Bunkeya, in the Elizabethville District, and from Coquilhatville. These records are from the Belgian Congo Survey collections;

*Kenya*, the species is recorded from the highlands, east of the Rift Valley at Rumuruti, Thompson's Falls, the forest reserve about Ngobit, and at Ngong; also from around Mt. Kenya. It has been collected at Elmenteita, in the Rift Valley, and also from western Masai, near the Mara River. In all these places buffaloes are known to occur; Vet. Lab., Kabete, records;

*Northern Rhodesia*, off cattle at Isoka, Chinsali, Nteka, Mankoya, Abercorn, on the Abercorn-Kalambo Falls road; east of Fort Hill and at Wayetwekas Village, 15 miles south of Fort Hill, and at Ndola. These records are from the Northern Rhodesian Tick Survey collections;

*Tanganyika*, off cattle at Sumbawanga, Mbeya; Onderstepoort record. One male collected off rhino at Sanya Juu, near Moshi; Kabete record;

*Nyasaland*, off buffalo at Chinunka, Songwa River, Kasungu; Onderstepoort records. The species is also listed by Wilson, 1950;

*Moçambique*, off cattle at Tete, Angonia; Onderstepoort record. From Mutuali (recorded as *R. capensis compositus*), Santos Dias.

Neumann's 1897 type of *R. capensis compositus* was described from a male collected at Khartoum (Paris Museum); this description he enlarged in 1904 according to 8 males and 3 females off a buffalo collected in 1903 by Schillings in Tanganyika. Dönitz (1905) records *R. capensis compositus* from Moshi, Bismarckburg, Songea (off a dog) and Ujiji.

It is difficult to explain Neumann's *R. capensis compositus* record from Khartoum, in so far as present-day workers are not finding either *R. capensis* or *R. ayrei* in this area. One is forced to assume that the record is the result of an incorrect label? His record from Tanganyika fits in with present-day findings.

Zumpt's remarks that the so-called *R. capensis compositus* "may even be dominant in the Eastern African plateau regions" fit in with our present-day findings, more especially in collections off buffalo.

*Geographically* the tick appears to be confined to the Eastern Highlands areas, including the mountains of north-eastern Northern Rhodesia, the Nyasaland Highlands with outliers into Portuguese Niassa, the Muchinga Mountains, the Mitumbu Mountains, Ruanda-Urundi, the Ruwenzori group, Kilimanjaro and the Highlands of Kenya. The only two records which fall outside these Eastern Highlands are Coquilhatville and Tete. In Nigeria it is also apparently confined to the higher lying areas.

*Disease:* *R. ayrei* transmits East Coast Fever, Wilson, 1951.

*Developmental Periods.*

Under laboratory conditions at Kabete.

	<i>Days.</i>		<i>Days.</i>
Preoviposition ... ..	6	Nymphae harden ... ..	—
Larvae hatch ... ..	26	Nymphae feed ... ..	4
Larvae harden ... ..	—	Nymphae moult ... ..	14
Larvae feed ... ..	3	Adults harden ... ..	—
Larvae moult ... ..	9	Adults feed ... ..	11

*Classification.*

*Discussion and Synonymy.*

Neumann, 1897, described in some detail a new species *Rhipicephalus compositus* based on one male collected at Khartoum by Mr. Vossion, to this type specimen he added a smaller specimen (only 4 mm. instead of 5 mm.) from Zanguebar (collection E. Simon). In 1904 he sinks it as a subspecies and figures it is *Rhipicephalus (Eurhipicephalus) capensis* var. *composita*; in 1905 he enlarges his description, basing the revised descriptions on 8 males and 3 females, off a buffalo, collected in Tanganyika.

Dönitz, 1905, draws attention to some ticks deposited in the Berlin Museum which Neumann had classified as *R. capensis compositus*, he disagrees with Neumann and maintains the *compositus* as a valid species and points out that there is no doubt that the two forms are closely related, but they are easily differentiated from one another by the fact that, as stated by Neumann, in *R. compositus* the punctations of the scutum however close together they may be are yet all separate, whereas in *R. capensis* they may fuse giving a shagreened surface. This applies also to the *R. compositus* female, which was unknown to Neumann. Even if occasionally two or three punctations may be confluent in *R. compositus* then this does not disturb the general impression. Transitional forms to *R. capensis* I have not seen, therefore the two forms can for the time being be left side by side”.

After Neumann's 1905 and 1911 publications, *R. capensis compositus* does not seem to figure in the literature again until Bequaert, 1930, records it with the comment however, “I am inclined to suspect that this form of *R. capensis* was described anew by Warburton, 1912, as *R. neavei* var. *punctatus*”.

Zumt, 1942, commenting on the great variability of *R. capensis* with its type locality at the Cape remarks, “Towards Eastern Central Africa specimens of *capensis* with finer and less densely packed punctations as also with more or less rounded off or at times reduced anal plates (his fig. 4) become more abundant; in the Eastern Plateau regions these may in some places be dominant. Such specimens figure in collections as *R. capensis compositus*. Neumann, 1897, and at first I also thought I had a fairly well defined species before me.



However, the study of further material showed me that in East Africa collections also the range of variations reached on the one hand to the typical Cape *R. capensis* and on the other hand specimens occurred which showed all gradations of variations giving an absolute connection with the West African sub-species *longus*" (his figs. 5 and 8). Of interest also is his comment on the type male specimen which he had before him, "It is a strikingly large specimen, 5.5 mm. long, which in shape of its anal plate and in its punctations closely approaches *R. capensis sensu strictu*". (Did Zumpt make an error of judgement?)

Theiler, 1943, in a footnote to *R. capensis* states, "*R. capensis*, Koch, 1844, and *R. capensis compositus*, Neumann, 1897, are undoubtedly the same, as all possible variations are found between them. Bequaert, 1939, questions whether *R. capensis* and *R. sulcatus*, Neumann, 1908, are specifically distinct. Once again in the study of the South African material we find the two forms merge into one another. In the same way *R. ayrei*, Warburton, 1912, can be shown to be *R. capensis*, Koch, 1844. Bequaert, 1930, suggests that *R. neavei punctatus*, Warburton, 1912, is *R. capensis* var. *compositus*; from the material available for study at Onderstepoort, however, I have come to the conclusion that Warburton's species is quite distinct from *R. capensis*". In 1947, after the study of further material Theiler lists *R. ayrei* as a separate species.

Santos Dias, 1951, records *R. capensis compositus* off a hartebeest from the Niassa Province of Moçambique. Comparing the material before him with Lewis' description he comes to the conclusion that *R. ayrei* is a synonym of *R. capensis compositus* [his drawing (fig. 4) for the female *R. capensis sensu strictu* is inaccurate and incorrect].

By rearing the eggs of females to the F<sub>1</sub> generation Theiler (in the press) has been able to show that *R. neavei punctatus* (= *R. pravus*, Dönitz, 1910, redescribed Zumpt, 1942), is a valid species, as also that *R. sulcatus* is a valid species; in the same way Miss Walker (in the press) has shown that *R. neavei*, *R. neavei-punctatus* and *R. piresi* are synonymous with *R. pravus* and do not belong to *R. capensis* as surmised by Bequaert, 1930.

The present analysis shows "*R. ayrei*" to be a valid species and not a sub-species of *R. capensis*, in that its F<sub>1</sub> generation shows no transitional forms to *R. capensis* and its immature forms are different from those of *R. capensis*.

As to whether *R. ayrei* is *R. compositus* or not, we are inclined to think that it is, but we are at the moment not in a position to commit ourselves. Our inclination is to accept Dönitz' 1905 findings that *R. compositus* is not a sub-species of *capensis* but is a valid species; unfortunately this finding is countered by Zumpt's remark that the type specimen "in the shape of its anal plate and in its punctations closely approaches *R. capensis sensu strictu*".

With the conflicting findings of two such careful workers as Dönitz and Zumpt before us, we can but reserve our judgment, until such time as Neumann's material has been restudied. In the meanwhile we would like to stress that *R. ayrei* is a valid species closely allied to *R. capensis* and that in all probability it is Neumann's 1897 *R. compositus*.

#### SUMMARY.

(1) The descriptions of *R. ayrei* adults are brought up to date and the immature stages described for the first time.

(2) The descriptions and the developmental periods are based on material raised at Kabete.

(3) The host list is given; its distribution is shown to be confined to the Eastern Highlands' areas of Portuguese Niassa, Nyassaland, Tanganyika, north-eastern Northern Rhodesia, Belgian Congo and Kenya, and in the higher lying areas of Nigeria.

(4) It is shown to be a valid species, and is in all probability synonymous with Neumann's 1897 *R. compositus*.

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AMBLYOMMA GEMMA, DÖNITZ, 1909.

*Male* (Fig. 9.)

*Size*: Average 5.5 mm. × 4.75 mm. (Dönitz: 5 mm.). Contour broad oval, slightly narrower in front.

*Consutum*.—Smooth, convex, ornate. Eyes small, circular, bulging, far forward. Emargination deep and narrow; *subcollare* present. Cervical pit short and deep. Marginal groove commencing about the level of the second lateral spot, continuous, festoons deeply separated from one another; ventral festoons also heavily chitinized, their edges can be seen from the dorsal surface. Punctations very fine centrally, becoming larger and deeper but still small towards the periphery.

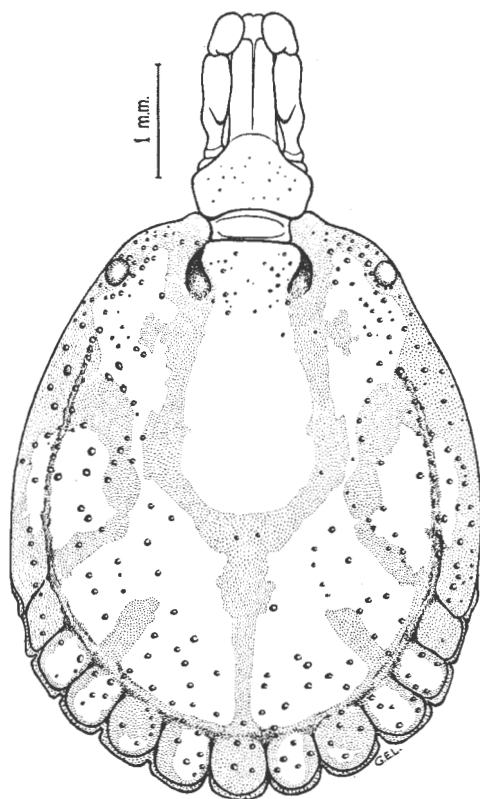


FIG. 9.—*A. gemma*. Male. Dorsal view. (Del. G. E. Laurence.)

*Colour Pattern*.—Postero-median stripe, knobbed at the anterior extremity where it touches or fuses with the falciform stripe; postero-accessory stripes, short, widely separated from the third lateral spot, directed towards the anterior extremity of the postero-median stripe; lateral spots isolated or more or less conjoined; cervical stripes, broad anteriorly, showing the same lateral branching as is seen in *A. hebraeum* tapering posteriorly, their hinder extremities generally extending to the horns of the falciform stripe; frontal spots usually fused with the cervical stripes, often fragmentary; marginal ridge dark coloured except for an incursion of the pale ground opposite the lateral spots; festoons particoloured, first and median festoon dark, second, third and fifth pale, fourth with a pale spot at the postero-internal angle. The enamelled pattern in most specimens has a coppery sheen and is edged with an iridescent green (Dönitz describes it as “matt, rötlich goldig”). *Fovea* in the falciform stripe.

*Rostrum*.—Not quite twice as long as broad, inornate. *Basis capituli*, quadrangular, lateral margin convex, posterior margin concave; a *subcollare* present; lateral slightly convex. *Palps*, article II more than twice as long as III. Hypostome  $3\frac{1}{2} \times 3\frac{1}{2}$ .

*Legs.*—Moderately stout, maroon brown with broad, pale annulations at the distal extremities of the articles, attaining half the length of the article on the dorsal side of tibia and protarsus of the hinder legs. The deep maroon colouring may be lost with preservation leaving the legs a light yellow red.

*Coxae.*—Coxa I external spur longer and narrower than the internal, both still medium-sized. Coxa IV, one spur, the same size as external spur of coxa I. Coxae II and III with trenchant edges. Tarsus I terminating abruptly both dorsally and ventrally.

*Female* (Fig. 10).

*Size:* Unengorged body 5 mm.  $-5.75 \text{ mm.} \times 4 \text{ mm.} - 4.75 \text{ mm.}$  Dorsum greenish, usually black in preserved specimens.

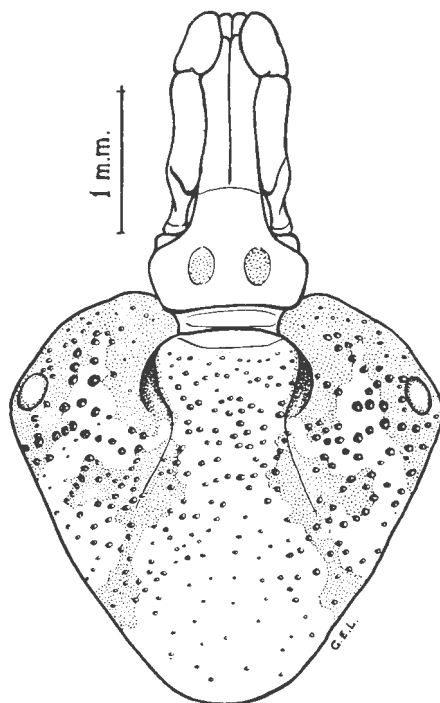


FIG. 10.—*A. gemma*. Female. Dorsal view. (Del. G. E. Laurence.)

*Scutum.*—Broadly cordiform, ornate. Eyes large, bulging, slightly far forward, slightly in front of widest part of scutum. Emargination narrow and deep, *sub-collare* present. Antero-lateral margins convex, postero-laterals slightly convex, posterior margin broadly rounded. Cervical pits deep, merging into a shallow cervical depression which soon fades out. *Punctations*, lateral areas with a clustering of larger, though still medium-sized punctations, smaller and fewer on the shoulders, smaller punctations in the central field, larger and denser anteriorly, and smaller and more scattered posteriorly.

*Colour Pattern*.—Ocular spots large, frontal spot isolated or connected by a narrow bridge with the cervical stripe; cervical stripes narrow, with the same lateral branches as are seen in *A. hebraeum*, extending to fuse posteriorly with the small limiting spots; the cervical stripe may be interrupted by a narrow bridge of enamelling a short way behind eye level (as is seen in fig. 10). Scapular fields dark, broken by a narrow forward extension of the enamelling between the eyes and the cervical spot; scapular angles pale though not enamelled. Enamelling usually with a bright coppery sheen.

*Rostrum*.—Elongate, twice as long as broad, inornate. *Basis capituli*, rectangular, posterior margin slightly concave, lateral margins convex; porose areas large oval, about their own diameter apart. *Palps*, long, slender. Article II more than twice as long as III.

*Legs and Coxae*.—As in the males.

*Ventral Surface*.—Genital aperture opposite coxa II.

*Nymph* (Figs. 11-13).

*Size*: 2 mm.—2·2 mm. × 1·22 mm.—1·25 mm. unengorged.

*Scutum*.—Wider than long (·87 mm. × ·62 mm.-·67 mm.). Widest at anterior third at eye level. Antero-lateral margin convex, postero-lateral straight. Emargination wide with a shoulder hump jutting into it. *Eyes*, large, bulging slightly, orbited slightly dorsally. Cervical pit elongate; cervical groove deep, reaching almost to the posterior margin. Punctations varying in size, the deepest and largest clustered loosely in the lateral field, usually 8-9 in number, on the shoulders a few small punctations, posteriorly in the lateral fields the punctations diminish in size and depth; 12-15 medium-sized shallow punctations in the central field (Fig. 11).

*Rostrum*.—About 500 $\mu$  long by 330 $\mu$  broad. *Basis capituli*, angles rounded, posterior margin long and straight; postero-lateral long and straight. *Palps*, very long, sides almost parallel. Article II about twice as long as III; three times as long as broad.

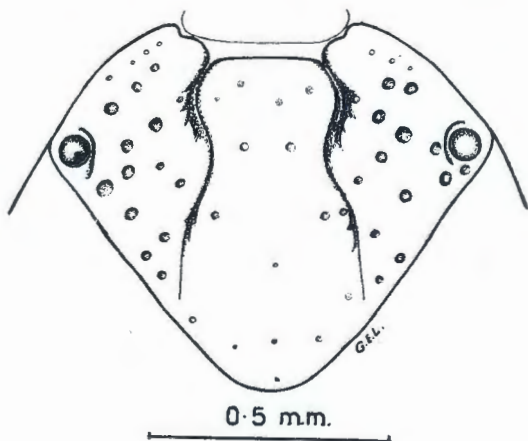
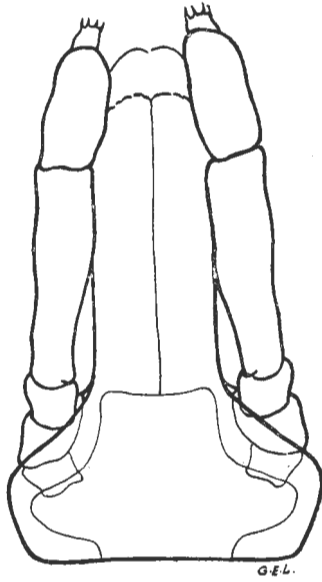
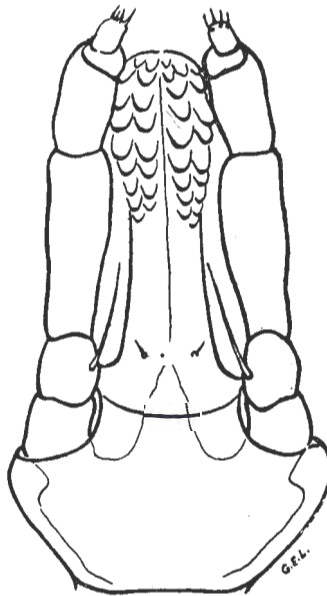


FIG. 11.—*A. gemma*. Nymph. Scutum. (Del. G. E. Laurence.)



0.5 m.m.

FIG. 12.—*A. gemma*. Nymph. Rostrum, dorsal view. (Del. G. E. Laurence.)



0.5 m.m.

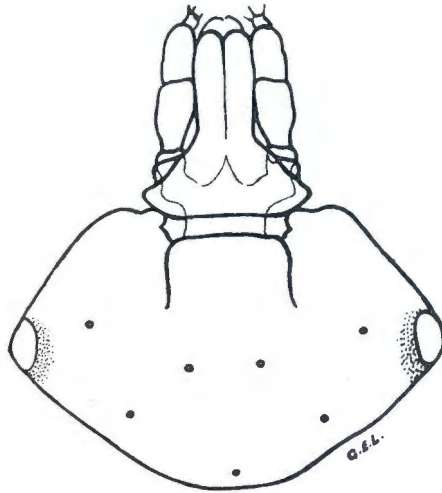
FIG. 13.—*A. gemma*. Nymph. Rostrum, ventral view. (Del. G. E. Laurence.)

*Larva* (Figs. 14-15).

*Size:* 720—810 $\mu$   $\times$  450—520 $\mu$ , unengorged.

*Scutum.*—Almost twice as broad as long, 390-400 $\mu$   $\times$  200-230 $\mu$ . Eyes prominent, about half-way back. Antero-lateral margin straight, postero-lateral slightly sinuous; posterior margin broadly rounded. A hump from the shoulder juts into the emargination. Pigmentation present round the eyes.

*Rostrum.*—Longer than broad, about 225 $\mu$   $\times$  175 $\mu$ . *Basis capituli*, antero-lateral margins straight to slightly concave, the curved postero-lateral meeting it at less than a right angle. *Palps*, long 150—175 $\mu$ , article II slightly longer than III, never more than one and a half times; article II slightly broader than III.



0.5m.m.

FIG. 14.—*A. gemma*. Larva. Scutum. (Del. G. E. Laurence.)

*Type.*—Dönitz, 1909. Males and females off giraffe, Mkatta Plains, Tanganyika.

The descriptions of the larvae and nymphae are based on the F<sub>1</sub> generation of a female off a bovine, Marsabit collection A. Chappell, and reared by Miss Walker, at Kabete.

#### *Host List and Geographical Distribution.*

Nuttall and Warburton list: Giraffe, *Phacochoerus aethiopicus*, *Oryx callotis*, cattle, eland, rhinoceros, gnu, ponies and mules.

The Onderstepoort collection has specimens off camel, sheep and goats.

In Kenya where this species is frequently met with, the Veterinary Research Laboratory, Kabete, has records of it off cattle, sheep, goats, camels, horse and donkey; also eland, oryx, rhinoceros, greater and lesser kudu, buffalo, zebra, waterbuck, giraffe, lion, wart-hog and impala.

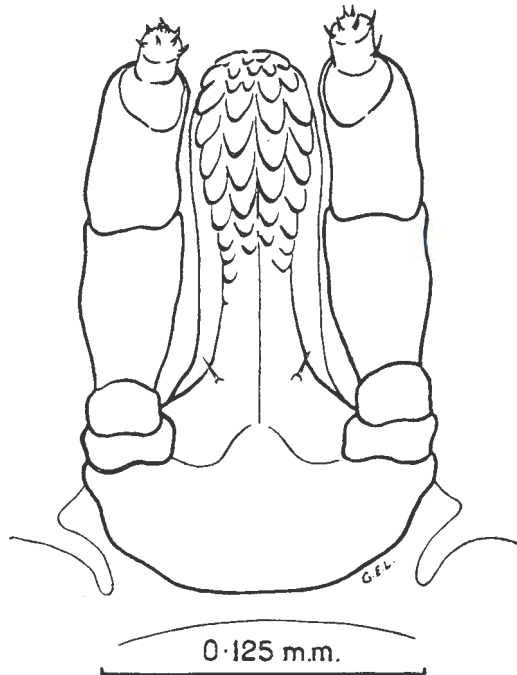


FIG. 15.—*A. gemma*. Larva. Rostrum, ventral view. (Del. G. E. Laurence.)

It is recorded from—

*Somaliland:*

Sagak by Nuttall and Warburton.

Dagabur, Hargeisa District, Sagaz, Dieredawa, Mandera; Onderstepoort records.

Somalia by E. Stella.

Sheriff Ing, Kismayu; Vet. Lab., Kabete, records.

*Abyssinia*, near the southern border; Kabete record.

*Uganda*, six miles east of Palango Station, Nile Province; Nuttall and Warburton.

Karamoja; Vet. Lab., Kabete, record.

*Kenya*, Mowa River (sixty miles south-east of Kitui), Mkokotoni, Bu-bubu, Makindu, in desert country, Marsabit, Voi, Tana River; Nuttall and Warburton.

Since the collections were made by Nuttall and Warburton, the colony has been opened up and settlement has gone ahead. The Veterinary Research Laboratory at Kabete now has innumerable records of this species and its distribution can be fairly accurately plotted. It is confined chiefly to the drier parts of the country, being common in the north, east and south. It is absent from many parts of the highlands above about 6,500 ft. and from Nyanza Province in the west, also from the western part of the Masai Reserve.



*Tanganyika*, Mkatta plains (Ngomberenga), Iringa, Shembekuli, Marangeek Province, Wilhelmsthal; by Nuttall and Warburton. Muengembo; Onderstepoort record.  
 Yaida Plains, 20 miles south-east of Lake Eyasi, Mto-wa-Mbu, north of Lake Manyara, Kabete record.  
*Zanzibar*, Onderstepoort record.

It is not listed for Nyasaland (Wilson), Moçambique (Santos Dias), Angola (Souza Dias), Anglo Egyptian Sudan (Hoogstraal, in the press). Does not figure in Onderstepoort collections for Uganda, Northern Rhodesia or Belgian Congo.

*Disease: A. gemma* transmits heartwater and Nairobi sheep disease. Lewis, 1947.

*Developmental Periods.*

Under laboratory conditions at Kabete.

	<i>Days.</i>		<i>Days.</i>
Preoviposition ... ..	12	Nymphae harden ... ..	—
Eggs hatch ... ..	69	Nymphae feed ... ..	6
Larvae harden ... ..	—	Nymphae moult ... ..	28
Larvae feed ... ..	5	Adults harden ... ..	—
Larvae moult ... ..	17	Adults feed ... ..	12

SUMMARY.

(1) The description of the male and the female is given; the immature stages are described for the first time, the description is based on material raised by Miss Walker at Kabete.

(2) The known hosts and its geographical distribution are given.

LITERATURE REFERENCES.

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 STELLA, E. (1938). Gli Ixodidi dell Africa Orientale Italiana. *Revista di Biol. Coloniale* 1, 135-153.