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ON THE ORNATE NYMPHS OF THE TICK GENUS *AMBLYOMMA*
(ACARINA: IXODIDAE).

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With 2 figures in the text.

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Introduction.

In 1927, C. WARBURTON described and figured the ornate nymph of the South African tick, *Amblyomma sylvaticum* (DEGEER) (= *Hyalomma latum* KOCH). He remarked that this was "the first instance of an ornate nymph of any species of tick hitherto recorded." Having recently observed two similar cases in the genus *Amblyomma*, I was led to investigate the matter more carefully. To my surprise, I found that one of my additional cases (*A. tuberculatum*) had been recorded many years ago by NEUMANN (1899) and that this author also knew the ornate nymph of *A. sylvaticum*, and, furthermore, described the ornate nymph of a third species, *A. cruciferum*. Moreover, it would seem that NEUMANN did not attach much importance to the absence of ornamentation in the nymphs of certain species of *Amblyomma*, for, when he states in the description of this stage that the scutum is unspotted, he often adds cautiously: "après séjour dans l'alcool." My own observations, however, seem to indicate that the presence or absence of ornamentation in the nymph, as well as the arrangement of the markings, are characteristic of the several species.

1. *Amblyomma sylvaticum* (Degeer).

Acarus sylvaticus DEGEER, 1778, Mémoires pour servir à l'Histoire des Insectes, VII, p. 162, Pl. XXXVIII, fig. 7 (♀; off a terrestrial tortoise; Cape of Good Hope). RETZIUS, 1783, C. DE GEER Gen. Spec. Insect., p. 203. GOEZE, 1783, in DEGEER, Abh. Gesch. Insekten, VII, p. 66, Pl. XXXVIII, fig. 7.

Cynorhaestes sylvaticus HERMANN, 1804, Mémoire Aptérologique, p. 68.

Ixodes sylvaticus LATREILLE, 1804 (An XII), Hist. Nat. Crust. Ins., VIII, p. 53. P. GERVAIS, 1844, in WALCKENAER, Hist. Nat. Ins. Aptères, III, p. 245.

Ixodes (Amblyomma) sylvaticus A. C. OUDEMANS, 1929, Tijdschr. v. Entom., LXXII, Supplement, p. 221.

Amblyomma sylvaticum KOCH, 1844, Arch. f. Naturgesch., X, 1, p. 231. NEUMANN, 1899, Mém. Soc. Zool. France, XII, p. 274 (♂♀ and nymph); 1901, *Loc. cit.*, XIV, p. 312; 1911, Das Tierreich, Lief. 26, Acarina, Ixodidae, p. 83 (♀♂). BEDFORD and HEWITT, 1925, South Afr. Jl. Nat. Hist., V, 1, p. 265, Pl. XX, figs. 10—11 (♂, nymph). BEDFORD, 1927, 11th and 12th Repts. Dir. Vet. Educ. Res., Un. South Africa, pt. 1, p. 734.

Amblyomma sylvaticum DÖNITZ, 1907, Die wirtschaftlich wichtigen Zecken, p. 86 (♀♂).

Hyalomma latum KOCH, 1844, Arch. f. Naturgesch., X, 1, p. 221 (♂; Südafrika); 1847, Übersicht d. Arachnidensystems, IV, p. 39, Pl. IV, fig. 14 (♂).

Amblyomma latum NEUMANN, 1899, Mém. Soc. Zool. France, XII, p. 233 (♂♂); 1901, *Loc. cit.*, XIV, p. 300. DÖNITZ, 1910, Denkschr. Med.-Naturw. Ges. Jena, XVI, p. 445 (♀♂). ROBINSON, 1926, Ticks, Part IV, *Amblyomma*, p. 151, figs. 69 and 70 (♀♂). WARBURTON, 1927, Parasitology, XIX, p. 410, fig. 4 (nymph).

Hyalomma devium KOCH, 1844, Arch. f. Naturgesch., X, 1, p. 222 (♀; Südafrika); 1847, Übersicht d. Arachnidensystems, IV, p. 47, Pl. VI, fig. 24 (♀).

Amblyomma devium NEUMANN, 1901, Mém. Soc. Zool. France, XIV, p. 307 (♀)¹. DÖNITZ, 1909, Sitzgaber. Ges. naturforsch. Freunde Berlin, p. 469, footnote.

I follow NEUMANN (1899), BEDFORD (1925 and 1927), and A. C. OUDERMANS (1929) in applying to this species DEGEER's name *Acarus sylvaticus*, since DEGEER's tick is recognizable even beyond a reasonable doubt. His description of the female fits that of KOCH's *Hyalomma latum* (= *H. devium*) to perfection, especially with regard to the ornamentation of the scutum. That DEGEER's description and figure are not up to present-day standards is no sufficient reason why his work should be "condemned" or be relegated "to the limbo of the forgotten". I do not see that DEGEER could have had a female of either *A. marmoreum* KOCH or *A. nuttalli* DÖNITZ, the other species of *Amblyomma* found on land turtles in South Africa. DEGEER describes and figures the scutum as "presque circulaire", which applies to the female of *Hyalomma latum* KOCH. In both *A. marmoreum* and *A. nuttalli* the scutum is subtriangular.

Those who are unwilling, under any circumstances, to accept DEGEER's *Acarus sylvaticus*, will nevertheless have to discard the name *A. latum* (KOCH) for this tick, and will have to use instead *Amblyomma devium* (KOCH). KOCH originally described the species in the genus *Hyalomma* and in the same paper he applied the name *Amblyomma latum* to a quite different tick of the Oriental Region (KOCH, 1844, *Loc. cit.*, p. 231). According to the rules, this precludes any subsequent use of the trivial name "latum" for another species in the genus *Amblyomma*. This rule holds even though the Indian "*Amblyomma latum* KOCH" is at present placed in the genus *Aponomma*².

¹ The female ticks described by NEUMANN in 1899 (Mém. Soc. Zool. France, XII, p. 255), as *Amblyomma devium*, were *A. marmoreum* KOCH (See NEUMANN, 1901, *Loc. cit.*, XIV, pp. 307 and 309).

² Moreover, it is doubtful whether *Aponomma* can be maintained as a genus distinct from *Amblyomma*.

DEGEER's description and figure of *Acarus sylvaticus* were, in my opinion, entirely based upon the female taken by SPARRMAN on a land turtle. The statements "sur les arbres et les buissons, sur le corps des hommes et des animaux", as well as the concluding remarks: "On trouve encore au Cap d'autres Mittes ayant à peine la moitié de la grandeur, entièrement d'un brun marron foncé et luisant, mais d'ailleurs de la même figure. Elles s'attachent de même aux animaux", were not based, so far as I can see, upon actual specimens. They refer merely to information supplied from memory by SPARRMAN. I cannot see that DEGEER described the replete nymphs, as OUDEMANS infers, the more so since we know that the nymph of *A. sylvaticum* is ornate and not "entièrement d'un brun marron foncé et luisant". OUDEMANS' inference that SPARRMAN's incidental remarks on external parasites of Cape buffalo actually prove that *A. sylvaticum* was found by him on this host, seems even more hazardous. Even nowadays, most travelers are wholly ignorant of the fact that different hosts may be infested with different species of ticks. One can only trust their information when supported by actual specimens. There is no proof that DEGEER himself saw anything but the single female taken by SPARRMAN off a terrestrial turtle.

WARBURTON (1927) thought that the true host of *A. sylvaticum* (which he calls *A. latum*) was still uncertain. But, in 1925, BEDFORD and HEWITT had recorded this tick from tortoises, *Chersine angulata* (SCHWEIGGER), and from a mole-snake, *Pseudaspis cana* (LINNAEUS), in South Africa¹. Moreover, NEUMANN also (1899) had seen two males from tortoises. WARBURTON examined two lots of this tick from the Vienna Museum, the hosts being given as "*Hamop. areolata*" and "*Tityus lineatus*", which, he says, were unknown to him. The first name is that of a South African land tortoise, *Homopus areolatus* (THUNBERG); while *Tityus lineatus* KOCH is a South African scorpion.

The ornate nymph of *A. sylvaticum* was first noticed by NEUMANN in 1899, when he described it as having the scutum wider in proportion and with the yellow patina less extensive than in the female. BEDFORD and HEWITT (1925) gave a much more complete description, together with a figure. They stated that the scutum is dark brown with a longitudinal admedian pale area on each side. WARBURTON (1927) called attention especially to the ornamentation of the nymph, which he also figured.

2. *Amblyomma tuberculatum* Marx.

Amblyomma tuberculatum MARX, 1894 (MAY), Insect Life, VI, No. 4, p. 314 (full description of ♀ ♂; off *Gopherus polyphemus*; Crescent City, Florida). HUB-

¹ The one male off this snake was obtained from a reptile in captivity, so that this may be a purely accidental host record. The accidental occurrence of the tick upon a scorpion, mentioned in the sequel, is by no means impossible, although it might require confirmation.

BARD, 1894, *Loc. cit.*, p. 306. NEUMANN, 1899, *Mém. Soc. Zool. France*, XII, p. 235 (♂ ♀ and nymph). N. BANKS, 1904, *Proc. Ac. Nat. Sci. Philadelphia*, LVI, p. 144; 1907, *Proc. U. S. Nat. Mus.*, XXXII, p. 607; 1908, *U. S. Dept. Agric. Bur. Ent., Techn. Ser.*, No. 15, p. 38, Pl. VI, fig. 8 (♀ ♂ and nymph). HUNTER and HOOKER, 1907, *U. S. Dept. Agric., Bur. Ent., Bull.* 72, p. 64. HOOKER, 1909, *Jl. Econ. Ent.*, II, pp. 254 and 421. NEUMANN, 1911, *Das Tierreich*, Lief. 26, *Acarina, Ixodidae*, p. 74 (♂ ♀). HOOKER, BISHOPP and WOOD, 1912, *U. S. Dept. Agric., Bur. Ent., Bull.* 106, p. 123, figs. 8 (map) and 9, Pl. IX, figs. 1—8 (♂ ♀, nymph, larva and egg). ROBINSON, 1926, *Ticks*, Part IV, *Amblyomma*, pp. 174 and 301, figs. 81 and 82 (♂ ♀).

ROBINSON's (1926) bibliography of this species is so fragmentary that I must give a complete list of references. NEUMANN at first (1899) gave the date of original publication wrongly as 1893, but corrected it later (1911) to 1894. ROBINSON leaves it indeterminate ("1893—1894"). The cover page of No. 4 of vol. VI of "Insect Life" states "Issued May 1894". MARX's original description also gives the host of the adults definitely as the Florida gopher turtle; although from NEUMANN's and ROBINSON's writings one might get the impression that the true host in nature only became known through the work of HOOKER, BISHOPP and WOOD.

A. tuberculatum is, in the adult and nymphal stages, a common and specific parasite of the gopher turtle, *Gopherus polyphemus* (DAUDIN)¹. Most probably its range coincides with that of the host, which occurs throughout the coastal plain of the Southeastern United States. L. STEJNEGER and T. BARBOUR (1923, *A Check List of North American Amphibians and Reptiles*, 2d Ed., p. 137) give the distribution of this gopher turtle as "Coast from southern South Carolina to Florida and the Mississippi River north into southern Arkansas"². Dr. BARBOUR tells me that it does not occur in the extreme southern part of Florida and that it certainly was never indigenous in Cuba. NEUMANN (1899) recorded a male of *A. tuberculatum*, at the Paris Museum, collected by GUNDLACH in Cuba; but this specimen must have been taken off a gopher turtle brought from the mainland and kept in captivity.

Previous, definite locality records of *A. tuberculatum* are as follows: Crescent City, Putnam Co., Florida (type locality; MARX and HUBBARD, 1894). Enterprise, Volusia Co., Florida (BANKS, 1904). Hawthorn, Alachua Co., Florida (HOOKER, BISHOPP and WOOD, 1912). Southern Alabama (HOOKER, 1909; ROBINSON, 1926).

I have seen five different lots of this tick, all taken off *Gopherus polyphemus*, from the following localities: Lakeland, Polk Co., Florida (Am. M. N. H. and W. T. Davis Coll.). La Grange, Brevard Co., Florida (W.

¹ *Testudo polyphemus* and *Xerobates polyphemus* are merely other names for the same turtle.

² For an interesting account of the burrows of the gopher turtle and the arthropods associated with them, see: HUBBARD, H. G. 1894. The insect guests of the Florida land tortoise. *Insect Life*, VI, No. 4, pp. 302—315.

T. Davis Coll.). Mt. Pleasant, Gadsden Co., Florida (W. T. Davis Coll.). South Carolina, without more definite locality (off a turtle brought to the Bronx Zoölogical Park. — W. T. Davis Coll.).

The two lots from Lakeland consisted mostly of nymphs, which are very striking on account of the beautiful markings of the scutum. That the nymph of this species is ornate, was fully recognized by NEUMANN (1899) who first described this stage. For he writes: „grandes punctuations occupant toute l'étendue des champs latéraux, *qui sont cuivrés, le médian brun rouge*” (italics by me). N. BANKS (1908) also noted that the nymphs “have, on the shield, a large silvery spot each side, united behind at tips, and in front much broken by the large punctures”. In addition, nymphs were described and figured by W. A. HOOKER, F. C. BISHOPP and H. P. WOOD (1912). In the examples I have seen, the ornamentation is only slightly different from that of the female: the scapular angles are more extensively dark brown and this color also forms a distinct longitudinal stripe in the median field (more or less hourglass-shaped and with pointed hind tip); behind the cervical grooves, the dark brown cervical stripes are short and very narrow; the brown spots behind and laterad of the cervical stripes are lacking.

3. *Amblyomma cruciferum* Neumann.

Amblyomma cruciferum NEUMANN, 1901, Mém. Soc. Zool. France, XIV, p. 302 (♂ and nymph; Haiti; off an iguana, “*Metopoceros cornutus*” = *Cyclura cornuta* BONNETERRE); 1911, Das Tierreich, Lief. 26, Acarina, Ixodidae, p. 88 (♂). DÖNITZ, 1909, Sitzungsber. Ges. naturforsch. Freunde Berlin, p. 448, fig. 8 (♂). ROBINSON, 1926, Ticks, Part IV, *Amblyomma*, p. 187, fig. 89 (♂).

The only specimens known thus far of this species were the types. At the Museum of Comparative Zoölogy I obtained two males, as well as one female, of this species, off *Cyclura stejnegeri* BARBOUR and NOBLE, from Mona Island (in the straits between Haiti and Porto Rico).

Female (undescribed). — A medium-sized tick; scutum cordiform, ornate, with a large pale spot in the scapular field and with the median field mostly pale; punctures numerous, large, subequal, not confluent; cervical grooves long, deep anteriorly, divergent and shallow posteriorly; coxa I with two subequal spurs; two unequal spurs on coxae II and III; coxa IV with a single, short spur.

Body (in alcohol): 6 mm. long, 4 mm. wide (probably half engorged). Scutum (Fig. 1 A): 1.7 mm. long and 2 mm. wide, cordiform, the posterior angle very broadly rounded, the scapulae blunt; color dark brown over most of the sides; with a large, subtriangular, pale spot in each scapular field, not reaching the anterior margin nor the eyes, and extending to near the tip of the cervical groove; inner scapular margins broadly pale; median field pale, except for the broad posterior margin, with an indication of a darker cross-stripe before the middle; punctures fairly equal,

not confluent, fairly evenly scattered, larger on the pale lateral areas; cervical grooves long, their anterior half deep and narrow, their posterior portion divergent, broad and very shallow, not quite reaching the hind third of the scutum; eyes large, flat, pale. Dorsum of abdomen with a few irregularly scattered short, white hairs; the festoons effaced; seven pit- or groove-like depressions on either side of the median furrow; the anterior paramedian furrow long but shallow; the posterior paramedian furrow deep, pit-like and connected by means of an oblique furrow with the postero-lateral pit; the antero-lateral furrow apparently broken up into three pits; the accessory paramedian furrow short and deep. Venter: with few, very short hairs; with the usual longitudinal furrows, the

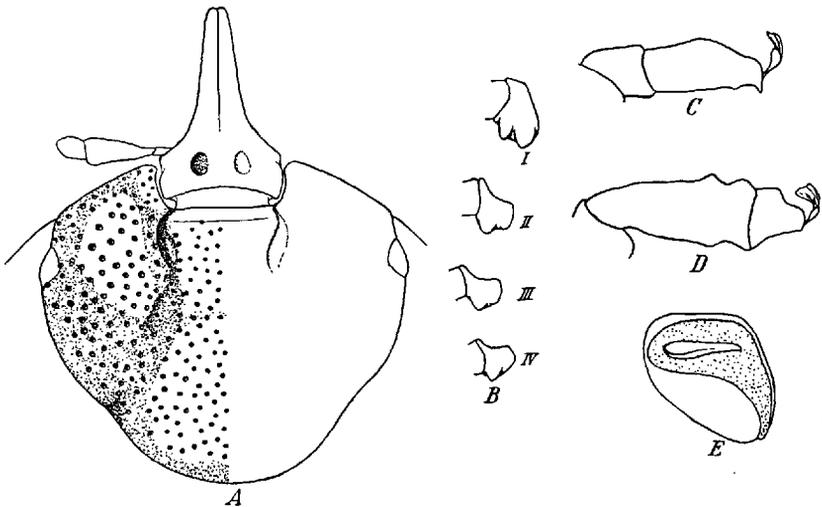


Fig. 1. *Amblyomma cruciferum* NEUMANN. Female. A, scutum. B, coxae I to IV. C, tarsus IV. D, tarsus I. E, stigmal plate.

median and accessory paramedians very deep; the anterior and posterior paramedians shallow, connected. Stigmal plate (Fig. 1 E) triangular, with broadly rounded angles, the dorsal prolongation very obtuse; the granulated inner area comma-shaped. Capitulum: 0,9 mm. long; basis capituli rectangular, the dorsal ridge concave; the postero-lateral angles well-marked, but not salient; porose areas small, nearly twice as far apart as their diameter; palps moderately long, slender; the second article nearly three times as long as the third, flattened on the inner side, very briefly stalked at the base; hypostome short, dentition 3 : 3. Legs (Fig. 1 B; coxae I—IV): of medium size, pale yellowish brown, without annulations; coxa I with two short, broad spurs, rather close together, of about equal length, the inner one the broader; coxa II and III each with a broad, ridge-like outer spur and a barely indicated inner ridge; coxa IV

with a single, broad and short spur; tarsi short, tarsus I (Fig. 1 *D*) abruptly attenuated at apex; tarsus IV (Fig. 1 *C*) attenuated in talus; pulvilli large.

The nymph of this species was fully described by NEUMANN (1901). He stated that the scutum is "blanchâtre avec reflet vert métallique, bordure brunâtre étroite, punctuations nombreuses, superficielles, rougeâtres". *A. cruciferum* is, therefore, one more species in which the nymph is ornate.

4. *Amblyomma darwini* S. and L. F. Hirst.

Amblyomma darwini S. HIRST and L. F. HIRST, 1910, Ann. Mag. Nat. Hist., (8) VI, p. 299 (♂ ♀; types off *Amblyrhynchus cristatus*, Albemarle Island, Galapagos; also without host from St. Paul's Island). ROBINSON, 1926, Ticks, Part IV, *Amblyomma*, p. 221 (♀ ♂).

Among the ticks obtained from reptiles in the Galapagos Islands by my friend, Mr. KARL P. SCHMIDT, during the Crane Pacific Expedition, and sent to me for study by the Field Museum of Natural History, there were four lots of *A. darwini*. A fifth series of this tick was taken from reptiles preserved at the Museum of Comparative Zoölogy, through the courtesy of Mr. ARTHUR LOVERIDGE. The data of these ticks are as follows:

Galapagos Islands. — Conway Bay, Indefatigable Island, four females and one nymph, off sea-iguana, *Amblyrhynchus cristatus* BELL, January 1929 (K. P. SCHMIDT. — Field Mus. N. Hist.). Jarvis Island, four females and two males, off *A. cristatus* (L. AGASSIZ. — M. C. Z.). Tagus Cove, Albemarle Island, nine females and four males off *Amblyrhynchus cristatus* BELL, January 7, 1929 (K. P. SCHMIDT. — Field Mus. N. H.). Narborough Island, two nymphs, off two specimens of *Tropidurus magnus* (HELLER), January 7, 1929 (K. P. SCHMIDT. — Field Mus. N. H.).

The males and females of these lots agree in shape, structure and sculpture with the original description; the various dorsal pits and grooves of the scutum being especially characteristic. The HIRST's describe the color of the male as "deep brown above, dirty yellowish-white below". In the males I have examined there are distinct pale enamel markings, forming a series of disconnected patches, very irregular in outline, over much of the raised portions of the scutum, as follows: antero-laterally a fairly large, oblique patch running from the eye to behind the cervical grooves, more or less connected with a small median spot, and extending somewhat on each side between the pair of antero-median impressions (together these three pale spots delimit more or less a pseudoscutum); a fairly large spot on each side of the anterior portion of the long postero-median groove, produced outwardly toward the anterior festoons; a pair of more or less triangular spots posteriorly on either side of the parma. These spots are best seen when the specimen is immersed in alcohol. The HIRST's merely mention, of the female, that

the scutum is "very dark brown, with irregular pale patches (which are only visible in the dry examples)". In the specimens in which I was able to observe the ornamentation, the female scutum showed three pale disconnected areas: those in the scapular fields were less extensive than in the nymph (described below), while that of the postero-median field seemed to be quite large. It was, however, always difficult to trace the outlines of these pale patches.

Nymph (undescribed). — Body (in alcohol, apparently fully engorged): 2,6 mm. long, 2 mm. wide. Scutum (Fig. 2 A): 0,5 mm. long, 0,75 mm. wide, elliptical, the posterior margin forming an even curve, the scapulae blunt; color mostly dark brown, on each side with a large, irregularly triangular, pale, very distinct and somewhat metallic spot covering much of the scapular field, its edges jagged, not far removed from the scapula and the eye, very narrowly separated from the posterior margin, more broadly so from the anterior margin; a series of brown dots correspond to the punctures, which are very few and much scattered, rather large; on each side, in the pale area of the scapular field, there is a dark-colored depression with several close punctures (a similar depression is found in the adult female); cervical grooves long, broad and deep, almost straight, somewhat interrupted half-way, extending beyond the hind third of the

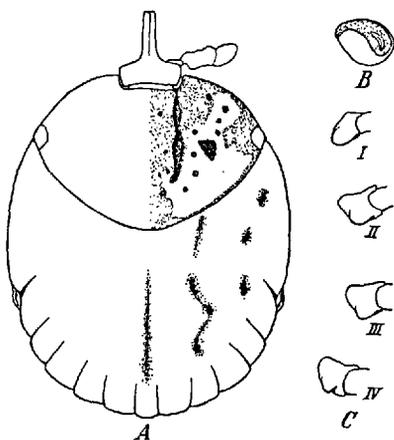


Fig. 2. *Amblyomma darwini* S. and L. F. HIRST. Nymph. A, dorsal view. B, stigmal plate. C, coxae I to IV.

scutum; eyes large, flat, pale. Dorsum of abdomen glabrous; the grooves and pits arranged much as in the female, but less pronounced; festoons distinct in unfed, indistinct in engorged nymphs. Venter: glabrous. Stigmal plate (Fig. 2 B) broadly oval, the inner granulated area comma-shaped. Capitulum: short; basis capituli rectangular, with rounded postero-lateral angles; palpi rather thick, the outer basal prominence of the second article less pronounced than in the female; hypostome short, dentition 3 : 3. Legs of medium size, uniformly pale yellowish brown; all coxae (Fig. 2 C) with a single, very short and broad, ridge-like spur.

This nymph is readily associated with the adult female of *A. darwini*. It differs mainly in the absence of the postero-median pale spot, in the much reduced puncturation, and in the presence of a single, broad spur on coxa I. It should be noted that even in the adult female the inner spur of coxa I is very short and often hardly visible.