

A REVIEW OF AFRICAN *AMBLYOMMA* SPECIES (ACARI, IXODIDA, IXODIDAE)ОБЗОР АФРИКАНСКИХ ВИДОВ РОДА *AMBLYOMMA* (ACARI, IXODIDA, IXODIDAE)

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## ABSTRACT

This review includes descriptions of all available African *Amblyomma* species, keys to males and females, data on synonymy, distribution, and host-parasite associations.

## РЕЗЮМЕ

Обзор включает описание всех известных на данный момент фаз жизненного цикла, определительные ключи самцов и самок, данные по синонимии, распространению и хозяевам африканских видов рода *Amblyomma*.

## INTRODUCTION

Recently interest in tick systematics and phylogeny has upsurged greatly. The publications on these questions are based on both morphological and molecular data sets [see the review by Barker and Murrell, 2002]. Two genera, *Aponomma* and *Amblyomma* are of great importance for evaluating hypotheses of basal relationships in Ixodidae [Klompen et al., 2000].

Ticks of the genus *Aponomma* have been reclassified and some species from the "indigenous Australian *Aponomma*" group have been transferred to the genus *Bothriocroton* [Klompen et al., 2002]. The remaining members of *Aponomma* have been transferred to *Amblyomma*. Thus, according to the current concept [Horak et al., 2002] the genus *Amblyomma* contains 126 species. For a re-examining of the relationship among the basal taxa of the Ixodidae the revision of the genus and study of all known *Amblyomma* species are necessary with the use of both morphological and molecular characters. We have previously reviewed the Asian *Amblyomma* species [Voltzit, Keirans, 2002], and the present paper includes descriptions of all available sexes and stages of African species, keys to males and females, data on synonymy, distribution, and host-parasite associations.

The materials used in the present study were received from US National Tick Collection (Statesboro, Georgia), from the Zoological Museum of Moscow State University (Moscow, Russia), and from Musée royal de l'Afrique centrale (Tervuren, Belgium).

HOSTS AND DISTRIBUTIONS OF AFRICAN *AMBLYOMMA* SPECIES*Amblyomma astrion* Dönitz, 1909

This relatively uncommon tick species is found in the Central African Republic, western portions of the Democratic Republic of Congo, western Angola and the islands of São Tomé and Príncipe. *Syncerus caffer*, the African buffalo is the primary host for this tick species, although it occasionally is found on other ruminants

*Amblyomma astrion* closely resembles *A. cohaerens* and some authors [Elbl and Anastos, 1966] have confused the two species.

*Amblyomma chabaudi* Rageau, 1964

Rageau [1964] described this species based on 3 males collected on the Malagasy spider tortoise, *Pyxis arachnoides* in southern Madagascar. Uilenberg [1965, 1967] described the female and immature stages of this tortoise parasite. The tick is found only along the southern coast of Madagascar, and appears to be a specific parasite of *P. arachnoides*, although experimentally *Testudo radiata* and *T. planicauda* can be used as hosts [Uilenberg, 1967].

*Amblyomma cohaerens* Dönitz, 1909

This is the East African buffalo tick. Its northern limit is in Equatoria Province of Sudan, and extends southward through Central and East Africa to Tanzania. In Kenya, the distribution of *A. cohaerens* is very restricted and populations very low

despite an abundance of buffalo [Walker, 1974]. Other hosts for *A. cohaerens* include cattle, bushbuck, Jackson's hartebeest, wart hogs and giraffe. Pegram [1979] indicated that there was the possibility of a species confused with *A. cohaerens* parasitizing cattle in wetter areas of western Ethiopia. He found typical *A. cohaerens* on buffalo, and a smaller, lighter-colored variant on cattle. Females of this species are morphologically very close to females of *A. splendidum*, and can only be separated with certainty by association with the male [Matthysse and Colbo, 1987], and all records of *A. cohaerens* from West African countries are most likely the latter species.

***Amblyomma compressum* (Macalister, 1872)**

This small species of *Amblyomma* is found almost exclusively on the three African species of pangolins, *Manis temminckii*, *M. tetradactyla*, and *M. tricuspis* (Manidae). It is found throughout the range of these host species, i. e., from Senegal, Liberia and Gambia in West Africa eastward to western Kenya and south to Namibia, Botswana, South Africa and Mozambique. Specimens of *A. compressum* are rarely collected on *Hylochoerus meinertzhageni*, the giant forest hog [Robinson, 1926; U.S. National Tick Collection, unpublished record].

***Amblyomma eburneum* Gerstäcker, 1873**

This is an East African species that has been recorded from Somalia, Eritrea and Ethiopia in the north, south through Kenya, Tanzania and Zimbabwe [Elbl and Anastos, 1966; Walker, 1974]. Cattle, sheep and African buffalo are the primary hosts, although there are occasional collections of this tick from zebra and eland.

***Amblyomma falsomarmoreum* Rondelli, 1935**

Varanid lizards and tortoises are the primary hosts for this rare East African tick species. It is found in Somalia, Ethiopia, Kenya and Tanzania [Theiler and Salisbury, 1959; Yeoman and Walker, 1967]. The U.S. National Tick Collection has an unpublished record of *A. falsomarmoreum* collected from sheep in Somalia.

***Amblyomma gemma* Dönitz, 1909**

This tick is found in Somalia, eastern Ethiopia, Kenya, and eastern and central Tanzania. It is present in eastern Uganda, but not well established there [Walker, 1987]. Pegram et al. [1981] stated that in Ethiopia, *Amblyomma gemma* was found only in the Rift Valley and eastward. Domestic livestock are the primary hosts for *A. gemma*, with

occasional collections from giraffe, African buffalo, zebra, rhinoceros, impala and camel. A distributional map of this species can be seen in Walker et al. [2003].

***Amblyomma geoche-lone*  
Durden, Keirans and Smith, 2002**

The male and female of *Amblyomma geoche-lone* were collected on the endangered plowshare tortoise, *Geochelone yniphora*, in northwestern Madagascar [Durden et al., 2002]. Immatures of this tick species are unknown.

***Amblyomma hebraeum* Koch, 1844**

The principle domestic host for *A. hebraeum* are cattle, followed by sheep, goats, horses and occasionally pigs and dogs. Many species of wild mammals are also hosts for this tick species, especially wild ungulates [Theiler, 1962; Petney et al., 1987]. Immature stages often feed on the same hosts as the adults [Walker, 1991]. They also feed on Canidae, Viverridae and Felidae, and on hares, especially the scrub hare, *Lepus saxatilis* [Horak et al., 1987a; 1987b]. It is distributed in South Africa, eastern Botswana, southern and central Zimbabwe and southern Mozambique [Paine, 1982; Walker, 1991; Walker et al., 2003].

***Amblyomma lepidum* Dönitz, 1909**

This is primarily an East African herbivore tick found in Sudan, Ethiopia, Eritrea, Somalia, Uganda, Kenya, Tanzania and Malawi. There have been some collections from Egypt and Chad [Robinson, 1926; Hoogstraal, 1956; Theiler, 1962; Matthysse and Colbo, 1987]. It has apparently become established on the island of Cyprus [U.S. National Tick Collection unpublished data], and in Israel [Feldman-Muhsam, 1955; Feldman-Muhsam and Saturen, 1961], and Syria [Köhler et al., 1967]. Domestic cattle can be heavily parasitized by *A. lepidum*. Wild hosts appear to be primarily zebra, buffalo, antelopes and ostrich. Immatures are often found on various birds such as bustards, antelope, cattle and dogs [Hoogstraal, 1956; Matthysse and Colbo, 1987]. It is likely that birds have transported this tick as far afield as Azerbaijan [Pospelova-Shtrom and Abusalimov, 1957].

***Amblyomma loculosum* Neumann, 1907**

The first and, so far as we have been able to determine, only record of this tick from Africa, was a collection of one nymph and 4 larvae taken from an immature Lesser Frigate Bird, *Fregata a. ariel*, at Msasani Peninsula, Dar es Salaam, Tanzania [Uilenberg, 1977]. This tick has also been recorded

from five bird species and was found biting humans on the Seychelles Islands [Hoogstraal and Feare, 1984]. Also on the Seychelles, Ramos et al. [2001] reported nestling Roseate Tern mortality caused by *A. loculosum*. Detailed records of the avian hosts and distribution of *A. loculosum* can be found in Hoogstraal et al. [1976].

#### *Amblyomma marmoreum* Koch, 1844

This tick species, which has been confused with *Amblyomma sparsum* and occasionally with *A. nuttalli* by Robinson [1926], is distributed in Zimbabwe, South Africa, southern Mozambique, with a few scattered records from Namibia. Tortoises appear to be the preferred host for all stages of *A. marmoreum*. It can also be found on large snakes such as the puffadder and varanid and other lizards [Walker, 1991]. Adults are specific parasites of reptiles, but immatures can be found on domestic livestock, various carnivores, especially the black-backed jackal, and the caracal. Also scrub hares and ground-feeding birds, especially the helmeted guineafowl are all hosts for immatures of this tick.

#### *Amblyomma nuttalli* Dönitz, 1909

Reptiles, especially tortoises, and to a lesser degree, lizards and snakes are the preferred hosts for adult *Amblyomma nuttalli*. Immatures can be found on ground nesting birds such as Galliformes and Coraciiformes, and on insectivores and rodents. *Amblyomma nuttalli* is nowhere abundant, but it is widely distributed throughout Africa except for countries in the northwest quadrant of the continent. It is found from Egypt in the north to the Kwa-Zulu Natal in South Africa.

#### *Amblyomma paulopunctatum* Neumann, 1899

*Amblyomma paulopunctatum* is distributed roughly between 10°N and 10°S of the equator from the Atlantic coast of Africa in the west to approximately 32°E in Uganda [Keirans, 1985]. Specimens have been recorded from Guinea, Liberia, Sierra Leone, Ivory Coast, Cameroon, Angola, Central African Republic, Democratic Republic of Congo, Burundi and Uganda. The mammalian family Suidae (*Potamochoerus porcus*, *Phacochoerus aethiopicus*, *Hylochoerus meinertzhageni* and *Sus scrofa*) are preferred hosts for this tick.

#### *Amblyomma personatum* Neumann, 1901

This very large tick species is a parasite of the hook-lipped or black rhinoceros, *Diceros bicornis*. Records of this tick are scarce, but it has been

recorded on hook-lipped rhinos from Gabon [Theiler, 1962], Kenya [Walker, 1991], and Tanzania [Yeoman and Walker, 1967]. It is estimated that the hook-lipped rhinoceros has gone from an estimated 100,000 in the 1960s to less than 3,000 in 1994 [Walker, 1994], and with it a drastic decrease of *A. personatum* to the point where it is on the verge of extinction [Penzhorn et al., 1994].

#### *Amblyomma pomposum* Dönitz, 1909

This tick species is known as the highland bont tick [Hoogstraal, 1956]. It is found in eastern Central Africa (Democratic Republic of Congo, Rwanda, Burundi), Angola, Kenya, Zambia, Zimbabwe and Mozambique. Hoogstraal [1954] recorded a single collection of *A. pomposum* from the Ankole topi, *Damaliscus korrigum ugandae*, from Lugaga, Uganda; the only record of this tick from this host and from Uganda. However, Matthyse and Colbo [1987] did not record this tick from Uganda in their monograph on the ixodid ticks of this country, and Theiler [1962] considered specimens recorded from Sudan, Kenya, Uganda, Rwanda and Burundi to be heavily punctate *Amblyomma variegatum*. Cattle, oxen, mules, and African buffalo are some of the more common hosts for this tick, along with zebra, warthog, red hartebeest, and sable antelope.

#### *Amblyomma rhinocerotis* (De Geer, 1778)

Adults (immatures are unknown) feed on both the white rhinoceros, *Ceratotherium simum*, and the hooked-lipped or black rhinoceros, *Diceros bicornis*. For the few other hosts of this tick see Hoogstraal [1956] and Yeoman and Walker [1967]. *Amblyomma rhinocerotis* is found from throughout the ranges of its two hosts in East and Central Africa. Because this tick species is found on both species of rhinoceros, its fate is not as endangered as that of *A. personatum*. However the remarks cited under *A. personatum* may soon apply to *A. rhinocerotis* as well.

#### *Amblyomma sparsum* Neumann, 1899

Hosts for adult *A. sparsum* are two distinctly different groups of animals, namely the black rhinoceros, *Diceros bicornis* and the African buffalo, *Syncerus caffer*, on the one hand, and various reptiles such as the hindged tortoise, *Kinixys belliniana*, and the leopard tortoise, *Geochelone pardalis*, on the other [Walker, 1991]. Matthyse and Colbo [1987] considered the hippopotamus, *Hippopotamus amphibius*, to also be an important host. They considered that such an unusual host relationship raises the question of whether or not the entity we know as *A. sparsum* constitutes a single species.

This tick species is often found in Kenya and northern Tanzania with lesser records from the southern Sudan, Uganda, Rwanda and Burundi. It appears to die out at roughly 20° South latitude where there is a slight overlap with *A. marmoreum* in Namibia, Zimbabwe and Mozambique [Theiler, 1962].

***Amblyomma splendidum* Giebel, 1877**

A tick species found in West Africa primarily parasitizing African buffalo and cattle. Collections have been recorded from Guinea-Bissau, Liberia, Guinea, Ivory Coast, Sierra Leone, Ghana, Togo, Benin, Nigeria, Cameroon, Gabon, Democratic Republic of Congo and Angola [Robinson, 1926; Theiler, 1962]. Published records of this tick from Kenya were considered by Walker [1974] to be *Amblyomma cohaerens*.

***Amblyomma sylvaticum* (De Geer, 1778)**

This species is known only from the Cape Province of South Africa, and all stages of the tick parasitize tortoises, especially the angulate tortoise, *Chersina angulata*. Immature stages have been collected on members of the family Agamidae, and both adults and nymphs have been collected on the mole snake, *Meroles cana* [Walker, 1991]. Warburton [1927] listed 3 collections of *A. sylvaticum* (as *Amblyomma latum* Koch, 1844) in the Vienna Museum from "Natal" and "Cape Zelandor". Theiler [1962] noted that these collections need to be restudied, because the tick is not found in Natal and the whereabouts of Cape Zelandor is unknown.

***Amblyomma tholloni* Neumann, 1899**

This is the tick found primarily on the African elephant, *Loxodonta africana*. It is found throughout the range of its host from Liberia, Sierra Leone and Nigeria in West Africa to Sudan, Somalia, Kenya and Tanzania in East Africa, south to Mozambique and South Africa [Theiler, 1962; Walker, 1991]. Occasionally other hosts are attacked by *A. tholloni*, but these hosts are also found within the distributional range of *Loxodonta africana*. The African buffalo, rhinoceros, lizards and some birds have been found with this tick attached. The records by Dinnik et al. [1963] of 45 adult and 105 nymphs of *A. tholloni* collected on 76 hippopotami demonstrate that this is also an important host.

***Amblyomma variegatum* (Fabricius, 1794)**

*Amblyomma variegatum* is the most widespread member of the genus in subSaharan Africa. Its northern borders in West Africa extend from the

Mauritania–Senegal border through southern Mali, Niger, Chad and Sudan into most of Ethiopia. Due to extreme aridity, eastern Ethiopia, northern Kenya and most of Somalia are free of this tick. The southern border of this species is the Caprivi Strip of Namibia, Zambia, northern Zimbabwe, north-east Botswana to central and northern Mozambique. Outside Africa it is become established in the Yemen Arabic Republic, Madagascar, and several islands in the Caribbean Sea and Indian Ocean. A map of its distribution can be found in Walker [1987]. Domestic cattle are the primary hosts for all stages of *A. variegatum*. Sheep and goats are parasitized to a lesser extent. Large Artiodactyla are the preferred wild hosts for this tick. Immature *A. variegatum* have been collected occasionally on reptiles, numerous bird species, and a large number of mammal species. It is likely that birds have transported this tick as far afield as the Black Sea coast. Thus in the Krasnodar Region a population of this species has existed for some years where adults have been found parasitizing cattle [Kerbaev et al., 1997].

**DESCRIPTIONS OF SPECIES**

The nomenclature of idiosomal chaetotaxy follows that of Klompen et al. [1996]. All measurements in the descriptions are given in millimeter (mm).

***Amblyomma astrion* Dönitz, 1909**

*Amblyomma astrion* Dönitz, 1909: 463, fig. 13, original description.

**Male** (Fig. 1). Measurements from 2 specimens. Length from apices of scapulae to posterior scutal margin 4.6, 4.9; breadth 3.75, 4.1. Outline oval broadest at level of spiracular plates. Scutum ornate, a large metallic beige patch with gold-redish edging covers the central part of the scutum and bifurcates in the posterior part; two small gold-redish patches in each lateral area; some green-redish patches on festoons. Punctations shallow, small, more numerous in each lateral area, absent in posterior half of scutum. Scapulae very pointed, medial margins with ledges. Cervical grooves short, deep, converging. Marginal groove complete beginning at level of legs III. Festoons rectangular, with sclerotized plates extending posterior margin of the festoons. Eyes slightly bulging, situated at a distance from scutal margin.

Capitulum (Fig. 1 b,c) length from palpal apices to cornua apices 1.5, 1.8; breadth 0.96, 0.94; punctations of basis capituli numerous, shallow,

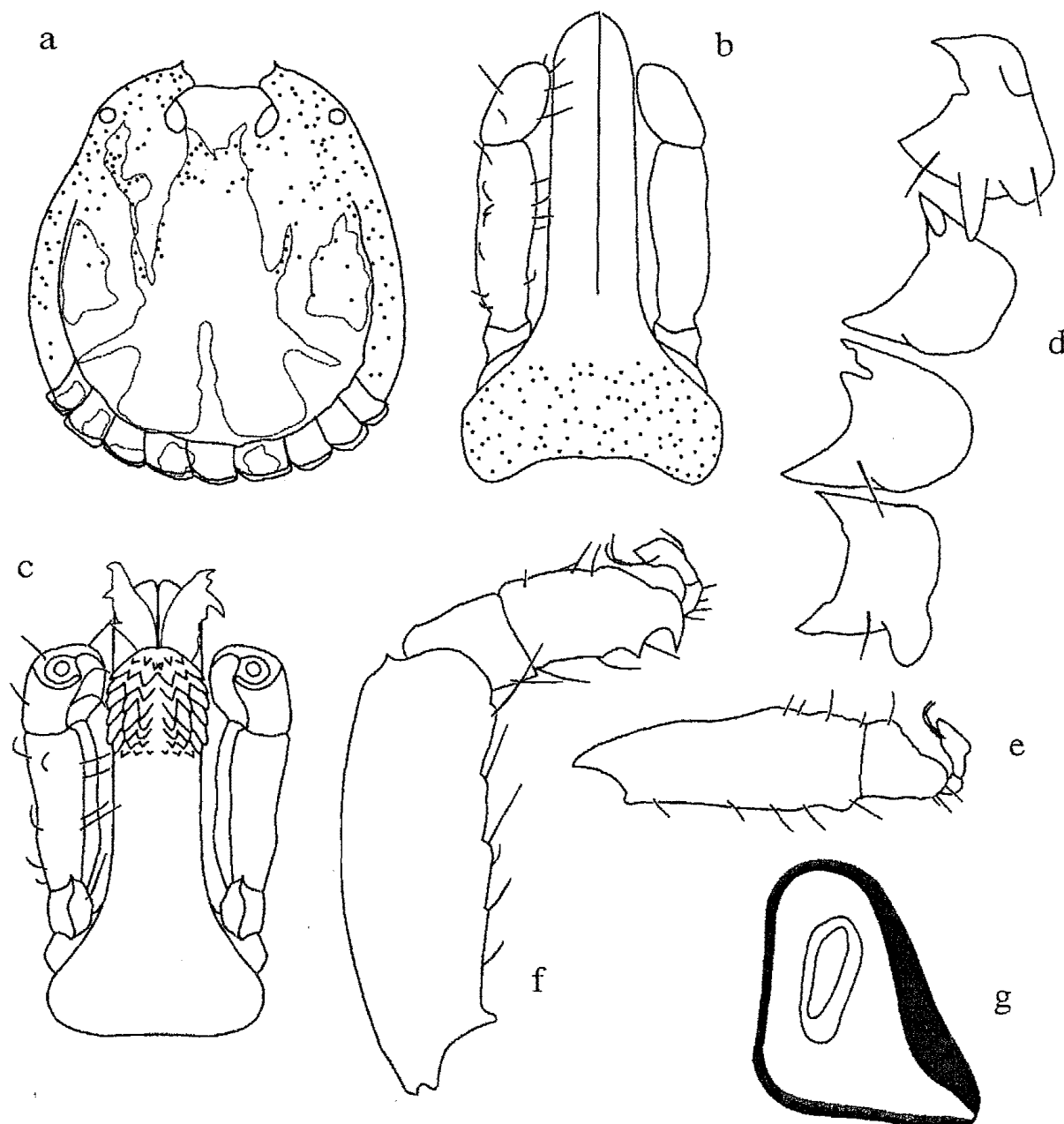


Fig. 1. *Amblyomma astrion*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

small; posterior margin concave, cornua of medium size, broadly rounded; external margins slightly convex; ventrally posterior margin straight. Palpi length 1.14; 1.24; breadth 0.23; 0.27. Segment II 2.9; 3.3 times longer than segment III, length of segment II 0.76, 0.79; length of segment III 0.26, 0.24. Segment II dorsally with few in number, shallow, small punctations. Segment I ventrally with a sharp ridge ending anteriorly with a small spur. Hypostome length 1.4, 1.2; length of toothed portion 0.57, 0.61; with a small corona of fine denticles apically, apex rounded, dental formula 3/3 in anterior part and 4/4 in posterior part.

Legs (Fig. 1 d–f). Coxa I with 2 triangular spurs, the external spur larger, pointed, reaching the anterior margin of coxa II, internal spur broadly rounded. Coxa I with a small, low callosity anteriorly.

Coxae II–III each with a single, broadly rounded, paddle-shaped spur. Coxa II with a small callosity similar to sharp ridge anteriorly. Coxa IV with a single, long, relatively broad, triangular spur. Trochanters lack spurs. Tarsus I length 1.24, 1.14; width 0.31, 0.29; without ventroapical hook. Tarsus IV length 0.86, 0.8; breadth 0.29, 0.29; with 1 strong ventroapical hook and 1 strong ventral hook. Tibia IV length 1.43, 1.43; breadth 0.44, 0.4. Leg segments with broad, yellow annular wheels at distal ends.

Venter with short, thick, cone-like setae. Genital aperture situated between coxae II–III. Medial and lateral margins of spiracular plate diverging, posterior margin straight, dorsal prolongation triangular, perpendicular to the anterior-posterior axis (Fig. 1g). Postanal groove with a shallow, unpaired,

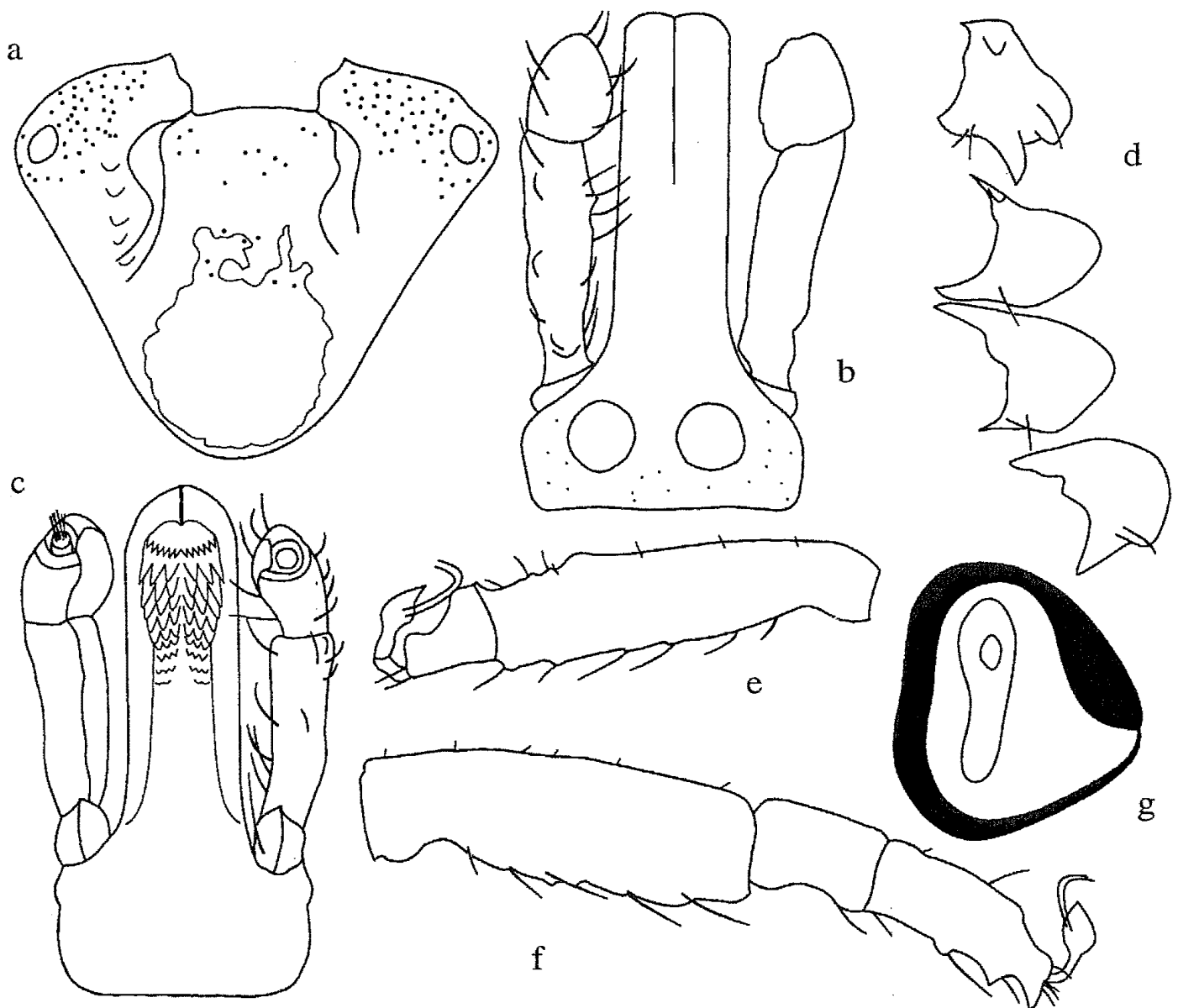


Fig. 2. *Amblyomma astrion*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

posteriorly directed, median groove extending to the unpaired anal shield. Integumentary hard elements of the ventral skeleton of idiosoma consist of unpaired anal and 2 paired postanal shields, and festoons' shields.

**Female** (Fig. 2). Measurements from 2 specimens. Length from apices of scapulae to posterior body margin 5.65, 5.75; breadth 4.75, 4.9. Dorsal body setae few in number, short, cone-like. Ventral body setae few in number, short, thin, cone-like. Marginal groove complete, beginning near the posterior margin of scutum. Festoons evident.

Scutum (Fig. 2a) length 2.7, 2.7; breadth 3.0; 3.1; dark-brown with light-brown border between scapulae, ornate, gold-redish metallic patch in the posterior half. Posterior margin narrowly rounded, posterolateral margins slightly concave. Scutal punctations deep, small, numerous in each scapular area, and very few, shallow in the central and

posterior areas. Scapulae pointed, medial margins with ledges. Cervical grooves long, deep, converging anteriorly then diverging as shallow depressions. Eyes slightly bulging, light brown, situated at a distance from scutal margin.

Capitulum (Fig. 2 b,c) length from palpal apices to posterior margin of basis 1.9, 1.9; breadth 1.1, 1.1; cornua very short, broadly rounded or absent; posterior margin straight or slightly sinuous, lateral margins straight; ventrally posterior margin straight. Basis capituli slightly wrinkled, punctations very few, small, shallow. Porose areas large, round, not deeply depressed, diameter of one area 0.2, interporose area 0.2. Palpi length 1.5, 1.5; breadth 0.26, 0.27. Segment II 2.2 times longer than segment III, length of segment II 0.96, 0.97; length of segment III 0.43, 0.44. Segment I ventrally with a sharp ridge ending anteriorly with a small spur. Palpi slightly wrinkled. Hypostome length 1.4, 1.5;

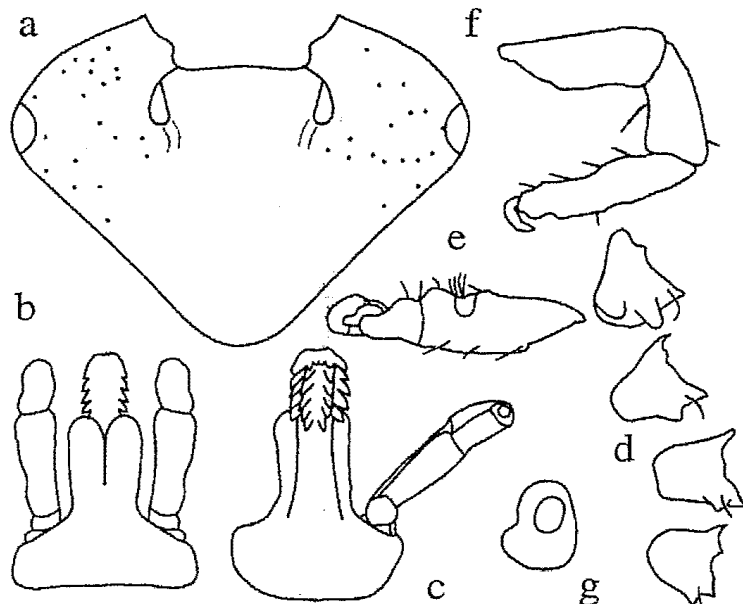


Fig. 3. *Amblyomma astrion*, nymph: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

length of toothed portion 0.76, 0.79; with a large corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3 in the anterior part and 4/4 in the posterior part.

Legs (Fig. 2 d–f). Coxa I with 2 spurs, the external spur large, long and pointed, internal spur short, triangular, rounded. Coxa I with an evident spur-like callosity anteriorly. Coxae II–III each with a single, broadly rounded, very short, paddle-shaped spur. Coxa IV with a single, triangular, broad spur. Trochanters lack spurs. Tarsus I length 1.4, 1.6; width 0.31, 0.33; without ventroapical hook. Tarsus IV length 1.3, breadth 0.3, with 1 strong ventroapical hook and 1 sharp ventral hump. Tibia IV length 1.5, breadth 0.44. Leg segments with broad, yellow annular wheels at distal ends.

Medial and lateral margins of spiracular plate diverging, dorsal prolongation short, triangular, forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 2g). Genital aperture “V” shaped, situated between coxae II–III. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Nymph** (Fig. 3). Length from apices of scapulae to posterior body margin 1.84, breadth 1.51. Dorsal body setae very few, relatively long, curved, stick-like. Ventral body setae thin, short, curved, cone-like. Marginal groove absent. Festoons evident.

Scutum (Fig. 3a) length 0.83, breadth 1.07. Yellow-brown, inornate. Posterior margin narrowly rounded, posterolateral margins slightly concave. Scapulae pointed. Surface shagreened with large,

deep, very few punctations in each lateral area. Cervical grooves deep, converging anteriorly then diverging as shallow depressions. Eyes bulging.

Capitulum (Fig. 3 b,c) length from palpal apices to posterior margin of basis 0.61, breadth 0.4. Basis capituli rectangular, posterior margin nearly straight, lateral margins bluntly rounded or straight, cornua absent; ventrally posterior margin convex. Punctations of basis capituli very few, large. Palpi length 0.46, breadth 0.09. Segment II 3.1 times longer than segment III, length of segment II 0.44, length of segment III 0.14. Palpi slightly wrinkled. Segment I ventrally with a sharp ridge. Hypostome length 0.46, length of toothed portion 0.28, with a large corona of fine denticles apically, apex slightly notched, rounded; dental formula 2/2.

Legs (Fig. 3 d–f). Coxa I with 2 triangular, rounded spurs, the external large. Coxa II with a single, short, broad, triangular spur. Coxae III–IV each with a single, triangular, pointed spur. Trochanters lack spurs. Tarsus I length 0.59, width 0.16, without ventroapical hook. Tarsus IV length 0.4, breadth 0.1, without ventroapical hook.

Spiracular plate oval, with very broadly rounded dorsal prolongation (Fig. 3g). Postanal groove without unpaired, median groove.

**Larva** undescribed.

**Material:** 2 males and 2 females (US National Tick Collection, RML 106 836) Central African Republic, Haute Kotto, Yada, N. of Yalinga, 06.1970, ex *Syncerus caffer*, coll. J. Thal; nymph (US National Tick Collection, RML 119 130) Zaire, Province of l'Equator, Bosobolo (4.11 N, 19.54 E), from Buffalo, 1.03.1953, coll. H.R.F. Colback.

#### *Amblyomma chabaudi* Rageau, 1964

*Amblyomma chabaudi* Rageau, 1964: 408, figs. A, B, original description.

**Male** (Fig. 4). Length from apices of scapulae to posterior scutal margin 4.5, breadth 3.6. Outline oval broadest at level of the middle of scutum. Scutum ornate, a ribbon, metallic, gold-redish with green border patch along the lateral margins of scutum; same patches on each festoons. Punctations few, deep, large, and small and shallow along the margin of scutum. Cervical grooves short, deep, converging. Marginal groove complete beginning at level of legs III. Festoons rectangular, without sclerotized plates extending posterior margin of the festoons. Eyes flat.

Capitulum (Fig. 4 b,c) length from palpal apices to cornua apices 1.33, breadth 0.76.

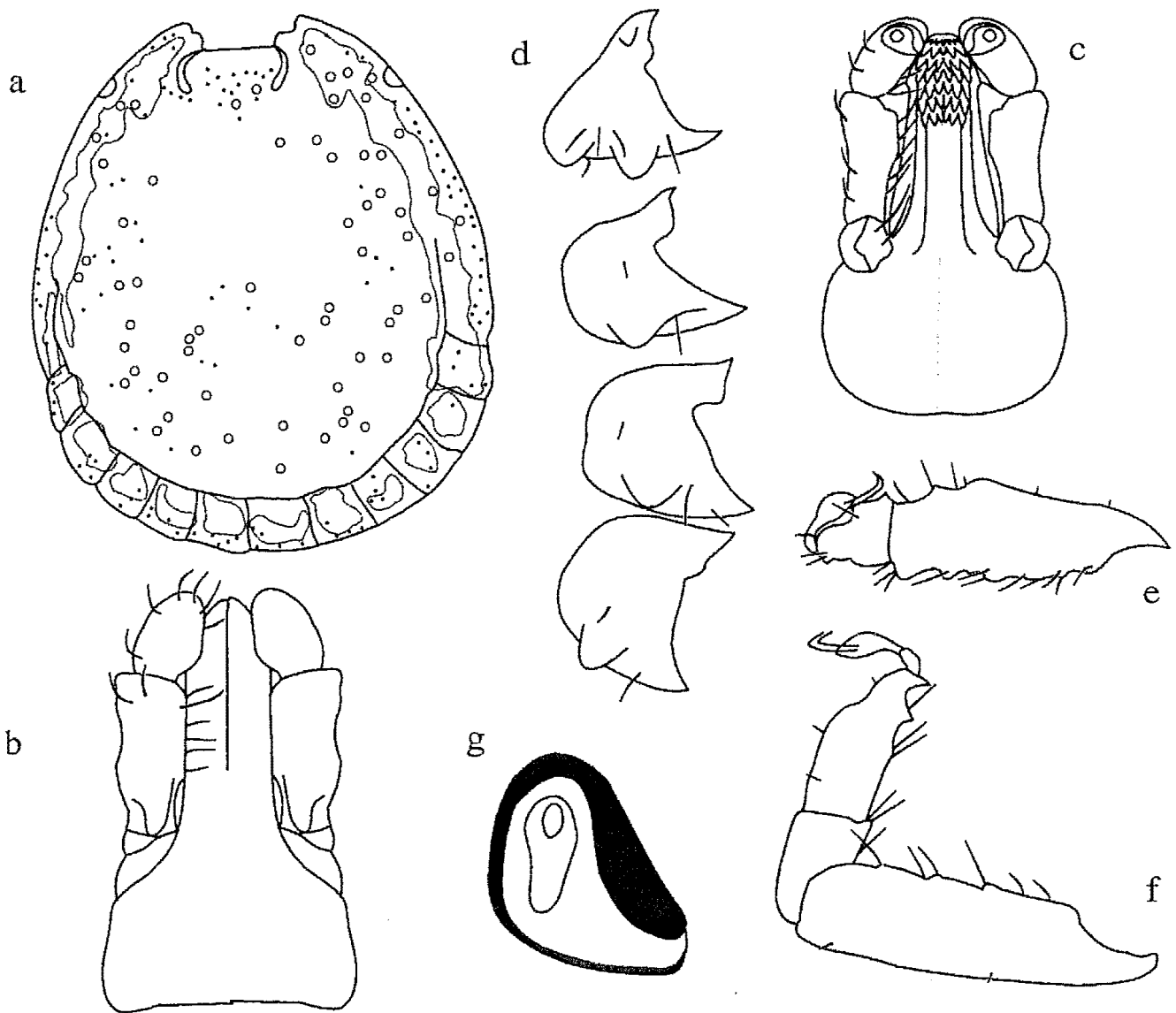


Fig. 4. *Amblyomma chabaudi*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

Punctations of basis capituli numerous, shallow, small; surface slightly wrinkled; posterior margin straight, cornua very small, rounded; external margins almost straight, ventrally posterior margin straight. Palpi length 0.87; breadth 0.23. Segment II 2 times longer than segment III, length of segment II 0.54, length of segment III 0.27. Segment II dorsally with narrowly rounded projection, slightly wrinkled. Segment I ventrally with a sharp, sinuous ridge ending posteriorly with a small spur. Hypostome length 0.77, length of toothed portion 0.36; with a small corona of fine denticles apically, apex rounded, dental formula 3/3.

Legs (Fig. 4 d–f). Coxa I with 2 subequal, triangular, rounded spurs. Coxa I with a small, low callosity anteriorly. Coxae II–III each with a single, broadly rounded, triangular spur. Coxa IV with a single, narrow rounded, triangular spur. Trochanters lack spurs. Tarsus I length 1.04, width 0.33; with a small, sharp ventroapical hump, one large, blunt and

2 small, blunt ventral humps, and with one small, sharp dorsal hump. Tarsus IV length 0.89; breadth 0.23; with 1 strong ventroapical hook and 1 sharp ventral hook. Tibia IV length 1.04, breadth 0.31.

Venter with numerous, long, thin, curved, needle-shaped setae. Genital aperture situated between coxae II. Spiracular plate small, with relatively long dorsal prolongation forming an obtuse angle with anterior-posterior axis of spiracular plate (Fig. 4g). Postanal groove with a shallow, unpaired, posteriorly directed, median groove extending to the festoon. Integumentary hard elements of the ventral skeleton of idiosoma consist of unpaired anal and 2 paired postanal very small, rounded shields, and festoons' shields.

**Female** (Fig. 5) (moderately engorged). Length from apices of scapulae to posterior body margin 10.5; breadth 8.0. Dorsal body setae thin, curved, cone-like. Ventral body setae thin, curved, cone-like. Marginal groove invisible. Festoons invisible.



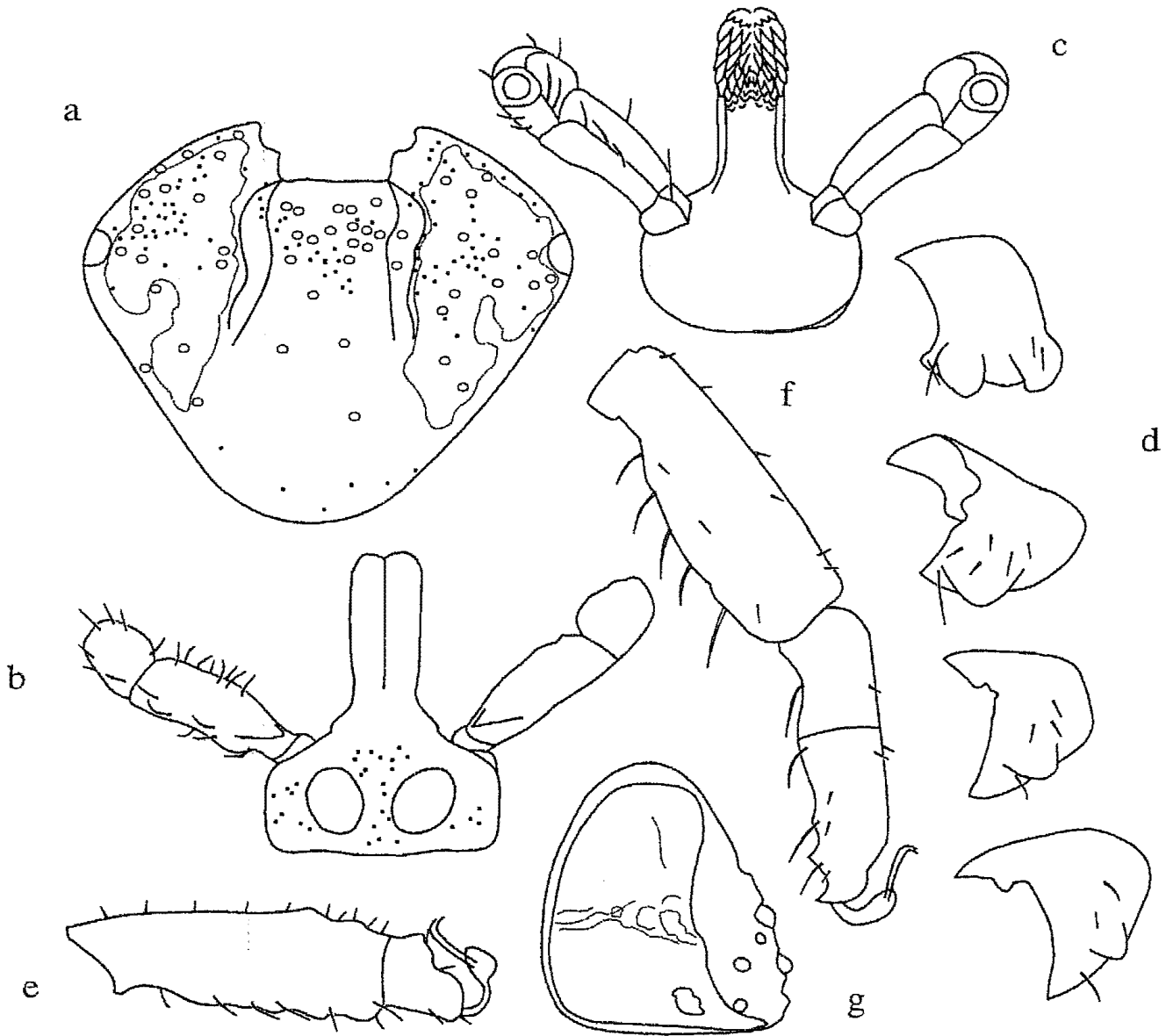


Fig. 5. *Amblyomma chabaudi*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

Scutum (Fig. 5a) length 2.77, breadth 2.86; dark-brown, ornatum, large crimson metallic patches in the each lateral area. Posterior margin broadly rounded, posterolateral margins relatively straight. Punctations both deep, large and shallow, small, distributed mainly in anterior half of scutum. Cervical grooves long, deep, converging anteriorly then diverging as shallow depressions. Eyes flat.

Capitulum (Fig. 5 b,c) length from palpal apices to cornua apices 1.3, breadth 0.86; cornua very short, broadly rounded; posterior margin slightly convex, lateral margins straight; ventrally posterior margin straight. Basis capituli punctations few, deep. Porose areas deep, oval; diameter of one area 0.19, interporose area 0.14. Palpi length 0.91, breadth 0.26. Segment II 2.8 times longer than segment III, length of segment II 0.56, length of segment III 0.2. Segment I ventrally with a low,

sloping ridge ending posteriorly with a small spur. Palpi wrinkled. Hypostome length 0.86; length of toothed portion 0.54; with a large corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3 in the anterior part and 4/4 in the posterior part.

Legs (Fig. 5 d-f). Coxa I with 2 subequal, broadly rounded spurs, the internal spur wider. Coxae II-IV each with a single, broadly rounded, triangular spur, spur on coxa II is the widest, spur on coxa IV is the most narrow. Trochanters lack spurs. Tarsus I length 1.19; width 0.36; without ventroapical hook, but with 3 blunt ventral humps. Tarsus IV length 1.0, breadth 0.24, with 1 strong ventroapical hook and 1 sharp ventral hump. Tibia IV length 1.1, breadth 0.36.

Medial and lateral margins of spiracular plate almost parallel, posterior margin straight, dorsal

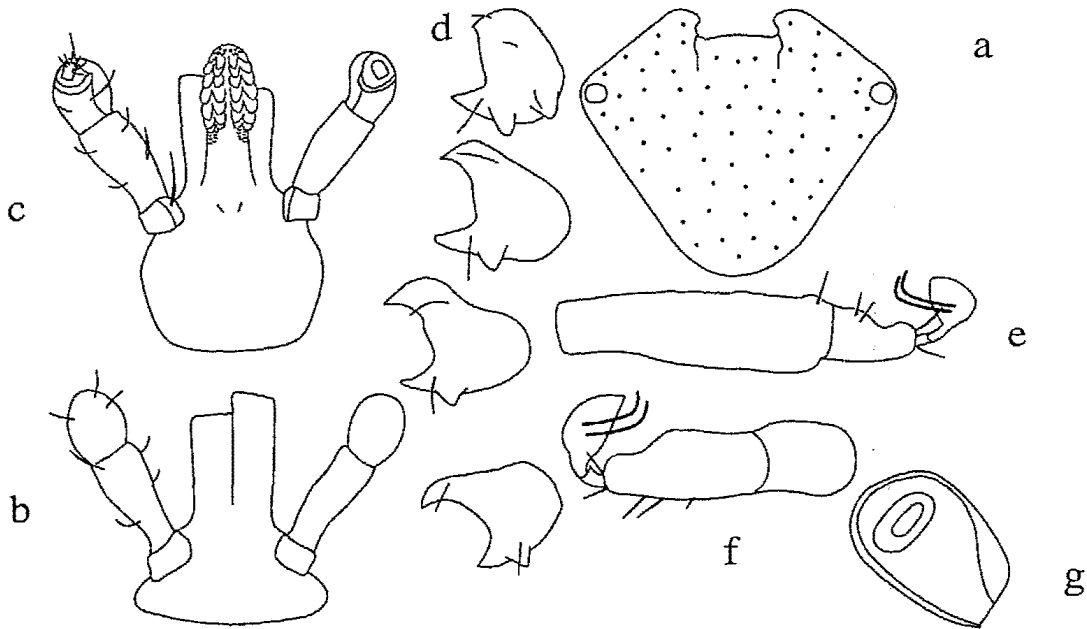


Fig. 6. *Amblyomma chabaudi*, nymph: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus IV; g — spiracular plate.

prolongation narrow, approximately perpendicular to the anterior-posterior axis of spiracular plate (Fig. 5g). Genital aperture "U" shaped, situated between coxae II. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Nymph** (slightly engorged, Fig. 6). Length from apices of scapulae to posterior body margin 2.8, breadth 2.25. Dorsal and ventral body setae very short, dense, curved. Marginal groove absent. Festoons evident, rectangular.

Scutum (Fig. 6a) length 0.9, breadth 1.1. Yellow-brown, darker in each lateral area, inornate. Posterior margin narrowly rounded, posterolateral margins straight. Scutal surface reticulated with large, deep punctations distributed regularly. Cervical grooves very short, deep, converging. Eyes round, bulging, situated at a distance from scutal margin.

Capitulum (Fig. 6 b,c) length from palpal apices to posterior margin of basis 0.5, breadth 0.35. Basis capituli subtriangular, posterior margin almost straight, lateral margins narrowly rounded, cornua absent; ventrally posterior margin straight. Punctations of basis capituli absent, surface reticulated. Palpi length 0.37, breadth 0.09. Segment II 1.5 times longer than segment III, length of segment II 0.2, length of segment III 0.13. Palpi slightly wrinkled. Segment I ventrally with a slope ridge ending with anterior and posterior small, blunt spurs. Hypostome length 0.31, length of toothed portion 0.18, with a large corona of fine denticles, consisting of two rows, apex rounded; dental formula 2/2 with seven denticles per file.

Legs (Fig. 6 d-f). Coxa I with 2 spurs, the external spur longer, both triangular. Coxae II-III each with a single, triangular, narrowly rounded spur. Coxa IV with a single, triangular, pointed spur. Trochanters lack spurs. Tarsus I length 0.4, width 0.09, without ventroapical hook. Tarsus IV length 0.28, breadth 0.08, without ventroapical hook.

Spiracular plate (Fig. 6g) relatively long, medial and posterior margins slightly convex; broad, long dorsal prolongation perpendicular to anterior-posterior axis. Postanal groove without unpaired, median groove.

**Larva** unavailable for study.

**Material:** male, female and nymph (US National Tick Collection, RML 122 817) Madagascar, Beheloka, 11.03.1999, ex *Pyxis arachnoides* (Testudinidae), coll. J.L. Behler.

#### *Amblyomma cohaerens* Dönitz, 1909

*Amblyomma cohaerens* Dönitz, 1909: 465, original description.

*Amblyomma anceps* Dönitz, 1909: 466, junior synonym.

**Male** (Fig. 7). Measurements from 2 specimens. Length from apices of scapulae to posterior scutal margin 5.55, 5.9; breadth 4.65; 4.7. Outline oval broadest at level of the middle of scutum. Scutum red-brown, ornate, a large metallic gold-redish patch with green edging covers the central part of the scutum and branches out in the posterior part; two medium gold-redish patches in each lateral area; some green-redish patches on festoons. Punctations shallow, small, more numerous in each

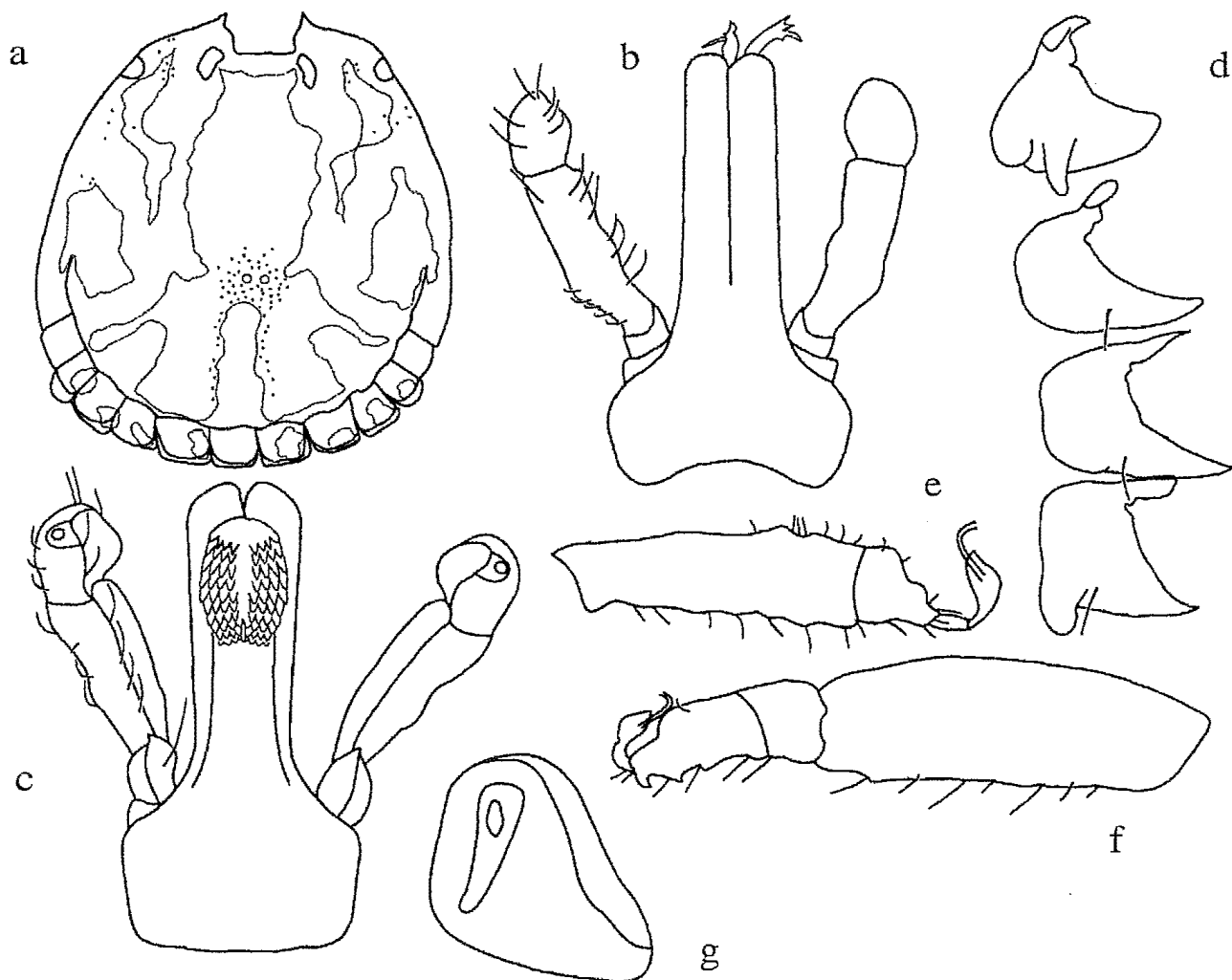


Fig. 7. *Amblyomma cohaerens*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

lateral area and on the metallic patches. Scapulae very pointed, each with pyramidal hump directed anteriorly or ventrally. Cervical grooves short, deep, bean-like in the anterior part then diverging as very shallow depressions. Marginal groove complete beginning at level of the middle of scutum. Festoons rectangular, with sclerotized plates extending posterior margin of the festoons. Eyes slightly bulging.

Capitulum (Fig. 7 b,c) length from palpal apices to cornua apices 1.9, 2.0; breadth 1.1, 1.14; punctations of basis capituli very numerous, shallow, very small; posterior margin concave; cornua small, broadly rounded; external margins slightly convex; ventrally posterior margin straight. Palpi length 1.43, 1.43; breadth 0.23; 0.27. Segment II 2.7, 2.6 times longer than segment III, length of segment II 0.93, 0.9; length of segment III 0.34, 0.34. Segment II dorsally with shallow, small punctations. Segment I ventrally with a sharp ridge ending anteriorly with a small spur directed ventrally. Hypostome length 1.4, 1.4; length of toothed portion 0.7, 0.74; with a small corona of fine

denticles apically, apex slightly notched, rounded, dental formula 4/4.

Legs (Fig. 7 d-f). Coxa I with 2 spurs, the external spur longer, narrowly rounded, internal spur short, broadly rounded. Coxa I with a evident, spur-like callosity anteriorly. Coxae II-III each with a single, very short, broadly rounded, paddle-shaped spur. Coxa II with a small callosity similar to sharp ridge anteriorly. Coxa IV with a single, long, relatively broad spur directed posteriorly. Trochanters lack spurs. Tarsus I length 1.36, 1.39; width 0.4, 0.4; without ventroapical hook but with two ventral, small, blunt humps. Tarsus IV length 0.93, 1.0; breadth 0.33, 0.33; with 1 strong ventroapical hook and 1 strong ventral hook. Tibia IV length 1.89, 1.79; breadth 0.6, 0.57. Leg segments with broad, yellow annular wheels at distal ends.

Venter with thin, curved, cone-like setae. Genital aperture situated between coxae II-III. Medial and lateral margins of spiracular plate diverging, posterior margin nearly straight, medial margin straight, dorsal prolongation relatively broad, perpendicular or forming an obtuse angle with

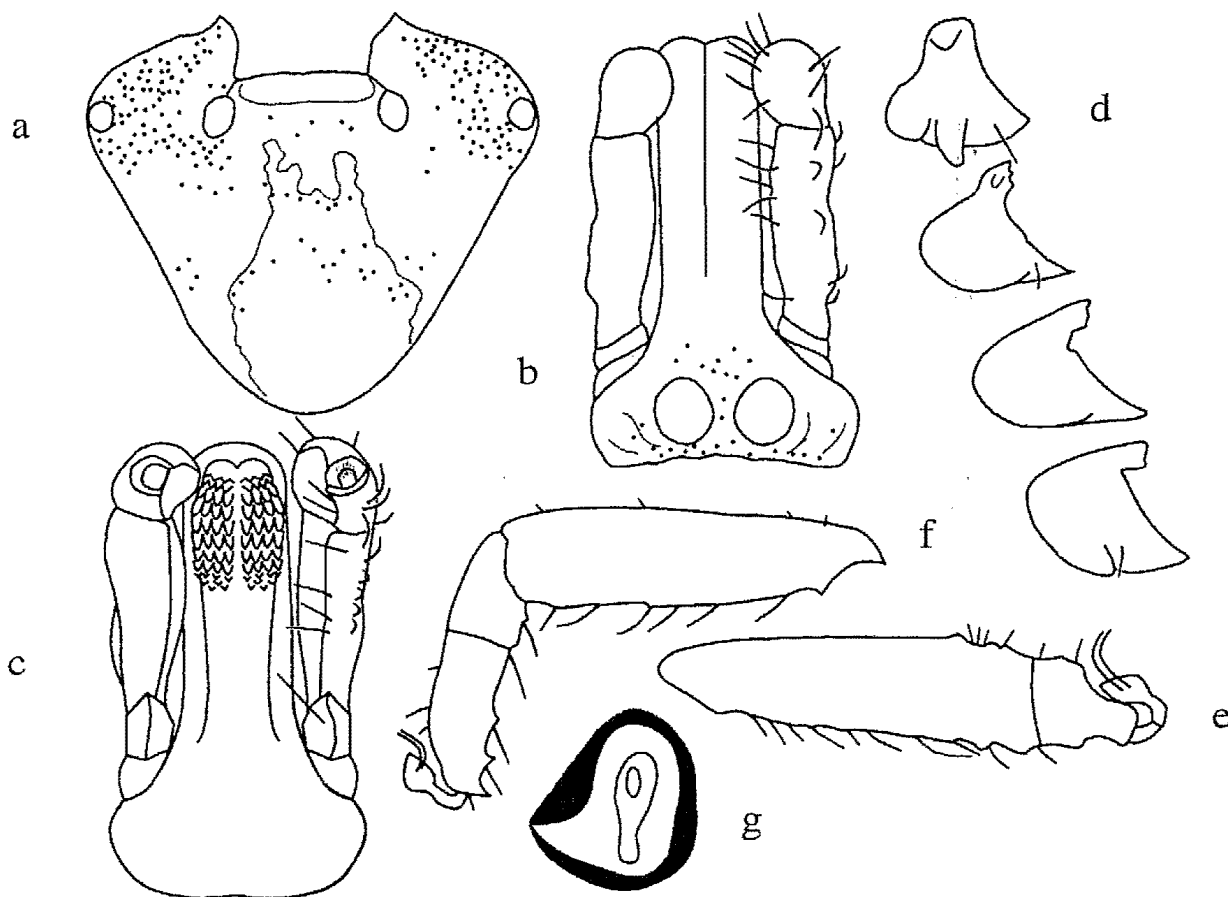


Fig. 8. *Amblyomma cohaerens*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

anterior-posterior axis of spiracular plate (Fig. 7g). Postanal groove without a unpaired median groove. Integumentary hard elements of the ventral skeleton of idiosoma consist of unpaired anal and 2 paired postanal shields, and large festoons' shields.

**Female** (Fig. 8). Measurements from 2 specimens. Length from apices of scapulae to posterior body margin 5.9, 5.95; breadth 4.9, 4.7. Dorsal body setae very short, slightly curved, cone-like. Ventral body setae short, slightly curved, cone-like. Marginal groove complete, beginning near the posterior margin of scutum. Festoons evident.

Scutum (Fig. 8a) length 2.9, 2.8; breadth 3.1; 3.0; red-brown, ornate, gold-redish with greenish edging metallic patch in the central and posterior parts of the scutum. Punctations deep, larger and more numerous in each anterolateral area, and very few, shallow in central area. Scapulae very pointed, each with pyramidal hump directed anteriorly. Cervical grooves short, thin anteriorly and very deep, oval pit-like posteriorly then diverging as very shallow depressions. Eyes small, bulging, orbital.

Capitulum (Fig. 8 b,c) length from palpal apices to posterior margin of basis 2.07, 2.11; breadth 1.1, 1.14; cornua very short, narrowly rounded or absent; posterior margin straight or

slightly sinuous, lateral margins convex; ventrally posterior margin convex. Basis capituli slightly wrinkled, punctations very few, small, shallow. Porose areas oval, not deeply depressed, diameter of one area 0.2, 0.21; interporose area 0.14, 0.16. Palpi length 1.46, 1.49; breadth 0.33, 0.36. Segment II 2.3, 2.4 times longer than segment III, length of segment II 0.96, 0.97; length of segment III 0.4, 0.43. Segment I ventrally with a sharp ridge ending anteriorly with a sharp spur. Hypostome length 1.4; length of toothed portion 0.71; with a large corona of fine denticles apically, apex slightly notched, rounded; dental formula 4/4.

Legs (Fig. 8 d-f). Coxa I with 2 spurs, the external spur large, relatively long and pointed, internal spur short, broadly rounded. Coxa I with an evident, sharp, spur-like callosity anteriorly. Coxae II-III each with a single, broadly rounded, very short, paddle-shaped spur. Coxa II with an evident, flat, spur-like callosity anteriorly. Coxa IV with a single, curved, narrowly rounded spur directed posterolaterally. Trochanters lack spurs. Tarsus I length 1.5, 1.6; width 0.35, 0.36; without ventroapical hook but with two ventral, small, blunt humps. Tarsus IV length 1.1, 1.27; breadth 0.27, 0.29; with 1 strong ventroapical hook and 2 sharp

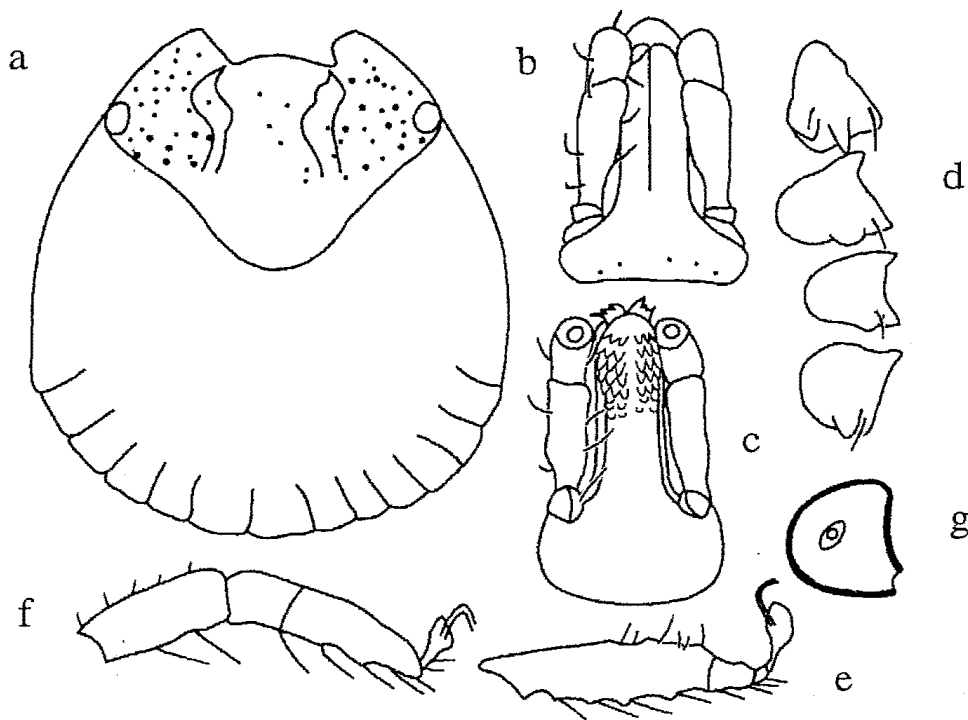


Fig. 9. *Amblyomma cohaerens*, nymph: a — body with scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

ventral humps. Tibia IV length 1.33, 1.63; breadth 0.4, 0.46. Leg segments with very broad, yellow annular wheels at distal ends.

Medial and lateral margins of spiracular plate diverging, medial and posterior margins approximately straight, dorsal prolongation pointed, triangular, forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 8g). Genital aperture "U" shaped, situated between coxae II. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Nymph** (Fig. 9). Measurements from 2 specimens. Length from apices of scapulae to posterior body margin 1.99, 1.76, breadth 1.6, 1.47. Dorsal body setae short, cone-like, curved, few in number. Ventral body setae relatively long, thin, curved, cone-like. Marginal groove absent. Festoons evident, narrow.

Scutum (Fig. 9a) length 0.67, 0.86, breadth 0.93; 1.04. Yellow-brown, inornate. Posterior margin narrowly rounded, postero-lateral margins concave. Punctations deep, large in each lateral area, few between cervical grooves and absent in the posterior area; surface shagreened. Cervical grooves short, deep, converging anteriorly then diverging as shallow depressions. Eyes bulging.

Capitulum (Fig. 9 b,c) length from palpal apices to posterior margin of basis 0.61, 0.63, breadth 0.34, 0.36. Basis capituli rectangular, posterior margin straight or slightly concave, lateral margins bluntly rounded, cornua absent, ventrally posterior margin

convex. Punctations of basis capituli absent, surface slightly wrinkled. Palpi length 0.41, 0.43, breadth 0.07, 0.08. Segment II 1.7–1.8 times longer than segment III, length of segment II 0.23, 0.24, length of segment III 0.13, 0.14. Medial border of segment II dorsally as a sharp ridge, surface slightly wrinkled. Segment I ventrally with a slightly sloping ridge. Hypostome length 0.4, 0.41, length of toothed portion 0.26, 0.29, with a small corona of fine denticles apically, apex rounded, dental formula 2/2.

Legs (Fig. 9 d–f) Coxa I with 2 triangular spurs, the external spur larger, long, pointed; internal spur wider, short. Coxa II with a single short, broadly rounded spur. Coxa III with a single short, triangular, blunt spur. Coxa IV with a single triangular, relatively long spur. Trochanters lack spurs. Tarsus I length 0.44, 0.5, width 0.13, 0.14, without ventroapical hook. Tarsus IV length 0.42, 0.39, breadth 0.13, 0.13, without ventroapical hook.

Spiracular plate (Fig. 9g) with very short, broad dorsal prolongation, medial and lateral margins diverging, posterior margin convex. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Larva** (Fig. 10) (engorged). Measurements from 3 specimens. Length from apices of scapulae to posterior body margin 1.9–2.0, breadth 1.4–1.5. Dorsal body setae: 2 central dorsal pairs, 8 marginal dorsal pairs; thin, tapered, curved, relatively long. Ventral body setae long, thin, straight: 3 sternal pairs, 2 preanal pairs, 4 premarginal

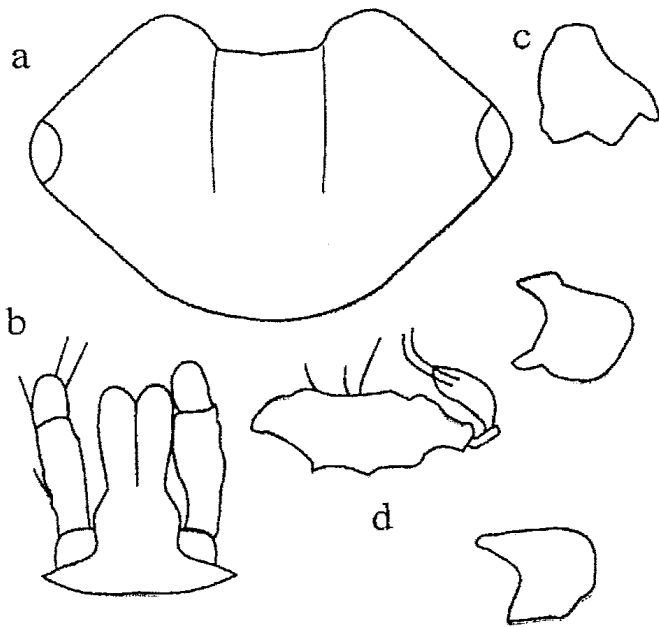


Fig. 10. *Amblyomma cohaerens*, larva: a — scutum; b — gnathosoma, dorsal view; c — coxae; d — tarsus I.

pairs, 5 marginal ventral pairs, and 1 pair on anal valves.

Scutum (Fig. 10a) length 0.26–0.34, breadth 0.47–0.5, inornate, yellow-brown, surface reticulated. Posterior margin bluntly rounded, anterolateral and posterolateral margins nearly straight or slightly concave. Cervical grooves deep, straight, parallel, reaching the half of the scutum length. Eyes large, slightly bulging.

Capitulum (Fig. 10 b) length from palpal apices to posterior margin of basis 0.23–0.26, breadth 0.19–0.2. Basis capituli dorsally hexagonal, posterior margin straight, lateral margins pointed, approximately triangular; cornua absent. Ventrally posterior margin straight. Palpi length 0.19–0.2, breadth 0.04. Segment II 1–1.3 times longer than segment III, segment II 0.07–0.09 long, segment III 0.07 long. Hypostome length 0.13–0.16, length of toothed portion 0.07–0.1; dental formula 2/2.

Legs (Fig. 10 c,d). Coxa I with 2 short, triangular spurs. Coxa II with a single, short, broadly rounded spur. Coxa III with a single, short, triangular spur. Tarsus I length 0.23–0.26, breadth 0.07, without hook. Tarsus III length 0.19–0.21, breadth 0.06, without hook.

**Material:** 2 males, 2 nymphs (US National Tick Collection, RML 88 907), Uganda, Ankole, Kzinga Channel, 01.1951, ex *Syncerus caffer*, coll. D. Davis; 2 females (US National Tick Collection, RML 88 902) Uganda, Bunyoro, 7 miles W. of Masindi, Budongo Forest, 17.08.1956, ex *Syncerus caffer*, coll. C.E. Yunker; 3 larvae (US National Tick Collection, RML 113 363) Ethio-

pia, Kefa, 19.09.1979, ex domestic cattle, coll. H.K. Lall.

***Amblyomma compressum* (Macalister, 1872)**

*Haemalastor compressum* Macalister, 1872: 287, pl. XIV, figs. 5–8, original description.

*Amblyomma cuneatum* Neumann, 1899: 233, junior synonym.

*Amblyomma javanense cuneatum* Neumann (*sensu* Schulze, 1937, 690, fig. 1), junior synonym.

**Male** (Fig. 11). Measurements from 2 specimens. Length from apices of scapulae to posterior scutal margin 4.0, 4.15; breadth 3.75. Outline round broadest at level of the spiracular plate. Scutum dark-brown, inornate; one male with white enameled patch in the middle of scutum. Punctations larger and very deep along the marginal grooves and irregularly in each posterolateral area; small and shallow in each scapular, lateral and posterior area. Cervical grooves very short, deep and pit-like. Marginal groove incomplete, beginning at level of legs II and ending before the first festoon. Festoons rectangular, with sclerotized plates extending posterior margin of the festoons. Eyes flat.

Capitulum (Fig. 11 b,c) length from palpal apices to cornua apices 0.97, 0.96; breadth 0.71, 0.7. Punctations of basis capituli few, shallow, small; posterior margin undulating, cornua very small, rounded; external margins almost straight, ventrally posterior margin straight. Palpi length 0.71, 0.67; breadth 0.26, 0.24. Segment II 1.7 times longer than segment III, length of segment II 0.41, 0.4; length of segment III 0.24. Palpi very sclerotized, dorsal surface slightly wrinkled, ventromedial ridge of segment II knobby. Segment I ventrally smooth. Hypostome length 0.63, 0.64; length of toothed portion 0.37; with a large corona of fine denticles apically, apex flat, slightly notched, dental formula 3/3.

Legs (Fig. 11 d–f). Coxa I with 2 subequal, triangular, short and relatively broad spurs. Coxa I with a low sloping ridge anteriorly. Coxae II–III each with a single, relatively large, triangular spur. Coxa IV with a single longer, narrowly rounded, triangular spur. Trochanters lack spurs. Tarsus I length 0.81, 0.8; width 0.33, 0.3, broader in the distal part; with a small, sharp ventroapical hump, 2 small, sharp ventral humps, and with 2 blunt dorsal humps. Tarsus IV length 0.64, 0.71; breadth 0.23, 0.26; with 1 strong ventroapical hook and 1 sharp ventral hook. Tibia IV length 0.59, 0.67; breadth 0.33, 0.32.

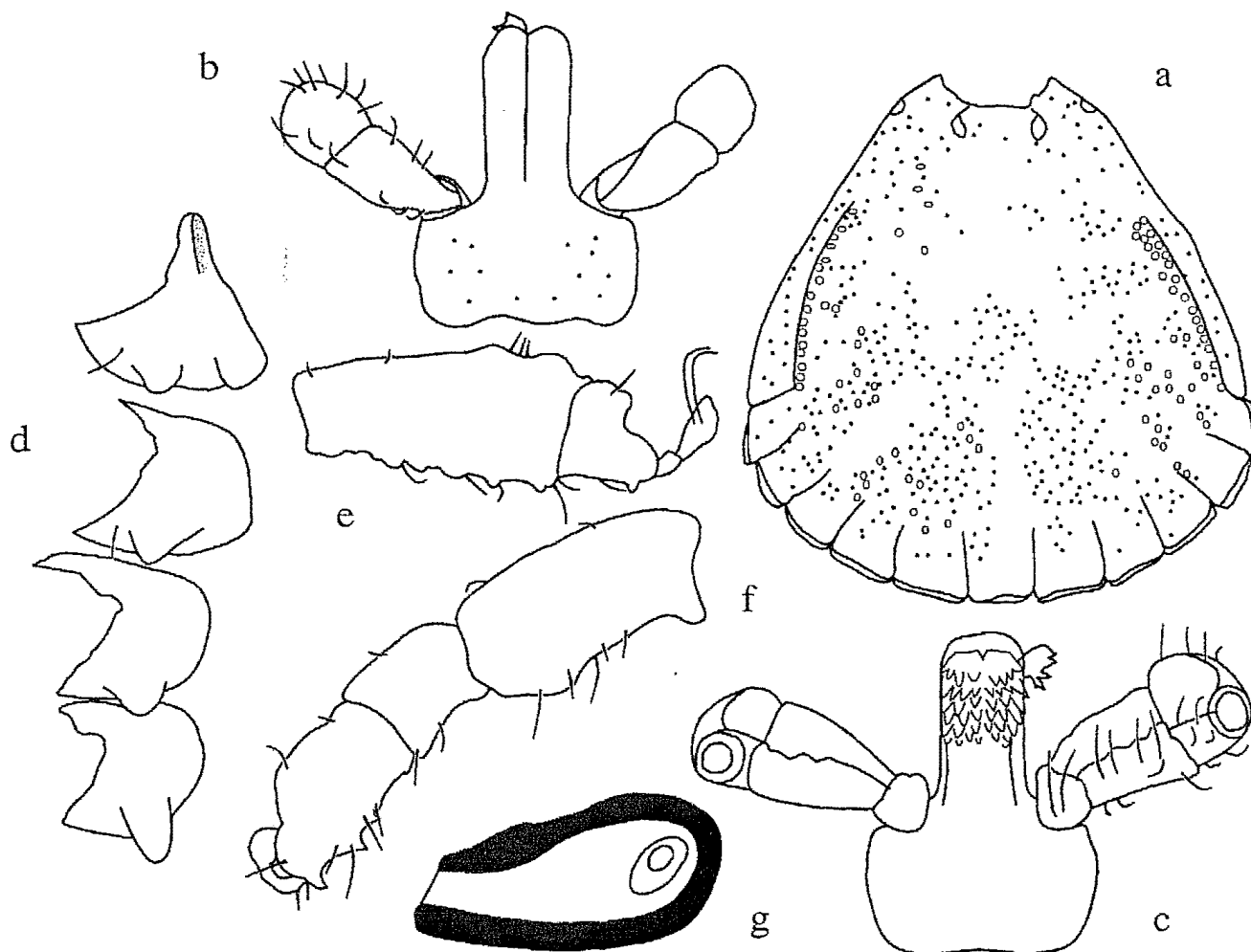


Fig. 11. *Amblyomma compressum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

Venter with long, thin, curved, cone-shaped setae. Genital aperture situated between coxae II. Spiracular plate oval, with broad and long dorsal prolongation (Fig. 11g). Postanal groove with a shallow, unpaired, posteriorly directed, median groove extending to the anal shield. Integumentary hard elements of the ventral skeleton of idiosoma consist of unpaired anal and 2 paired postanal very small shields, and large festoons' shields.

**Female** (Fig. 12). Length from apices of scapulae to posterior body margin 5.6, breadth 4.1. Dorsal body setae short, straight, stick-like. Ventral body setae thin, curved, cone-like. Marginal groove incomplete, beginning from the posterior margin of scutum and embracing 2 festoons. Festoons evident.

Scutum (Fig. 12a) length 2.0, breadth 2.57, black-brown, inornate. Posterior margin broadly rounded, posterolateral margins slightly convex. Punctations deep, both large and small, distributed regularly. Cervical grooves very short, deep, converging, and pit-like posteriorly. Eyes slightly bulging.

Capitulum (Fig. 12 b,c) length from palpal apices to cornua apices 1.2, breadth 0.96; cornua very short, broadly rounded; posterior margin slightly concave, lateral margins straight; ventrally posterior margin straight. Basis capituli punctations absent. Porose areas deep, oval; diameter of one area 0.17, interporose area 0.14. Palpi length 0.91, breadth 0.34. Segment II 1.7 times longer than segment III, length of segment II 0.57, length of segment III 0.34. Segment I ventrally smooth. Palpi slightly wrinkled, punctations few, small. Hypostome length 0.79, length of toothed portion 0.44; with a small corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3.

Legs (Fig. 12 d-f). Coxa I with 2 subequal, broadly rounded spurs, the internal spur wider. Coxa I with a low sloping ridge anteriorly. Coxae II-IV each with a single, broadly rounded, triangular spur, spur on coxa III is the widest, spur on coxa IV is the longest. Trochanters lack spurs. Tarsus I length 1.19, width 0.37, attenuated in talus, with small, sharp ventroapical hook, and with 3 blunt dorsal humps. Tarsus IV length 1.0, breadth 0.27

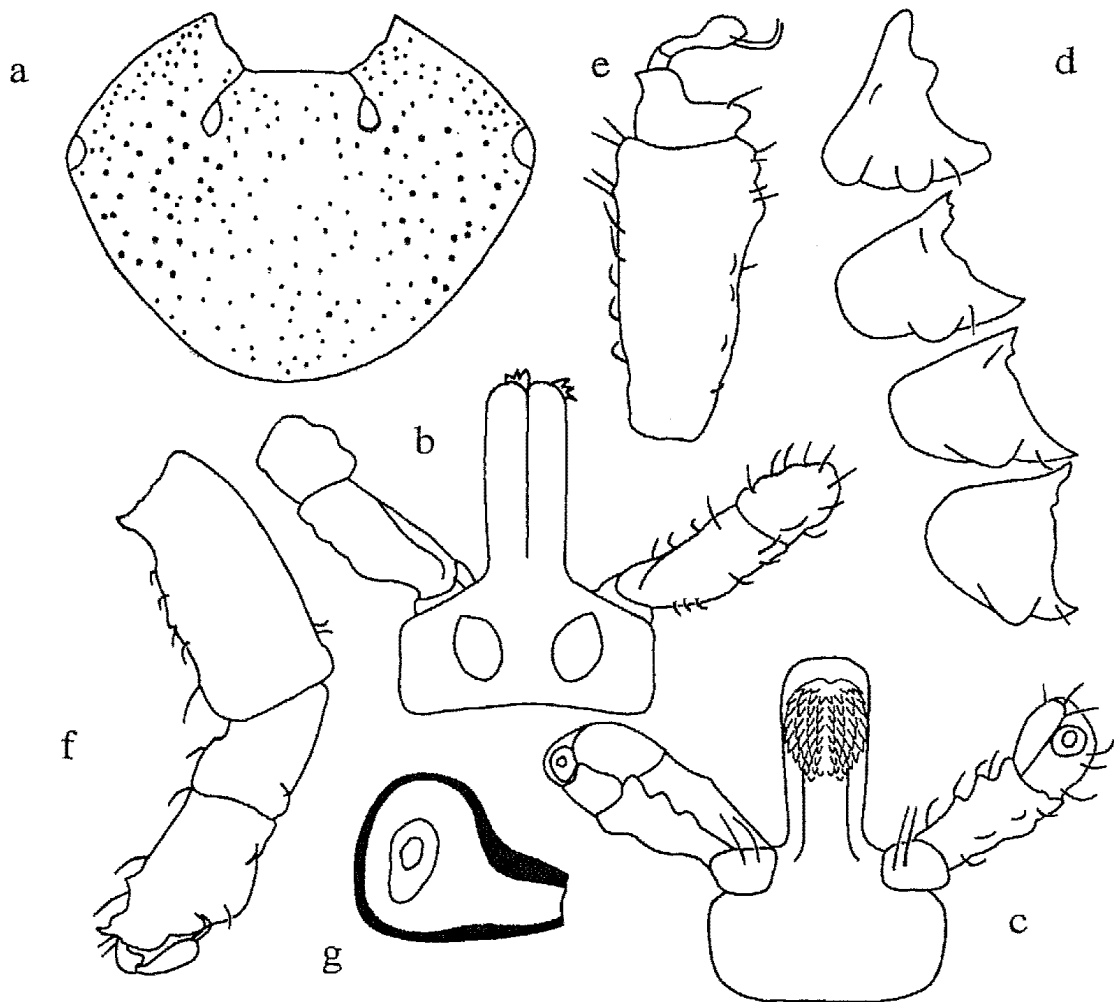


Fig. 12. *Amblyomma compressum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

with 1 strong ventroapical hook and 1 sharp ventral hump. Tibia IV length 0.86, breadth 0.33.

Medial and lateral margins of spiracular plate almost parallel, posterior margin slightly concave, dorsal prolongation broad and very long, perpendicular to the anterior-posterior axis of spiracular plate (Fig. 12g). Genital aperture "U" shaped, situated between coxae II–III. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Nymph** (Fig. 13). Measurements from 2 specimens (one specimen slightly engorged, the other damaged). Length from apices of scapulae to posterior body margin 3.0, breadth 2.25. Dorsal body setae few, short, thin, curved, stick-like. Ventral body setae few, thin, curved, needle-shaped. Marginal groove absent. Festoons evident.

Scutum (Fig. 13a) length 0.69, 0.79; breadth 1.0; inornate, yellow-brown in the central area and dark-brown in each lateral area. Posterior margin narrowly rounded, posterolateral margins slightly concave. Punctations large, moderately

deep. Cervical grooves deep, diverging anteriorly then diverging as shallow depressions. Eyes flat.

Capitulum (Fig. 13 b,c) length from palpal apices to posterior margin of basis 0.37, 0.4; breadth 0.34. Basis capituli rectangular, posterior margin straight, lateral margins bluntly rounded or straight, cornua absent; ventrally posterior margin convex. Punctations of basis capituli absent. Palpi length 0.36, 0.39; breadth 0.07. Segment II 2.4 times longer than segment III, length of segment II 0.33, 0.36; length of segment III 0.14, 0.15. Palpi slightly wrinkled. Segment I ventrally with a sloping ridge ending anteriorly with a small, blunt spur. Hypostome length 0.29, 0.3; length of toothed portion 0.16, 0.17; with a small corona of fine denticles apically, apex slightly notched, rounded; dental formula 2/2.

Legs (Fig. 13d) Coxa I with 2 triangular spurs, the external spur large, narrowly rounded, internal spur broader. Coxae II–IV each with a single, triangular, narrowly rounded spur. Trochanters lack spurs. Tarsus I length 0.44, width 0.14, without ventroapical hook. Tarsus IV length 0.3, 0.31, breadth 0.1, without ventroapical hook.



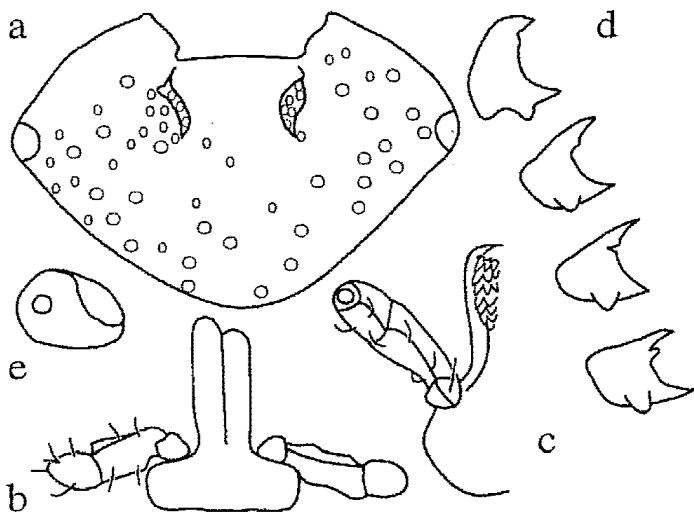


Fig. 13. *Amblyomma compressum*, nymph: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — spiracular plate.

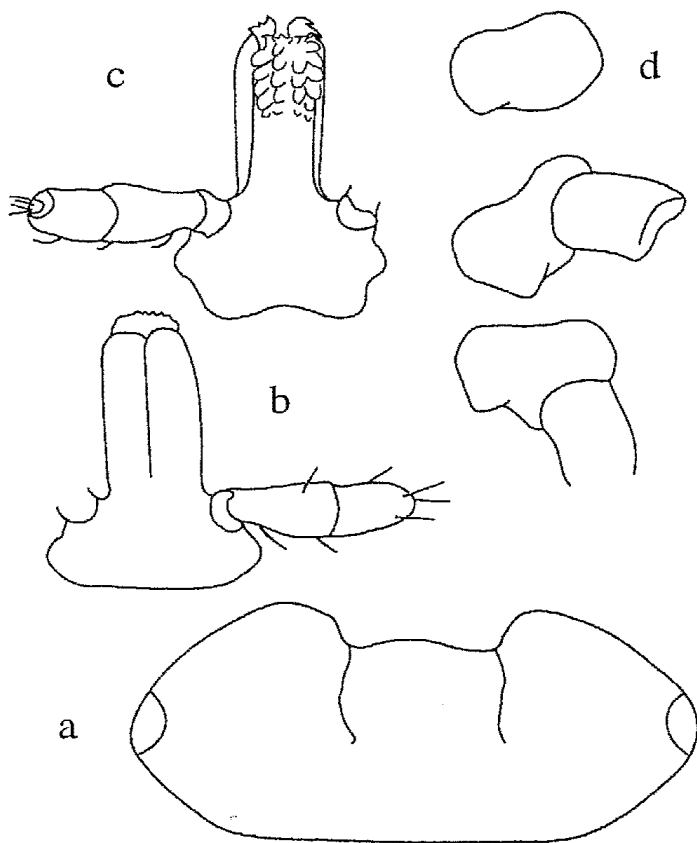


Fig. 14. *Amblyomma compressum*, larva: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae.

Spiracular plate oval, with relatively long and broad dorsal prolongation, perpendicular to the anterior-posterior axis (Fig. 13e). Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Larva** (Fig. 14) (engorged and damaged). Length from apices of scapulae to posterior body margin 1.4, breadth 0.88. Dorsal and ventral body setae invisible.

Scutum (Fig. 14a) length 0.23, breadth 0.5, inornate, yellow-brown; punctations small, fine; surface of posterior area reticulated. Posterior margin of scutum straight, lateral margins convex, narrowly rounded. Scutal setae: 3 pairs, z2 0.02, s2 0.014, j3 0.014. Cervical grooves shallow, long, almost parallel, thin, reaching the half of the scutum length. Eyes bulging.

Capitulum (Fig. 14 b,c) length from palpal apices to posterior margin of basis 0.21, breadth 0.19. Basis capituli dorsally hexagonal, posterior margin straight, lateral margins narrowly rounded, approximately triangular; cornua absent. Ventrally posterior margin deeply concave, lateral margins each with narrowly rounded prolongation. Palpi length 0.18, breadth 0.06. Segment II and III equal-sized, 0.08 long. Palpal surface smooth. Palpal setae: dorsally 3 (0.016–0.026 long) barbed on its outer surface, ventrally 2 (0.01–0.02 long) non-barbed on II; dorsally 4 (0.03–0.046 long) barbed, ventrally 1 (0.02 long) non-barbed on III. No setae on segment I. Hypostome length 0.15, length of toothed portion 0.09; dental formula 2/2. Apex flat with a corona consisting of one row of fine denticles.

Legs (Fig. 14d). Coxa I with a single short, triangular spur. Coxae II–III each with a single, broad, triangular spur. Coxal setae barbed. Trochanters lack spurs. Tarsi absent in studied specimen.

**Material:** 2 males, female, 2 nymphs, and larva (US National Tick Collection, RML 99 162) Uganda, Mubango, Mabina Forest, Kyagle (alt. 4000 ft.), 1933, ex *Manis tricuspis*, coll. C.R.S. Pitman.

***Amblyomma eburneum* Gerstäcker, 1873**

*Amblyomma eburneum* Gerstäcker, 1873: 465, pl. XVI–II, fig. 1, original description.

*Amblyomma hebraeum eburneum* Gerstäcker, 1873, 465, pl. 18, fig. 1, junior synonym.

*Amblyomma barbaricum* Santos Dias, 1956: 65, figs. 6–7, pl. I, figs. 8–9, pl. II, figs. 10–11, pl. III, figs. 12–15, junior synonym.

**Male** (Fig. 15). Measurements from 2 specimens. Length from apices of scapulae to posterior scutal margin 5.7, 5.55; breadth 5.0, 4.75. Outline oval broadest at level of legs IV. Scutum dark red-brown, ornate, metallic red with greenish border patches symmetrically distributed. Punctations shallow, small, more numerous in each anterolateral area. Cervical grooves very short, deep and bean-like. Marginal groove complete, beginning at level

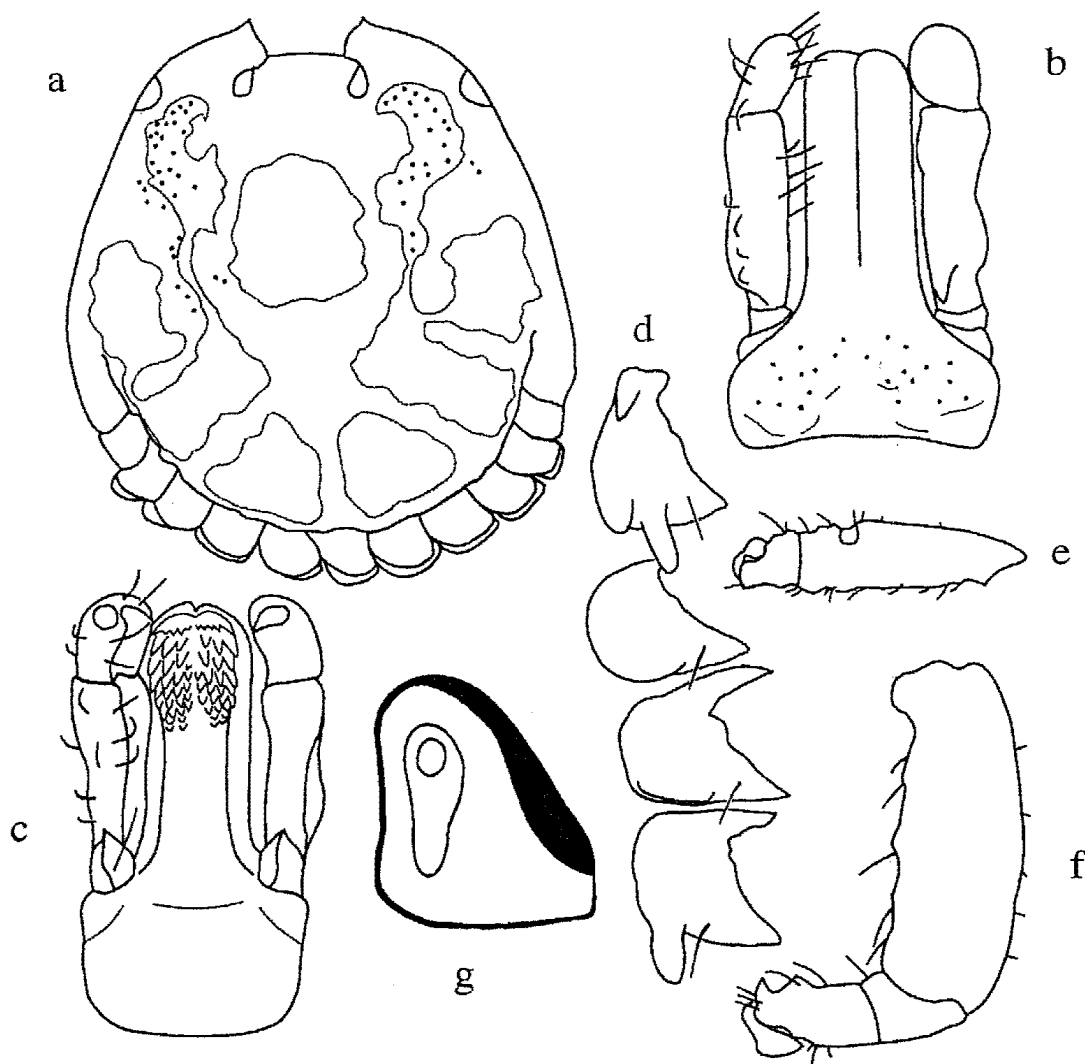


Fig. 15. *Amblyomma eburneum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

of legs III. Festoons rectangular, with sclerotized plates extending posterior margin of the festoons. Eyes slightly bulging.

Capitulum (Fig. 15 b,c) length from palpal apices to cornua apices 2.2, 2.1, breadth 1.14, 1.1. Basis capituli slightly wrinkled, punctations small, shallow, numerous. Posterior margin nearly straight, cornua very small, almost inconspicuous; external margins almost straight, ventrally posterior margin straight. Palpi length 0.94, 1.0; breadth 0.47, 0.39. Segment II 2–2.5 times longer than segment III, length of segment II 0.94, 1.0, length of segment III 0.47, 0.39. Segment II dorsally with narrowly rounded projection, slightly wrinkled. Segment I ventrally with a sharp ridge ending anteriorly as a small spur. Hypostome length 1.44, 1.31, length of toothed portion 0.79, 0.74; with a large corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3 in the anterior part and 4/4 in the posterior part.

Legs (Fig. 15 d–f). Coxa I with 2 spurs, the external spur longer, reaching the anterior margin

of coxa III, internal spur short, each narrowly rounded. Coxa I with a evident, spur-like callosity anteriorly. Coxae II–III each with a single, very short, broadly rounded, paddle-shaped spur. Coxa IV with a single, very long spur directed posteriorly. Trochanters lack spurs. Tarsus I length 1.34, 1.36, width 0.37, 0.36; without ventroapical hook but with 3 ventral, small, blunt humps. Tarsus IV length 1.0, 0.97, breadth 0.33, 0.31; with 1 strong ventroapical hook and 1 blunt, triangular ventral hook. Tibia IV length 1.7, 1.8, breadth 0.54. Leg segments with yellow annular wheels at distal ends.

Venter with very short, thick, cone-like setae. Genital aperture situated between coxae II–III. Medial and lateral margins of spiracular plate diverging, posterior and medial margins nearly straight, dorsal prolongation broad, long, perpendicular to anterior-posterior axis of spiracular plate (Fig. 15g). Postanal groove with a shallow, unpaired median groove. Integumentary hard elements of the ventral skeleton of idiosoma consist

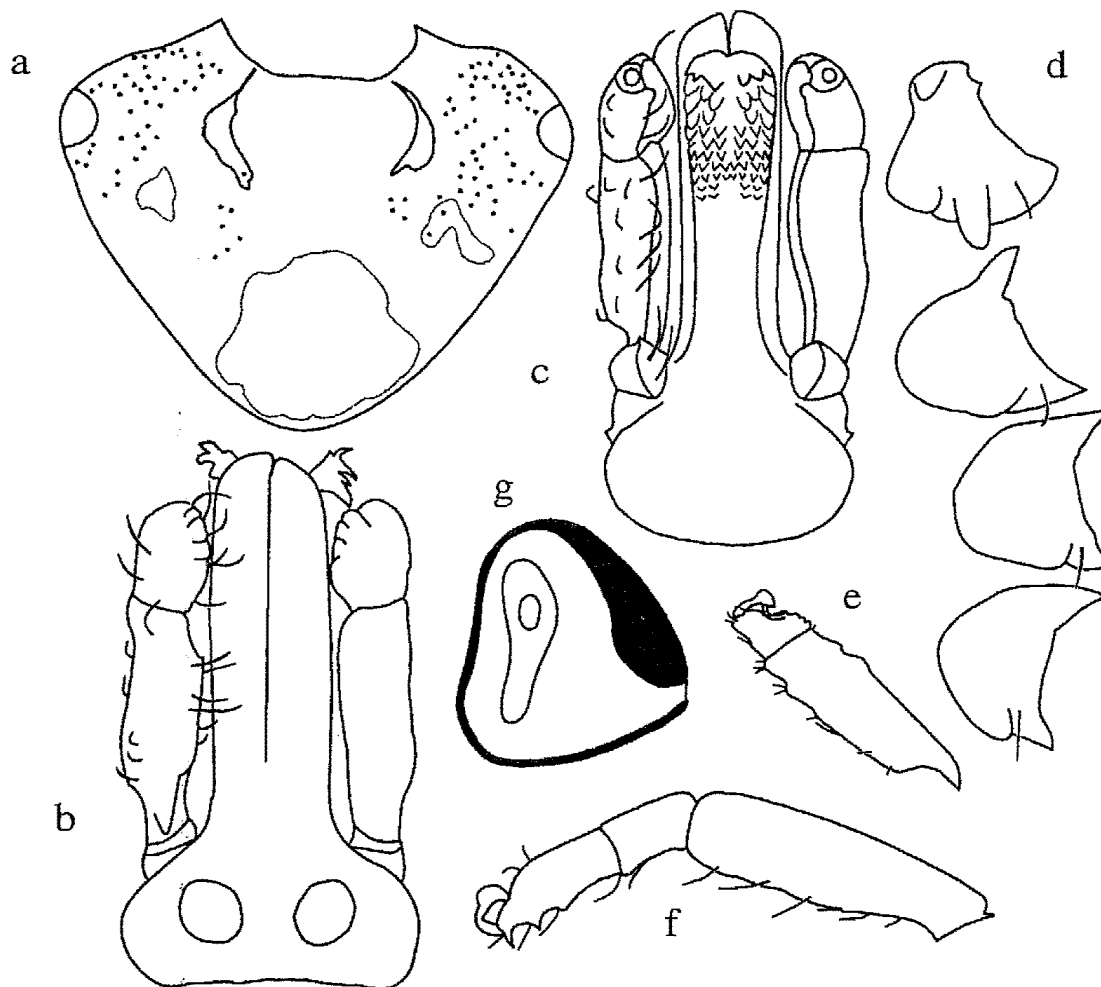


Fig. 16. *Amblyomma eburneum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

of small unpaired anal and 2 paired postanal shields, and large festoons' shields.

**Female** (Fig. 16). Length from apices of scapulae to posterior body margin 6.2, breadth 1.4. Dorsal body setae short, thin, few in number. Ventral body setae short, cone-like, almost straight. Marginal groove complete, beginning near the posterior margin of scutum. Festoons evident.

Scutum (Fig. 16a) length 1.57, breadth 1.93; red-brown, ornate, relatively large, pale, redish patch in the posterior part and 2 small patches in each lateral area. Punctations small, deeper in each scapular area, more numerous in each anterolateral area. Scapulae very pointed. Cervical grooves relatively long, very deep, crescent anteriorly then diverging as very shallow depressions. Eyes large, slightly bulging, marginal.

Capitulum (Fig. 16 b,c) length from palpal apices to posterior margin of basis 2.3, breadth 1.2; cornua very short, rounded or absent; posterior margin slightly concave, lateral margins convex; ventrally posterior margin straight. Porose areas oval, deeply depressed, diameter of one area 0.24, interporose area 0.21. Palpi length 1.63,

breadth 0.3. Segment II 2.1 times longer than segment III, length of segment II 1.04, length of segment III 0.5. Segment I ventrally with a sharp ridge ending anteriorly with a small spur. Hypostome length 1.6, length of toothed portion 0.79; with a corona of fine denticles apically, apex slightly notched, rounded; dental formula 2/2 in the 4 anterior files, then 3/3 in 2 files, and 4/4 in 3 posterior files.

Legs (Fig. 16 d-f). Coxa I with 2 spurs, the external spur large, relatively long and narrow, internal spur very short and broad. Coxa I with an evident, sharp, spur-like callosity anteriorly. Coxae II-III each with a single, broadly rounded, very short, paddle-shaped spur. Coxa IV with a single, narrowly rounded spur directed posterolaterally. Trochanters lack spurs. Tarsus I length 1.64, width 0.41; without ventroapical hook but with 3 ventral, small, blunt humps. Tarsus IV length 1.3, breadth 0.33; with 1 strong ventroapical hook and 1 pointed ventral hump. Tibia IV length 1.57, breadth 0.46. Leg segments with white annular wheels at distal ends.

Medial and lateral margins of spiracular plate diverging, medial margin concave, dorsal prolon-

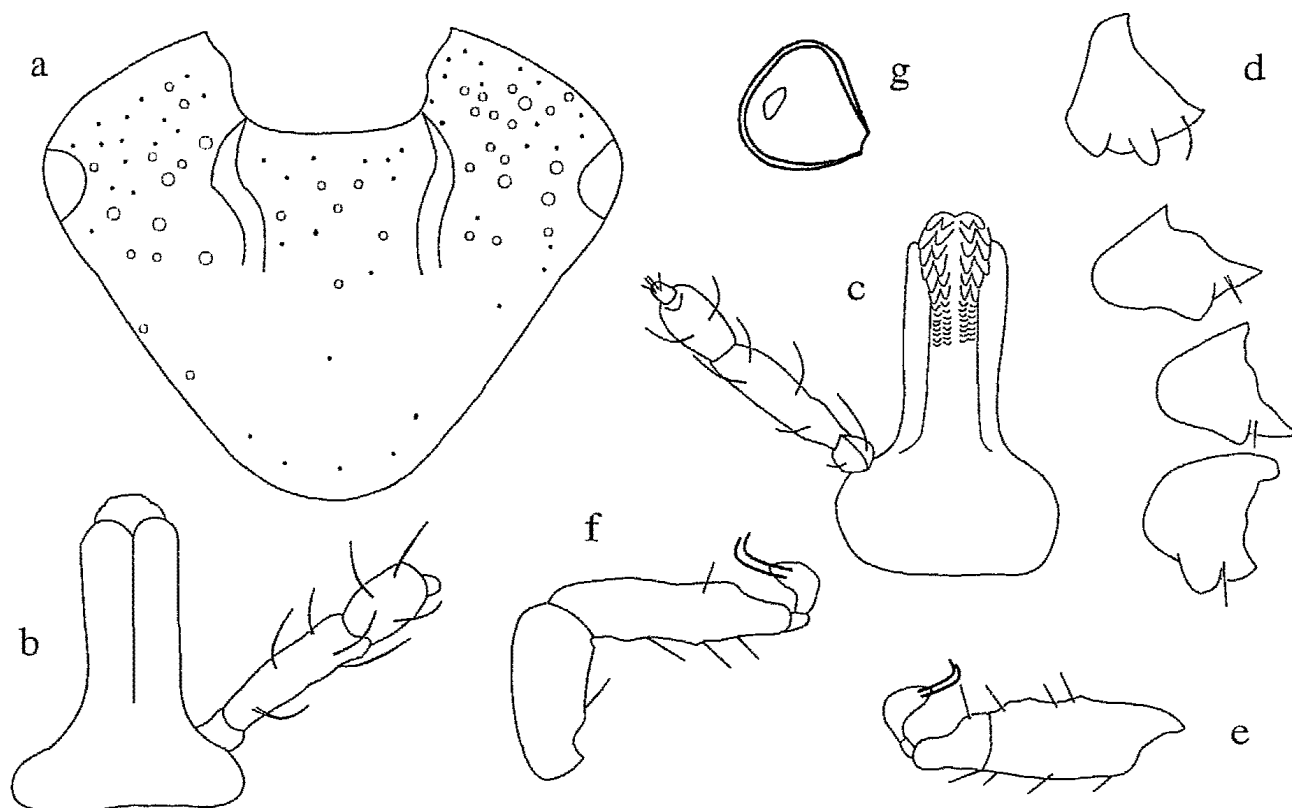


Fig. 17. *Amblyomma eburneum*, nymph: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

gation forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 16g). Genital aperture invisible (surface damaged). Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Nymph** (Fig. 17). Measurements from 2 specimens (slightly engorged). Length from apices of scapulae to posterior body margin 1.8, breadth 1.6. Dorsal and ventral body setae relatively long, thin, slightly curved. Marginal groove absent. Festoons evident, narrow.

Scutum (Fig. 17a) length 0.8; breadth 1.2; yellow-brown, inornate. Posterior margin narrowly rounded, posterolateral margins straight. Punctations deep, large and small, more numerous in the anterior half, scutal surface reticulated. Cervical grooves very deep and converging anteriorly, then shallow and diverging posteriorly. Eyes bulging, large, marginal.

Capitulum (Fig. 17 b,c) length from palpal apices to posterior margin of basis 0.6; breadth 0.4. Basis capituli subtriangular, posterior margin straight or slightly concave, lateral margins bluntly rounded, cornua absent; ventrally posterior margin straight. Punctations of basis capituli absent, surface reticulated. Palpi length 0.4; breadth 0.08. Segment II 1.7 times longer than segment III, length of segment II 0.24; length of segment III 0.14. Palpi

slightly wrinkled. Segment I ventrally with a sloping ridge ending anteriorly and posteriorly with small, pointed spurs. Hypostome length 0.41; length of toothed portion 0.23; apex rounded with small corona consisting of two rows of fine denticles; dental formula 2/2 with six denticles per file.

Legs (Fig. 17 d–f) Coxa I with 2 triangular spurs, the external spur longer and more narrow. Coxae II–IV each with a single, triangular, broadly rounded spur; spur on coxa IV longer. Trochanters lack spurs. Tarsus I length 0.43, width 0.1, without ventroapical hook. Tarsus IV length 0.4, breadth 0.1, without ventroapical hook.

Spiracular plate pyriform with very short dorsal prolongation (Fig. 17g). Postanal groove with short, thin unpaired, median groove.

**Larva** (Fig. 18). Measurements from 2 specimens. Length from apices of scapulae to posterior body margin 1.0, 0.74; breadth 0.77, 0.65. Dorsal body setae: 2 central dorsal pairs j5 0.02, 0.022; J2 0.024, 0.022; 8 marginal dorsal pairs s3 0.03, 0.026; s4 0.026; s6 0.034, 0.036; S1 0.034; S2 0.038, 0.04; S3 0.04; S4 0.04, 0.038; S5 0.044, 0.04. Ventral body setae: 3 sternal pairs St1 0.036, 0.038; St2 0.038, 0.034; St3 0.032, 0.028; 2 preanal pairs Jv3 0.03; Jv5 0.03, 0.032; 4 premarginal pairs Zv1 0.048, 0.044; Zv2 0.048, 0.05; Zv4 0.04, 0.044; Zv5 0.044, 0.05; 5 marginal ventral pairs Sv1

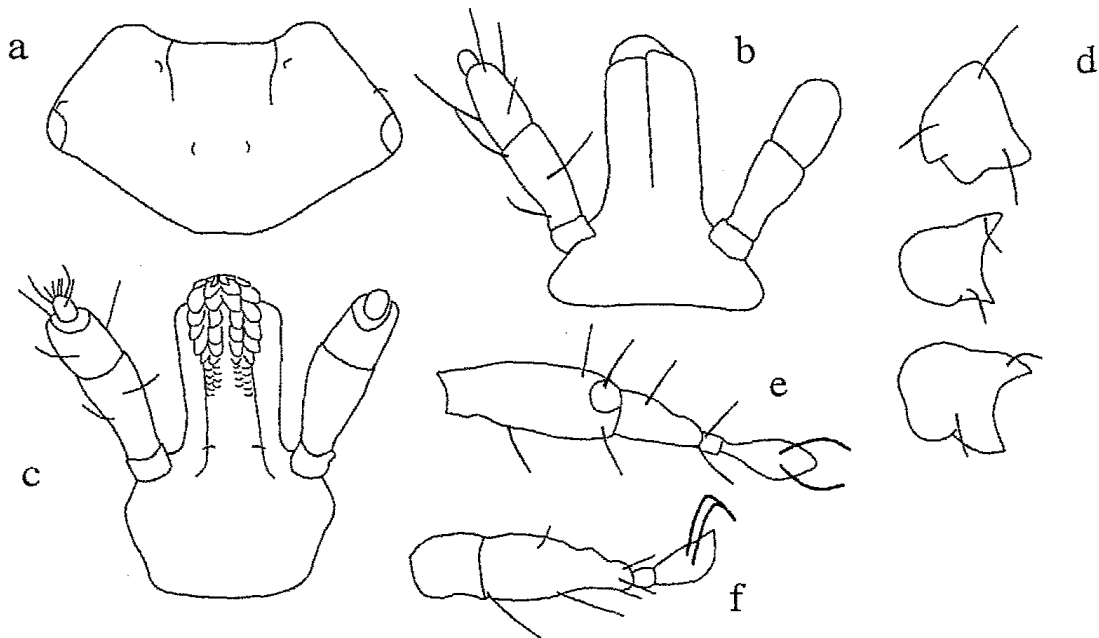


Fig. 18. *Amblyomma eburneum*, larva: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus III.

0.026, 0.036; Sv2 0.038, 0.032; Sv3 0.038, 0.032; Sv4 0.038; Sv5 0.038, 0.04; and 1 pair on anal valves.

Scutum (Fig. 18a) length 0.35, 0.33, breadth 0.5, 0.48; inornate, yellow-brown. Posterior margin slightly concave, posterolateral margins slightly concave, anterolateral margins almost straight. Scutal punctations small, numerous. Cervical grooves almost straight, slightly converging anteriorly and parallel posteriorly, reaching the one third of the scutal length. Scutal setae 3 pairs: z2 0.026, 0.022; s2 0.014; j3 0.016, 0.014. Eyes large, bulging, marginal.

Capitulum (Fig. 18 b,c) length from palpal apices to posterior margin of basis 0.23, breadth 0.18. Basis capituli dorsally subtriangular, posterior margin straight or slightly concave, lateral margins narrowly rounded, cornua absent. Ventrally posterior margin slightly convex. Palpi length 0.17, breadth 0.046. Segment II 1.3 times longer than segment III, segment II 0.08, 0.09 long, segment III 0.064 long. Setae number: dorsally 3 (0.04–0.056); ventrally 2 (0.026–0.034) on II, dorsally 4 (0.036–0.056), ventrally 2 (0.02–0.03) on III, barbed on both or on its outer surface. No setae on segment I. Hypostome length 0.16, length of toothed portion 0.122, 0.118; dental formula 2/2. Apex rounded, with a corona consisting of 2 rows of fine denticles, first row directed anteriorly.

Legs (Fig. 18 d–f). Coxa I with 2 spurs, the external spur longer and wider, broadly rounded, internal triangular and narrowly rounded. Coxae II with a single, short, broadly rounded spur, spur on coxa III longer and wider. Trochanters lack spurs.

Tarsus I length 0.21, breadth 0.064, 0.066, without hook. Tarsus III length 0.19, breadth 0.054, without hook.

**Material:** 2 males and female (US National Tick Collection, RML 99409; HH36460 from Brit. Mus. Nat. Hist.) Tanzania, Morogoro, Kilosa, Mgunda, 1.02.1927, ex *Syncerus caffer*, coll. N.C.F. Miller; 2 nymphs and 2 larvae (US National Tick Collection, RML 099068) Kenya, eastern, Meru, Mikinduri (4300 ft.), 6.08.1956, ex *Syncerus caffer*, coll. M.N. Kaiser.

***Amblyomma falsomarmoreum* Rondelli, 1935**

*Amblyomma falsomarmoreum* Rondelli, 1935: 245, figs. iv–v, original description.

**Male** (Fig. 19). Length from apices of scapulae to posterior scutal margin 6.9, breadth 5.6. Outline oval broadest at level of legs IV. Scutum dark-brown, ornate, two small, metallic, red-greenish patches in each scapular area. Punctations deep, both large and small. Cervical grooves short, deep, converging then shallow and oval. Marginal groove complete, beginning as deep punctations at level of legs III. Festoons rectangular, without sclerotized plates extending posterior margin of the festoons. Eyes slightly bulging.

Capitulum (Fig. 19 b,c) length from palpal apices to cornua apices 2.1, breadth 1.2. Basis capituli slightly wrinkled. Posterior margin almost straight, cornua small, narrowly rounded; external margins slightly convex, ventrally posterior margin straight. Palpi length 1.33, breadth 0.34. Segment II 2.9 times longer than segment III, length of

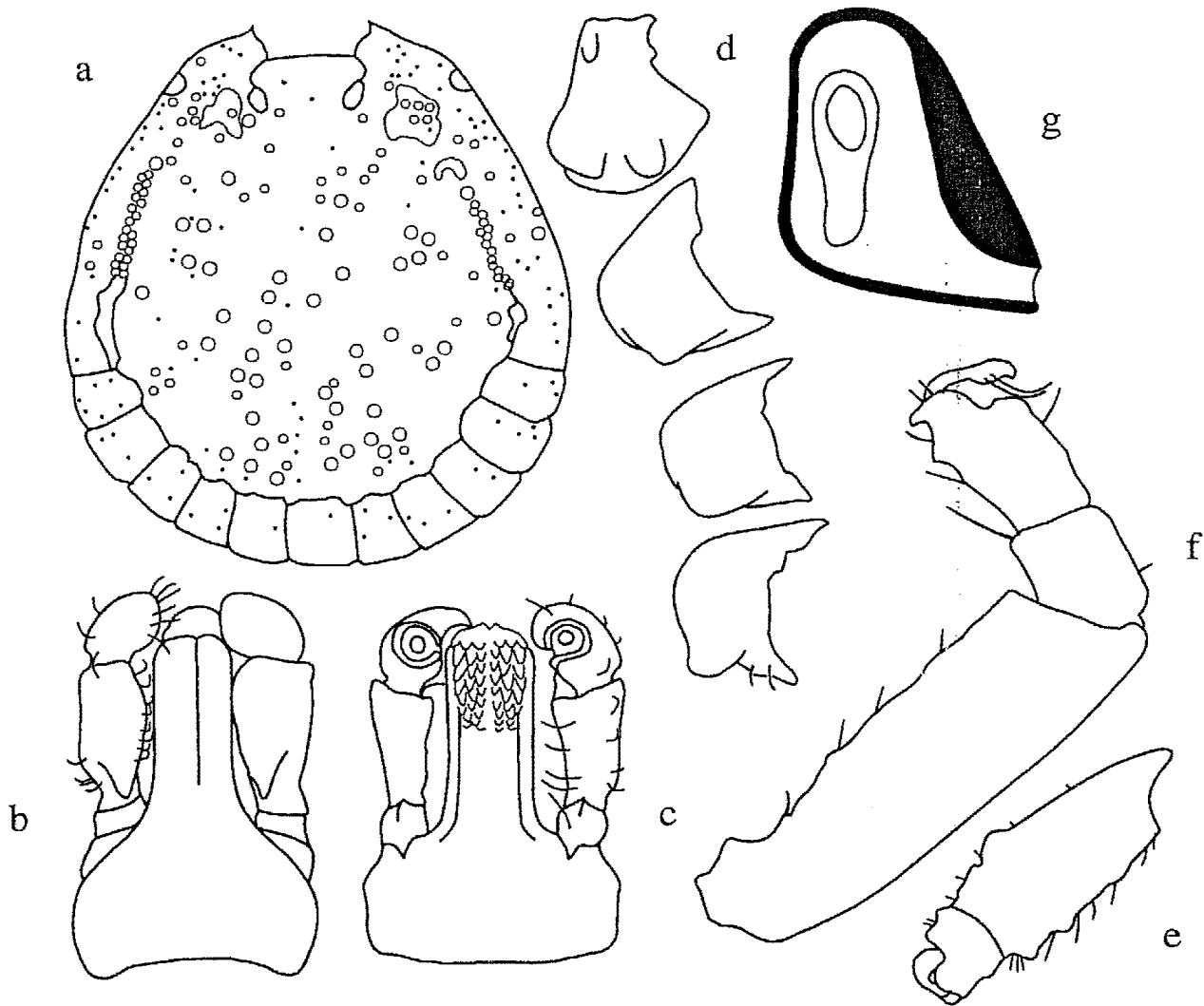


Fig. 19. *Amblyomma falsomarmoreum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

ment II dorsally with narrowly rounded projection, slightly wrinkled. Segment I ventrally with a sloping ridge ending anteriorly and posteriorly as small spurs. Hypostome length 1.2, length of toothed portion 0.64; with a small corona of fine denticles apically, apex notched, each half of the apex nipple-shaped; dental formula 3/3.

Legs (Fig. 19 d–f). Coxa I with 2 subequal, short, thick, broadly rounded spurs. Coxa I with a evident, spur-like callosity anteriorly. Coxa II with a single very broad, triangular spur. Coxa III with a single, relatively long, broadly rounded, paddle-shaped spur. Coxa IV with a single, long, broadly rounded spur directed medially. Trochanters lack spurs. Tarsus I length 1.24, width 0.46; without ventroapical hook but with 2 ventral, small, blunt humps and 3 dorsal, blunt humps. Tarsus IV length 1.14, breadth 0.31; with 1 strong ventroapical hook and 1 stout ventral hook. Tibia IV length 1.79, breadth 0.59.

Venter with short, very thin setae. Genital aperture situated between coxae II. Medial and

lateral margins of spiracular plate diverging, posterior and medial margins nearly straight, dorsal prolongation relatively broad, long, forming a obtuse angle with its anterior-posterior axis (Fig. 19g). Postanal groove with an shallow, unpaired median groove. Integumentary hard elements of the ventral skeleton of idiosoma consist of 2 very small, thin paired postanal shields, festoons' borders sclerotized.

**Female** (Fig. 20). Length from apices of scapulae to posterior body margin 7.25, breadth 5.75. Dorsal body setae very short, thin, straight, stick-like. Ventral body setae short, thin, straight, stick-like. Marginal groove complete, beginning near the posterior margin of scutum. Festoons evident.

Scutum (Fig. 20a) length 3.48, breadth 3.75; light-brown, ornate, two large, metallic, yellow patches with greenish border in each lateral area and two small, reddish patches in each posterolateral area. Punctations deep, both small and large, very numerous in each anterolateral area, and very large, few in the central and posterior area. Cervi-

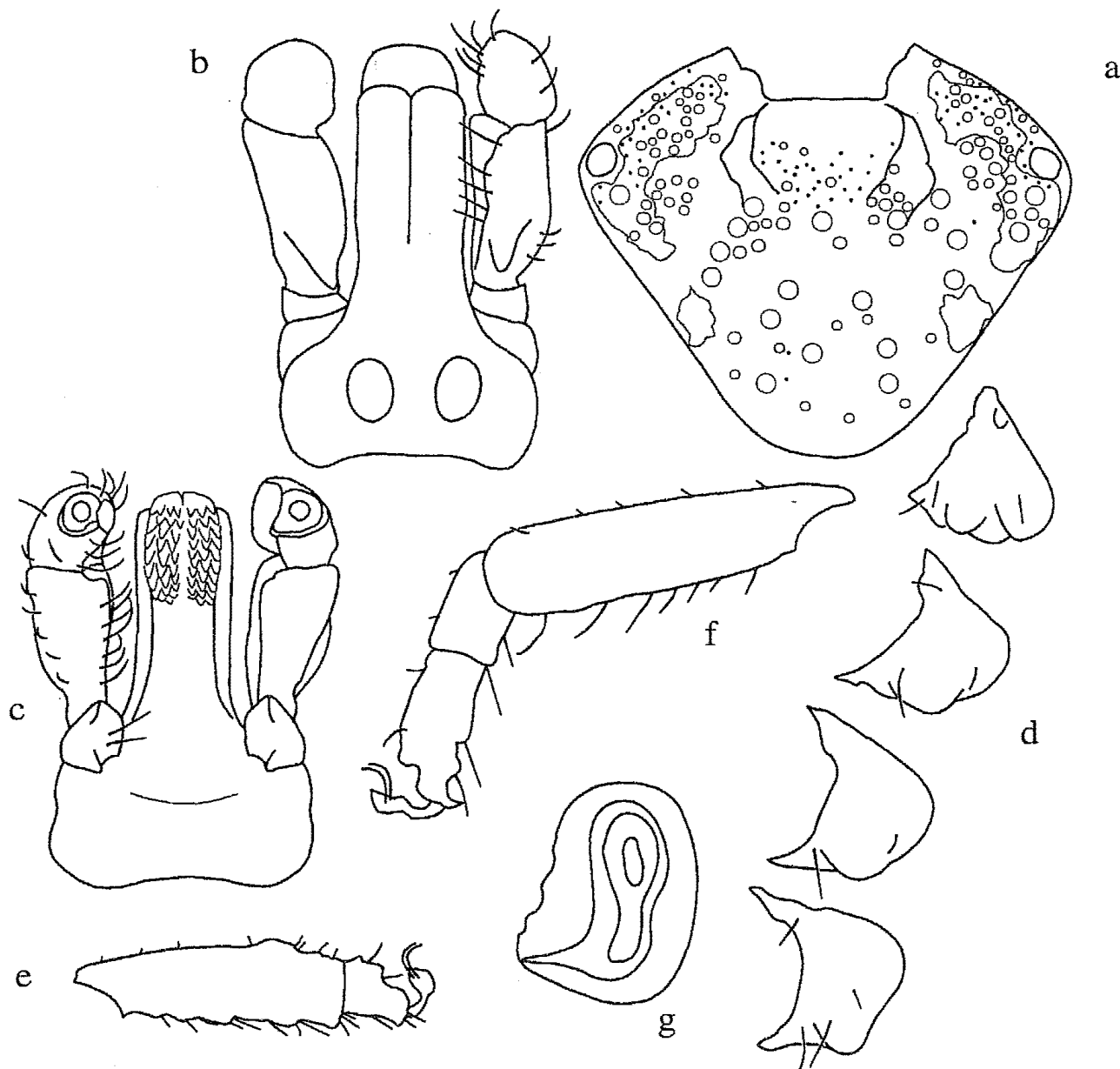


Fig. 20. *Amblyomma falsomarmoreum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

cal grooves long, very deep, converging anteriorly then very deep, diverging, with large, deep punctations. Eyes flat.

Capitulum (Fig. 20 b,c) length from palpal apices to cornua apices 2.33, breadth 1.29; cornua very short, rounded; posterior margin slightly concave, lateral margins convex; ventrally posterior margin straight. Porose areas oval, deeply depressed, diameter of one area 0.26, interporose area 0.14. Palpi length 1.43, breadth 0.3. Segment II 2.1 times longer than segment III, length of segment II 0.97, length of segment III 0.46. Segment I ventrally with a sharp ridge ending posteriorly with a pointed spur directed posteromedially. Hypostome length 1.37, length of toothed portion 0.76; with a small corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3.

Legs (Fig. 20 d-f). Coxa I with 2 equal spurs, the external spur broader, both rounded. Coxa I with an evident, sharp, spur-like callosity anteriorly. Coxae II-III each with a single, broadly rounded, triangular spur. Coxa IV with a single, narrowly rounded, triangular spur directed posteriorly. Trochanters lack spurs. Tarsus I length 1.56, width 0.47; without ventroapical hook but with 3 ventral, both large and small, blunt humps. Tarsus IV length 1.37, breadth 0.36, with 1 strong ventroapical hook and 1 pointed, triangular ventral hump. Tibia IV length 1.86, breadth 0.53.

Medial and posterior margins of spiracular plate concave, dorsal prolongation very narrow, perpendicular to anterior-posterior axis of spiracular plate (Fig. 20g). Genital aperture "U" shaped, situated between coxae II-III. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

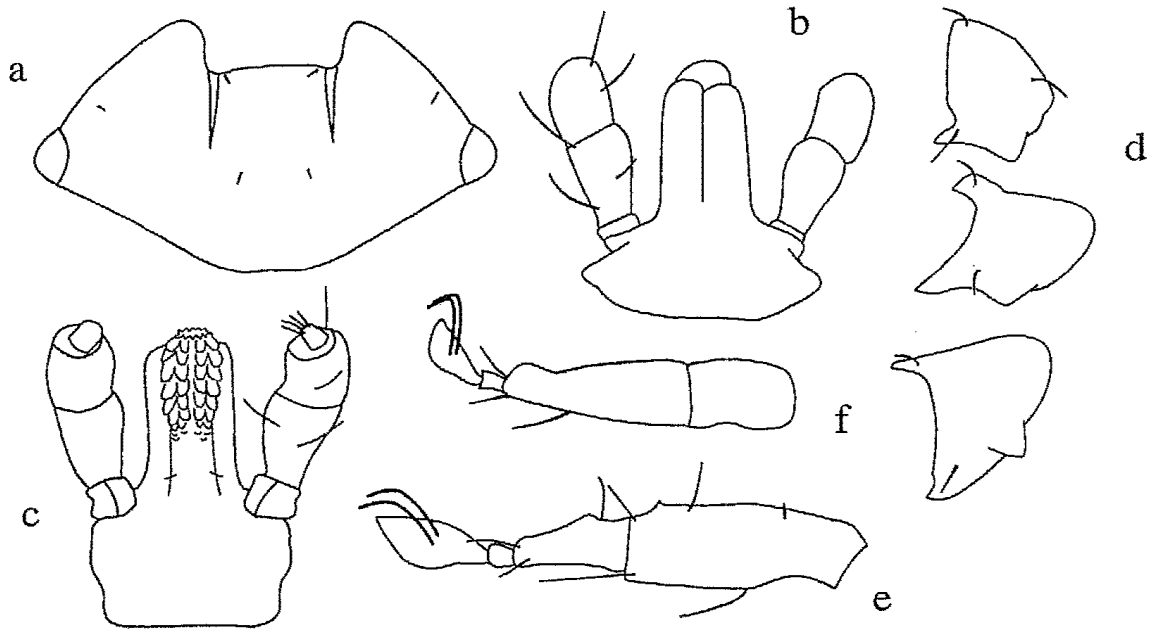


Fig. 21. *Amblyomma falsomarmorium*, larva: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae, e — tarsus I; f — tarsus III.

#### Nymph undescribed.

**Larva** (Fig. 21). Measurements from 2 specimens. Length from apices of scapulae to posterior body margin 0.76; breadth 0.66, 0.65. Dorsal body setae: 2 central dorsal pairs j5 0.01; J2 0.01; 8 marginal dorsal pairs s3 0.01; s4 0.01; s6 0.01; S1 0.012; S2 0.01, 0.012; S3 0.01, 0.014; S4 0.01, 0.016; S5 0.012, 0.018. Ventral body setae: 3 sternal pairs St1 0.008; St2 0.008; St3 0.008; 2 preanal pairs Jv3 0.01; Jv5 0.012; 4 premarginal pairs Zv1 0.012; Zv2 0.016; Zv4 0.016; Zv5 0.024; 5 marginal ventral pairs Sv1 0.02; Sv2 0.02; Sv3 0.02; Sv4 0.02; Sv5 0.022; and 1 pair on anal valves.

Scutum (Fig. 21a) length 0.3, breadth 0.5; inornate, yellow-brown. Posterior margin slightly concave, posterolateral margins straight, anterolateral margins slightly convex. Scutal punctations small, fine, dense. Cervical grooves slightly diverging, relatively long, reaching the one third of the scutal length. Scutal setae 3 pairs: z2 0.008; s2 0.01; j3 0.008. Eyes large, bulging, marginal.

Capitulum (Fig. 21 b,c) length from palpal apices to posterior margin of basis 0.19, breadth 0.16. Basis capituli dorsally subhexagonal, posterior margin slightly concave, lateral margins triangular, narrowly rounded, cornua absent. Ventrally posterior margin straight. Palpi length 0.14, 0.13, breadth 0.046, 0.044. Segment II 1.4–1.5 times longer than segment III, segment II 0.05, 0.066 long, segment III 0.06, 0.056 long. Setae number: dorsally 3 (0.02–0.04); ventrally 2 (0.022–0.034) on II, dorsally 3 (0.026–0.04), ventrally 2 (0.018–0.024) on III, barbed on its outer surface

or split. No setae on segment I. Hypostome length 0.11, length of toothed portion 0.08; dental formula 2/2 with seven denticles per file. Apex with a corona of fine denticles consists of 2 rows, first row directed anteriorly.

Legs (Fig. 21 d–f). Coxa I with a single triangular, narrowly rounded spur. Coxa II with a single, triangular, broader spur. Coxa III with a single, triangular, longer, pointed spur. Trochanters lack spurs. Tarsus I length 0.23, breadth 0.06, without hook. Tarsus III length 0.19, 0.18, breadth 0.048, without hook.

**Material:** male and female (US National Tick Collection, RML 122 881) Kenya, Lake Bogoria (0°15.5'N, 36°5.11'E), 18.IV.1999, ex *Geochelone pardalis* (Testudinidae), coll. S.E. Miller; 2 larvae (US National Tick Collection, RML 45897) locality unknown, laboratory reared, coll. J. Walker, received 6.08.1965.

#### *Amblyomma gemma* Dönitz, 1909

*Amblyomma gemma* Dönitz, 1909: 458, original description.

**Male** (Fig. 22). Measurements from 5 specimens. Length from apices of scapulae to posterior scutal margin 5.1 (4.5–5.6), breadth 4.2 (3.4–4.7) Outline oval broadest at level of the middle of scutum. Scutum dark-brown, ornate, a large metallic crimson patch with green border covers the centroanterior part of the scutum, two large, trilobate patches situated in each posterolateral area, small, metallic patches on festoons. Scapulae very pointed. Punctations shallow, small, situated in each lateral area. Cervical grooves short, deep,



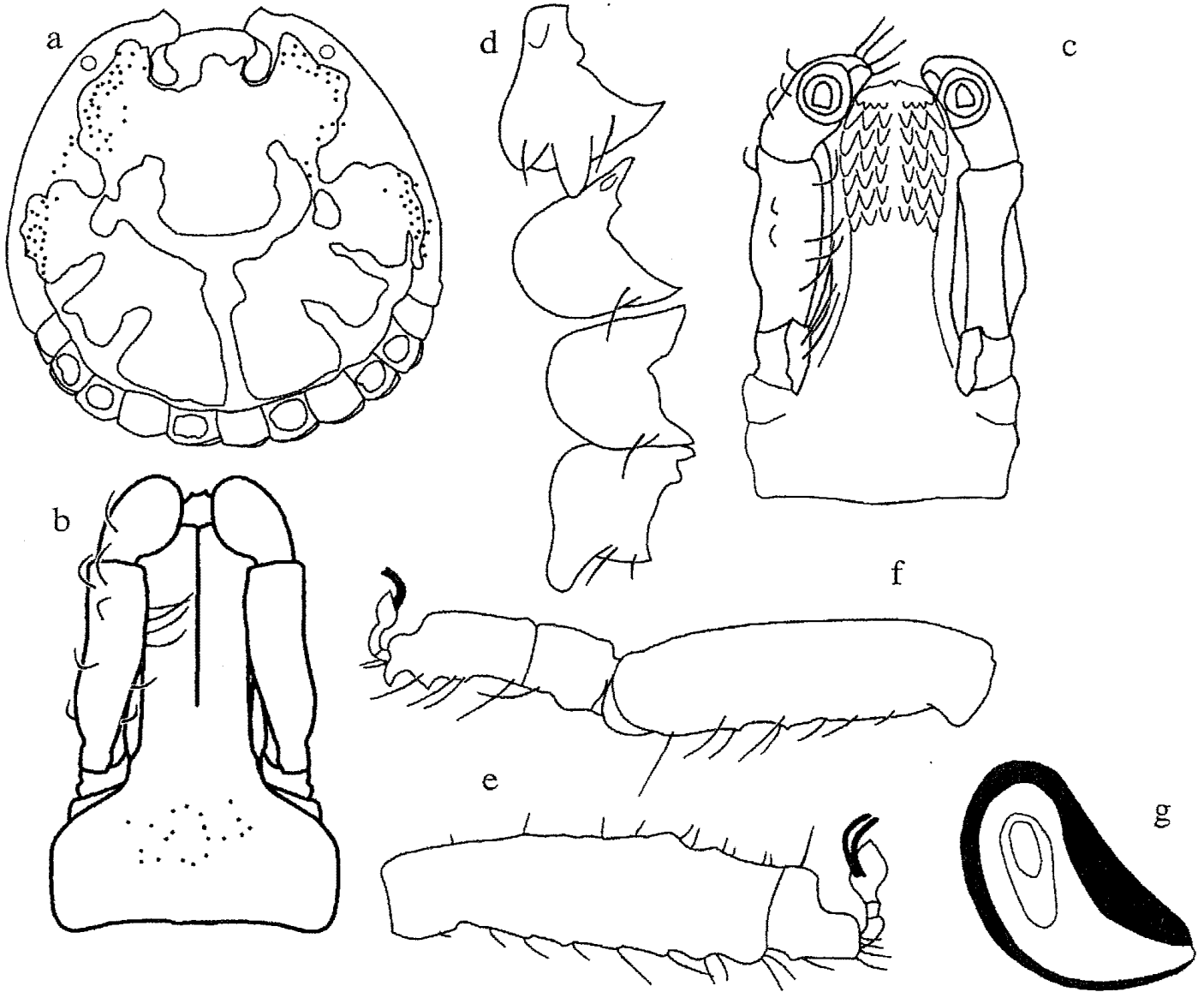


Fig. 22. *Amblyomma gemma*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

crescent, converging. Marginal groove complete beginning at level of legs II–III. Festoons narrow, with sclerotized plates extending posterior margin of the festoons. Eyes small, round, bulging, situated at a distance from scutal margin.

Capitulum (Fig. 22 b,c) length from palpal apices to cornua apices 1.8 (1.6–2.0), breadth 0.98 (0.9–1.04); basis capituli wrinkled, punctations small, shallow in the central area; posterior margin concave; cornua small, narrowly rounded; external margins straight, ventrally posterior margin straight. Palpi length 1.4 (1.2–1.43), breadth 0.28 (0.26–0.29). Segment II 2.5 (2.4–2.6) times longer than segment III, length of segment II 0.9 (0.8–1.0), length of segment III 0.37 (0.34–0.4). Segment II dorsally with shallow depression, slightly wrinkled. Segment I ventrally with a sharp ridge ending posteriorly with a pointed spur. Hypostome length 1.3 (1.1–1.4), length of toothed portion 0.6 (0.57–

0.66); with a small corona of fine denticles apically, apex slightly notched, flat, dental formula 3/3.

Legs (Fig. 22 d–f). Coxa I with 2 spurs, each narrowly rounded, the external spur longer, reaching the anterior margin of coxa II, internal spur broader. Coxa I with an evident, spur-like callosity anteriorly. Coxae II–III each with a single, very short, broadly rounded, paddle-shaped spur. Coxa II with an evident, cylinder-shaped callosity anteriorly. Coxa IV with a single, long spur directed posteromedially. Trochanters lack spurs. Tarsus I length 1.23 (1.2–1.3), width 0.34 (0.33–0.36); without ventroapical hook but with two ventral, small, blunt humps. Tarsus IV length 0.87 (0.84–0.93), breadth 0.28 (0.24–0.3); with 1 strong ventroapical hook and 1 strong ventral hook. Tibia IV length 1.4 (1.24–1.57), breadth 0.44 (0.41–0.53). Leg segments with broad, yellow annular wheels at distal ends.

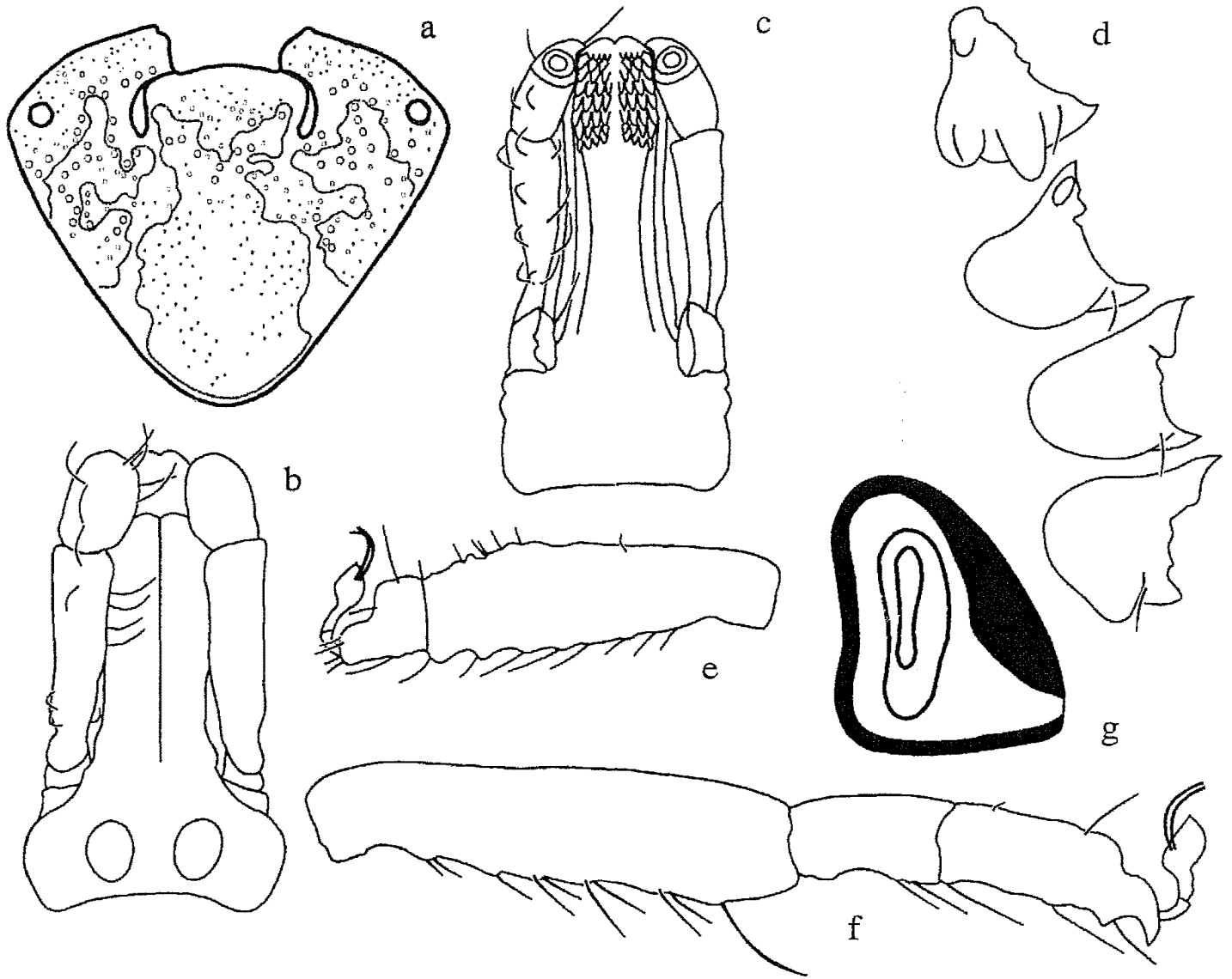


Fig. 23. *Amblyonuna gemma*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

Venter with numerous short, thin, straight setae. Genital aperture situated between coxae II–III. Medial and lateral margins of spiracular plate parallel, posterior and medial margins convex, dorsal prolongation long, forming an obtuse angle with anterior-posterior axis of spiracular plate (Fig. 22g). Postanal groove with a shallow unpaired median groove extending to the anal shield. Integumentary hard elements of the ventral skeleton of idiosoma consist of unpaired, narrow anal and 2 small, round paired postanal shields, and large festoons' shields.

**Female** (Fig. 23). Measurements from 4 specimens (one female semi-engorged, 3 unfed). Length from apices of scapulae to posterior body margin 5.2 (4.9–5.2) and 8.9 in semi-engorged female, breadth 4.4 (4.0–4.7) and 6.8 in semi-engorged female. Dorsal and ventral body setae short, thin, curved, stick-like. Marginal groove complete, beginning near the posterior margin of scutum. Festoons square.

Scutum (Fig. 23a) length 2.6 (2.37–2.95), breadth 2.7 (2.4–2.86); dark-brown, ornate, a very large metallic, pale, crimson patch in the central part of the scutum, two large patches in each lateral area. Punctations very deep, large around the eyes and between cervical grooves; less deep and smaller in each scapular area; small and shallow in the central and posterior part of the scutum. Cervical grooves shallow, broad anteriorly, then very deep, converging, and diverging as shallow depressions to the margin of scutum. Eyes round, bulging, situated at a distance from scutal margin.

Capitulum (Fig. 23 b,c) length from palpal apices to cornua apices 1.8 (1.6–1.97), breadth 1.0 (0.96–1.1); cornua short, narrow rounded; posterior margin straight or slightly concave; lateral margins nearly straight or slightly convex; ventrally posterior margin convex. Basis capituli slightly wrinkled, punctations very few, small, shallow. Porose areas oval, diameter of one area 0.17 (0.16–

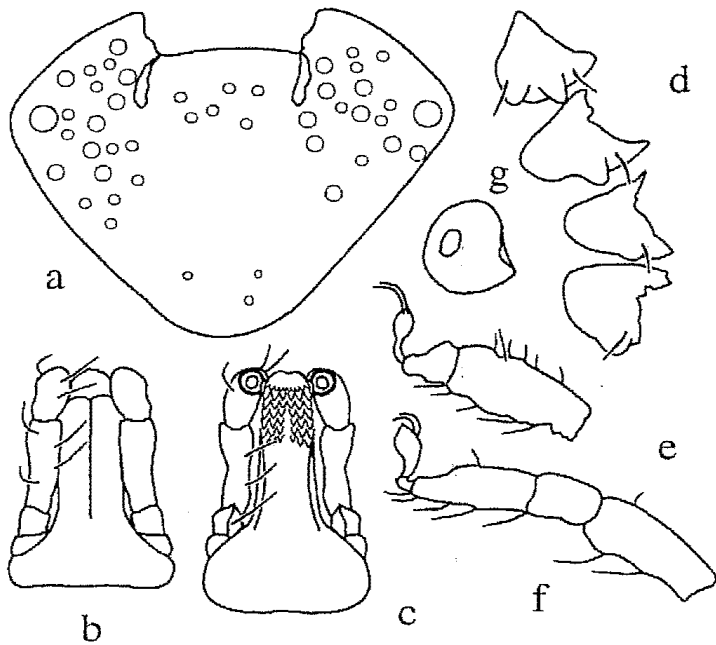


Fig. 24. *Amblyomma gemma*, nymph: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

0.19), interporose area 0.17 (0.14–0.19). Palpi length 1.4 (1.39–1.43), breadth 0.23 (0.21–0.27). Segment II 3.3 times longer than segment III, length of segment II 0.98 (0.89–1.01), length of segment III 0.3 (0.27–0.33). Palpi slightly wrinkled. Segment I ventrally with a sharp ridge ending posteriorly with a small spur. Hypostome length 1.34 (1.29–1.46); length of toothed portion 0.64 (0.57–0.71); with a small corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3 anteriorly and 4/4 in the posterior part.

Legs (Fig. 23 d–f). Coxa I with 2 rounded spurs, the external spur large, relatively long, internal spur broader. Coxa I with an evident, sharp, spur-like callosity anteriorly. Coxae II–III each with a single, broadly rounded, very short, paddle-shaped spur. Coxa II with an evident, cylinder-shaped callosity anteriorly. Coxa IV with a single, relatively long, triangular, broadly rounded spur. Trochanters lack spurs. Tarsus I length 1.36 (1.23–1.43), width 0.35 (0.3–0.37); without ventroapical hook but with 3 ventral, small, blunt humps. Tarsus IV length 1.15 (1.07–1.26), breadth 0.27 (0.26–0.29); with 1 strong ventroapical hook and a small, pointed ventral hump. Tibia IV length 1.43 (1.36–1.47); breadth 0.38 (0.36–0.4). Leg segments with very broad, yellow annular wheels at distal ends.

Medial and lateral margins of spiracular plate parallel, medial margin slightly concave, posterior margin approximately straight, dorsal prolongation triangular, almost perpendicular to anterior-posterior axis of spiracular plate (Fig. 23g). Genital

aperture “V” shaped, situated between coxae II. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Nymph** (Fig. 24). Measurements from 5 specimens. Length from apices of scapulae to posterior body margin 1.6 (1.5–1.66), breadth 1.27 (1.2–1.37). Dorsal body setae numerous, relatively long, curved, thin. Ventral body setae shorter than dorsal setae, very thin, few in number. Marginal groove absent. Festoons evident.

Scutum (Fig. 24a) length 0.79 (0.73–0.84), breadth 0.93 (0.89–0.96). Yellow-brown with two small black spots behind the eyes, inornate. Posterior margin narrowly rounded, postero-lateral margins almost straight. Punctations deep, large, more numerous in each lateral area, surface reticulated, wrinkled on the scapular areas. Cervical grooves deep, converging in the anterior part, then diverging posterolaterally as shallow depressions and reaching the posterior scutal margin. Eyes round, bulging.

Capitulum (Fig. 24 b,c) length from palpal apices to posterior margin of basis 0.5 (0.43–0.61), breadth 0.36 (0.34–0.39). Basis capituli trapezoid in shape, lateral margins straight, slightly diverging, posterior margin straight, cornua absent, ventrally posterior margin straight. Punctations of basis capituli few, small, shallow. Palpi length 0.4 (0.36–0.47), breadth 0.08 (0.07–0.09). Segment II 1.8 times longer than segment III, length of segment II 0.22 (0.21–0.23), length of segment III 0.12 (0.11–0.16). Palpi slightly wrinkled. Segment I ventrally with a slightly sloping ridge.

Hypostome length 0.36 (0.34–0.37), length of toothed portion 0.21 (0.2–0.21); with a large corona of fine denticles apically, apex slightly notched, rounded, dental formula 2/2.

Legs (Fig. 24 d–f) Coxa I with 2 triangular spurs, the external spur larger, each narrowly rounded. Coxa II with a single triangular, broadly rounded spur. Coxa III with a single short, triangular, blunt spur. Coxa IV with a single triangular, broadly rounded, relatively long spur. Trochanters lack spurs. Tarsus I length 0.46 (0.43–0.47), width 0.136 (0.13–0.14); without ventroapical hook. Tarsus IV length 0.39 (0.36–0.43), breadth 0.1; without ventroapical hook.

Spiracular plate (Fig. 24g) oval, with very short, triangular dorsal prolongation, medial and lateral margins parallel, posterior margin convex. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Larva** (Fig. 25). Length from apices of scapulae to posterior body margin 0.64; breadth 0.54.

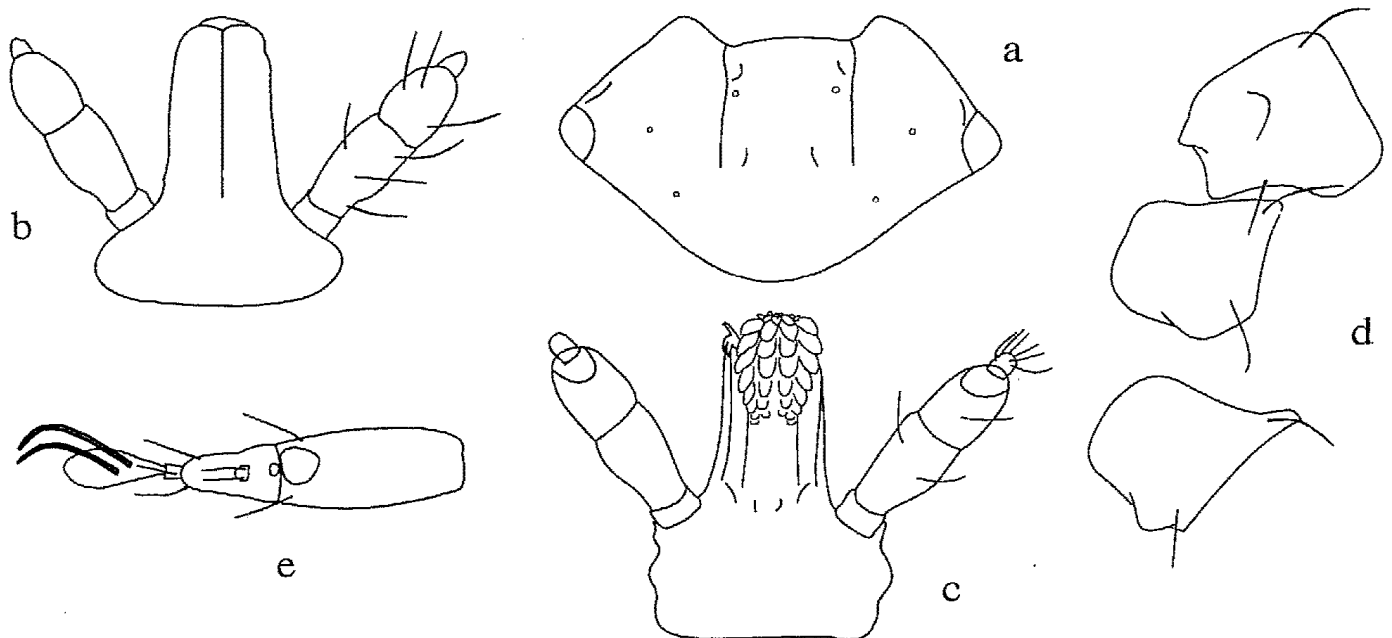


Fig. 25. *Amblyomma gemma*, larva: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I.

Dorsal body setae: 2 central dorsal pairs: j5 0.02, J2 0.026; 8 marginal dorsal pairs: s3 0.034; s4 0.036; s6 0.036; S1 0.04; S2 0.042; S3 0.04; S4 0.046; S5 0.04. Ventral body setae: 3 sternal pairs, St1 0.03; St2 0.04; St3 0.036; 2 preanal pairs Jv3 0.024, Jv5 0.024; 4 premarginal pairs Zv1 0.036, Zv2 0.038, Zv4 0.038, Zv5 0.04; 5 marginal ventral pairs Sv1 0.03, Sv2 0.03, Sv3 0.032, Sv4 0.032, Sv5 0.034; and 1 pair on anal valves.

Scutum (Fig. 25a) length 0.28, breadth 0.45, inornate, yellow-brown. Posterior margin slightly convex, posterolateral margins slightly concave, anterolateral margins almost straight. Cervical grooves very long, straight. Scutal setae: 3 pairs, z2 0.01, s2 0.02, j3 0.018. Eyes large, bulging laterally beyond the contour of the scutum.

Capitulum (Fig. 25 b,c) length from palpal apices to posterior margin of basis 0.24, breadth 0.16. Basis capituli dorsally subhexagonal with lateral broadly rounded angles, posterior margin straight, cornua absent. Ventrally posterior margin straight. Palpi length (with segment IV) 0.144, breadth 0.046, smooth. Segment II 1.2 times longer than segment III, segment II 0.07 long; segment III 0.06 long. Setae number: on segment II — dorsally 4 (0.024–0.048 mm), lateral setae barbed, medial seta smooth, ventrally 2 (0.03–0.036), barbed; on segment III — dorsally 3 (0.036–0.044), apical and lateral setae barbed, medial seta smooth, ventrally 1 (0.022) split seta. No setae on segment I. Hypostome length 0.12, length of toothed portion 0.086; dental formula 2/2 with six denticles per file. Apex spatulate, with a small corona consisting of 2 rows of fine denticles.

Legs (Fig. 25 d,e). Coxa I with 2 triangular, narrowly rounded spurs, the external spur larger; coxa II with a single very broad spur, coxa III with a single triangular, narrowly rounded spur. Coxa I with 3 setae: anterior and medial setae barbed, posterior seta split. Coxa II with 2 setae: anterior barbed, posterior smooth. Coxa III with 2 setae: anterior split, posterior smooth. Trochanters lack spurs. Tarsus I 0.2 long, 0.06 broad, without hook. Tarsus III 0.17 long, 0.05 broad, without hook.

**Material:** 1 male, 1 female (US National Tick Collection, RML 73133; HH 36562) Ethiopia, Tigre, Shire lowlands, Northern Ethiopia, ex cattle, 28.04.–12.06.71, coll. C.G. Grimshaw; 4 males, 3 females (ZMMU, Tdi 460). Adults progeny of one female from Kenya, lab. reared, from H. Hoogstraal collection. 5 nymphs (ZMMU, Tdi 461) Kenya, progeny of one female. Presumable from the Hoogstraal's collection. 1 reared larva (US National Tick Collection), Kenya, J.B. Walker.

*Amblyomma geochelone*  
Durden, Keirans et Smith, 2002

*Amblyomma geochelone* Durden, Keirans & Smith, 2002: 398, figs. 1–4, original description.

Description and figures of male and female see in Durden, Keirans, Smith [2002].

*Amblyomma hebraeum* Koch, 1844

*Amblyomma hebraeum* Koch, 1844: 225, original description.

*Amblyomma annulipes* Koch, 1844: 230, junior synonym.

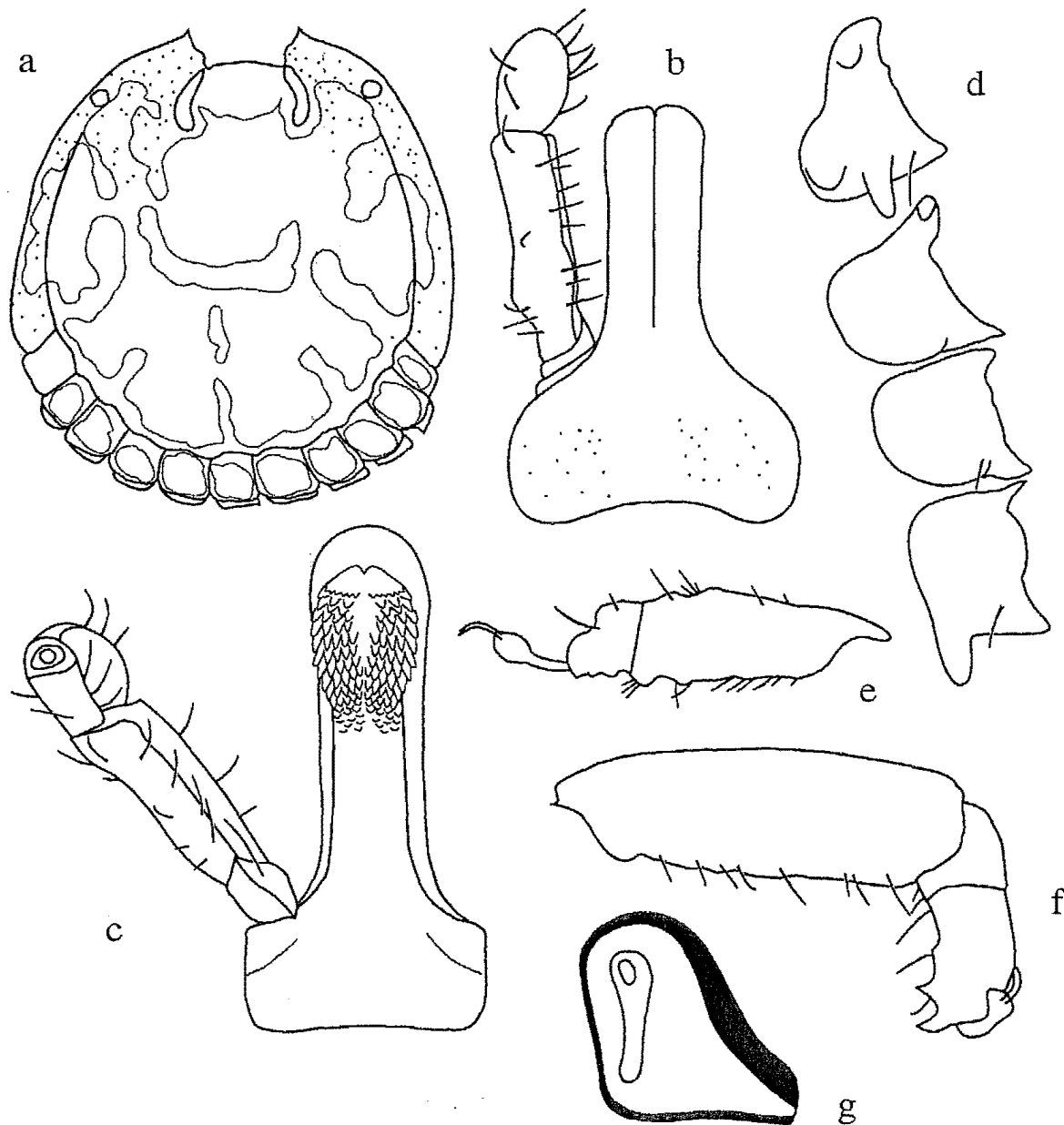


Fig. 26. *Amblyomma hebraeum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

*Ixodes poortmani* Lucas, 1850: xli, junior synonym.

*Amblyomma hassalli* Marx & Neumann in Neumann, 1899: 271, junior synonym (*pro parte*).

*Amblyomma theileri* Santos Dias, 1947: 244, junior synonym.

*Amblyomma theilerae* Santos Dias, 1947 (emended spelling, Santos Dias, 1962).

**Male** (Fig. 26). Measurements from 2 specimens. Length from apices of scapulae to posterior scutal margin 5.45, 5.15; breadth 4.6, 4.3. Outline oval broadest at level of the middle of scutum. Scutum red-brown, ornate, a large metallic crimson patch of complicated configuration covers almost the all scutum. Scapulae very pointed, each with pyramidal hump directed ventrally. Punctations shallow, small, situated in each lateral area. Cervical grooves relatively long, deep, crescent, converging.

Marginal groove complete beginning at level of legs II. Fестоons rectangular, with sclerotized plates extending posterior margin of the festoons. Eyes slightly bulging, situated at a distance from scutal margin.

Capitulum (Fig. 26 b,c) length from palpal apices to cornua apices 2.01, 2.1, breadth 1.07 punctations of basis capituli small, few in number; posterior margin concave; cornua small, broadly rounded; external margins almost straight, ventrally posterior margin straight. Palpi length 1.43, breadth 0.24, 0.23. Segment II 2–2.3 times longer than segment III, length of segment II 0.93, 0.87; length of segment III 0.41, 0.46. Segment I ventrally with a sharp ridge ending anteriorly and posteriorly with pointed spurs. Hypostome length 1.4, length of toothed portion 0.67; with a large corona of fine denticles apically, apex slightly notched,

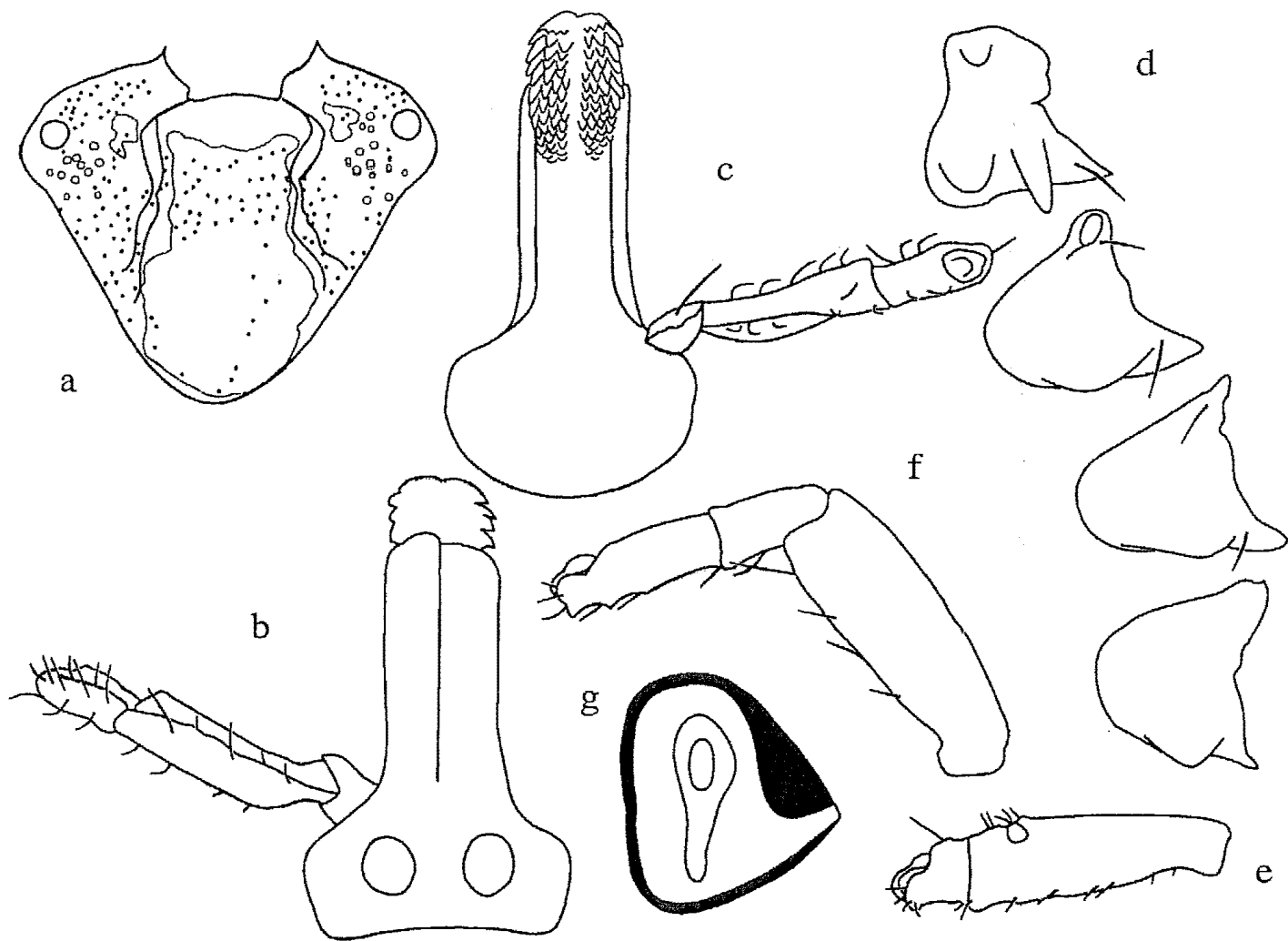


Fig. 27. *Amblyomma hebraeum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

narrowly rounded, dental formula 3/3 in the 2 anterior files, then 4/4 in 2 files, and 5/5 in the posterior files.

Legs (Fig. 26 d–f). Coxa I with 2 spurs, the external spur larger, long and narrow, internal spur broadly rounded. Coxa I with an evident, spur-like callosity anteriorly. Coxae II–III each with a single, very short, broadly rounded, paddle-shaped spur. Coxa II with an evident, cylinder-shaped callosity anteriorly. Coxa IV with a single, long, narrowly rounded spur directed posteriorly. Trochanters lack spurs. Tarsus I length 1.29, 1.26, width 0.36; without ventroapical hook but with two ventral, small, blunt humps. Tarsus IV length 0.94, 0.93, breadth 0.29, 0.3; with 1 strong ventroapical hook and 1 stout ventral hook. Tibia IV length 1.64, 1.61, breadth 0.5, 0.53. Leg segments with broad, yellow annular wheels at distal ends.

Venter with short, thin, straight setae. Genital aperture situated between coxae II–III. Medial and lateral margins of spiracular plate diverging, posterior and medial margins almost straight, dorsal

prolongation triangular, perpendicular to anterior-posterior axis of spiracular plate (Fig. 26g). Postanal groove with a thin, shallow unpaired median groove not extending to the festoon. Integumentary hard elements of the ventral skeleton of idiosoma consist of small unpaired anal and 2 paired postanal shields, and large festoons' shields.

**Female** (Fig. 27). Measurements from 2 specimens (one female slightly engorged). Length from apices of scapulae to posterior body margin 6.65, 5.7, breadth 5.9, 4.7. Dorsal body setae very short, thin, straight. Ventral body setae very short, thin, curved. Marginal groove complete, thin, shallow, beginning near the posterior margin of scutum. Festoons evident.

Scutum (Fig. 27a) length 2.3, 2.8, breadth 2.9, 3.0; dark red-brown, ornate, a very large metallic, pale, crimson patch in the central third of the scutum, two very small patches between cervical grooves and eyes. Punctations deep, large around the eyes; less deep and smaller in each scapular area; small and shallow in the central part of the scutum and in

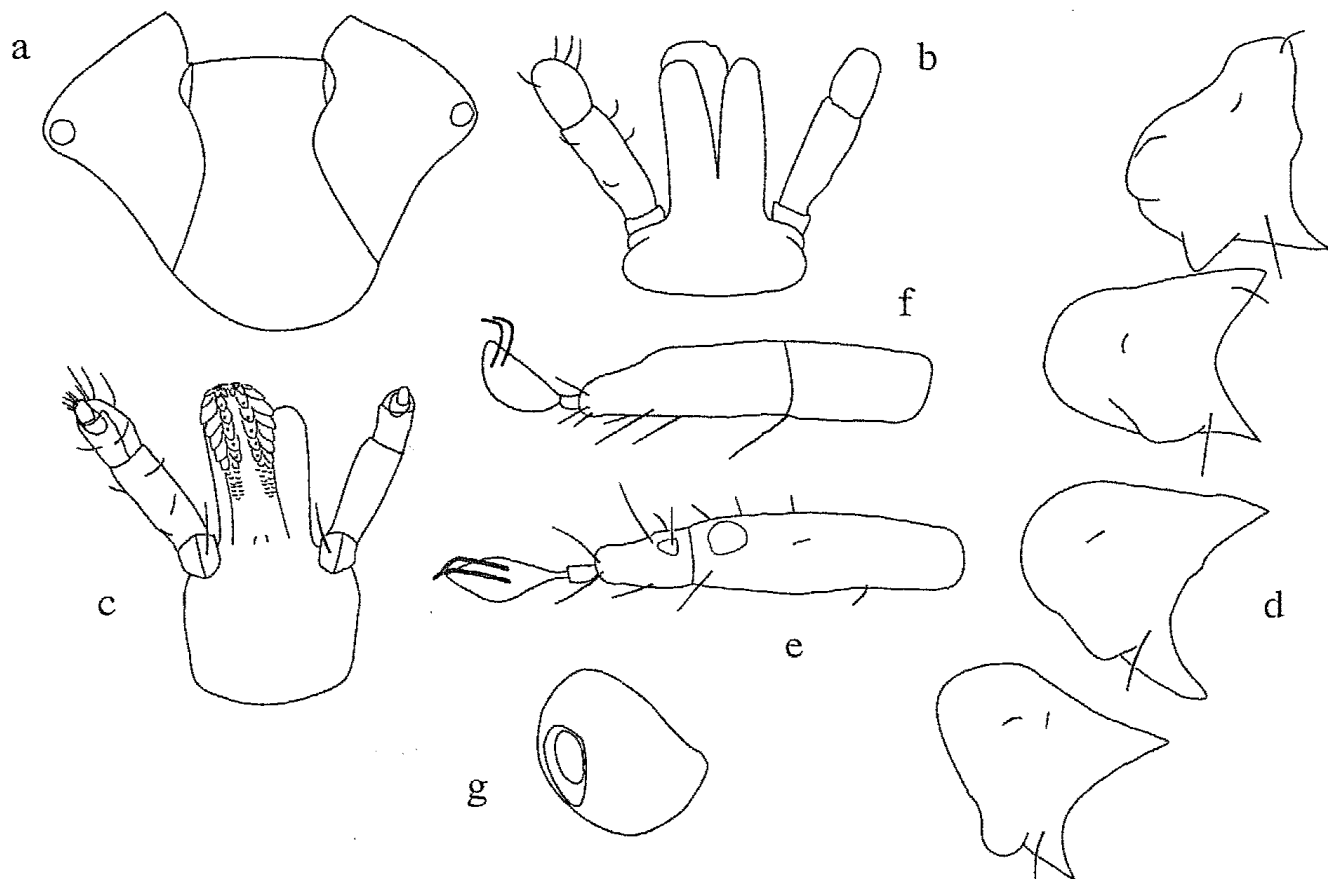


Fig. 28. *Amblyomma hebraeum*, nymph: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus IV; g — spiracular plate.

each scapular area. Cervical grooves long, crescent, converging, then diverging as shallow depressions to the margin of scutum. Eyes slightly bulging, situated at a distance from scutal margin.

Capitulum (Fig. 27 b,c) length from palpal apices to cornua apices 1.7, 2.0, breadth 1.0, 1.14; cornua very short, rounded; posterior margin straight, lateral margins nearly straight ventrally posterior margin straight. Punctations of basis capituli absent. Porose areas oval, deeply depressed, diameter of one area 0.16, 0.17, interporose area 0.21. Palpi length 1.29, 1.5, breadth 0.23, 0.26. Segment II 2.1–2.2 times longer than segment III, length of segment II 0.84, 0.98; length of segment III 0.4, 0.44. Segment I ventrally with a sharp ridge ending posteriorly with a small spur. Hypostome length 1.3, 1.46, length of toothed portion 0.66; 0.71; with a small corona of fine denticles apically, apex slightly notched, slightly rounded or flat; dental formula 3/3 in the anterior part and 4/4 in the posterior part.

Legs (Fig. 27 d–f). Coxa I with 2 spurs, the external spur large, long, narrowly rounded, internal spur broadly rounded. Coxa I with an evident, spur-like callosity anteriorly. Coxae II–III each with a single, broadly rounded, very short, paddle-shaped spur. Coxa II with a small, cylinder-shaped callos-

ity anteriorly. Coxa IV with a single, triangular spur. Trochanters lack spurs. Tarsus I length (from one specimen, second female damaged, without legs I) 1.43, width 0.39; without ventroapical hook but with 2 ventral, small, blunt humps. Tarsus IV length 1.14, 1.21, breadth 0.26, 0.29; with 1 strong ventroapical hook and a triangular, pointed ventral hump. Tibia IV length 1.34, 1.57, breadth 0.4, 0.47.

Medial and lateral margins of spiracular plate nearly parallel, medial margin straight, posterior margin approximately straight, dorsal prolongation narrow, long, forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 27g). Genital aperture “V” shaped, situated between coxae II. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Nymph** (Fig. 28). Measurements from 2 specimens. Length from apices of scapulae to posterior body margin 2.0, breadth 1.6. Dorsal body setae relatively long and dense, slightly curved, needle-shaped. Ventral body setae slightly longer and more thick, curved. Marginal groove absent. Fes-toons evident, rectangular.

Scutum (Fig. 28a) length 0.7; breadth 1.1; brown, nearly black around the eyes, inornate. Posterior margin narrowly rounded, posterolateral margins concave. Punctations deep and large in

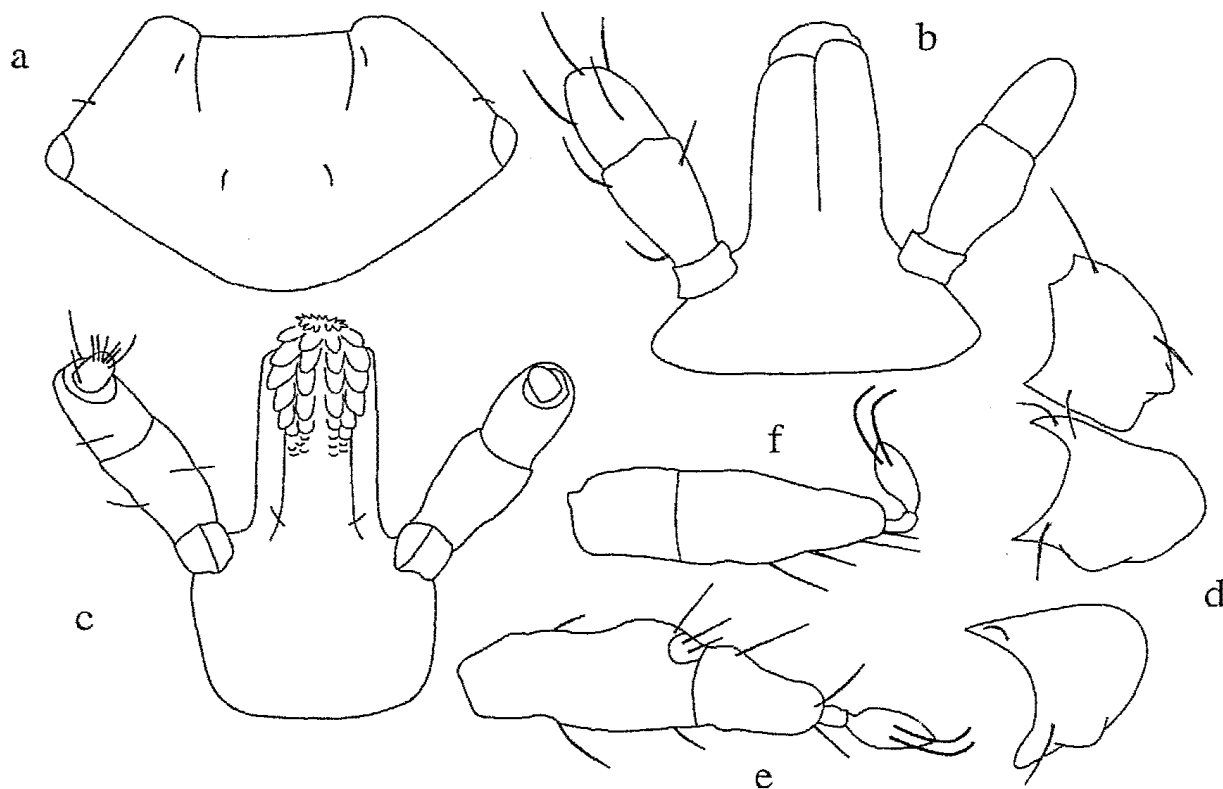


Fig. 29. *Amblyomma hebraeum*, larva: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus III.

each lateral area, small and very few in central area. Cervical grooves long, extending the posterior margin of scutum, deep and converging anteriorly then almost straight and diverging. Eyes round, bulging, situated at a distance from scutal margin.

Capitulum (Fig. 28 b,c) length from palpal apices to posterior margin of basis 0.7; breadth 0.4. Basis capituli subtriangular, posterior margin straight, lateral margins broadly rounded, cornua absent; ventrally posterior margin convex. Punctations of basis capituli absent. Palpi length 0.39; breadth 0.09. Segment II 1.8 times longer than segment III, length of segment II 0.27; length of segment III 0.15. Palpi slightly wrinkled. Segment I ventrally with a sloping ridge ending posteriorly with a small, blunt spur. Hypostome length 0.38; length of toothed portion 0.25; apex rounded with a corona consisting of three rows of fine denticles; dental formula 2/2 with seven denticles per file.

Legs (Fig. 28 d-f) Coxa I with 2 spurs, the external spur longer, triangular, internal spur short, broadly rounded. Coxae II-III each with a single, triangular, broadly rounded spur; spur on coxa IV longer and more narrow. Trochanters lack spurs. Tarsus I length 0.43, width 0.16, without ventroapical hook. Tarsus IV length 0.4, breadth 0.1, without ventroapical hook.

Spiracular plate pyriform with broad, very short dorsal prolongation (Fig. 28g). Postanal groove

with shallow unpaired, median groove extending to the festoon.

**Larva** (Fig. 29). Measurements from 2 specimens. Length from apices of scapulae to posterior body margin 0.65, 0.66; breadth 0.59, 0.57. Dorsal body setae: 2 central dorsal pairs j5 0.016, 0.022; J2 0.028, 0.03; 8 marginal dorsal pairs s3 0.02, 0.024; s4 0.032, 0.028; s6 0.032, 0.036; S1 0.032, 0.034; S2 0.034, 0.036; S3 0.032, 0.036; S4 0.036, 0.032; S5 0.032, 0.034. Ventral body setae: 3 sternal pairs St1 0.03, 0.032; St2 0.03, 0.032; St3 0.03, 0.028; 2 preanal pairs Jv3 0.024, 0.022; Jv5 0.03, 0.028; 4 premarginal pairs Zv1 0.036, 0.038; Zv2 0.04, 0.042; Zv4 0.04; Zv5 0.04, 0.042; 5 marginal ventral pairs Sv1 0.03; Sv2 0.03, 0.036; Sv3 0.034; Sv4 0.034, 0.032; Sv5 0.036, 0.04; and 1 pair on anal valves.

Scutum (Fig. 29a) length 0.27, 0.28, breadth 0.42; inornate, yellow-brown. Posterior margin rounded, posterolateral margins straight, anterolateral margins almost straight. Scutal punctations small, dense. Cervical grooves almost straight, parallel, reaching the one third of the scutal length. Scutal setae 3 pairs: z2 0.02; s2 0.014; j3 0.016, 0.02. Eyes large, bulging, marginal.

Capitulum (Fig. 29 b,c) length from palpal apices to posterior margin of basis 0.2, 0.21, breadth 0.17. Basis capituli dorsally subtriangular, posterior margin straight, lateral margins triangular, narrowly



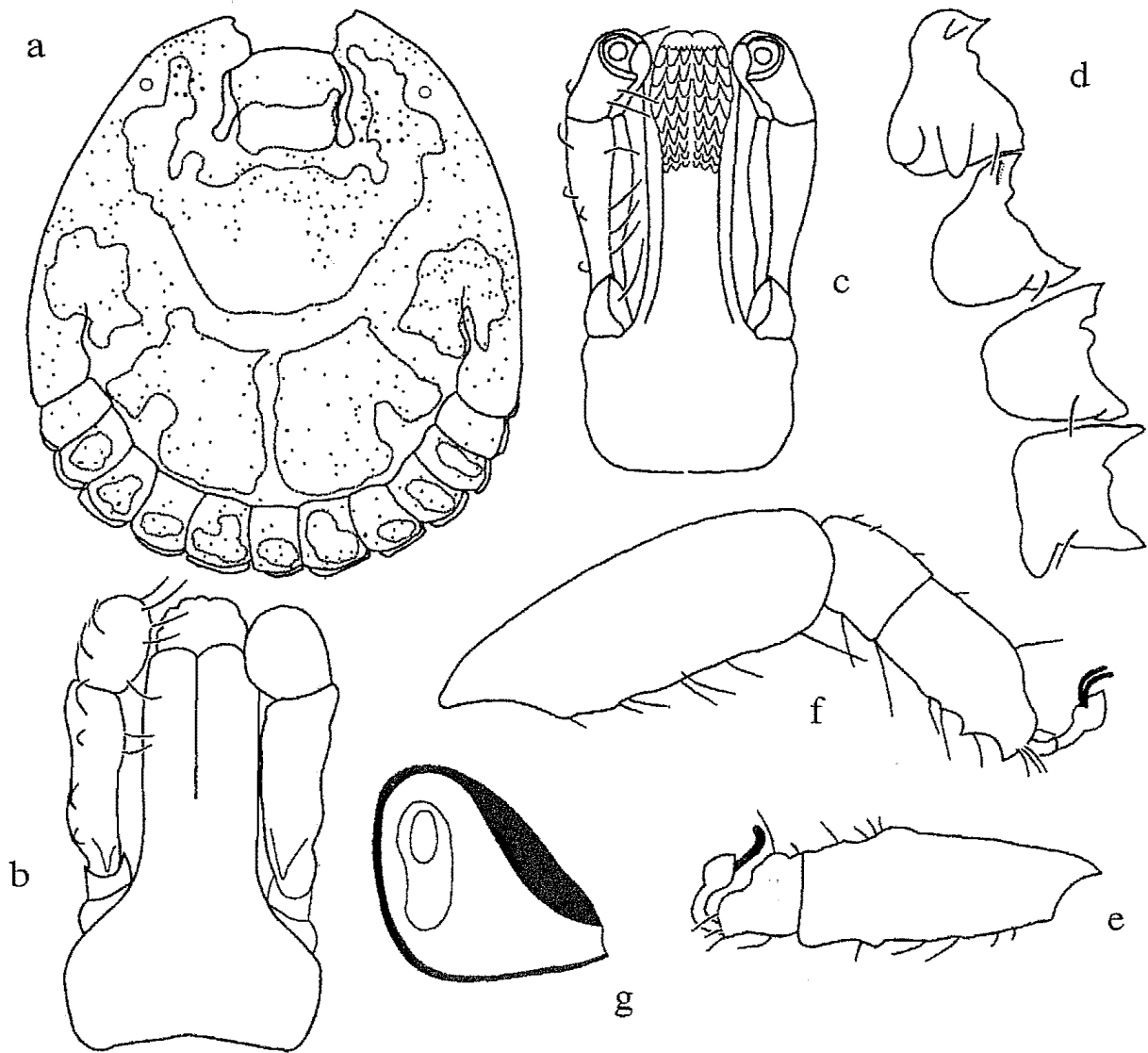


Fig. 30. *Amblyomma lepidum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

rounded, cornua absent. Ventrally posterior margin slightly convex. Palpi length 0.14, breadth 0.046, 0.044. Segment II 1.1 times longer than segment III, segment II 0.066 long, segment III 0.056, 0.06 long. Setae number: dorsally 3 (0.026–0.042); ventrally 2 (0.02–0.03) on II, dorsally 4 (0.034–0.04), ventrally 2 (0.014–0.022) on III, barbed on both or on its outer surface. No setae on segment I. Hypostome length 0.13, 0.12, length of toothed portion 0.09, 0.08; dental formula 2/2 with six denticles per file. Apex rounded, with a corona consisting of 2 rows of fine denticles, first row directed anteriorly.

Legs (Fig. 29 d–f). Coxa I with 2 triangular, broadly rounded spurs, the external spur longer and wider. Coxa II with a single, triangular, short, broad, rounded spur, spur on coxa III triangular and more narrow. Trochanters lack spurs. Tarsus I length 0.2, 0.21, breadth 0.06, 0.066, without hook. Tarsus III length 0.17, 0.18, breadth 0.06, without hook.

**Material:** 2 males and 2 females (US National Tick Collection, RML 45 988) ?, coll. G. Theiler; 2 nymphs and 2 larvae (US National Tick Collection, RML 110675) origin probably Pretoria (25.45 S, 28.10 E), Republic of South Africa, reared in Cambridge, England, received 20.07.1912 from C.P. Lounsbury.

***Amblyomma lepidum* Dönitz, 1909**

*Amblyomma lepidum* Dönitz, 1909: 460, fig 12, original description.

*Amblyomma hebraeum lepidum* Dönitz, 1909 (*sensu* Rondelli, 1926), junior synonym.

**Male** (Fig. 30). Measurements from 4 specimens. Length from apices of scapulae to posterior scutal margin 4.5 (4.3–4.8), breadth 3.5 (3.2–3.9). Outline oval broadest at level of legs IV. Scutum brown, ornate, metallic gold-crimson patches symmetrically distributed, differently in different speci-

mens. Punctations small, shallow, more numerous in each lateral area. Cervical grooves deep, short, converging. Marginal groove complete, beginning at level of legs III. Fестоons rectangular, with sclerotized plates extending posterior margin of the festoons. Eyes bulging, small, round, situated at a distance from scutal margin.

Capitulum (Fig. 30 b,c) length from palpal apices to cornua apices 1.76 (1.71–2.0), breadth 0.9 (0.86–1.04). Basis capituli slightly wrinkled, punctations small, shallow, few in number. Posterior margin concave, cornua short, rounded; external margins almost straight or slightly convex, ventrally posterior margin straight. Palpi length 1.23 (1.11–1.36), breadth 0.26 (0.21–0.33). Segment II 2.4 times longer than segment III, length of segment II 0.83 (0.79–0.91), length of segment III 0.34 (0.33–0.37). Palpi wrinkled. Segment I ventrally with a sharp ridge ending anteriorly and posteriorly as pointed spurs. Hypostome length 1.18 (1.1–1.3), length of toothed portion 0.57 (0.5–0.61); with a small corona of fine denticles apically, apex slightly notched, rounded or flat; dental formula 3/3.

Legs (Fig. 30 d–f). Coxa I with 2 spurs, the external spur large, straight, narrowly rounded, internal spur short, broadly rounded. Coxa I with an evident, spur-like callosity anteriorly. Coxae II–III each with a single, very short, broadly rounded, paddle-shaped spur. Coxa II with an ridge-like callosity anteriorly. Coxa IV with a single, long, triangular spur directed posteriorly. Trochanters lack spurs. Tarsus I length 1.1 (1.0–1.29), width 0.31 (0.3–0.33); without ventroapical hook but with one ventral, blunt hump. Tarsus IV length 0.88 (0.86–0.9), breadth 0.29 (0.27–0.3); with 1 strong ventroapical hook and 1 stout ventral hook. Tibia IV length 1.18 (1.1–1.2), breadth 0.41 (0.39–0.43). Leg segments with yellow annular wheels at distal ends, broader in legs IV.

Venter with numerous short, thin, straight setae. Genital aperture situated between coxae II–III. Medial and lateral margins of spiracular plate diverging, posterior and medial margins nearly straight, dorsal prolongation relatively broad and long, nearly perpendicular to anterior-posterior axis of spiracular plate (Fig. 30g). Postanal groove with a shallow, unpaired median groove extending to the festoon. Integumentary hard elements of the ventral skeleton of idiosoma consist of unpaired anal and 2 small, paired postanal shields, and large festoons' shields.

**Female** (Fig. 31). Measurements from 4 specimens. Length from apices of scapulae to posterior

body margin 5.0 (4.6–5.1), breadth 3.95 (3.7–4.3). Dorsal body setae numerous, short, thick, curved, stick-like. Ventral body setae short, very thin, almost straight. Marginal groove complete, beginning near the posterior margin of scutum. Fестоons rectangular.

Scutum (Fig. 31a) length 2.5 (2.3–2.6), breadth 2.5 (2.4–2.6); light-brown, ornate, very large, pale, crimson patch in the center of scutum. Punctations numerous, deep, both small and large. Scapulae very pointed. Cervical grooves deep, converging anteriorly then diverging as very shallow depressions. Eyes small, round, bulging, situated at a distance from scutal margin.

Capitulum (Fig. 31 b,c) length from palpal apices to posterior margin of basis 1.86 (1.7–1.97), breadth 0.94 (0.8–1.0); cornua very short, rounded; posterior margin concave, lateral margins slightly convex; ventrally posterior margin straight. Basis capituli slightly wrinkled. Porose areas oval, diameter of one area 0.145 (0.11–0.2), interporose area 0.19 (0.17–0.24). Palpi length 1.29 (1.21–1.36), breadth 0.27 (0.26–0.29). Segment II 2.1 times longer than segment III, length of segment II 0.83 (0.74–0.86), length of segment III 0.4 (0.39–0.4). Segment II dorsally with narrowly rounded projection, slightly wrinkled. Segment I ventrally with a sharp ridge ending posteriorly with a small, pointed spur; dorsally with a pointed spur directed anteriorly. Hypostome length 1.28 (1.26–1.3), length of toothed portion 0.62 (0.57–0.64); with a small corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3 in the anterior part and 4/4 in the posterior files.

Legs (Fig. 31 d–f). Coxa I with 2 spurs, the external spur large, relatively long and narrowly rounded, internal spur short and broad. Coxa I with an evident, sharp, spur-like callosity anteriorly. Coxae II–III each with a single, broadly rounded, very short, paddle-shaped spur. Coxa II with an evident, sloping, ridge-like callosity anteriorly. Coxa IV with a single, broad, triangular spur. Trochanters lack spurs. Tarsus I length 1.3 (1.21–1.36), width 0.36 (0.33–0.37); without ventroapical hook but with 2 ventral, small, blunt humps. Tarsus IV length 1.14 (1.11–1.21), breadth 0.26 (0.23–0.29); with 1 strong ventroapical hook and 1 pointed ventral hump. Tibia IV length 1.29 (1.14–1.43), breadth 0.38 (0.36–0.4). Leg segments with yellow annular wheels at distal ends, broader in legs IV.

Medial and lateral margins of spiracular plate almost parallel, medial and posterior margins

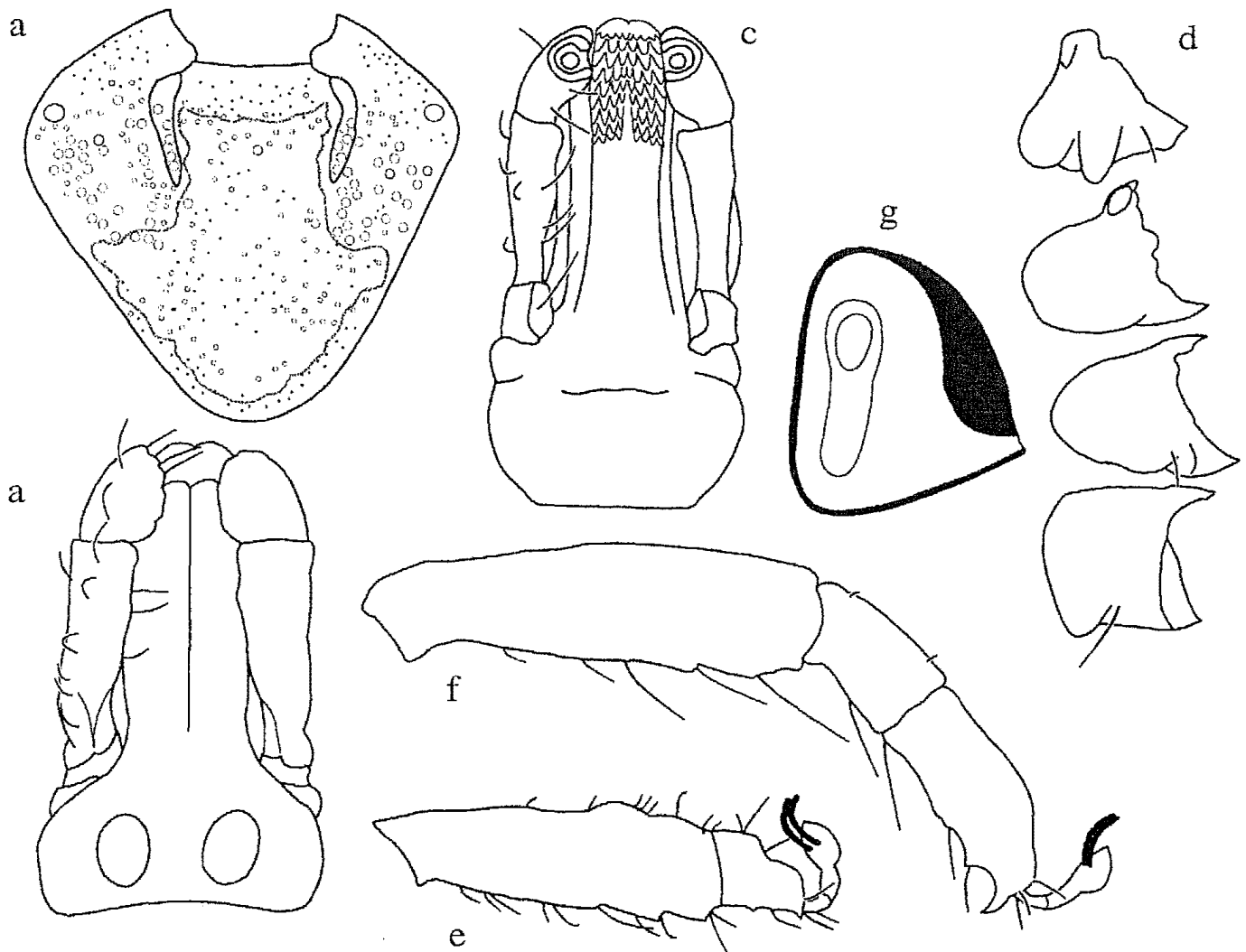


Fig. 31. *Amblyomma lepidum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

straight, dorsal prolongation triangular, forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 31g). Genital aperture “U” shaped, situated between coxae II–III. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Nymph** (Fig. 32). Measurements from 3 specimens (2 specimens slightly engorged). Length from apices of scapulae to posterior body margin 2.5 (2.0–3.0), breadth 2.0 (1.6–2.3). Dorsal body setae numerous, relatively long, curved, stick-like. Ventral body setae thin, short, curved. Marginal groove absent. Festoons evident.

Scutum (Fig. 32a) length 0.85 (0.8–0.9), breadth 0.92 (0.9–0.96). Yellow-brown, inornate. Posterior margin narrowly rounded, posterolateral margins slightly concave. Scapulae pointed. Surface shagreened with shallow, both small and large punctations, more numerous in each lateral area. Cervical grooves deep, converging anteriorly then diverging as shallow depressions. Eyes small, round, bulging.

Capitulum (Fig. 32 b,c) length from palpal apices to posterior margin of basis 0.53 (0.47–0.57), breadth 0.37 (0.36–0.39). Basis capituli rectangular, posterior margin concave, lateral margins bluntly rounded or straight, cornua absent; ventrally posterior margin convex. Basis capituli shagreened with very few, small punctations. Palpi length 0.39 (0.36–0.4), breadth 0.08 (0.07–0.09). Segment II 2.2–2.6 times longer than segment III, length of segment II 0.26 (0.24–0.29), length of segment III 0.1. Segment II dorsally with narrowly rounded projection, slightly wrinkled. Segment I ventrally with a sharp ridge. Hypostome length 0.41, length of toothed portion 0.2, 0.21; with a small corona of fine denticles apically, apex slightly notched, rounded; dental formula 2/2.

Legs (Fig. 32 d–f) Coxa I with 2 triangular, pointed spurs, the external large, internal spur broader. Coxae II–III each with a single, triangular spur. Coxae IV with a single, triangular, pointed spur. Trochanters lack spurs. Tarsus I length

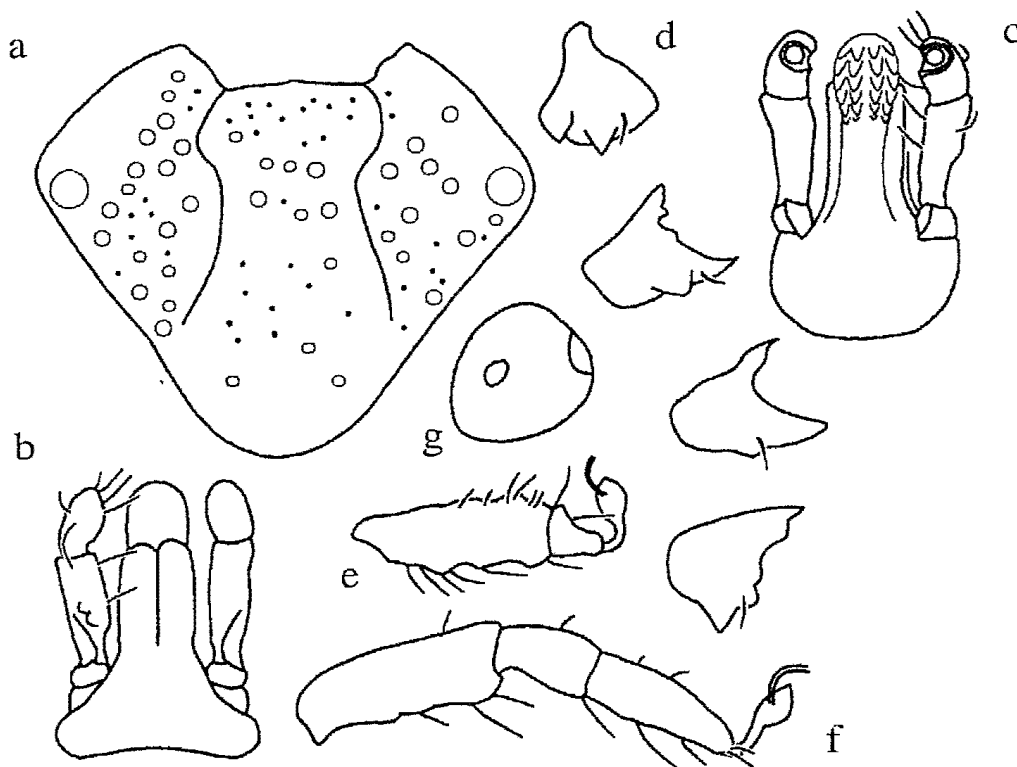


Fig. 32. *Amblyomma lepidum*, nymph: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

0.48 (0.46–0.5), width 0.12 (0.11–0.13), without ventroapical hook. Tarsus IV length 0.48 (0.46–0.5), breadth 0.12 (0.11–0.13), without ventroapical hook.

Spiracular plate oval, with very short, triangular dorsal prolongation (Fig. 32g). Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Larva** (Fig. 33). Length from apices of scapulae to posterior body margin 0.63, breadth 0.53. Dorsal body setae: 2 central dorsal pairs j5 0.033, J2 0.033; 8 marginal dorsal pairs s3 0.022, s4 0.028, s6 0.028, S1 0.039, S2 0.033, S3 0.028, S4 0.028, S5 0.028. Ventral body setae: 3 sternal pairs St1 0.066, St2 0.066, St3 0.066; 2 preanal pairs Jv3 0.028, Jv5 0.033; 4 premarginal pairs Zv1 0.05, Zv2 0.044, Zv4 0.044, Zv5 0.033; 5 marginal ventral pairs Sv1 0.033, Sv2 0.033, Sv3 0.033, Sv4 0.033, Sv5 0.033; and 1 pair on anal valves 0.014.

Scutum (Fig. 33a) length 0.54, breadth 0.67; inornate, yellow-brown. Posterior margin convex, posterolateral margins slightly concave. Scutum wrinkled, punctations very small. Cervical grooves invisible. Scutal setae: 3 pairs z2 0.028, s2 0.028, j3 0.028. Eyes large, bulging.

Capitulum (Fig. 33 b,c) length from palpal apices to posterior margin of basis 0.11, breadth 0.11. Basis capituli dorsally nearly triangular, posterior margin straight, lateral margins concave with very pointed, triangular prolongations, cor-

nua absent. Ventrally posterior margin undulating. Palpi length 0.24, breadth 0.07. Segment II 1.1 times longer than segment III, segment II 0.11 long; segment III 0.10 long. Setae number: dorsally 3 (0.066, 0.094, 0.083 long), ventrally 2 (0.066, 0.039 long) on II, dorsally 4 (0.055, 0.083, 0.066, 0.088 long), ventrally 2 (0.061, 0.044 long) on III, all barbed. No setae on segment I. Hypostome length 0.209, length of toothed portion 0.15; dental formula 2/2. Apex flat, with a corona consisting of 2 rows of fine denticles.

Legs (Fig. 33 d,e). Coxa I with a single, large, broadly rounded, triangular spur. Coxa II with a single, very short, rounded spur. Coxa III with a single, short, narrow, triangular spur. Trochanters lack spurs. Tarsus I 0.34 long, 0.099 broad, without hook. Tarsal setae 0.06–0.11 long. Tarsus III length 0.336, breadth 0.077, without hook.

**Material:** 4 males, 4 females (ZMMU Tdi 463, from Hoogstraal's collection HH 36 566) Ethiopia, Aug. 1971; 3 nymphs (US National Tick Collection RML 92589) Ethiopia, Tigre, Shire Lowlands, 28.04–12.06.1971, from cattle, coll. C.G. Grimshaw; larva (US National Tick Collection RML 88677) Sudan Kassala, Telaweit, ex *Turtur abyssinica*, 23.02.1967, coll. Kaiser.

#### *Amblyomma loculosum* Neumann, 1907

*Amblyomma loculosum* Neumann, 1907, 193, original description.

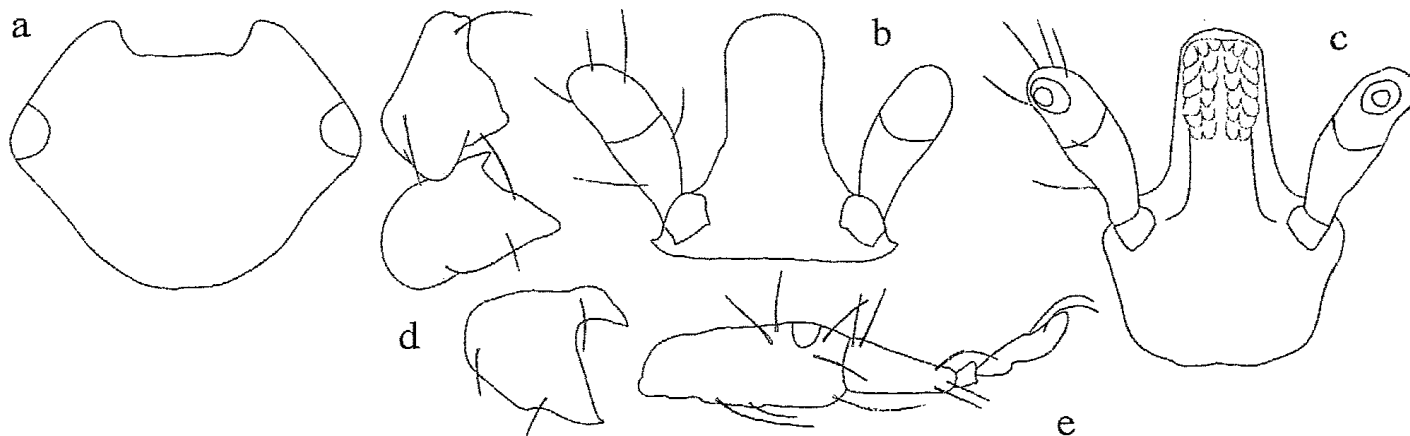


Fig. 33. *Amblyomma lepidum*, larva: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I.

*Amblyomma sternae* Roberts, 1953: 155, figs. 13–14, junior synonym.

**Male** (Fig. 34). Length from apices of scapulae to posterior scutal margin 4.9; breadth 4.2. Outline oval broadest at level of spiracular plates. Scutum ornate, a large metallic bronzed-crimson symmetrical patch covers almost the all scutum. Punctations small, deep, dense and distributed mainly on metallic patch. Scapulae short, triangular. Cervical grooves deep, short, converging. Marginal groove complete beginning at level of legs II. Festoons rectangular, without sclerotized plates extending posterior margin of the festoons. Eyes small, slightly bulging.

Capitulum (Fig. 34 b,c) length from palpal apices to cornua apices 1.4; breadth 0.8; punctations of basis capituli small and relatively large, deep, sparse; surface slightly wrinkled; posterior margin straight, lateral margins straight, cornua short, broadly rounded; ventrally posterior margin straight. Palpi length 0.9; breadth 0.3, slightly wrinkled. Segment II 2.5 times longer than segment III, length of segment II 0.57; length of segment III 0.23. Segment I ventrally with a sloping ridge ending posteriorly with a small, blunt spur. Hypostome length 0.86; length of toothed portion 0.47; with a large corona of fine denticles apically, apex narrowing and notched, dental formula 3/3.

Legs (Fig. 34 d–f). Coxa I with 2 spurs, the external spur very long, with parallel margins, narrowly rounded, reaching the anterior margin of coxa II, internal spur broadly rounded. Coxa I with a triangular, spur-like callosity anteriorly. Coxae II–III each with a single, broadly rounded, paddle-shaped spur. Coxa IV with a single, long, narrowly rounded spur directed medially. Tro-

chanters lack spurs. Tarsus I length 0.8; width 0.3; without ventroapical hook. Tarsus IV length 0.8; breadth 0.24; with 1 strong ventroapical hook and 1 triangular, pointed ventral hook. Tibia IV length 1.0; breadth 0.36.

Venter with short, thin, slightly curved setae. Genital aperture situated between coxae II. Medial and lateral margins of spiracular plate parallel, posterior margin convex, dorsal prolongation long, broad, perpendicular to the anterior-posterior axis (Fig. 34g). Postanal groove with a thin, unpaired, posteriorly directed, median groove extending to the unpaired anal shield. Integumentary hard elements of the ventral skeleton of idiosoma consist of unpaired anal and 2 paired postanal shields, and large festoons' shields.

**Female** (Fig. 35). Measurements from 2 specimens. Length from apices of scapulae to posterior body margin 5.3; 5.0; breadth 4.4; 4.8. Dorsal body relatively long, thick, stick- or cone-like, numerous. Ventral body setae cone-like, shorter and less numerous than dorsal. Marginal groove complete, beginning near the posterior margin of scutum. Festoons evident.

Scutum (Fig. 35a) length 2.9; 2.5; breadth 2.9; 2.7; ornate, gold-crimson metallic patch covers the all scutum except the cervical grooves. Posterior margin broadly rounded, posterolateral margins slightly convex. Scutal punctations dense, distributed regularly, deeper and larger in each lateral area. Cervical grooves very deep, converging anteriorly and more shallow, diverging posteriorly. Eyes flat, relatively large, marginal.

Capitulum (Fig. 35 b,c) length from palpal apices to posterior margin of basis 1.7; 1.4; breadth 0.96; 0.89; cornua very short, broadly rounded; posterior margin straight, lateral margins straight;

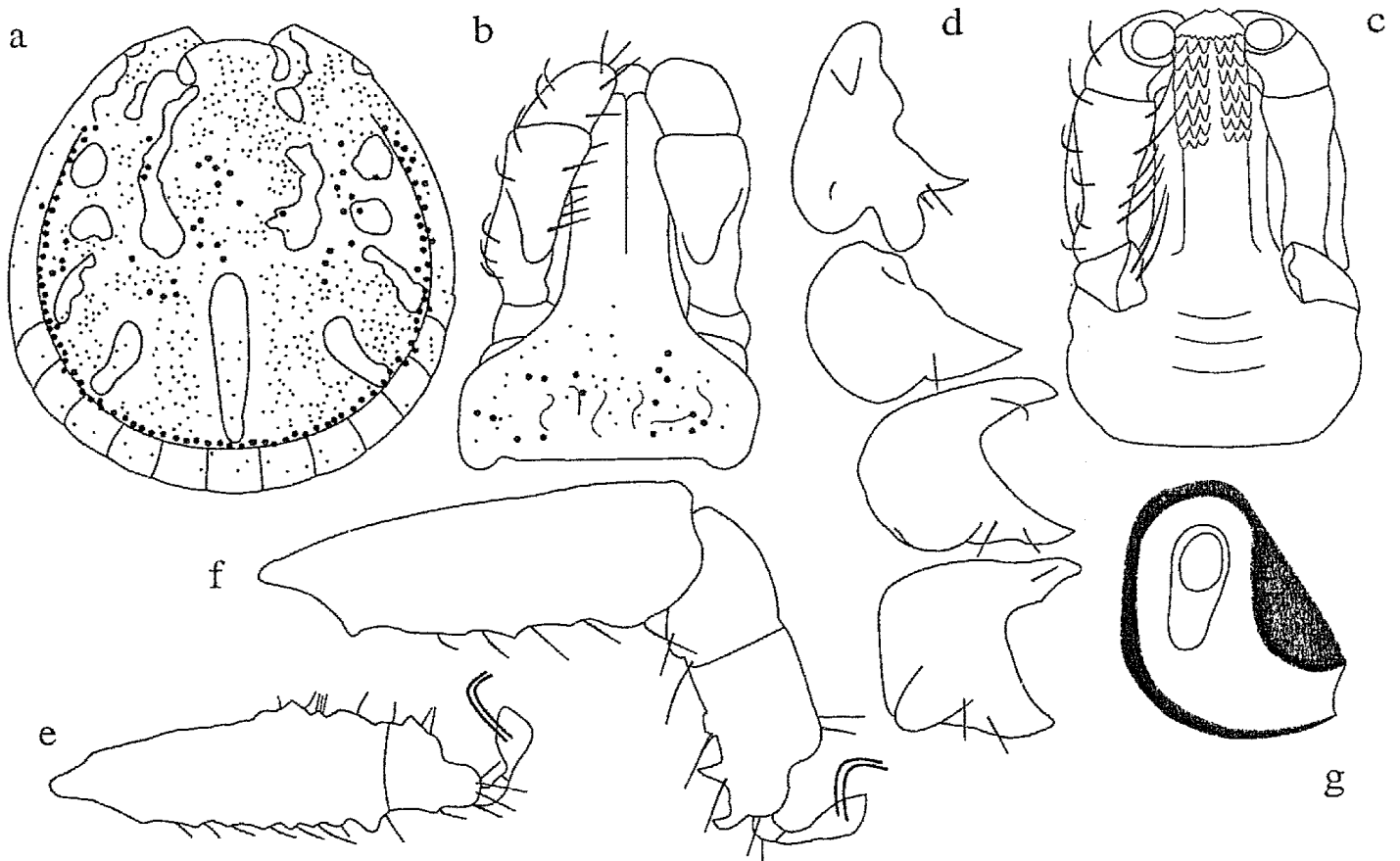


Fig. 34. *Amblyomma loculosum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

ventrally posterior margin straight. Basis capituli slightly wrinkled, punctations few, small, shallow. Porose areas narrow, oval, deeply depressed, diameter of one area 0.13; 0.11, interporose area 0.17. Palpi length 1.1, 0.99; breadth 0.31, 0.29. Segment II 2.1, 2.6 times longer than segment III, length of segment II 0.6, 0.63; length of segment III 0.29, 0.24. Segment I ventrally with a sloping ridge ending anteriorly and posteriorly with small, pointed spurs. Palpi wrinkled. Hypostome length 1.0, 0.9; length of toothed portion 0.6, 0.5; with a large corona of fine denticles apically, apex rounded; dental formula 3/3.

Legs (Fig. 35 d–f). Coxa I with 2 rounded spurs equal in length, the internal spur broader. Coxa I with an evident spur-like callosity anteriorly. Coxae II–III each with a single, broadly rounded, short, triangular spur. Coxa IV with a single, triangular, narrowly rounded spur. Trochanters lack spurs. Tarsus I length 1.1, 1.0; width 0.31, 0.27; with small, sharp ventroapical hook. Tarsus IV length 0.9, 0.8, breadth 0.26, 0.23, with 1 strong ventroapical hook and 1 large, sharp ventral hump. Tibia IV length 0.97, 0.94, breadth 0.36, 0.3.

Medial and lateral margins of spiracular plate parallel, medial margin slightly concave, posterior margin concave, dorsal prolongation long, narrow,

forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 35g). Genital aperture “U” shaped, situated between coxae II–III. Postanal groove with thin, unpaired, posteriorly directed, median groove extending to the festoon.

**Nymph** (Fig. 36). Measurements from 2 specimens. Length from apices of scapulae to posterior body margin 1.6, 1.5, breadth 1.3. Dorsal body setae relatively long, dense, stick-like, slightly curved. Ventral body setae shorter, needle-shaped, slightly curved. Marginal groove absent. Festoons evident, rectangular.

Scutum (Fig. 36a) length 0.7, breadth 0.97, 0.9. Yellow-brown, darker in each lateral area, inornate. Posterior margin rounded, posterolateral margins slightly concave. Scapulae blunt. Surface with lengthwise wrinkles and large, deep, very few punctations. Cervical grooves deep, straight, reaching the one third of the scutal length. Eyes bulging, large, marginal.

Capitulum (Fig. 36 b,c) length from palpal apices to posterior margin of basis 0.4, breadth 0.3. Basis capituli subtriangular, posterior margin straight, lateral margins narrowly rounded, cornua absent; ventrally posterior margin slightly convex. Palpi length 0.3, breadth 0.075. Segment II 1.4 times longer than segment III, length

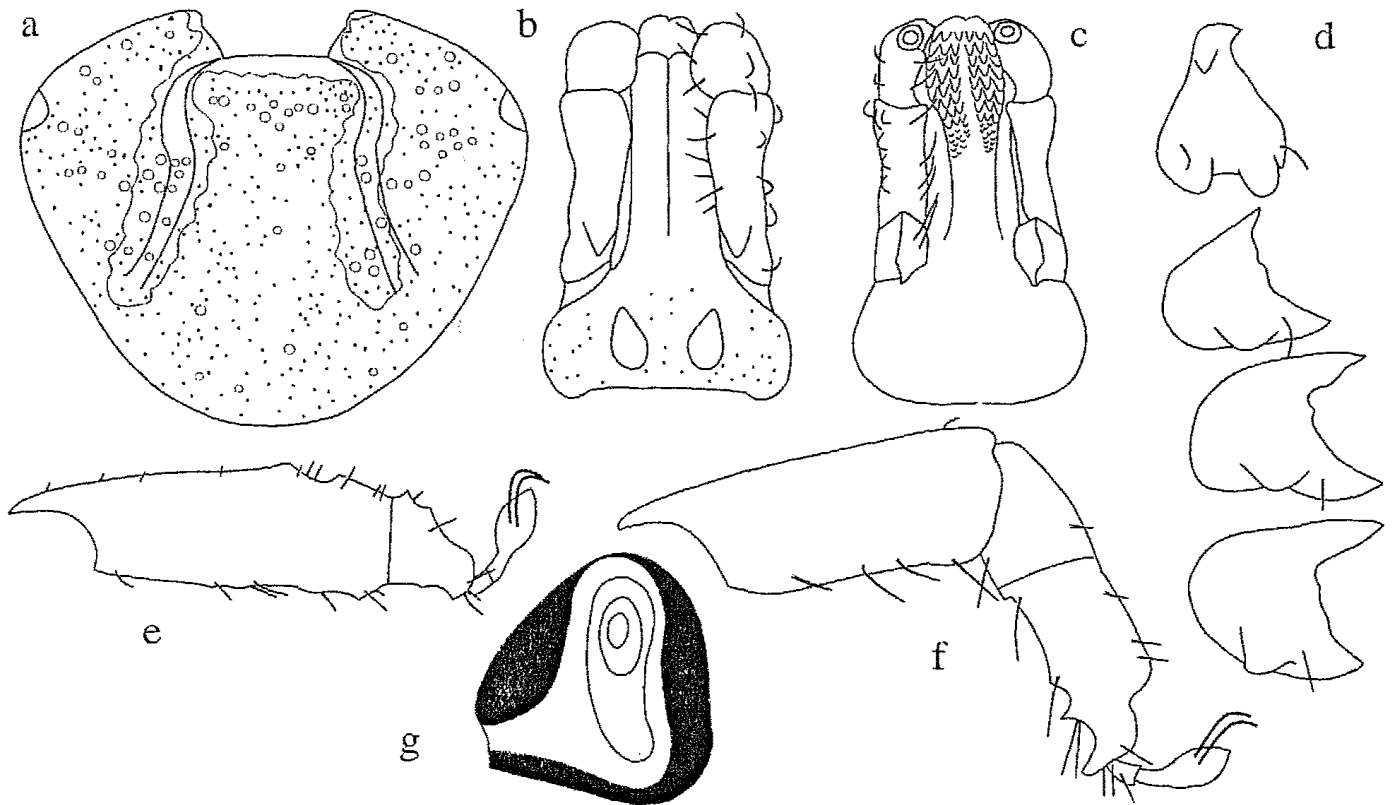


Fig. 35. *Amblyomma loculosum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

of segment II 0.17, 0.15, length of segment III 0.12, 0.11. Palpi slightly wrinkled. Segment I ventrally with a sloping ridge. Hypostome length 0.25, 0.27, length of toothed portion 0.18, with a corona consisting of 2 rows of fine denticles, apex rounded; dental formula 2/2 with 6 denticles per file.

Legs (Fig. 36 d–f). Coxa I with 2 triangular spurs, the external spur larger, pointed. Coxae II–III each with a single, short, triangular, pointed spur. Coxa IV with a single, triangular, slightly longer and more narrow spur. Trochanters lack spurs. Tarsus I length 0.34, width 0.09, 0.1, without ventroapical hook. Tarsus IV length 0.28, 0.3, breadth 0.08, without ventroapical hook.

Spiracular plate pyriform with very broad dorsal prolongation (Fig. 36g). Postanal groove without unpaired, median groove.

**Larva** (Fig. 37). Measurements from 2 specimens. Length from apices of scapulae to posterior body margin 0.6, 0.63; breadth 0.57. Dorsal body setae: 2 central dorsal pairs j5 0.012; J2 0.016, 0.014; 8 marginal dorsal pairs s3 0.01, 0.012; s4 0.016, 0.014; s6 0.012, 0.014; S1 0.022; S2 0.024; S3 0.026, 0.022; S4 0.024, 0.022; S5 0.024. Ventral body setae: 3 sternal pairs St1 0.012; St2 0.016, 0.014; St3 0.02, 0.018; 2 preanal pairs Jv3 0.018; Jv5 0.016, 0.014; 4 premarginal pairs Zv1 0.02, 0.022; Zv2 0.02, 0.026; Zv4 0.016, 0.024; Zv5

0.026, 0.03; 5 marginal ventral pairs Sv1 0.02, 0.014; Sv2 0.02, 0.022; Sv3 0.022, 0.026; Sv4 0.024, 0.026; Sv5 0.022; and 1 pair on anal valves.

Scutum (Fig. 37a) length 0.27, 0.26, breadth 0.4; inornate, yellow-brown. Posterior margin narrowly rounded, posterolateral margins slightly concave, anterolateral margins slightly convex. Scutal punctations small, dense, surface reticulated. Cervical grooves deep, straight, parallel, reaching the half of the scutum length. Scutal setae 3 pairs: z2 0.01, 0.008; s2 0.008; j3 0.012, 0.01. Eyes bulging, marginal.

Capitulum (Fig. 37 b,c) length from palpal apices to posterior margin of basis 0.17, 0.18, breadth 0.15. Basis capituli dorsally subtriangular, posterior margin straight, lateral margins triangular, narrowly rounded, cornua absent. Ventrally posterior margin straight. Palpi length 0.13, 0.14, breadth 0.04. Segment II 1.4, 1.2 times longer than segment III, segment II 0.07, 0.06 long, segment III 0.05, 0.056 long. Setae number: dorsally 4 (0.01–0.04); ventrally 2 (0.018–0.028) on II, dorsally 3 (0.024–0.032), ventrally 2 (0.012–0.014) on III, barbed on its outer surface or split. No setae on segment I. Hypostome length 0.11, length of toothed portion 0.07, 0.072; dental formula 2/2 with six denticles per file. Apex rounded, with a corona consisting of 2 rows of fine denticles, first row directed anteriorly.

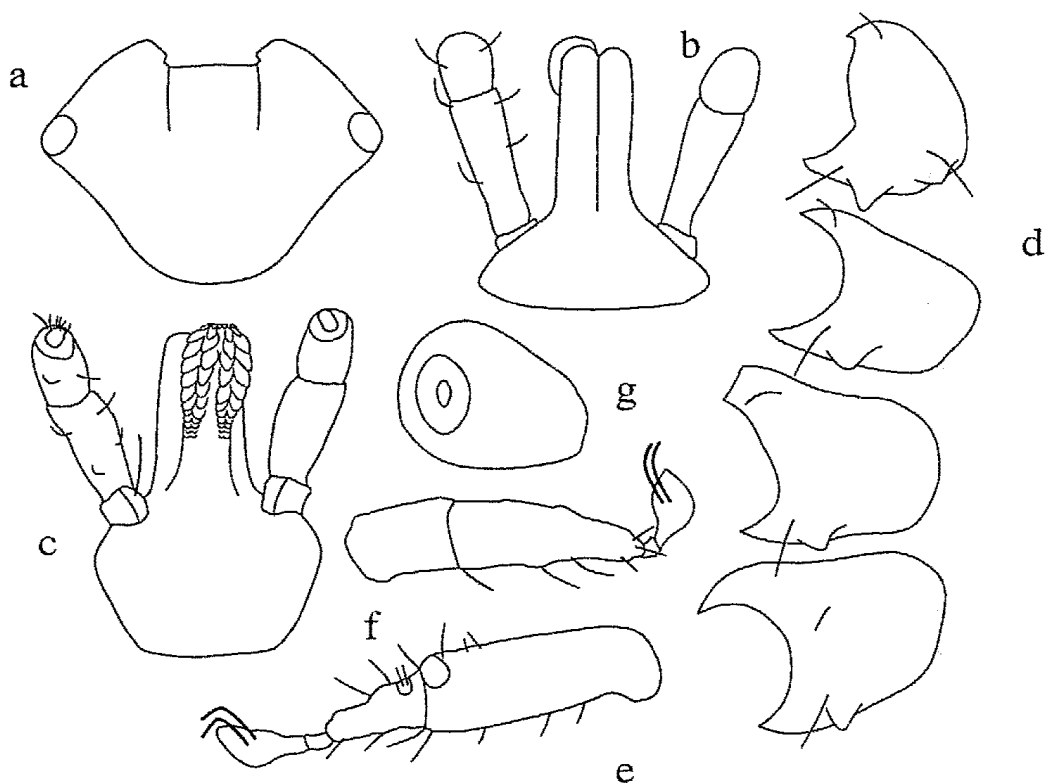


Fig. 36. *Amblyomma loculosum*, nymph: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus IV; g — spiracular plate.

Legs (Fig. 37 d–f). Coxa I with a single, short, triangular, pointed spur. Coxae II–III each with a single, triangular, short spur; spur on coxa I the longest. Trochanters lack spurs. Tarsus I length 0.19, 0.17, breadth 0.06, 0.05, without hook. Tarsus III length 0.15, 0.14, breadth 0.046, 0.044, without hook.

**Material:** 2 males, 2 females, 2 nymphs, and 2 larvae (US National Tick Collection, RML 65374) Seychelles: North Island, African Banks (Amirantes Group), 6.07.1974 and 1.08.1974, from litter under coconut trees, coll. J.C. Feare and F.C. Feare; sent by Dr. H. Hoogstraal.

#### *Amblyomma marmoreum* Koch, 1844

*Amblyomma marmoreum* Koch, 1844: 224, original description.

*Amblyomma hassalli* Neumann, 1899: 271, junior synonym (*pro parte*).

*Amblyomma rugosum* Neumann, 1899: 253, fig. 55, junior synonym (*pro parte*).

*Amblyomma serpentinum* Schulze, 1936: 622, fig. 3a–b, junior synonym.

**Male** (Fig. 38). Measurements from 6 specimens. Length from apices of scapulae to posterior scutal margin 7.5 (6.7–8.15), breadth 6.1 (5.4–6.65). Outline oval broadest at level of first festoon. Scutum brown, ornate, small metallic gold-crimson with greenish borders patches in each scapular and lateral areas. Punctations deep, large in the

anterior part of the scutum and shallow, small in the posterior part. Cervical grooves deep, short, converging. Marginal groove complete, beginning at level of legs II. Festoons rectangular, without sclerotized plates extending posterior margin of the festoons. Eyes slightly bulging.

Capitulum (Fig. 38 b,c) length from palpal apices to cornua apices 2.2 (2.1–2.4), breadth 1.33 (1.2–1.5). Punctations of basis capituli shallow, small, few in number. Posterior margin straight or concave, cornua very short, narrowly rounded; external margins slightly convex, ventrally posterior margin straight. Palpi length 1.63 (1.5–1.7), breadth 0.39 (0.33–0.43). Segment II 2.1–2.5 times longer than segment III, length of segment II 1.02 (0.93–1.1), length of segment III 0.43 (0.4–0.47). Segment II dorsally with narrowly rounded projection, slightly wrinkled. Segment I ventrally with a sloping, interrupted ridge ending posteriorly and anteriorly as small, pointed spurs. Hypostome length 1.3 (1.2–1.4), length of toothed portion 0.68 (0.64–0.71); with a large corona of fine denticles apically, apex slightly notched, each half of the apex nipple-shaped; dental formula 3/3 anteriorly and 4/4 posteriorly.

Legs (Fig. 38 d–f). Coxa I with 2 spurs, the external spur slightly larger, both broadly rounded. Coxa I with an evident, spur-like callosity anteriorly. Coxae II–III each with a single, short, broadly



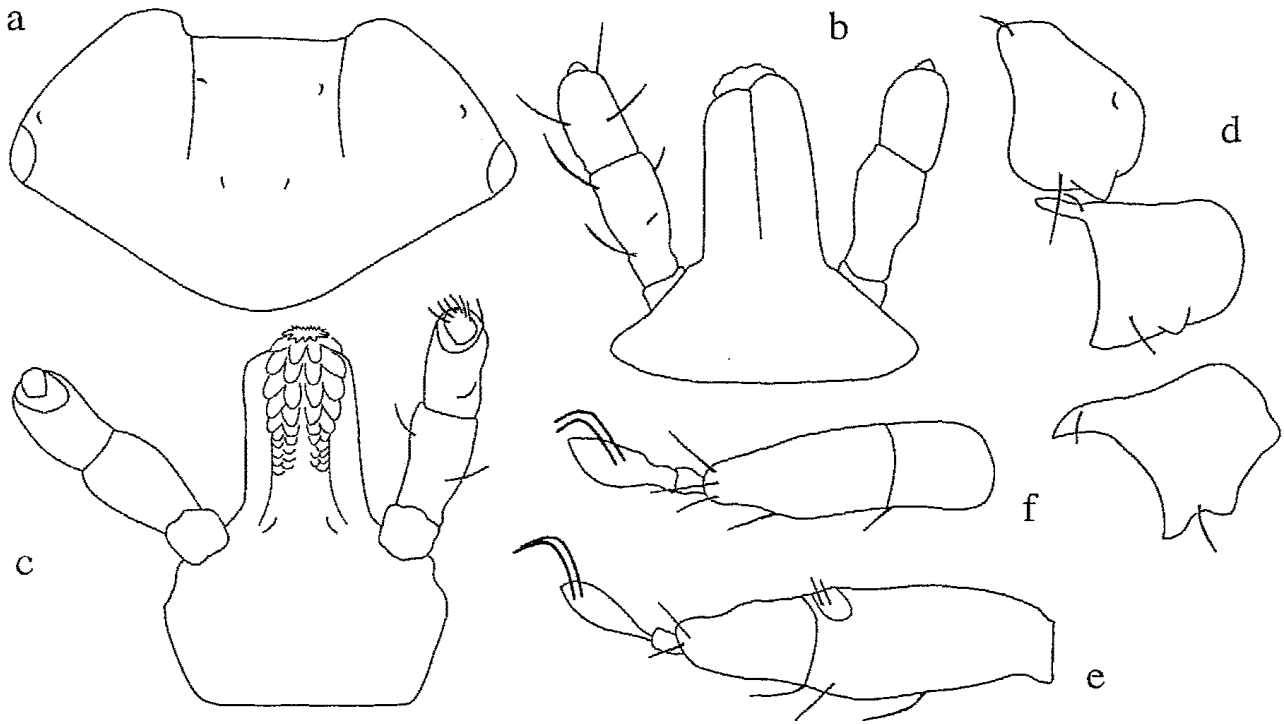


Fig. 37. *Amblyomma loculosum*, larva: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus III.

rounded, paddle-shaped spur. Coxa II with a roller-like callosity anteriorly. Coxa IV with a single, large, triangular spur directed posteriorly. Trochanters lack spurs. Tarsus I length 1.4 (1.3–1.5), width 0.47 (0.4–0.56); with small, blunt, ventroapical hump and with 1 ventral, large, blunt hump; dorsally with 3 triangular humps. Tarsus IV length 1.0 (0.93–1.1), breadth 0.42 (0.33–0.49); with 1 strong, very pointed ventroapical hook and 1 strong, pointed ventral hook. Tibia IV length 1.7 (1.3–2.0), breadth 0.67 (0.57–0.74).

Venter with short, relatively thick, cone-like, curved setae. Genital aperture situated between coxae II–III. Medial and lateral margins of spiracular plate slightly diverging, medial margin straight, posterior margin slightly concave, dorsal prolongation narrow and long, perpendicular to anterior-posterior axis of spiracular plate (Fig. 38g). Postanal groove without unpaired median groove. Integumentary hard elements of the ventral skeleton of idiosoma consist of narrow unpaired anal and 2 paired, small, oval postanal shields, and large festoons' shields.

**Female** (Fig. 39). Measurements from 7 specimens (5 specimens semi-engorged). Length from apices of scapulae to posterior body margin 10.2 (7.0–11.8), breadth 7.4 (5.2–9.2). Dorsal body setae very short, slightly curved, stick-like. Ventral body setae slightly longer, curved, cone-like. Marginal groove complete, beginning near the pos-

terior margin of scutum. Festoons evident, rectangular.

Scutum (Fig. 39a) length 3.3 (2.9–3.5), breadth 3.8 (3.6–4.1); wrinkled, dark-brown, ornate, two, large, metallic, red-brown patches in each lateral area. Punctations both large, very deep and small, shallow, more numerous in each lateral area. Scapulae each with pointed, triangular hump directed anteriorly. Cervical grooves long, very deep, converging anteriorly, then diverging and straight. Eyes large, slightly bulging.

Capitulum (Fig. 39 b,c) length from palpal apices to cornua apices 2.04 (1.9–2.1), breadth 1.3 (1.29–1.43); cornua short, rounded; posterior margin concave or undulating, lateral margins convex; ventrally posterior margin straight. Punctations of basis capituli few, small and shallow. Porose areas oval, deeply depressed, diameter of one area 0.29 (0.26–0.31), interporose area 0.22 (0.14–0.29). Palpi length 1.5 (1.3–1.67), breadth 0.43 (0.37–0.54), wrinkled. Segment II 2.2–4.2 times longer than segment III, length of segment II 0.98 (0.86–1.07), length of segment III 0.4 (0.33–0.43). Segment I ventrally with a sloping or sharp ridge ending posteriorly with a relatively long, pointed spur and anteriorly with a smaller spur. Hypostome length 1.35 (1.21–1.47), length of toothed portion 0.71 (0.69–0.74); with a large corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3 in the anterior part and 4/4 in the posterior files.

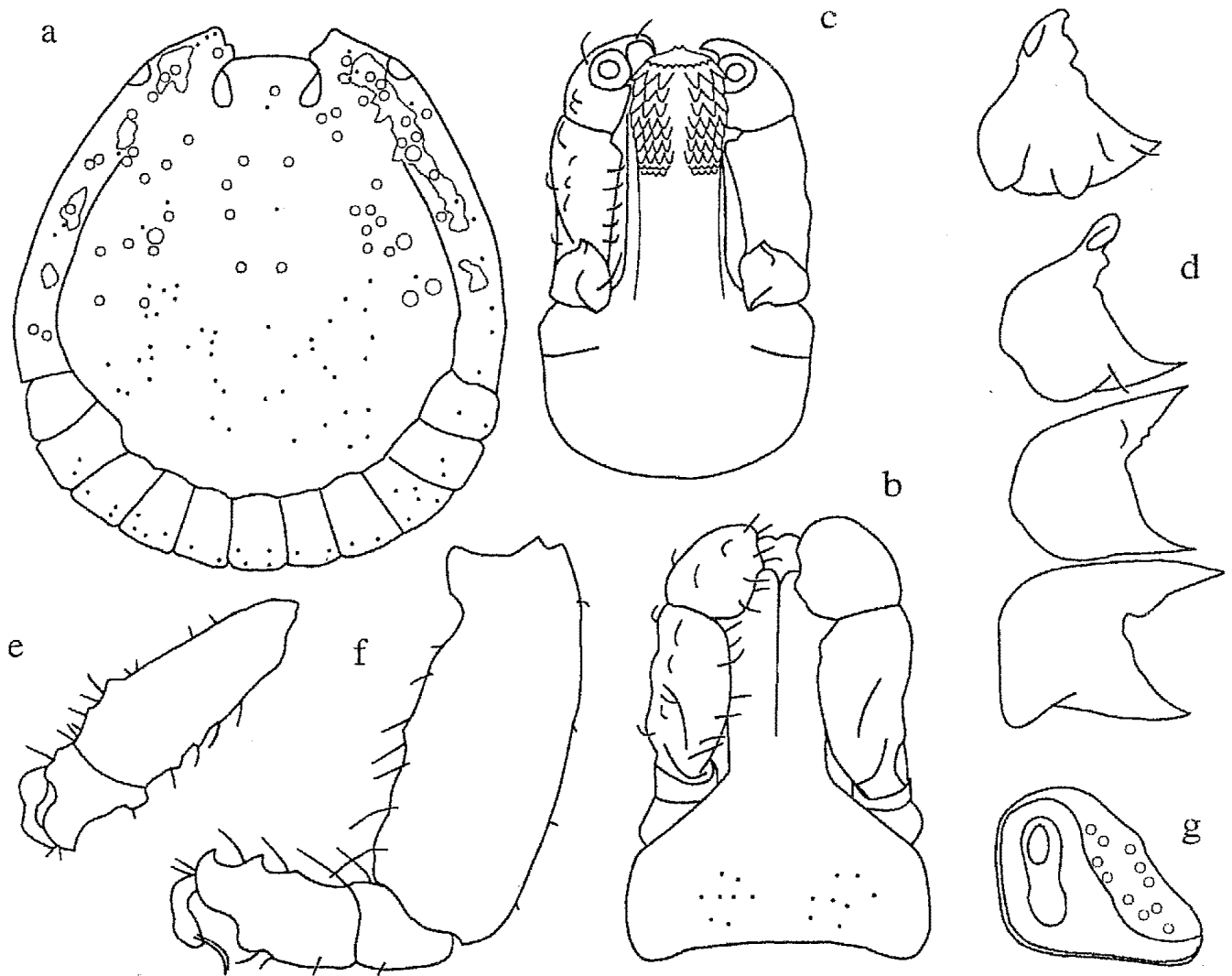


Fig. 38. *Amblyomma marmoreum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

Legs (Fig. 39 d–f). Coxa I with 2 equal, rounded spurs, the internal spur broader. Coxa I with an evident, spur-like callosity anteriorly. Coxae II–III each with a single, short, broadly rounded, paddle-shaped spur. Coxa IV with a single, broadly rounded, triangular spur, directed posteromedially. Trochanters lack spurs. Tarsus I length 1.59 (1.47–1.69), width 0.49 (0.43–0.57); without ventroapical hump and with 2 ventral, triangular, blunt humps. Tarsus IV length 1.3 (1.21–1.4), breadth 0.35 (0.29–0.37); with 1 blunt ventroapical hook and 2 blunt ventral humps. Tibia IV length 1.7 (1.5–1.87), breadth 0.52 (0.5–0.54). Leg segments with narrow, dim, yellow annular wheels at distal ends.

Medial and lateral margins of spiracular plate parallel or slightly converging, medial margin concave, posterior margin straight, dorsal prolongation long and narrow, perpendicular to anterior-posterior axis of spiracular plate (Fig. 39g). Genital aperture “U” shaped, situated between coxae II–III. Postanal groove with unpaired,

posteriorly directed, median groove extending to the festoon.

**Nymph** (Fig. 40). Measurements from 5 specimens. Length from apices of scapulae to posterior body margin 2.6 (2.46–2.79), breadth 2.19 (2.0–2.37). Dorsal body setae few, very short, thin, curved. Ventral body setae few, relatively long, thin, curved. Marginal groove absent. Festoons evident.

Scutum (Fig. 40a) length 1.03 (1.0–1.07), breadth 1.24 (1.14–1.34). Yellow-brown, inornate. Posterior margin narrowly rounded, posterolateral margins straight. Scapulae pointed. Scutal punctations deep, more numerous and larger in each lateral area. Cervical grooves relatively long, converging and deep anteriorly, and almost straight posteriorly. Eyes large, slightly bulging.

Capitulum (Fig. 40 b,c) length from palpal apices to posterior margin of basis 0.55 (0.5–0.59), breadth 0.42 (0.4–0.44). Basis capituli trapezoid in shape, posterior margin straight, lateral margins bluntly rounded, cornua absent; ventrally posterior

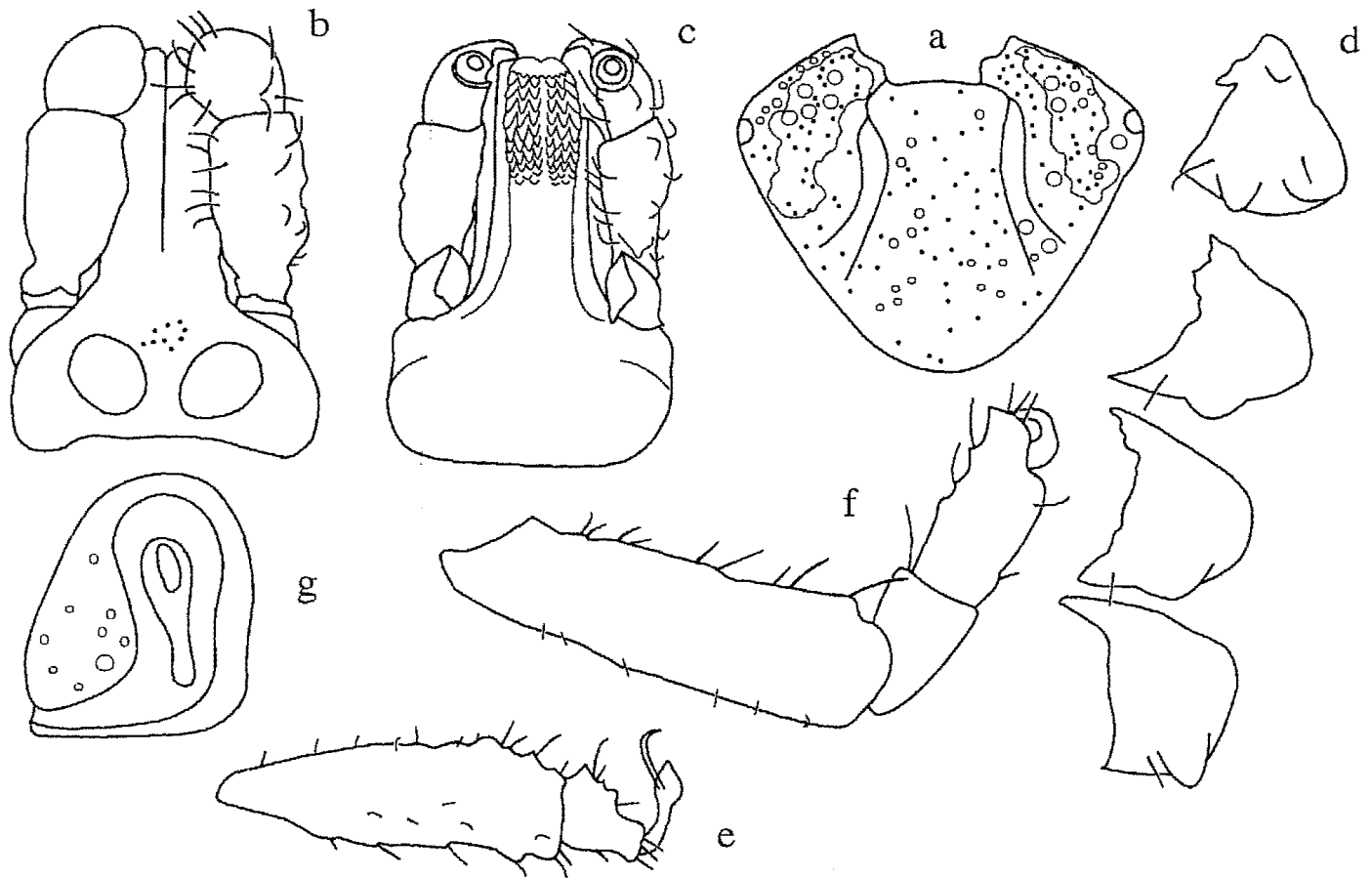


Fig. 39. *Amblyomma marmoreum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

margin convex. Punctations of basis capituli absent. Palpi length 0.43 (0.4–0.44), breadth 0.11 (0.1–0.13). Segment II 1.5–2.5 times longer than segment III, length of segment II 0.24 (0.21–0.26), length of segment III 0.13 (0.1–0.17). Palpi smooth. Segment I ventrally with a sharp ridge ending anteriorly and posteriorly with small, pointed spurs. Hypostome length 0.36 (0.38–0.4), length of toothed portion 0.21 (0.2–0.23); with a small corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3 in the 3 anterior files and 2/2 in 5–6 posterior files.

Legs (Fig. 40 d–f). Coxa I with 2 triangular, rounded spurs, the external spur longer but more narrow. Coxae II–IV with a single, short, triangular spur. Trochanters lack spurs. Tarsus I length 0.48 (0.44–0.5), width 0.16 (0.16–0.17); without ventroapical hook. Tarsus IV length 0.45 (0.41–0.5), breadth 0.136 (0.13–0.14); without ventroapical hook.

Medial and lateral margins of spiracular plate parallel, medial margin slightly convex, posterior margin straight, dorsal prolongation long and narrow, forming an obtuse angle with anterior-posterior axis of spiracular plate (Fig. 40g). Postanal groove with shallow, unpaired, median groove extending to the festoon.

**Larva** (Fig. 41). Measurements from 10 specimens. Length from apices of scapulae to posterior body margin 0.87 (0.86–0.88), breadth 0.65 (0.63–0.67). Dorsal body setae: 2 central dorsal pairs j5 0.01–0.012, J2 0.014–0.016; 8 marginal dorsal pairs s3 0.012–0.016, s4 0.014–0.018, s6 0.016–0.02, S1 0.02–0.022, S2 0.022–0.024, S3 0.024, S4 0.022–0.026, S5 0.024. Ventral body setae: 3 sternal pairs St1 0.012–0.014, St2 0.014–0.018, St3 0.014–0.018; 2 preanal pairs Jv3 0.014, Jv5 0.014–0.018; 4 premarginal pairs Zv1 0.014–0.016, Zv2 0.016–0.018, Zv4 0.018–0.02, Zv5 0.02; 5 marginal ventral pairs Sv1 0.02–0.026, Sv2 0.02–0.026, Sv3 0.022–0.028, Sv4 0.024–0.026, Sv5 0.022–0.028; and 1 pair on anal valves.

Scutum (Fig. 41a) length 0.28 (0.27–0.29), breadth 0.45 (0.44–0.46); inornate, yellow-brown. Posterior margin slightly concave, posterolateral margins straight, anterolateral margins almost straight. Scutal punctations small, numerous. Cervical grooves long, almost straight, slightly diverging. Scutal setae 3 pairs: z2 0.01, s2 0.01, j3 0.01. Eyes bulging.

Capitulum (Fig. 41 b,c) length from palpal apices to posterior margin of basis 0.18 (0.16–0.19), breadth 0.16 (0.16–0.17). Basis capituli dor-

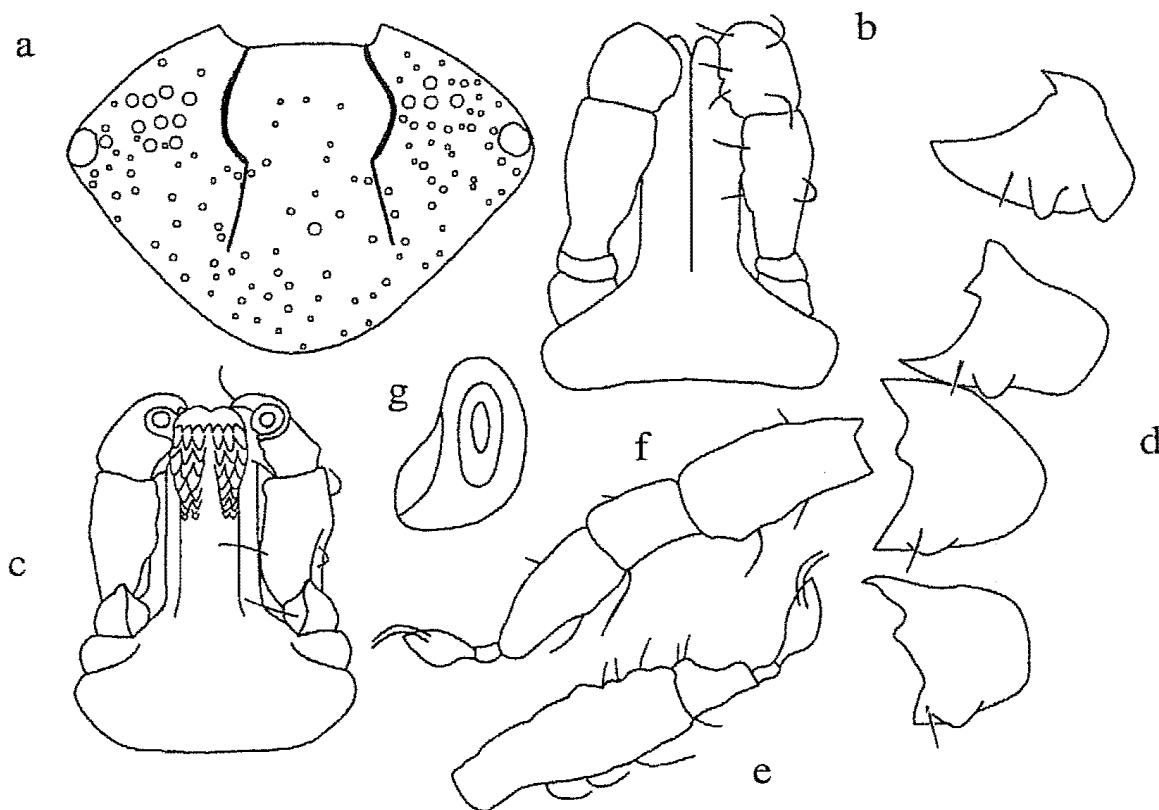


Fig. 40. *Amblyomma marmoratum*, nymph: a—scutum; b—gnathosoma, dorsal view; c—gnathosoma, ventral view; d—coxae; e—tarsus I; f—tarsus and tibia IV; g—spiracular plate.

sally hexagonal, posterior margin straight, posterolateral margins straight or slightly concave, lateral margins narrowly rounded, triangular, cornua absent. Ventrally posterior margin straight. Palpi length 0.14 (0.14–0.15), breadth 0.045 (0.044–0.046). Segment II 1.4–1.5 times longer than segment III, segment II 0.07 (0.06–0.074) long, segment III 0.048 (0.044–0.05) long. Setae number: dorsally 3 (0.02–0.04); ventrally 2 (0.02–0.038) on II, dorsally 3 (0.026–0.04), ventrally 2 (0.02–0.038) on III, all barbed. No setae on segment I. Hypostome length 0.11 (0.11–0.12), length of toothed portion 0.07; dental formula 2/2. Apex rounded, with a corona consisting of 2 rows of fine denticles, first row directed anteriorly.

Legs (Fig. 41 d,e). Coxa I with 2 triangular spurs, the external spur larger. Coxae II–III each with a single, triangular spur, spur on coxa III longer. Trochanters lack spurs. Tarsus I length 0.22 (0.2–0.23), breadth 0.057 (0.054–0.06), without hook. Tarsus III length 0.18 (0.17–0.19), breadth 0.054 (0.052–0.056), without hook.

**Material:** 1 male (US National Tick Collection, RML 122476) USA, Maryland, Frederick CO., Frederick (The Leopard tortoise was imported from Republic of South Africa), 26.02.1997, ex *Geochelone pardalis*, coll. G. Williams; 5 males and 5 females (Zoological Museum of Moscow State University, Tdi 1811) South Africa, Jagersfontein (Or-

ange Free State), 26.10.2000, from tortoise, coll. V.N. Belozarov; 2 females (US National Tick Collection, RML 120597, HH 39815) Namibia, Windhoek, Windhoek, -.11.1978, ex tortoise, coll. L.E.W. Dixon; 5 nymphs (Zoological Museum of Moscow State University, Tdi 1776) South Africa, Orange Free State, 29.10.1993, female from tortoise, coll. V.N. Belozarov; 10 larvae (Zoological Museum of Moscow State University, Tdi 3802, 3801) South Africa, Orange Free State, 29.10.1993, female from tortoise, coll. V.N. Belozarov.

#### *Amblyomma nuttalli* Dönitz, 1909

*Amblyomma nuttalli* Dönitz, 1909: 469, fig. 4, original description.

*Amblyomma rugosum* Neumann, 1899: 253, fig. 55, junior synonym (*pro parte*).

*Amblyomma weneri* Schulze, 1932: 466, fig. 5, junior synonym.

*Amblyomma weneri typicum* Schulze, 1932: 475, junior synonym.

*Amblyomma weneri weneri* Schulze, 1932, junior synonym.

*Amblyomma silvai* Santos Dias, 1951: 104, fugs. 1–3, junior synonym.

**Male** (Fig. 42). Measurements from 7 specimens. Length from apices of scapulae to posterior scutal margin 4.7 (3.4–5.6), breadth 4.1 (2.8–5.0). Outline oval broadest at level of first festoon. Scutum brown, ornate, small metallic gold-crim-

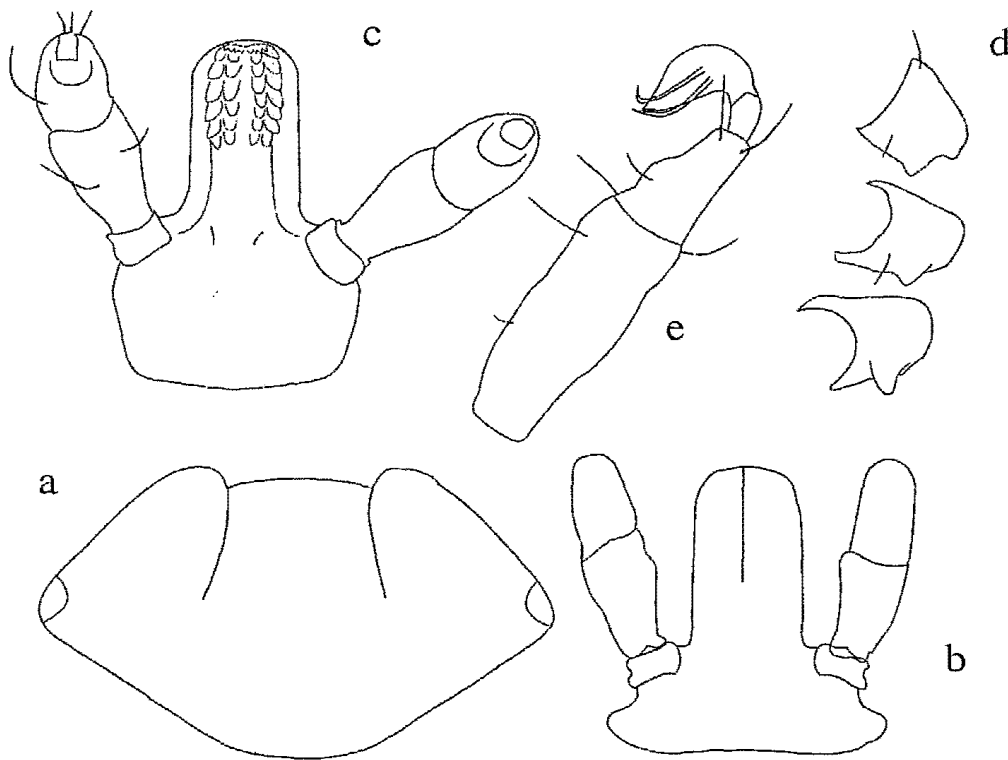


Fig. 41. *Amblyomma marmoreum*, larva: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I.

son patches between cervical grooves, in each scapular area, along the lateral margins of the scutum, and on the festoons. Punctations large, very deep, distributed in groups. Cervical grooves deep, short, converging. Marginal groove complete, beginning at level of legs II. Festoons rectangular, without sclerotized plates extending posterior margin of the festoons. Eyes flat, small.

Capitulum (Fig. 42 b,c) length from palpal apices to cornua apices 1.4 (1.0–1.6), breadth 0.85 (0.64–0.96). Punctations of basis capituli shallow, both small and large, more numerous in center of basis. Posterior margin straight, cornua short, narrowly rounded; external margins straight, ventrally posterior margin straight. Palpi length 0.95 (0.76–1.07), breadth 0.28 (0.21–0.33). Segment II 1.7–2.3 times longer than segment III, length of segment II 0.58 (0.43–0.67), length of segment III 0.31 (0.24–0.36). Segment II dorsally with narrowly rounded projection, slightly wrinkled. Segment I ventrally with a sloping ridge ending posteriorly as very pointed spurs directed medially. Hypostome length 0.92 (0.6–1.07), length of toothed portion 0.45 (0.36–0.5); with a large corona of fine denticles apically, apex slightly notched, each half of the apex nipple-shaped or rounded; dental formula 3/3 anteriorly and 4/4 posteriorly.

Legs (Fig. 42 d–f). Coxa I with 2 spurs, the external spur slightly larger, both broadly rounded.

Coxa I with an evident, spur-like callosity anteriorly. Coxae II–III each with a single, short, broadly rounded, paddle-shaped spur deflected ventrally. Coxa II with a ridge-like callosity anteriorly. Coxa IV with a single, long, triangular spur directed posteriorly. Trochanters lack spurs. Tarsus I length 1.0 (0.86–1.1), width 0.31 (0.26–0.37); with small pointed ventroapical hook and with 2–4 ventral, blunt humps; dorsally with 3 very pointed humps. Tarsus IV length 0.77 (0.6–0.99), breadth 0.25 (0.19–0.29); with 1 strong, very pointed ventroapical hook and 1 stout ventral hook. Tibia IV length 1.06 (0.71–1.33), breadth 0.34 (0.24–0.4).

Venter with short, cone-like, straight setae. Genital aperture situated between coxae II. Medial and lateral margins of spiracular plate parallel, medial margin slightly convex, posterior margin straight, dorsal prolongation broad and long, forming an obtuse angle with its anterior-posterior axis (Fig. 42g). Postanal groove without unpaired median groove. Integumentary hard elements of the ventral skeleton of idiosoma consist of narrow unpaired anal and 2 paired postanal shields, and small festoons' shields.

**Female** (Fig. 43). Measurements from 4 specimens (2 specimens engorged). Length from apices of scapulae to posterior body margin 4.5, 6.4 in unfed specimens, breadth 3.35, 5.3. Dorsal body setae short, straight, needle-shaped. Ventral body setae short, cone-like, slightly curved. Marginal

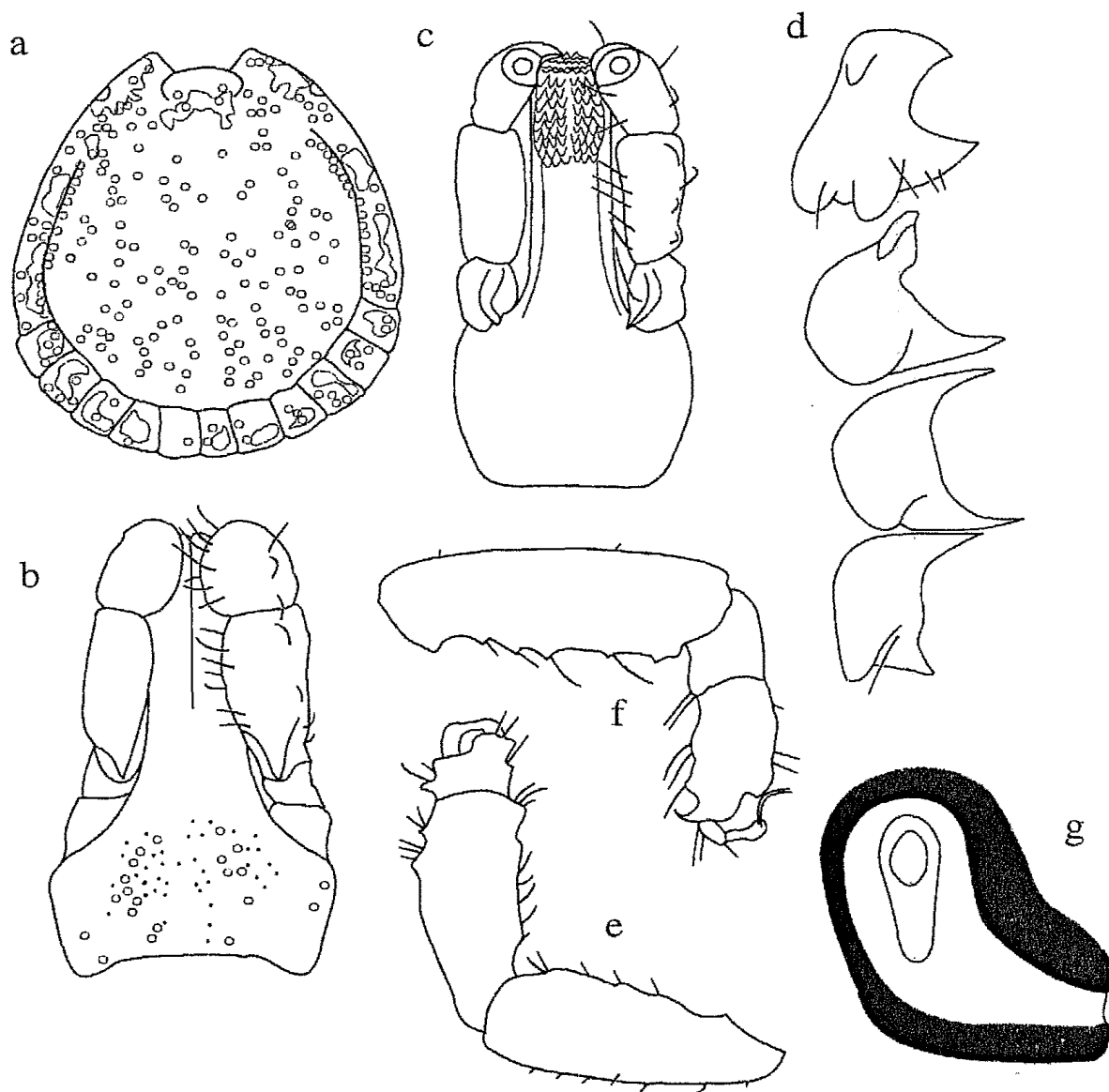


Fig. 42. *Amblyomma nuttalli*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus and tibia I; f — tarsus and tibia IV; g — spiracular plate.

groove complete, beginning near the posterior margin of scutum. Festoons evident, rectangular.

Scutum (Fig. 43a) length 2.6 (2.1–3.25), breadth 2.9 (2.4–3.5); ornate, three very large, pale, gold-crimson patches: two in each lateral area and one in central area between the cervical grooves. Punctations both large, deep and small, shallow, more numerous in each lateral area. Cervical grooves deep, converging anteriorly then diverging as very shallow or deep depressions. Eyes flat.

Capitulum (Fig. 43 b,c) length from palpal apices to cornua apices 1.5 (1.3–2.0), breadth 1.0 (0.9–1.2); cornua short, narrowly rounded; posterior margin straight, lateral margins slightly convex; ventrally posterior margin straight. Punctations of basis capituli few, small; basis ornate, relatively large pale gold-crimson patch between porose areas. Porose areas oval, deeply depressed,

diameter of one area 0.21 (0.19–0.23), interporose area 0.18 (0.16–0.21). Palpi length 1.1 (0.94–1.3), breadth 0.3 (0.24–0.36); smooth or slightly wrinkled. Segment II 2.1 times longer than segment III, length of segment II 0.66 (0.57–0.74), length of segment III 0.33 (0.24–0.41). Segment I ventrally with a sloping ridge ending posteriorly with a pointed spur directed posteriorly and anteriorly with a smaller spur. Hypostome length 1.1 (0.86–1.21), length of toothed portion 0.54 (0.47–0.57); with a large corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3 in the anterior part and 4/4 in the 1–2 posterior files.

Legs (Fig. 43 d–f). Coxa I with 2 equal broadly rounded spurs. Coxa I with an evident, sharp, spur-like callosity anteriorly. Coxae II–III each with a single, short, broadly rounded, paddle-shaped spur deflected ventrally. Coxa II with an evident, sloping, ridge-like callosity anteriorly. Coxa IV with a

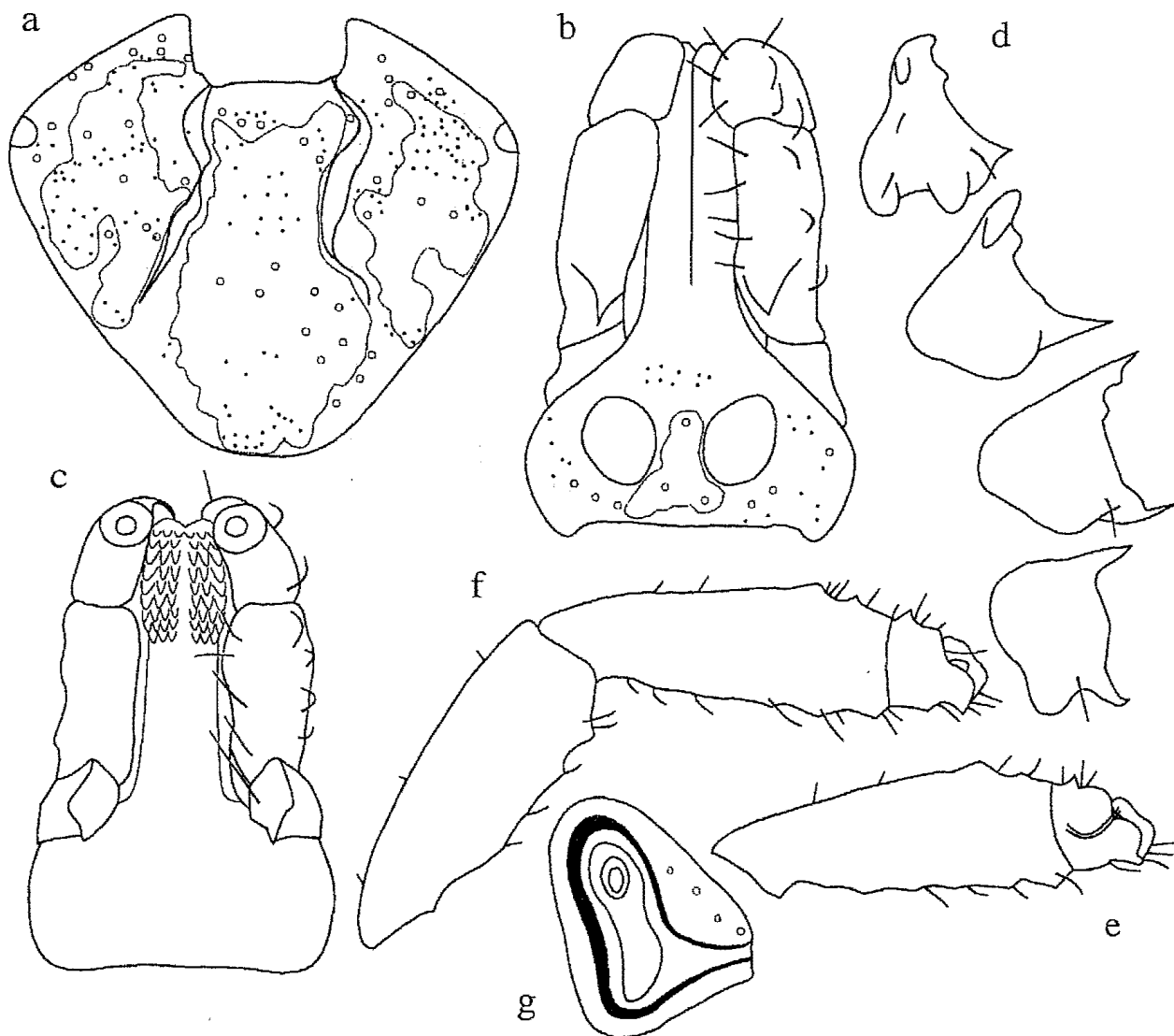


Fig. 43. *Amblyomma nuttalli*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

single, broadly rounded, triangular spur. Trochanters lack spurs. Tarsus I length 1.27 (1.1–1.4), width 0.37 (0.33–0.43); with small ventroapical hump and with 2–3 ventral, blunt humps. Tarsus IV length 1.0 (0.79–1.2), breadth 0.26 (0.21–0.29); with 1 strong ventroapical hook and 1 small pointed ventral hump. Tibia IV length 1.22 (0.86–1.5), breadth 0.4 (0.31–0.46).

Medial and lateral margins of spiracular plate parallel, medial and posterior margins concave, dorsal prolongation long and narrow, forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 43g). Genital aperture “U” shaped, situated between coxae II. Postanal groove without unpaired, posteriorly directed, median groove.

**Nymph** (Fig. 44) (2 semi-engorged). Measurements from 2 specimens. Length from apices of scapulae to posterior body margin 3.0, 2.8, breadth 2.25, 2.0. Dorsal body setae few in number, short, thin, straight or slightly curved. Ventral body setae

few, longer, thin, straight or slightly curved. Marginal groove absent. Festoons evident, narrow.

Scutum (Fig. 44a) length 0.7, 0.8; breadth 0.9; dark brown, inornate. Posterior margin narrowly rounded, posterolateral margins nearly straight. Punctations deep, larger and more numerous in each lateral area. Cervical grooves very deep and converging anteriorly, then deep and slightly diverging posteriorly. Eyes slightly bulging, large, marginal.

Capitulum (Fig. 44 b,c) length from palpal apices to posterior margin of basis 0.4, 0.5; breadth 0.3. Basis capituli subtriangular, posterior margin concave, lateral margins convex, cornua absent; ventrally posterior margin straight. Punctations of basis capituli absent. Palpi length 0.3, 0.35; breadth 0.09. Segment II 1.9, 2.0 times longer than segment III, length of segment II 0.19, 0.2; length of segment III 0.1. Palpi wrinkled. Segment I ventrally with a sloping ridge ending anteriorly and posteriorly

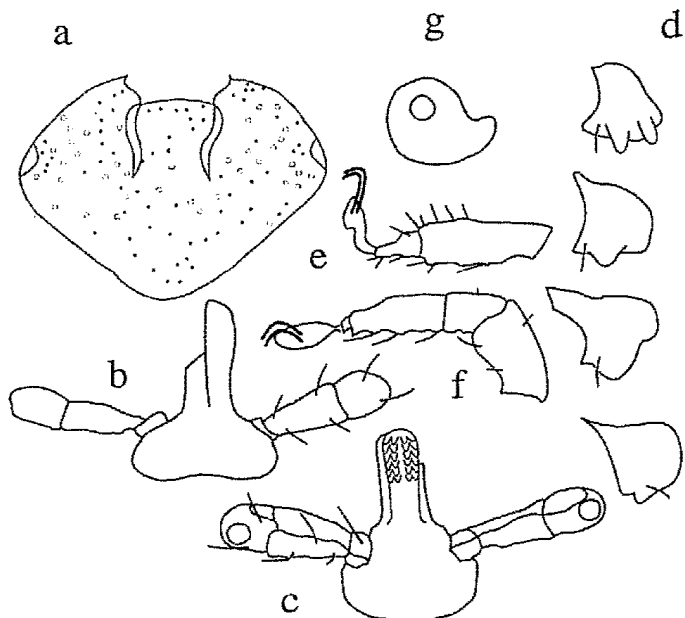


Fig. 44. *Amblyomma nuttalli*, nymph: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

with small, blunt spurs. Hypostome length 0.33; length of toothed portion 0.19; apex rounded with large corona of fine denticles; dental formula 2/2 with seven denticles per file.

Legs (Fig. 44 d–f) Coxa I with 2 long and narrow spurs, the external spur slightly larger. Coxae II–III each with a single, triangular, broadly rounded spur. Coxa IV with triangular, pointed spur. Trochanters lack spurs. Tarsus I length 0.43, 0.4, width 0.1, 0.13, without ventroapical hook. Tarsus IV length 0.39, 0.36, breadth 0.1, 0.11, without ventroapical hook.

Spiracular plate pyriform with broad, relatively long dorsal prolongation (Fig. 44g). Postanal groove without unpaired, median groove.

**Larva** (Fig. 45). Measurements from 2 specimens (semi-engorged). Length from apices of scapulae to posterior body margin 1.44, 1.23; breadth 1.1, 1.0. Dorsal body setae: 2 central dorsal pairs j5 0.014, J2 0.016; 8 marginal dorsal pairs s3 0.016, s4 0.014, s6 0.014, S1 0.016, S2 0.016, S3 0.018, S4 0.016, S5 0.016. Ventral body setae: 3 sternal pairs 0.016; 2 preanal pairs Jv3 0.016, Jv5 0.016; 4 premarginal pairs Zv1 0.016, Zv2 0.016, Zv4 0.02, Zv5 0.028; 5 marginal ventral pairs Sv1 0.016, Sv2 0.02, Sv3 0.022, Sv4 0.022, Sv5 0.022; and 1 pair on anal valves.

Scutum (Fig. 45a) length 0.26, 0.25, breadth 0.41; inornate, yellow-brown. Posterior margin concave, posterolateral margins concave, anterolateral margins slightly convex. Scutal puncta-

tions small, numerous. Cervical grooves deep, slightly diverging, parallel, reaching about the half of scutal length. Scutal setae 3 pairs. Eyes large, bulging.

Capitulum (Fig. 45 b,c) length from palpal apices to posterior margin of basis 0.17, breadth 0.14. Basis capituli dorsally hexagonal, posterior margin straight, posterolateral margins slightly concave, anterolateral margins slightly convex, cornua absent. Ventrally posterior margin straight. Palpi length 0.128, breadth 0.04. Segment II 1.5 times longer than segment III, segment II 0.066 long, segment III 0.044 long. Setae number: dorsally 3 (0.02–0.038 long), ventrally 2 (0.024, 0.018 long) on II, dorsally 3 (0.022–0.03 long), ventrally 2 (0.022, 0.026 long) on III, all barbed on its outer surface. No setae on segment I. Hypostome length 0.098, length of toothed portion 0.06, dental formula 2/2. Apex rounded, with a corona consisting of 2 rows of fine denticles.

Legs (Fig. 45d). Coxa I with 2 broadly rounded, triangular spurs, the external spur larger. Coxae II–III each with a single, pointed, triangular spur. Trochanters lack spurs. Tarsus I broken. Tarsus III length 0.15, 0.15, breadth 0.046, 0.048; without hook.

**Material:** 7 males, 4 females (Musée royal de l'Afrique centrale, Tervuren, Belgium, No. 76272–76279; Mus. Congo 39096/39097): 6 males and 3 females from Mafuta, Mozambique, 10.10.1950, ex *Kinixys beliana zombensis*, coll. & det. Santos Dias; 1 male and 1 female from Mahagi, Plaine de Ishwa, 12.1942, ex *Kinixys beliana*; coll. Vrijdagh, det. A. Elbl (1963); 2 nymphs (US National

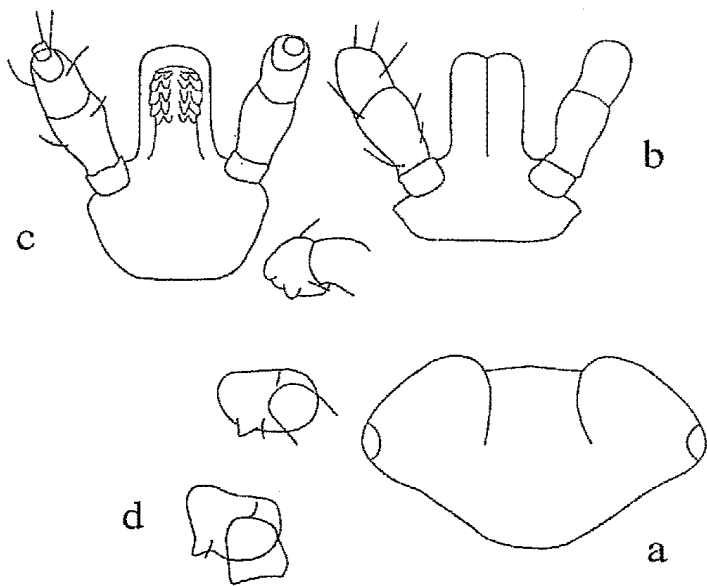


Fig. 45. *Amblyomma nuttalli*, larva: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae.



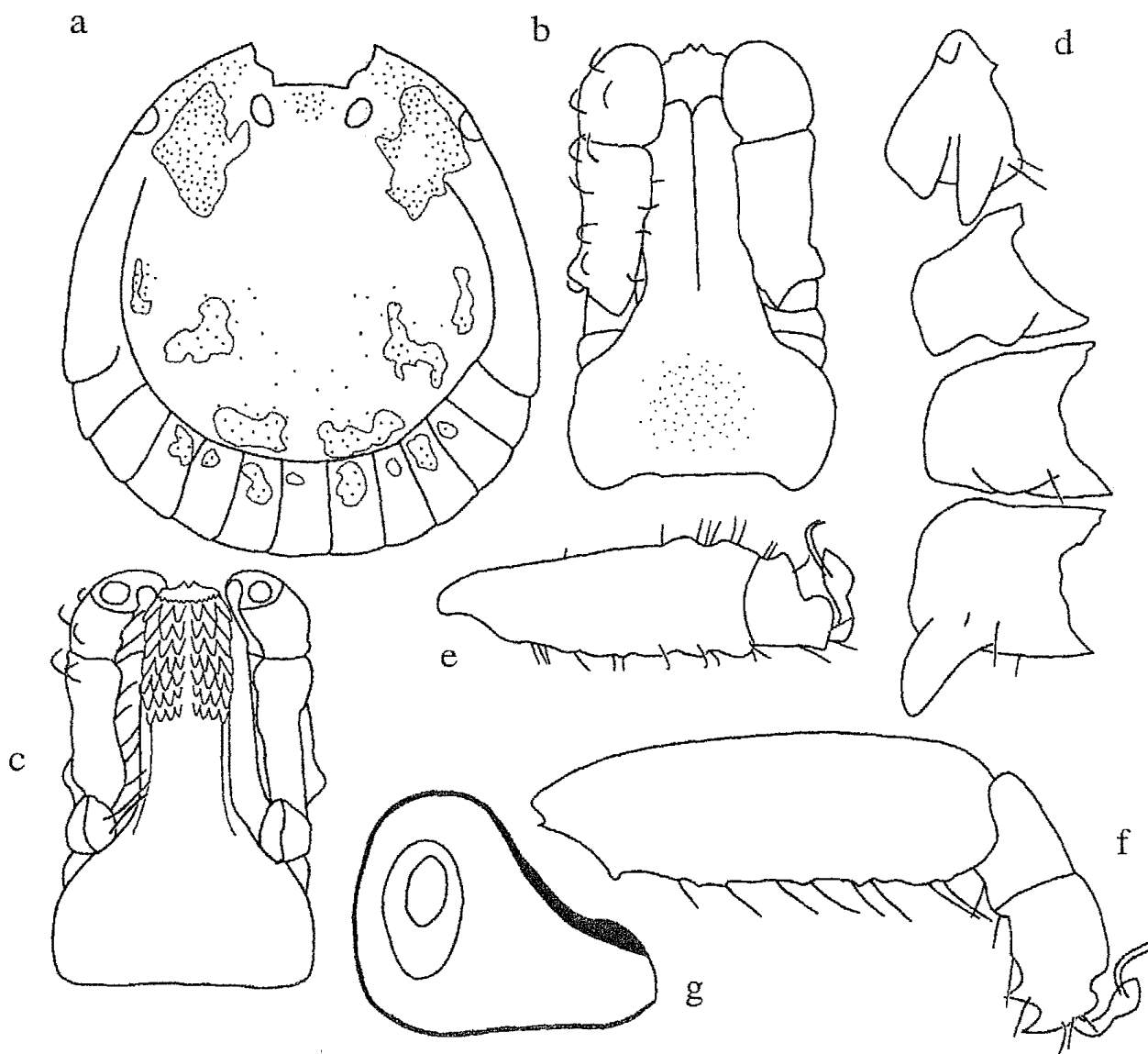


Fig. 46. *Amblyomma paulopunctatum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

Tick Collection, RML 079483) Egypt, Matruh, Bahid area, 9.04.1971, ex *Anthus trivialis*, coll. Palearctic Migratory Bird Survey; 1 larva (US National Tick Collection, RML 102380) Ivory coast (no other data).

***Amblyomma paulopunctatum* Neumann, 1899**

*Amblyomma paulopunctatum* *Amblyomma paulopunctatum* Neumann, 1899: 248, original description.

*Amblyomma sparsum paulopunctatum* Neumann, 1905: 233, junior synonym.

*Amblyomma trimaculatum* Neumann, 1908: 84, figs. 5–7, junior synonym.

**Male** (Fig. 46). Length from apices of scapulae to posterior scutal margin 6.45, breadth 5.4. Outline oval broadest at level of spiracular plate. Scutum light-brown, ornate, two large, metallic, gold-pink patches in each scapular area, some small patches in the posterior area and on the festoons. Punctations small and very shallow, numerous in each scapular area and few in the

posterior area of the scutum. Scapulae pointed, each with pyramidal hump directed anteriorly or ventrally. Cervical grooves short, deep, pit-like, situated at a distance from anterior margin of scutum. Marginal groove complete beginning at level of legs II. Festoons narrow, long, without sclerotized plates extending posterior margin of the festoons. Eyes flat.

Capitulum (Fig. 46 b,c). length from palpal apices to cornua apices 2.26, breadth 1.31; punctations small, shallow; posterior margin straight; cornua relatively large, narrowly rounded; external margins slightly convex; ventrally posterior margin straight. Palpi length 1.5, breadth 0.4. Segment II 2 times longer than segment III, length of segment II 0.93, length of segment III 0.46. Segment II dorsally with narrowly rounded projection and large, triangular hump directed laterally; surface slightly wrinkled with shallow, small punctations. Segment I ventrally with a sharp ridge ending

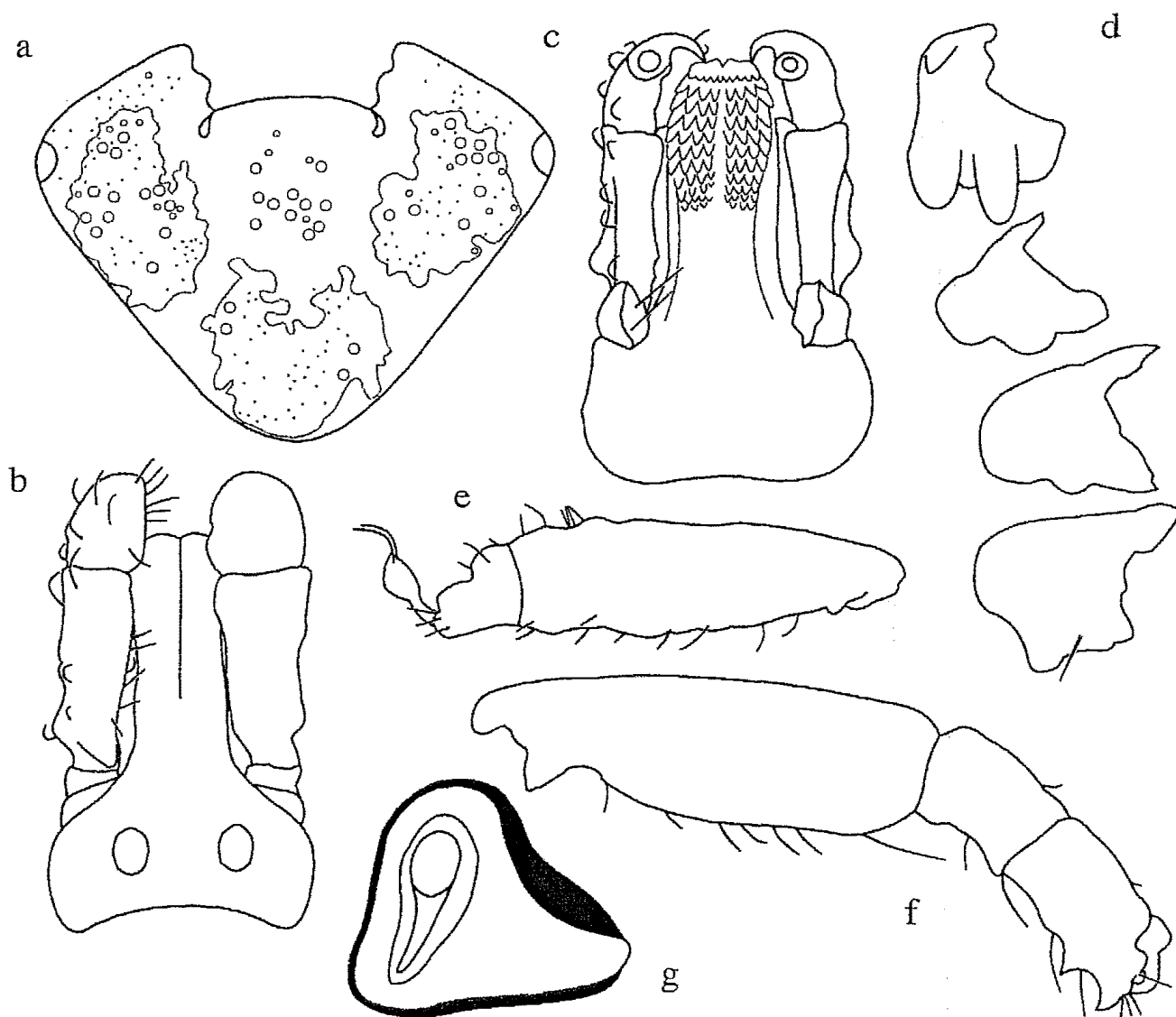


Fig. 47. *Amblyomma paulopunctatum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus IV; g — spiracular plate.

posteriorly with a small, blunt spur. Hypostome length 1.33, length of toothed portion 0.79; with a large corona of fine denticles apically, apex notched, each half of the apex nipple-shaped; dental formula 3/3 in the 2 anterior files and 4/4 posteriorly.

Legs (Fig. 46 d–f). Coxa I with 2 spurs, the external spur longer and reaching the anterior margin of coxa II, triangular, narrowly rounded, internal spur broad, triangular. Coxa I with a evident, spur-like callosity anteriorly. Coxa II with 2 equal, short, triangular spurs. Coxa III with a single, short, broadly rounded, triangular spur. Coxa IV with a single, very long, triangular spur directed posteromedially. Trochanters lack spurs. Tarsus I length 1.37, width 0.47; without ventroapical hook but with 4 ventral, small, blunt humps. Tarsus IV length 1.0; breadth 0.34; with 1 strong ventroapical hook and 1 strong ventral hook. Tibia IV length 1.79, breadth 0.57. Leg segments with narrow, white annular wheels at distal ends.

Venter with short, thick, needle-shaped setae. Genital aperture situated between coxae II. Medial and lateral margins of spiracular plate diverging, posterior margin slightly concave, medial margin slightly convex, dorsal prolongation very broad, long, perpendicular to anterior-posterior axis of spiracular plate (Fig. 46g). Postanal groove with a unpaired median groove extending to the festoon. Integumentary hard elements of the ventral skeleton of idiosoma absent.

**Female** (Fig. 47). Length from apices of scapulae to posterior body margin 6.6, breadth 5.4. Dorsal body setae very short and thin. Ventral body setae short and very thin. Marginal groove complete, beginning near the posterior margin of scutum. Festoons rectangular.

Scutum (Fig. 47a) length 3.2, breadth 4.0; light-brown, ornate, 3 large, metallic, gold-greenish patches. Punctations shallow, both small and large. Cervical grooves very short and deep, pit-like. Eyes flat.

Capitulum (Fig. 47 b,c) length from palpal apices to cornua apices 2.29, breadth 1.37; cornua relatively large, narrowly rounded; posterior margin concave, lateral margins slightly convex; ventrally posterior margin slightly concave. Punctations of basis capituli very few, small, shallow. Porose areas oval, not deeply depressed, diameter of one area 0.21, interporose area 0.31. Palpi length 1.6, breadth 0.4. Segment II 2.9 times longer than segment III, length of segment II 1.17, length of segment III 0.4. Segment II dorsally with narrowly rounded projection and large, triangular hump directed laterally; surface slightly wrinkled. Segment I ventrally with a sharp ridge ending posteriorly with a pointed spur. Hypostome length 1.47, length of toothed portion 0.86; with a corona of fine denticles apically, each half of the apex flat with nipple-shaped medial angle; dental formula 4/4.

Legs (Fig. 47 d-f). Coxa I with 2 long, rounded spurs, the external spur large. Coxa I with an evident, sharp, spur-like callosity anteriorly. Coxa II with 2 very short, broadly rounded spurs, the external spur large. Coxa III with a single, very short, broadly rounded spur. Coxa IV with a single, triangular, narrowly rounded spur. Trochanters lack spurs. Tarsus I length 1.69, width 0.46; without ventroapical hook but with 3 ventral, small, blunt humps. Tarsus IV length 1.21, breadth 0.36; with 1 strong ventroapical hook and 1 strong ventral hook. Tibia IV length 1.71, breadth 0.57.

Medial and lateral margins of spiracular plate diverging, medial and posterior margins slightly concave, dorsal prolongation broad and long, forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 47g). Genital aperture "U" shaped, situated between coxae II-III. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Immatures** undescribed.

**Material:** male and female (US National Tick Collection, RML 116 826) Zaire, Belgian Congo, Medje (02.25N, 27.18E), -VI.1914, ex ?, coll. Lang & Chapin.

#### *Amblyomma personatum* Neumann, 1901

*Amblyomma personatum* Neumann, 1901: 306, fig. 12, original description.

**Male** (Fig. 48). Measurements from 2 specimens. Length from apices of scapulae to posterior scutal margin 6.6, 7.7; breadth 6.0, 6.3. Outline oval broadest in the middle of scutum. Scutum yellow-brown, ornate, a large metallic gold patch with redish edging covers the most part of the scutum. Punctations few, small, shallow, more

numerous in each lateral and in posterior area. Scapulae pointed, medial margins with ledges. Cervical grooves very short, deep, converging. Marginal groove absent. Festoons rectangular, narrow, with narrow, sclerotized plates extending posterior margin of the festoons. Eyes small, slightly bulging.

Capitulum (Fig. 48 b,c) length from palpal apices to cornua apices 2.2; 2.6; breadth 1.4; punctations of basis capituli small, shallow; surface slightly wrinkled; posterior margin nearly straight, lateral margins almost straight, cornua of medium size, rounded; ventrally posterior margin straight. Palpi length 1.5, 1.7; breadth 0.4, 0.5; slightly wrinkled. Segment II 2.5, 2.8 times longer than segment III, length of segment II 1.0, 1.2; length of segment III 0.4, 0.43. Segment I ventrally with a sharp ridge ending anteriorly with a small spur and posteriorly with a relatively long, sharp spur. Segment I dorsally with a sharp spur directed anteriorly and upwards. Hypostome length 1.4; 1.6; length of toothed portion 0.8; 0.86; with a large corona of fine denticles apically, apex spatulate, notched, each half of the apex nipple-shaped; dental formula 4/4 in anterior part and 5/5 in posterior part.

Legs (Fig. 48 d-f). Coxa I with 2 spurs, the external spur larger, triangular, pointed, its lateral margin curved; internal spur long, broadly rounded. Coxae II-III each with a single, broadly rounded, paddle-shaped spur. Coxa IV with a single, long, narrowly rounded, with parallel lateral and medial margins spur directed to anus. Trochanters lack spurs. Tarsus I length 1.8, 1.7; width 0.46, 0.49; with a small, pointed ventroapical hump. Tarsus IV length 1.3, 1.1; breadth 0.4, 0.36; with 1 strong ventroapical hook and 1 sharp, triangular ventral hook. Tibia IV length 2.3, 2.0; breadth 0.6, 0.5. Leg segments with broad, yellow annular wheels at distal ends.

Venter with short, thin, needle-shaped setae; surface reticulated. Genital aperture situated between coxae II. Medial and lateral margins of spiracular plate parallel, posterior margin straight, dorsal prolongation long, narrow, perpendicular to the anterior-posterior axis (Fig. 48g). Postanal groove with a very short, unpaired, posteriorly directed, median groove extending to the unpaired anal shield. Integumentary hard elements of the ventral skeleton of idiosoma consist of unpaired anal and 2 paired postanal shields.

**Female** (Fig. 49) (semi-engorged). Length from apices of scapulae to posterior body margin 13.6, breadth 11.2. Dorsal body setae short, thin, almost straight. Ventral body setae short, thin,

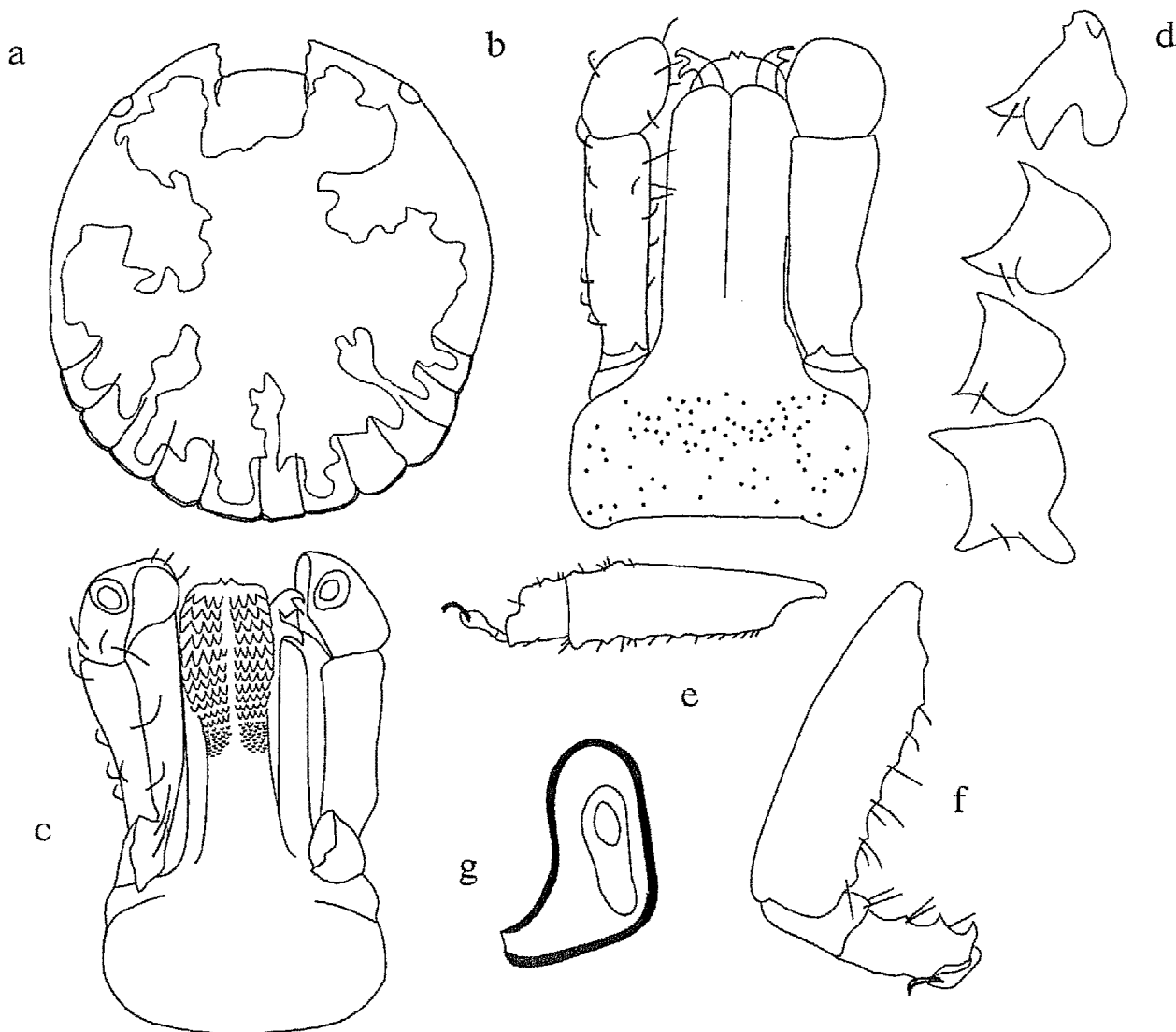


Fig. 48. *Amblyomma personatum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus IV; g — spiracular plate.

curved. Marginal groove incomplete, beginning at level of legs II and embracing 3 festoons. Festoons rectangular.

Scutum (Fig. 49a) length 4.2, breadth 5.55; dark-brown, ornate, 3 blending metallic, gold-crimson with greenish border patches. Punctations numerous, shallow, small. Scapulae pyramidal-shaped, their medial margins with ledges. Cervical grooves short and deep, pit-like anteriorly then diverging as shallow depressions. Eyes slightly bulging.

Capitulum (Fig. 49 b,c) length from palpal apices to cornua apices 2.75, breadth 1.78; cornua short, broadly rounded; posterior margin straight, lateral margins slightly convex; ventrally posterior margin straight. Punctations of basis capituli few, small, shallow. Porose areas oval, deeply depressed, diameter of one area 0.3, interporose area 0.4. Palpi length 2.14, breadth 0.41; with numerous, shallow, small punctations. Segment II

2.6 times longer than segment III, length of segment II 1.46, length of segment III 0.57. Segment I ventrally with a sharp ridge ending posteriorly with a pointed spur directed ventrally. Segment I dorsomedially with a pointed, pyramidal spur. Hypostome length 1.93, length of toothed portion 1.0; with a corona of fine denticles apically, apex slightly notched, rounded; dental formula 5/5.

Legs (Fig. 49 d-f). Coxa I with 2 long, narrowly rounded spurs, the external spur large. Coxae II-III each with a single, short, broadly rounded, paddle-shaped spur. Coxa IV with a single, large, triangular, rounded spur. Trochanters lack spurs. Tarsus I length 2.43, width 0.54; with small, blunt, ventroapical hook and with 2 ventral, small, blunt humps. Tarsus IV length 1.74, breadth 0.43; with 1 strong ventroapical hook and 1 strong ventral hook. Tibia IV length 2.29, breadth 0.64.

Medial and lateral margins of spiracular plate almost parallel, medial margin straight, posterior

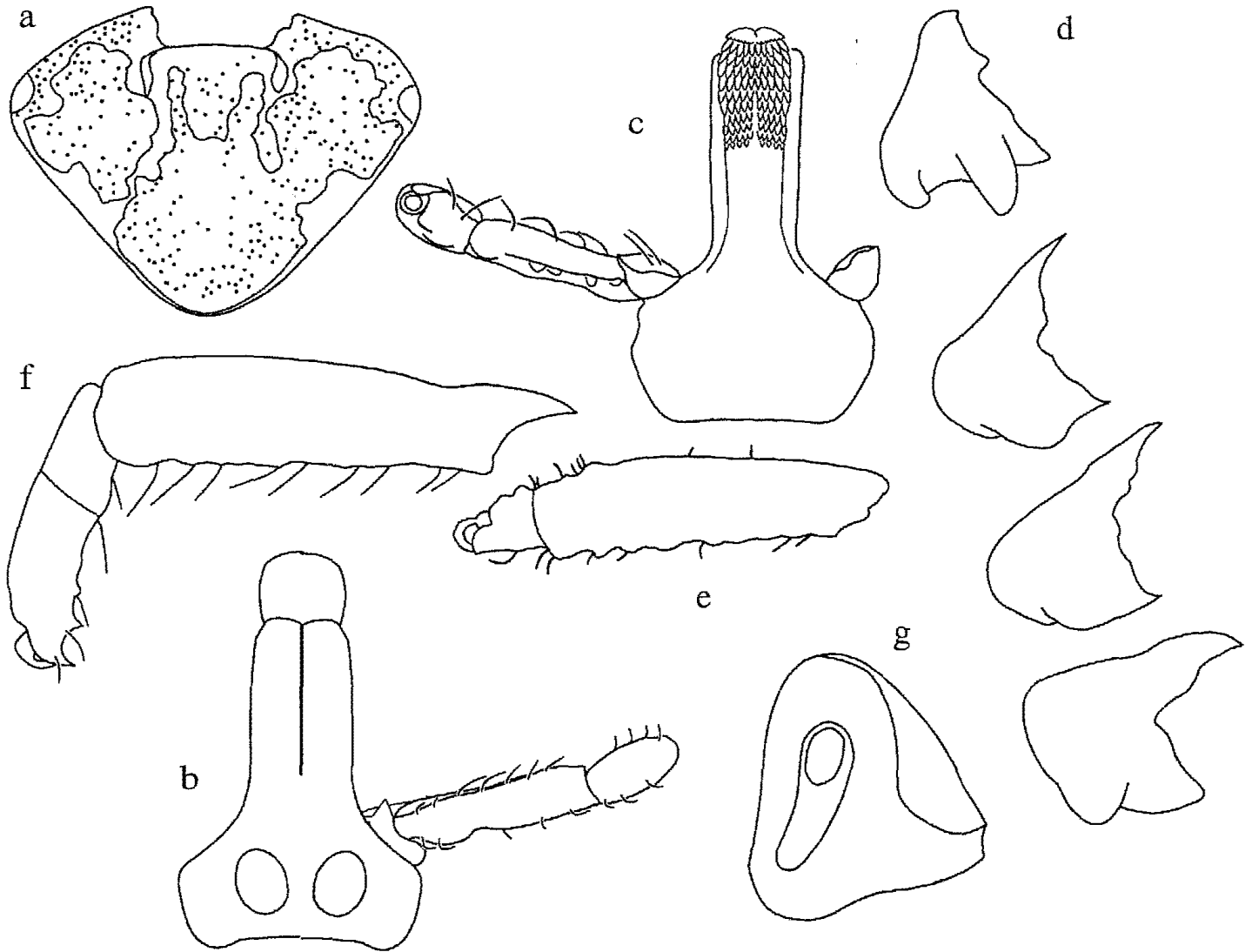


Fig. 49. *Amblyomma personatum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

margin concave, dorsal prolongation long, relatively broad, forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 49g). Genital aperture "V" shaped, situated between coxae II. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Immatures** undescribed.

**Material:** 2 males (US National Tick Collection, RML 123117) Kenya, Kilima Mbogo, 30.07.1907, ex *Rhinocerotidae*; one female (US National Tick Collection, RML 46459) Africa, ex *Rhinoceros* (hide or skin), coll.: in Paul Schulze Collection.

***Amblyomma pomposum* Dönitz, 1909**

*Amblyomma pomposum* Dönitz, 1909: 466, fig. 14, original description.

*Amblyomma variegatum pomposum* Dönitz, 1909 (*sensu* Tendeiro, 1959: 454, fig. 25), junior synonym.

*Amblyomma variegatum* var. *nocens* Robinson, 1912: 480, fig. 2a-f, junior synonym.

*Amblyomma supurbum* Santos Dias, 1953: 134, figs. 5–6, junior synonym.

**Male** (Fig. 50). Length from apices of scapulae to posterior scutal margin 5.3, breadth 4.43. Outline oval broadest at level of spiracular plate. Scutum dark-brown, ornate, some large, metallic, gold-redish with greenish border patches. Punctations deep, larger, more numerous in the anterior part of the scutum and shallow, small in central and posterior areas. Scapulae each with small, pyramidal hump directed ventrally. Cervical grooves short, deep, crescent. Marginal groove complete beginning at level of legs III. Festoons narrow, long, with sclerotized plates extending posterior margin of the festoons. Eyes small, round, bulging, situated at a distance from scutal margin.

Capitulum (Fig. 50 b,c) length from palpal apices to cornua apices 2.1, breadth 1.0; puncta-



Fig. 50. *Amblyonma pomposum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

tions small, shallow; posterior margin straight; cornua relatively large, narrowly rounded; external margins almost straight; ventrally posterior margin straight. Palpi length 1.4, breadth 0.3. Segment II dorsally smooth, with shallow depression. Segment II 2 times longer than segment III, length of segment II 0.86, length of segment III 0.44. Segment I ventrally with a sharp ridge ending anteriorly and posteriorly with a small, pointed spurs. Hypostome length 1.26, length of toothed portion 0.64; with a small corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3 in the 5 anterior files and 4/4 posteriorly.

Legs (Fig. 50 d–f). Coxa I with 2 spurs, the external spur longer and reaching the anterior mar-

gin of coxa II, triangular, narrowly rounded, internal spur broadly rounded. Coxa I with a evident, spur-like callosity anteriorly. Coxa II with a single, short, rounded spurs with concave posterior margin (maybe fused external and internal spurs). Coxa II with a roller-like callosity anteriorly. Coxa III with a single, short, broadly rounded, triangular spur. Coxa IV with a single, relatively long, triangular spur directed medially. Trochanters lack spurs. Tarsus I length 1.3, width 0.39; without ventroapical hook but with 2 ventral, blunt humps. Tarsus IV length 1.0, breadth 0.27; with 1 strong ventroapical hook and 1 strong ventral hook. Tibia IV length 1.5, breadth 0.46. Leg segments with yellow annular wheels at distal ends.

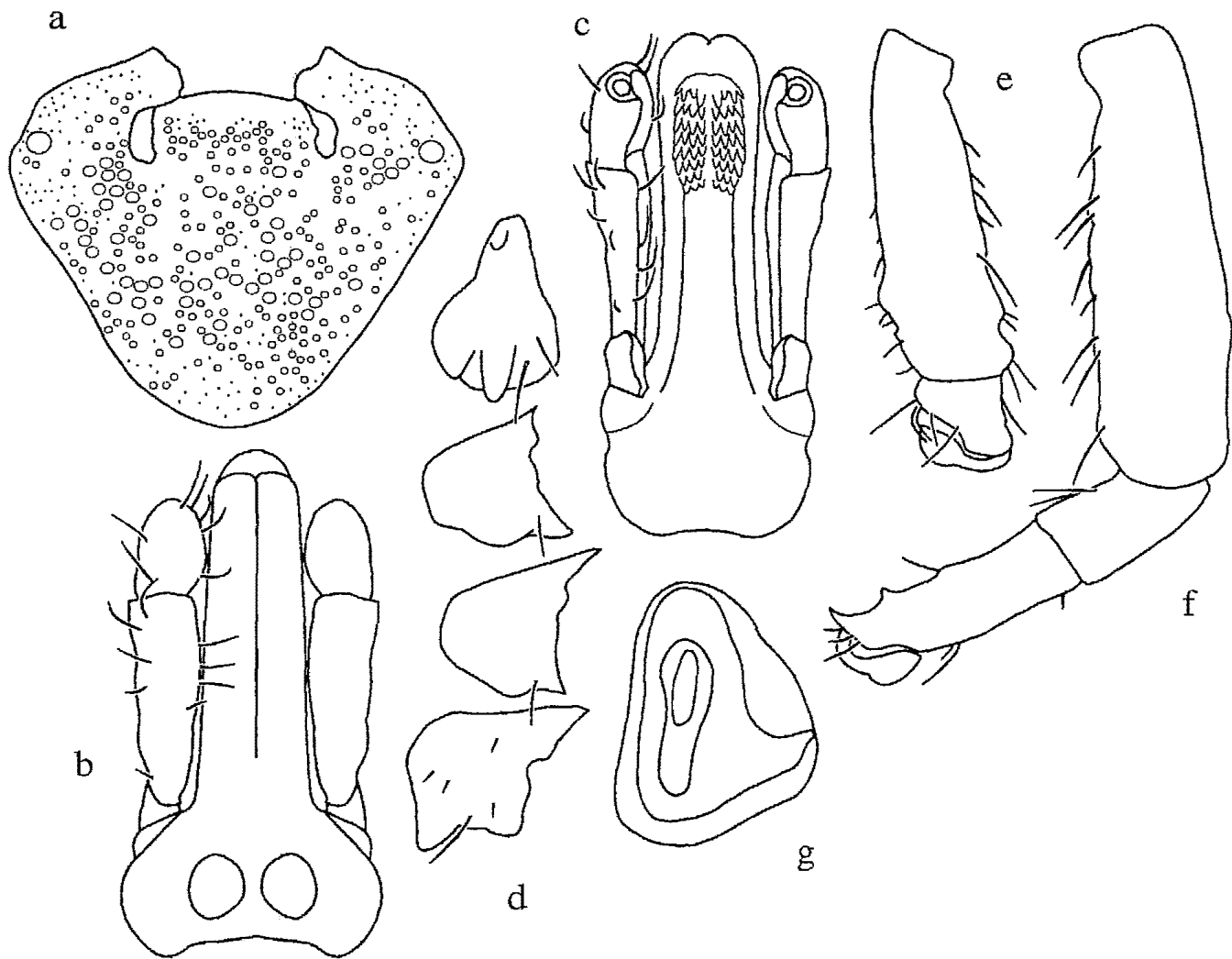


Fig. 51. *Amblyomma pomposum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

Venter with short, very thin setae. Genital aperture situated between coxae II–III. Medial and lateral margins of spiracular plate diverging, medial and posterior margins straight, dorsal prolongation long, triangular, perpendicular to anterior-posterior axis of spiracular plate (Fig. 50 g). Postanal groove without a unpaired median groove. Integumentary hard elements of the ventral skeleton of idiosoma consist of evident unpaired anal and 2 paired postanal shields, and large festoons' shields.

**Female** (Fig. 51). Length from apices of scapulae to posterior body margin 5.95, breadth 1.33. Dorsal body setae short, thin, curved, stick-like. Ventral body setae shorter and more thin, curved, stick-like. Marginal groove complete, beginning near the posterior margin of scutum. Festoons rectangular.

Scutum (Fig. 51a) length 2.95, breadth 3.25; yellow-brown in the central area and dark-brown in each lateral area, slightly ornate, some small, pale,

crimson patches in the posterior area of the scutum. Scutal punctations dense, shallow, both small and large. Cervical grooves short, deep, converging anteriorly then diverging as shallow depressions. Eyes small, round, bulging, situated at a distance from scutal margin.

Capitulum (Fig. 51 b,c) length from palpal apices to cornua apices 2.25, breadth 1.2; cornua short, narrowly rounded; posterior margin concave, lateral margins convex, ventrally posterior margin slightly concave. Surface of basis slightly wrinkled. Porose areas oval, not deeply depressed, diameter of one area 0.27, interporose area 0.14. Palpi length 1.7, breadth 0.3, slightly wrinkled. Segment II 2.1 times longer than segment III, length of segment II 1.07, length of segment III 0.5. Segment I ventrally with a sharp ridge. Hypostome length 1.6, length of toothed portion 0.8; with a small corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3 in the anterior part and 4/4 in the posterior part.

Legs (Fig. 51 d–f). Coxa I with 2 spurs, the external spur large, long, narrowly rounded, internal spur broader, narrowly rounded. Coxa I with an evident, spur-like callosity anteriorly. Coxae II–III each with a single, short, broadly rounded on II and triangular on III spur. Coxa II with a small, cylinder-shaped callosity anteriorly. Coxa IV with a single, relatively long, triangular spur. Trochanters lack spurs. Tarsus I length 1.6, width 0.43; without ventroapical hook but with 2 ventral, small, blunt humps. Tarsus IV length 1.47, breadth 0.34; with 1 strong ventroapical hook and a triangular, pointed ventral hump. Tibia IV length 1.86, breadth 0.51. Leg segments with yellow annular wheels at distal ends.

Medial and lateral margins of spiracular plate slightly diverging, medial margin straight, posterior margin approximately straight, dorsal prolongation triangular, relatively long, forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 51g). Genital aperture “U” shaped, situated between coxae II–III. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Immatures** undescribed.

**Material:** male and female (US National Tick Collection, RML 32 592) Mozambique, Govuro, 16.VII.1951, ex *Syncerus caffer*, coll. J.A.T. Santos Dias.

***Amblyomma rhinocerotis* (De Geer, 1778)**

*Acarus rhinocerotis* De Geer, 1778: 160, figs. 5–6, pl. 38, original description.

*Cynorhaestes rhinocerotis* (De Geer, 1778) (*sensu* Hermann, 1804: 68), junior synonym.

*Ixodes rhinocerotis* (De Geer, 1778) (*sensu* Fabricius, 1805: 351), junior synonym.

*Ixodes walckenaeri* Gervais, 1842: xlvii, junior synonym.

*Amblyomma petersi* Karsch, 1878: 336, pl. 1, fig 4, junior synonym.

*Dermacentor rhinozerotis* Karsch, 1878: 337, junior synonym.

*Amblyomma foai* Neumann, 1899: 262, junior synonym

*Amblyomma aureum* Neumann, 1899: 254, fig. 56, junior synonym.

*Hyalomma walckenaeri* (Gervais, 1842) (*lapsus calami* Bequaert, 1933), junior synonym.

*Rhipicephalus walckenaeri* (Gervais, 1842) (*lapsus calami* Kratz, 1940), junior synonym.

**Male** (Fig. 52). Length from apices of scapulae to posterior scutal margin 7.9, breadth 6.75. Outline oval broadest at level of the middle of scutum. Scutum brown, ornate, very large, metallic, gold-pale, almost symmetrical patch and some small

patches in the posterior area and on the festoons. Punctations numerous, shallow, both very small and larger. Cervical grooves short, deep, converging. Marginal groove absent. Festoons narrow, short, without sclerotized plates extending posterior margin of the festoons. Eyes flat.

Capitulum (Fig. 52 b,c) length from palpal apices to cornua apices 2.78, breadth 1.5; slightly wrinkled, punctations very small, shallow; posterior margin slightly concave, cornua small, narrowly rounded; external margins slightly convex; ventrally posterior margin almost straight. Palpi length 1.93, breadth 0.53. Segment II dorsally slightly wrinkled. Segment II 2.1 times longer than segment III, length of segment II 1.2, length of segment III 0.57. Segment I ventrally with a sharp, interrupted ridge ending anteriorly with a small, pointed spur and posteriorly with a small, blunt spur. Hypostome length 1.76, length of toothed portion 0.97; with a small corona of fine denticles apically, apex slightly notched, each half of the apex nipple-shaped and pointed; dental formula 4/4.

Legs (Fig. 52 d–f). Coxa I with 2 spurs, the external spur longer and reaching the anterior margin of coxa II, slightly curved, narrowly rounded, internal spur broadly rounded. Coxa I with a small, hump-like callosity anteriorly. Coxae II–III with a single, short, broadly rounded, paddle-shaped spur. Coxa IV with a single, very long, triangular spur directed posteromedially. Trochanters lack spurs. Tarsus I length 2.1, breadth 0.5; with a small, blunt ventroapical hump. Tarsus IV length 1.43, breadth 0.4; with 1 strong, very long ventroapical hook and 1 strong, curved ventral hook. Tibia IV length 2.43, breadth 0.69.

Venter with long, thin, straight, cone-like setae. Genital aperture situated between coxae II–III. Medial and lateral margins of spiracular plate nearly parallel, medial and posterior margins slightly concave, dorsal prolongation long, convergent, triangular, forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 52g). Postanal groove without a unpaired median groove. Integumentary hard elements of the ventral skeleton of idiosoma consist of festoons' shields.

**Female** (Fig. 53). Length from apices of scapulae to posterior body margin 10.0, breadth 8.25. Dorsal and ventral body setae short, thin, needle-like. Marginal groove complete, beginning near the posterior margin of scutum. Festoons rectangular.

Scutum (Fig. 53a) length 4.8, breadth 5.55; dark-brown, ornate, a large gold-pinkish-pale patch covers almost the all surface of the scutum. Scutal



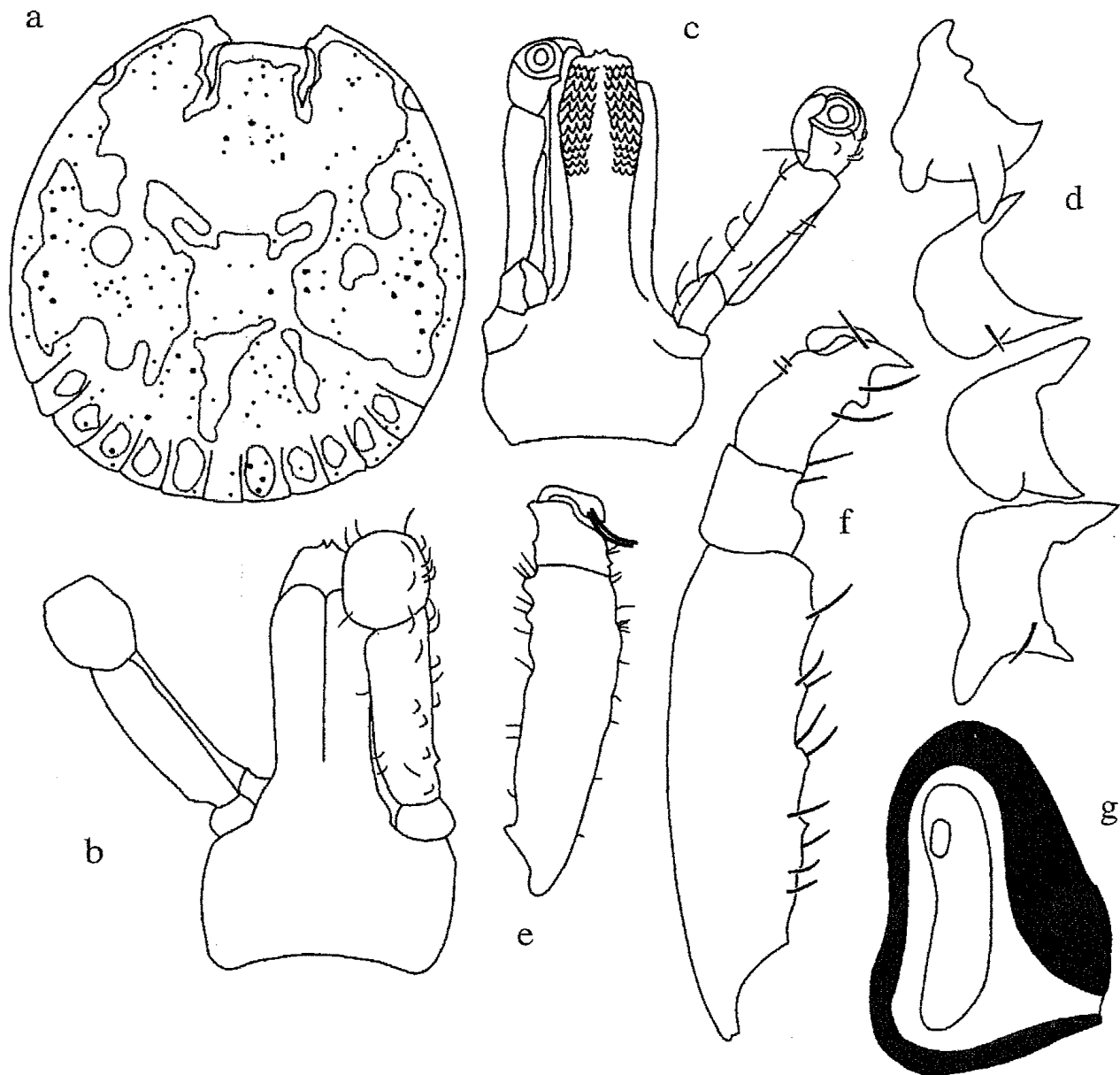


Fig. 52. *Amblyomma rhinocerotis*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

punctations very numerous, shallow, small and few relatively large. Scapulae each with small, pyramidal hump directed ventrally, medial margins with ledges. Cervical grooves short, deep, converging anteriorly then diverging as shallow depressions. Eyes flat.

Capitulum (Fig. 53 b,c) length from palpal apices to cornua apices 3.2, breadth 1.8; cornua short, broadly rounded; posterior margin concave, lateral margins nearly straight, ventrally posterior margin straight. Surface of basis wrinkled. Porose areas round, not deeply depressed, diameter of one area 0.36, interporose area 0.33. Palpi length 2.1, breadth 0.6, slightly wrinkled. Segment II 2.3 times longer than segment III, length of segment II 1.4, length of segment III 0.6. Segment I ventrally with a slope, sinuous ridge ending anteriorly and posteriorly with a small, pointed spurs. Hypostome length

2.0, length of toothed portion 1.0, with a small corona of fine denticles apically, apex slightly notched, rounded; dental formula 4/4.

Legs (Fig. 53 d-f). Coxa I with 2 spurs, the external spur large, curved, triangular, internal spur triangular, narrowly rounded. Coxae II-III each with a single, short, broadly rounded spur; on coxa III the spur more narrow. Coxa IV with a single, long, rounded spur directed posteriorly. Trochanters lack spurs. Tarsus I length 2.57, width 0.61; with a small, blunt ventroapical hump. Tarsus IV length 1.57, breadth 0.46; with a very strong ventroapical hook and a triangular, pointed ventral hump. Tibia IV length 3.05, breadth 0.6. Femur IV with dense setae.

Medial and lateral margins of spiracular plate parallel, medial margin slightly convex, posterior margin approximately straight, dorsal prolongation triangular, relatively long, forming an acute

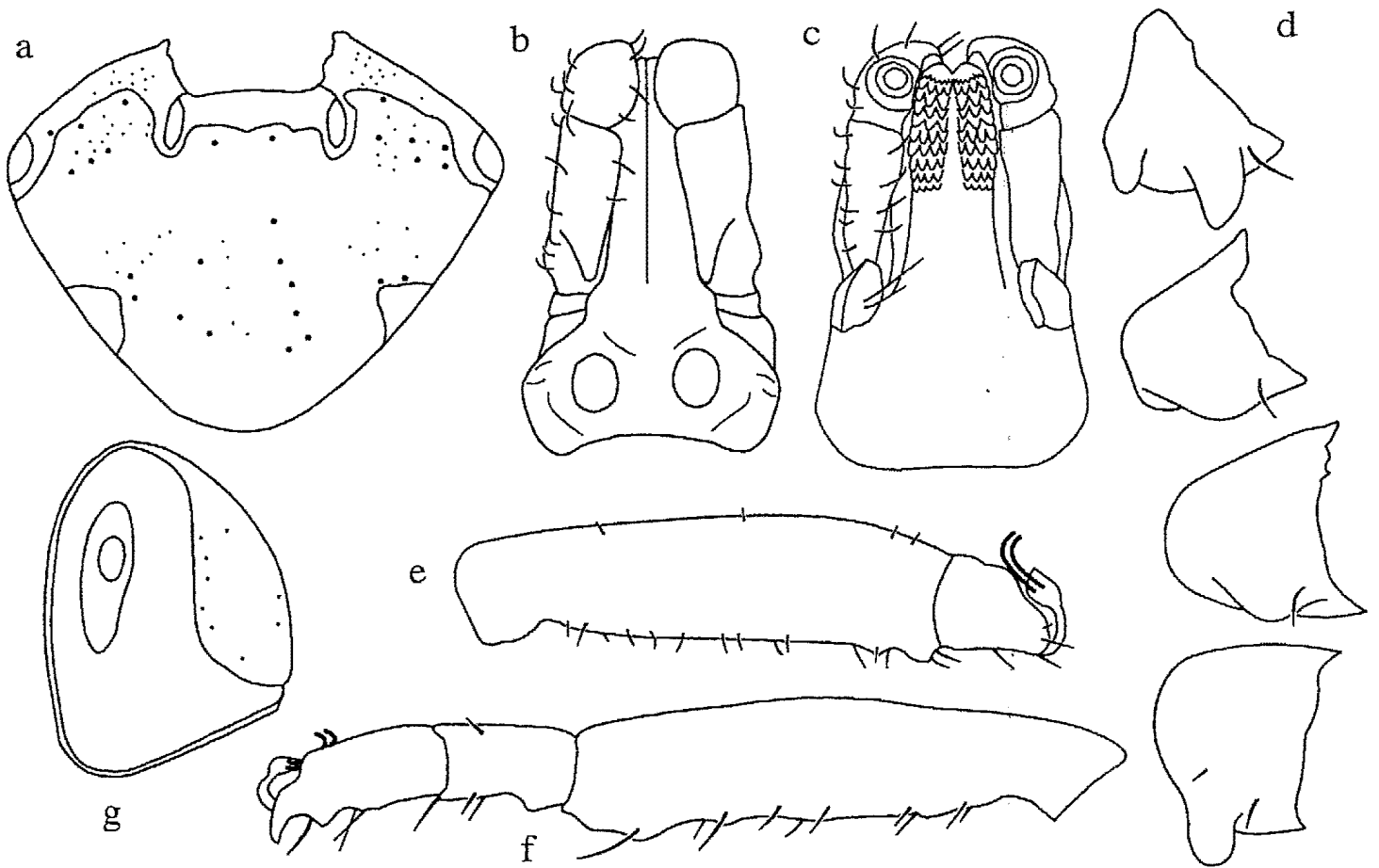


Fig. 53. *Amblyomma rhinocerotis*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

angle with anterior-posterior axis of spiracular plate (Fig. 53g). Genital aperture “U” shaped, situated between coxae II–III. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Immatures** unknown.

**Material:** male and female (US National Tick Collection, RML 99174 HH 34610) Uganda, Govuro, from cattle, coll. Uganda Vet. Serv.

#### *Amblyomma sparsum* Neumann, 1899

*Amblyomma sparsum* Neumann, 1899: 247, original description.

*Amblyomma hassalli* Marx & Neumann in Neumann, 1899 (*pro parte*)

*Amblyomma rugosum* Neumann, 1899: 253, fig. 55, junior synonym (*pro parte*)

*Amblyomma hebraeum magnum* Neumann, 1909: 62, junior synonym.

*Amblyomma werneri schlottkei* Schulze, 1932: 375, junior synonym.

*Amblyomma schlottkei* Schulze, 1932: 463, junior synonym.

*Amblyomma werneri poematium* Schulze, 1932: 476, junior synonym.

*Amblyomma faiai* Santos Dias, 1951: 87, figs 1–2, junior synonym.

**Male** (Fig. 54). Length from apices of scapulae to posterior scutal margin 7.5, breadth 6.9. Outline oval broadest at level of the first festoon. Scutum dark-brown, ornate, some large, metallic, gold-crimson, symmetrical distributing patches and small patches on the festoons. Punctations both small, shallow and large, deep, more numerous on the metallic patches. Scapulae very pointed, medial margins with ledges. Cervical grooves short, deep, converging. Marginal groove complete, beginning at level of legs III. Festoons rectangular, without sclerotized plates extending posterior margin of the festoons. Eyes flat.

Capitulum (Fig. 54 b,c) length from palpal apices to cornua apices 2.2, breadth 1.31; slightly wrinkled, punctations very small, shallow; posterior margin concave, cornua relatively large, narrowly rounded; external margins slightly convex; ventrally posterior margin straight. Palpi length 1.47, breadth 0.46. Segment II dorsally slightly wrinkled, segment III wrinkled. Segment II 2.5

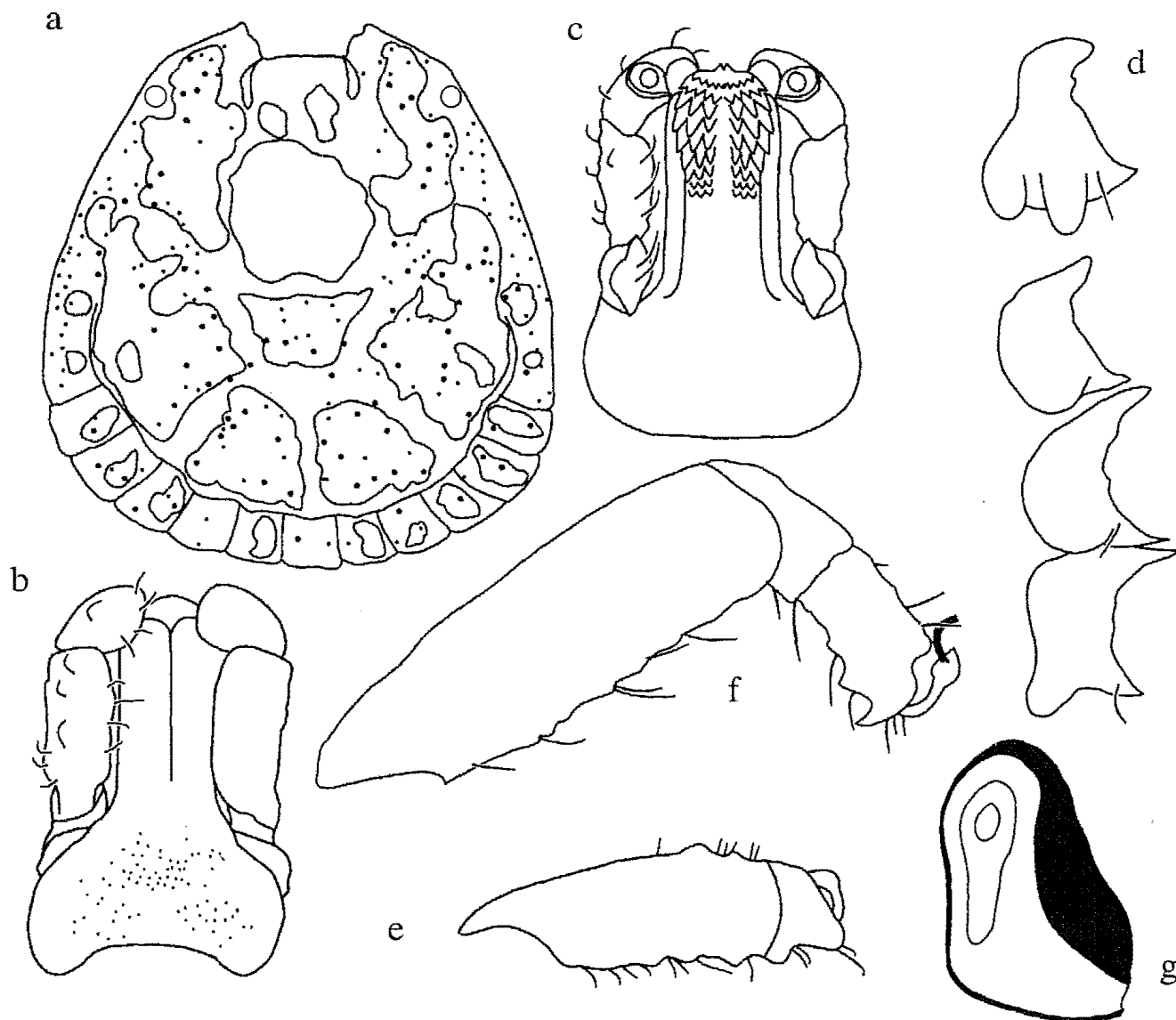


Fig. 54. *Amblyomma sparsum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

times longer than segment III, length of segment II 0.96, length of segment III 0.39. Segment I ventrally with a sharp, interrupted ridge ending anteriorly with a small, pointed spur and posteriorly with a larger, blunt spur. Hypostome length 1.46, length of toothed portion 0.76; with a large corona of fine denticles apically, apex slightly notched, each half of the apex nipple-shaped and pointed; dental formula 3/3 in the anterior files and 4/4 posteriorly.

Legs (Fig. 54 d–f). Coxa I with 2 spurs, the external spur longer, both broadly rounded. Coxae II–III with a single, short, broadly rounded, paddle-shaped spur. Coxa IV with a single, relatively long, triangular, broadly rounded spur directed postero-medially. Trochanters lack spurs. Tarsus I length 1.53, breadth 0.51; with a small, blunt ventroapical hump and 3 blunt ventral humps. Tarsus IV length 1.2, breadth 0.36; with 1 strong ventroapical hook and 1 strong, triangular ventral hook. Tibia IV

length 2.09, breadth 0.63. Leg segments narrowly annulated at distal ends.

Venter with short, thin, curved, cone-like setae. Genital aperture situated between coxae II. Spiracular plate long, medial and lateral margins parallel, medial margin slightly concave, posterior margin slightly convex, dorsal prolongation long, broad, forming an obtuse angle with anterior-posterior axis of spiracular plate (Fig. 54g). Postanal groove without an unpaired median groove. Integumentary hard elements of the ventral skeleton of idiosoma consist of evident unpaired anal and 2 paired postanal shields, and festoons' shields.

**Female** (Fig. 55). Length from apices of scapulae to posterior body margin 6.15, breadth 5.35. Dorsal body setae short, relatively thick, cone-like. Ventral body setae more thin, short, curved. Marginal groove complete, beginning near the posterior margin of scutum. Festoons rectangular.

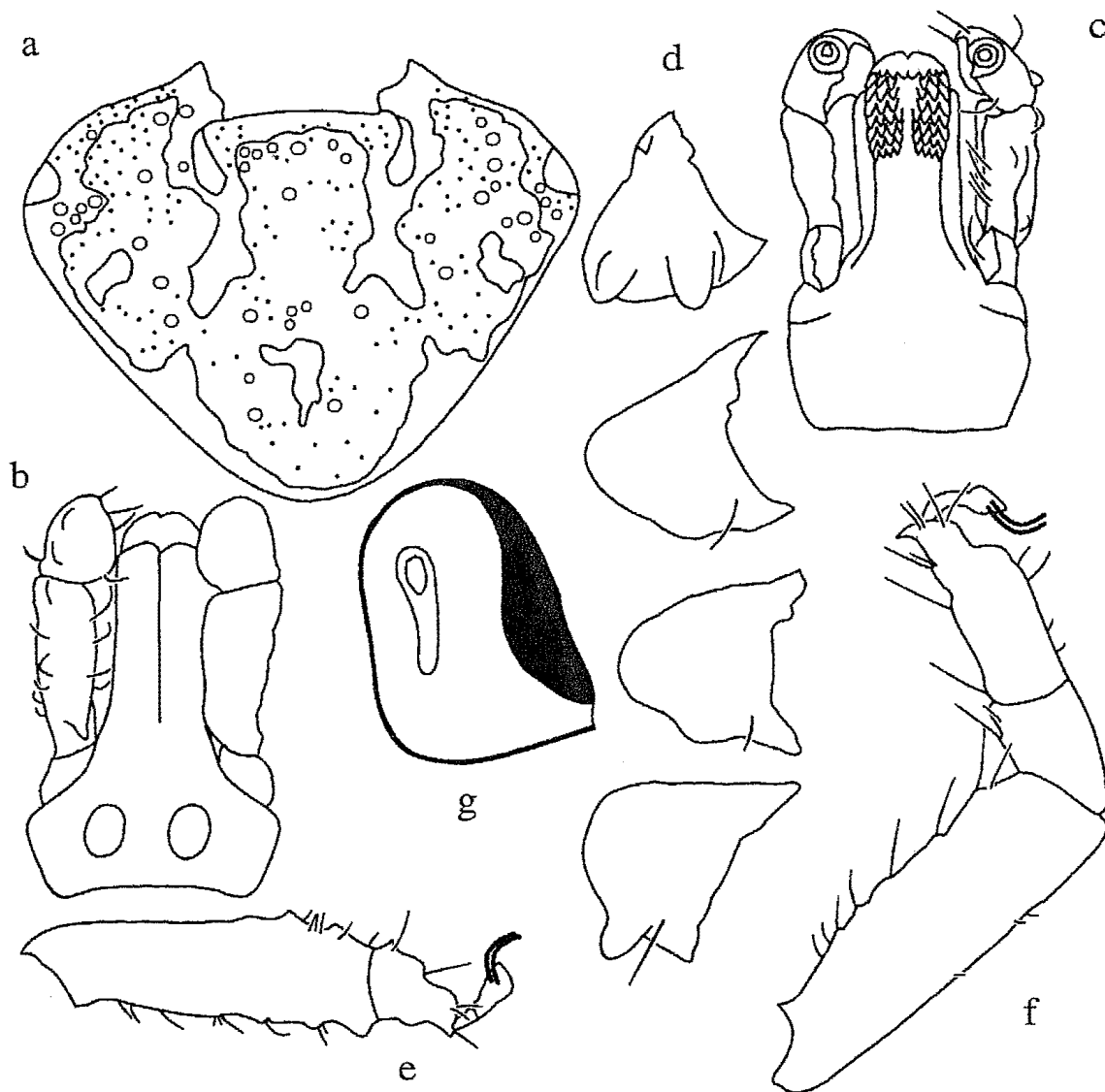


Fig. 55. *Amblyomma sparsum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

Scutum (Fig. 55a) length 2.53, breadth 3.1; brown, ornate, a large, metallic, in complicated and symmetrical form, gold-crimson with greenish border patch. Scutal punctations both shallow, small and deep, large, more numerous in the posterior area. Scapulae each with small, pyramidal hump directed ventrally. Cervical grooves short, deep, bean-like anteriorly then diverging as shallow depressions. Eyes flat.

Capitulum (Fig. 55 b,c) length from palpal apices to cornua apices 1.96, breadth 1.07; cornua very short, narrowly rounded; posterior margin straight, lateral margins straight, ventrally posterior margin straight. Surface of basis slightly wrinkled, punctation few, very small. Porose areas oval, not deeply depressed, diameter of one area 0.17, interporose area 0.19. Palpi length 1.31, breadth 0.33; wrinkled. Segment II 2 times longer than segment III, length of segment II 0.79, length of segment III 0.4. Segment I ventrally with a slope,

sinuous ridge ending anteriorly and posteriorly with small, pointed spurs. Hypostome length 1.17, length of toothed portion 0.6; with a small corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3 in the anterior files and 4/4 posteriorly.

Legs (Fig. 55 d-f). Coxa I with 2 spurs, the external spur a little longer, both broadly rounded. Coxa I with a small, triangular, pointed spur-like callosity anteriorly. Coxae II-III each with a single, very short, broadly rounded, triangular spur. Coxa IV with a single, relatively long, triangular spur directed posteromedially. Trochanters lack spurs. Tarsus I length 1.47, width 0.4; with a small, pointed ventroapical hump and 3 blunt, ventral humps. Tarsus IV length 1.21, breadth 0.27; with a very strong ventroapical hook and a triangular, pointed ventral hump. Tibia IV length 1.47, breadth 0.4. Leg segments narrowly annulated at distal ends.

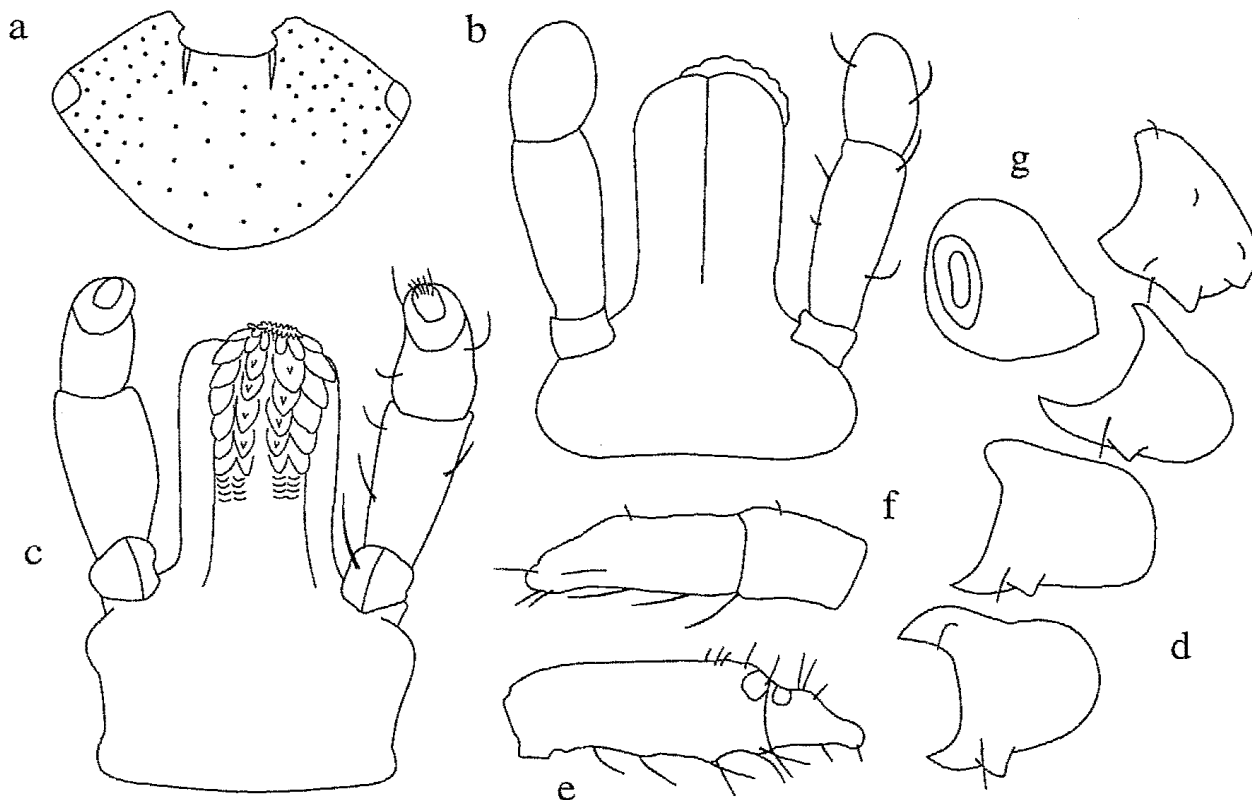


Fig. 56. *Amblyomma sparsum*, nymph: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus IV; g — spiracular plate.

Medial and lateral margins of spiracular plate parallel, medial margin slightly concave, posterior margin approximately straight, dorsal prolongation narrow, forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 55g). Genital aperture “U” shaped, situated between coxae II–III. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Nymph** (Fig. 56) (specimens decomposed and disarticulated). Dorsal body setae short, needle-shaped. Ventral body setae long, needle-shaped. Marginal groove absent. Festoons evident, rectangular.

Scutum (Fig. 56a) length 0.9, 0.8, breadth 1.2, 1.0. Yellow-brown, darker in each lateral area, inornate. Posterior margin broadly rounded, posterolateral margins nearly straight, anterolateral margins slightly convex. Surface with deep, large, few, smaller in central area punctations. Cervical grooves very short, straight. Eyes bulging, large, marginal.

Capitulum (Fig. 56 b,c) length from palpal apices to posterior margin of basis 0.48, 0.45, breadth 0.35, 0.31. Basis capituli subrectangular, posterior margin nearly straight, lateral margins bluntly rounded, cornua absent; ventrally posterior margin convex. Punctations of basis capituli very few, deep, large. Palpi length 0.37, 0.35, breadth 0.09, 0.075; smooth. Segment II 1.5, 1.4 times longer than segment III, length of segment II 0.2, 0.18, length of

segment III 0.13. Segment I ventrally with a sloping ridge ending with a very short, blunt spur directed posteriorly. Hypostome length 0.29, 0.28, length of toothed portion 0.23, 0.22. Apex rounded, with a corona consisting of two rows of fine denticles; dental formula 2/2 with 6 denticles per file.

Legs (Fig. 56 d–f) Coxa I with 2 triangular, pointed spurs, the external spur longer. Coxae II–III each with a single, short, triangular, pointed spur. Coxa IV with a single, slightly longer, triangular spur. Trochanters lack spurs. Tarsus I length 0.28, width 0.07, without ventroapical hook. Tarsus IV length 0.23, breadth 0.06, without ventroapical hook.

Spiracular plate pyriform with very broad dorsal prolongation (Fig. 56g). Postanal groove without unpaired, median groove.

**Larva** (Fig. 57) (engorged). Length from apices of scapulae to posterior body margin 1.7, breadth 1.4. Scutum length 0.36, breadth 0.43; brown, darker around the eyes. Posterior margin bluntly rounded, anterolateral margins slightly convex, posterolateral margins slightly concave. Cervical grooves deep, almost straight, parallel, reaching the half of the scutum length. Eyes large, marginal.

Capitulum (Fig. 57 b,c) length from palpal apices to posterior margin of basis 0.17, breadth 0.13. Basis capituli dorsally subtriangular, posterior margin straight, lateral margins narrowly round-

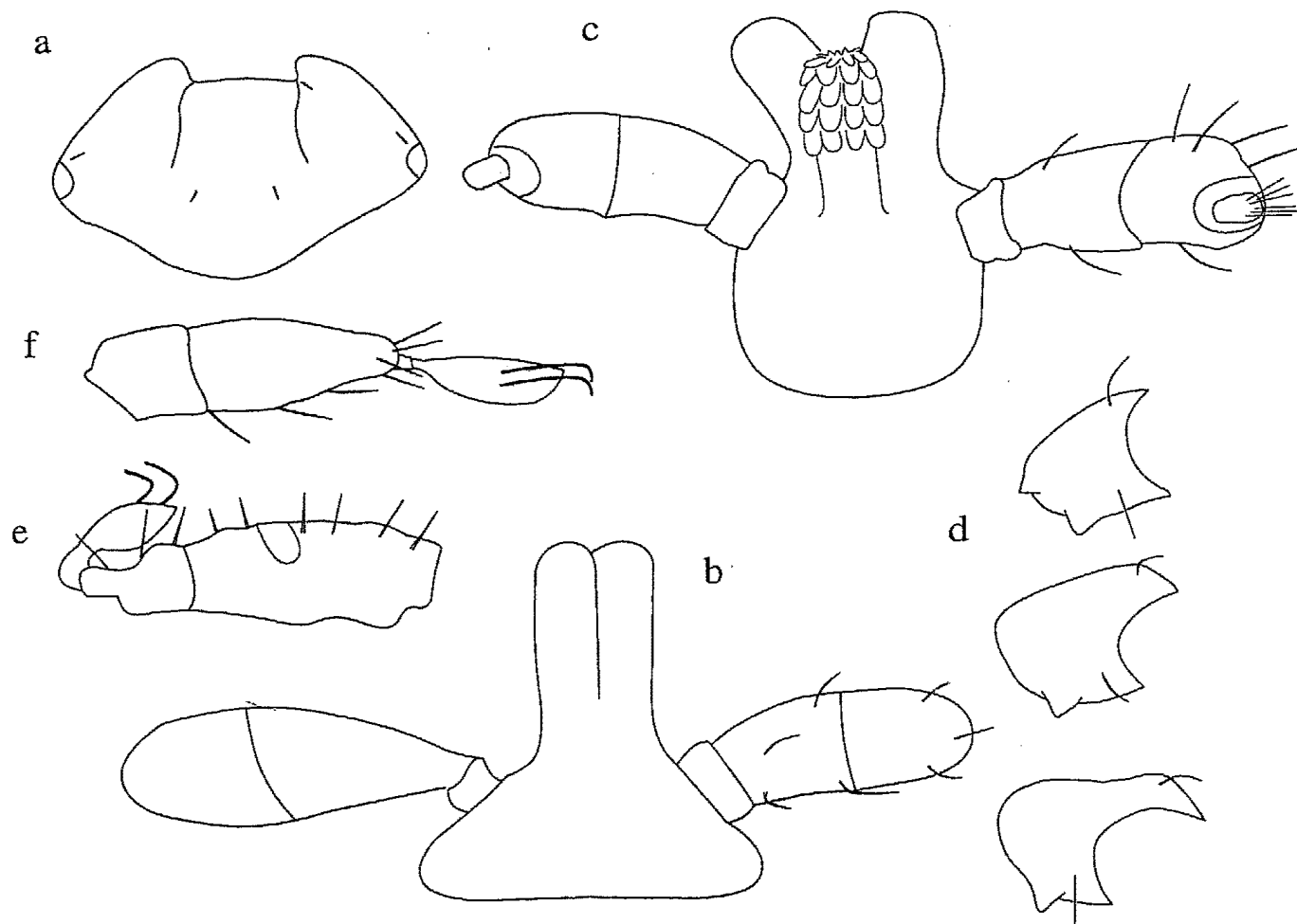


Fig. 57. *Amblyomma sparsum*, larva: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus III.

ed, cornua absent. Ventrally posterior margin slightly convex. Palpi length 0.13, breadth 0.05. Segment II and segment III nearly equal in length, segment II 0.056 long, segment III 0.05 long. Hypostome length 0.14, length of toothed portion 0.1; dental formula 2/2 with 5 denticles per file. Apex rounded with a corona consisting of 2 rows of fine denticles.

Legs (Fig. 57 d–f). Coxa I with 2 triangular spurs, the external spur longer. Coxae II–III with a single, short, triangular, pointed spur. Tarsus I length 0.2, breadth 0.09, without hook. Tarsus III length 0.017, breadth 0.06, without hook.

**Material:** male and female (US National Tick Collection, RML 120008) Zimbabwe, Chete Wildlife Area, 26.09.1990, ex *Diceros bicornis* (Rhinocerotidae), coll. C.E. Yunker; 2 nymphs (US National Tick Collection, RML 118415) Zimbabwe, coll. C.E. Yunker; larva (US National Tick Collection, RML 072493) Ethiopia, Illubabor, Gambela, 6.12.1972, ex *Vidua macroura*, coll. J.S. Ash.

***Amblyomma splendidum* Giebel, 1877**

*Amblyomma splendidum* Giebel, 1877: 293, original description.

*Xiphiastor rostratum* Murray, 1877: 201, fig., junior synonym.

*Amblyomma quantini* Martin, 1895: 267, pl. 14, figs. 1–11, junior synonym.

*Amblyomma hebraeum* var. *splendidum* Giebel: 293 (*sensu* Neumann, 1905: 234), junior synonym.

*Amblyomma hebraeum splendidum* Giebel: 293 (*sensu* Neumann, 1911: 80), junior synonym.

*Amblyomma splendens* Lewis, 1939: 262 (*lapsus calami*), junior synonym.

**Male** (Fig. 58). Length from apices of scapulae to posterior scutal margin 5.4, breadth 4.05. Outline oval broadest at level of spiracular plate. Scutum brown, ornate, some large, metallic, gold-yellow with green border, symmetrical distributing patches and small patches on the festoons. Punctations few, small, shallow. Scapulae each with small, pyramidal hump directed ventrally. Cervical grooves short, deep, pit-like anteriorly then diverging as shallow depressions. Marginal groove shallow, complete beginning at level of legs II. Festoons narrow, with sclerotized plates extending posterior margin of the festoons. Eyes slightly bulging.

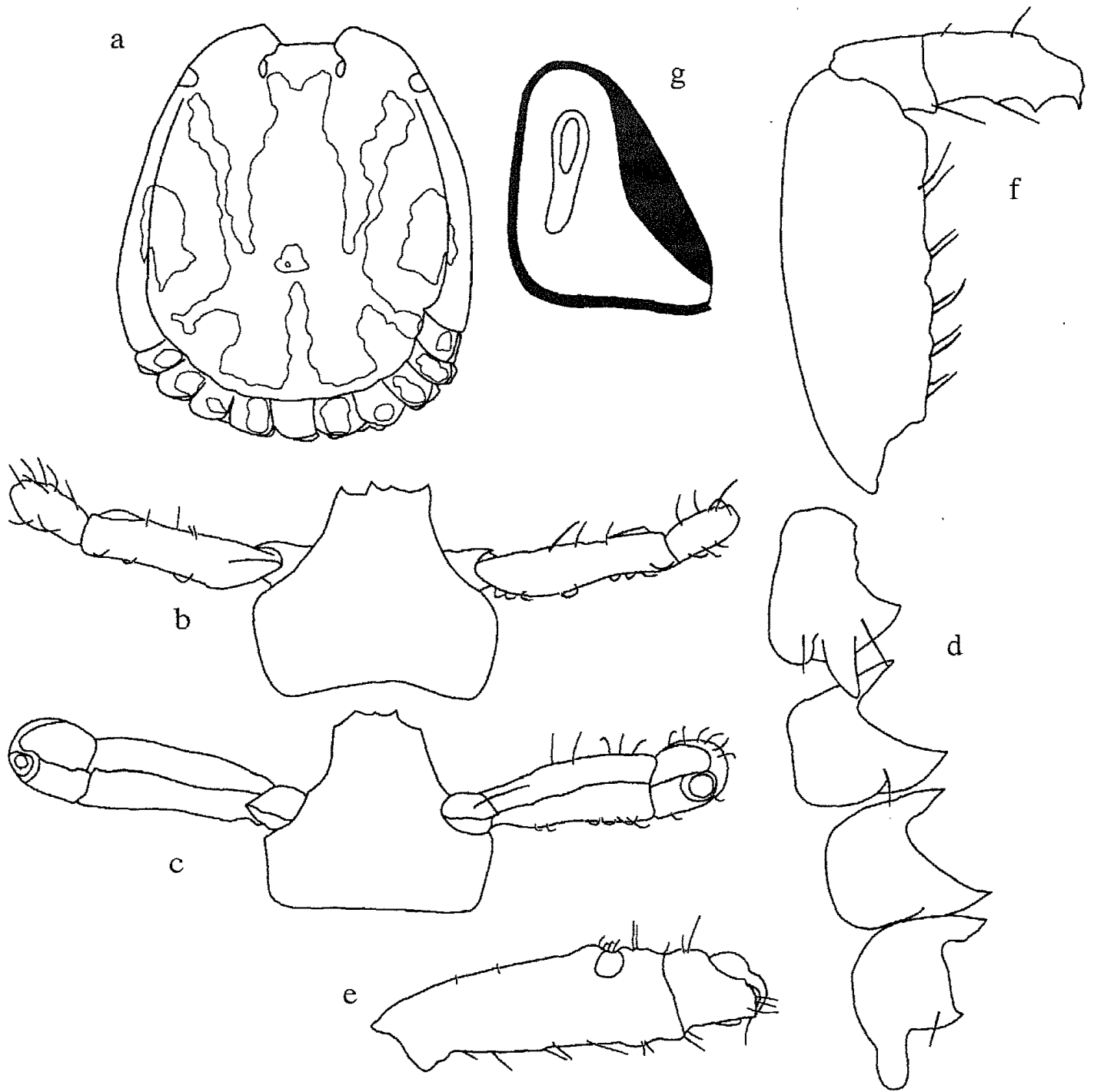


Fig. 58. *Amblyomma splendidum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

Capitulum (Fig. 58 b,c) length from palpal apices to cornua apices 1.99, breadth 1.0; punctations small, shallow; posterior margin concave; cornua short, narrowly rounded; external margins almost straight; ventrally posterior margin straight. Palpi length 1.29, breadth 0.3. Segment II 2.5 times longer than segment III, length of segment II 0.93, length of segment III 0.37. Segment I ventrally with a slope ridge ending anteriorly and posteriorly with a small, pointed spurs. Hypostome broken. Dental

formula 3/3 in the anterior files and 4/4 posteriorly [Elbl and Anastos, 1966].

Legs (Fig. 58 d-f). Coxa I with 2 spurs, the external spur longer and reaching the anterior margin of coxa II, triangular, pointed, internal spur broadly rounded. Coxae II-III with a single, very short, broadly rounded, paddle-shaped spur. Coxa IV with a single, very long, rounded spur directed posteriorly. Trochanters lack spurs. Tarsus I length 1.29, width 0.39; without ventroapical hook but

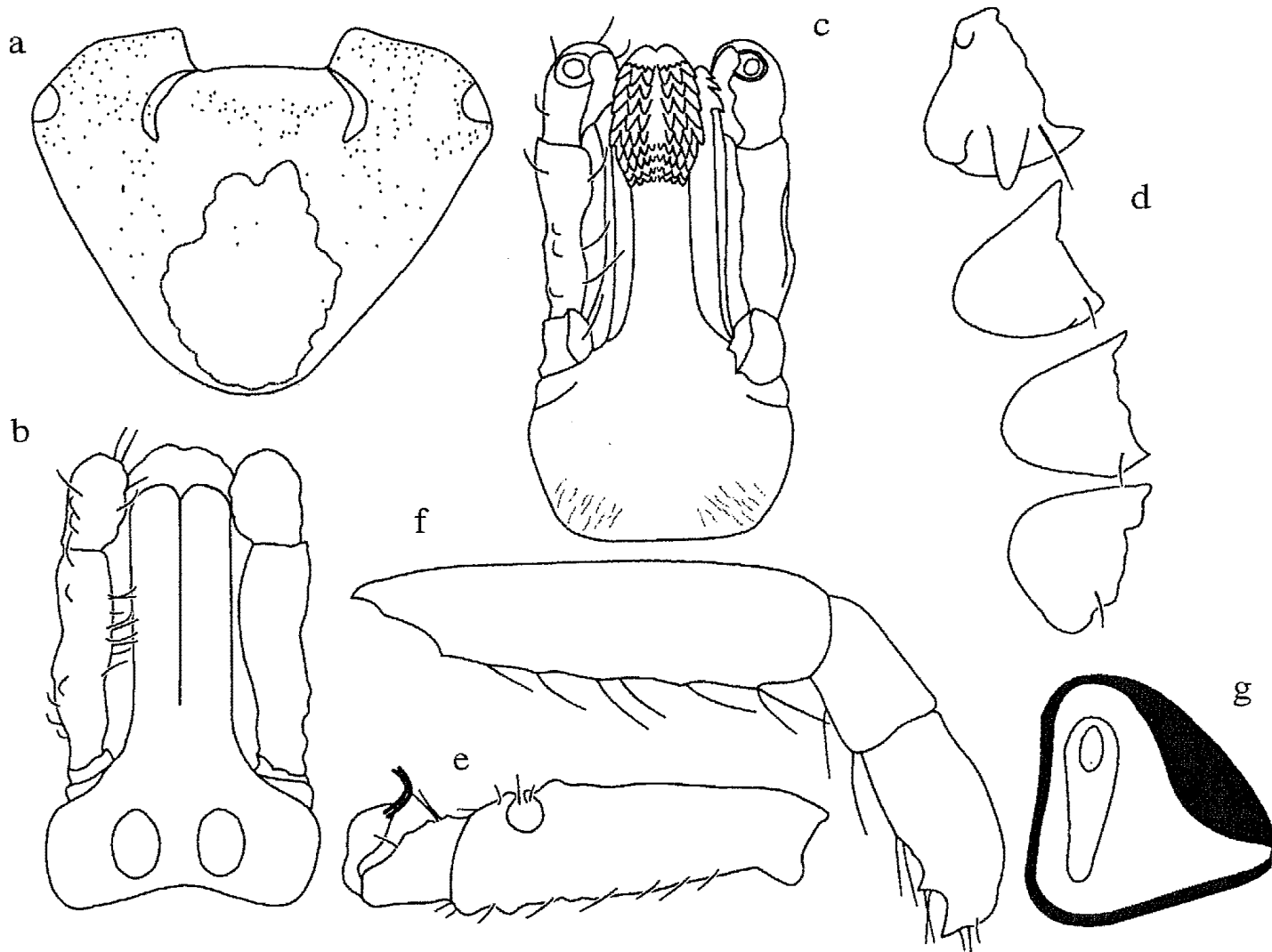


Fig. 59. *Amblyomma splendidum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

with 2 ventral, blunt humps. Tarsus IV length 0.86, breadth 0.3; with 1 strong, pointed ventroapical hook and 1 strong, triangular ventral hook. Tibia IV length 1.57, breadth 0.51. Leg segments with yellow annular wheels at distal ends.

Venter with long, straight, cone-like setae. Genital aperture situated between coxae II–III. Medial and lateral margins of spiracular plate slightly diverging, medial and posterior margins straight, dorsal prolongation long, triangular, perpendicular to anterior-posterior axis of spiracular plate (Fig. 58g). Postanal groove without a unpaired median groove. Integumentary hard elements of the ventral skeleton of idiosoma consist of evident unpaired anal and 2 paired postanal shields, and small, transparent festoons' shields.

**Female** (Fig. 59). Length from apices of scapulae to posterior body margin 4.8, breadth 4.1. Dorsal and ventral body setae short, very thin, curved, few in number. Marginal groove complete, beginning near the posterior margin of scutum. Festoons rectangular.

Scutum (Fig. 59a) length 2.5, breadth 2.8; brown, ornate, a large, metallic, dim, crimson patch in the posterior part of the scutum. Scutal punctations small, shallow, dense and larger in each scapular area. Cervical grooves short, deep, converging anteriorly then diverging as shallow depressions. Eyes large, slightly bulging, marginal.

Capitulum (Fig. 59 b,c) length from palpal apices to cornua apices 1.96, breadth 1.04; cornua short, narrowly rounded; posterior margin concave, lateral margins almost straight, ventrally posterior margin straight. Punctations few, small, shallow. Porose areas oval, not deeply depressed, diameter of one area 0.19, interporose area 0.14. Palpi length 1.43, breadth 0.26; slightly wrinkled. Segment II 2.25 times longer than segment III, length of segment II 0.9, length of segment III 0.4. Segment I ventrally with a sharp ridge ending anteriorly and posteriorly with a small, pointed spurs. Hypostome length 1.36, length of toothed portion 0.71; with a large corona of fine denticles apically, apex slightly notched, rounded; dental



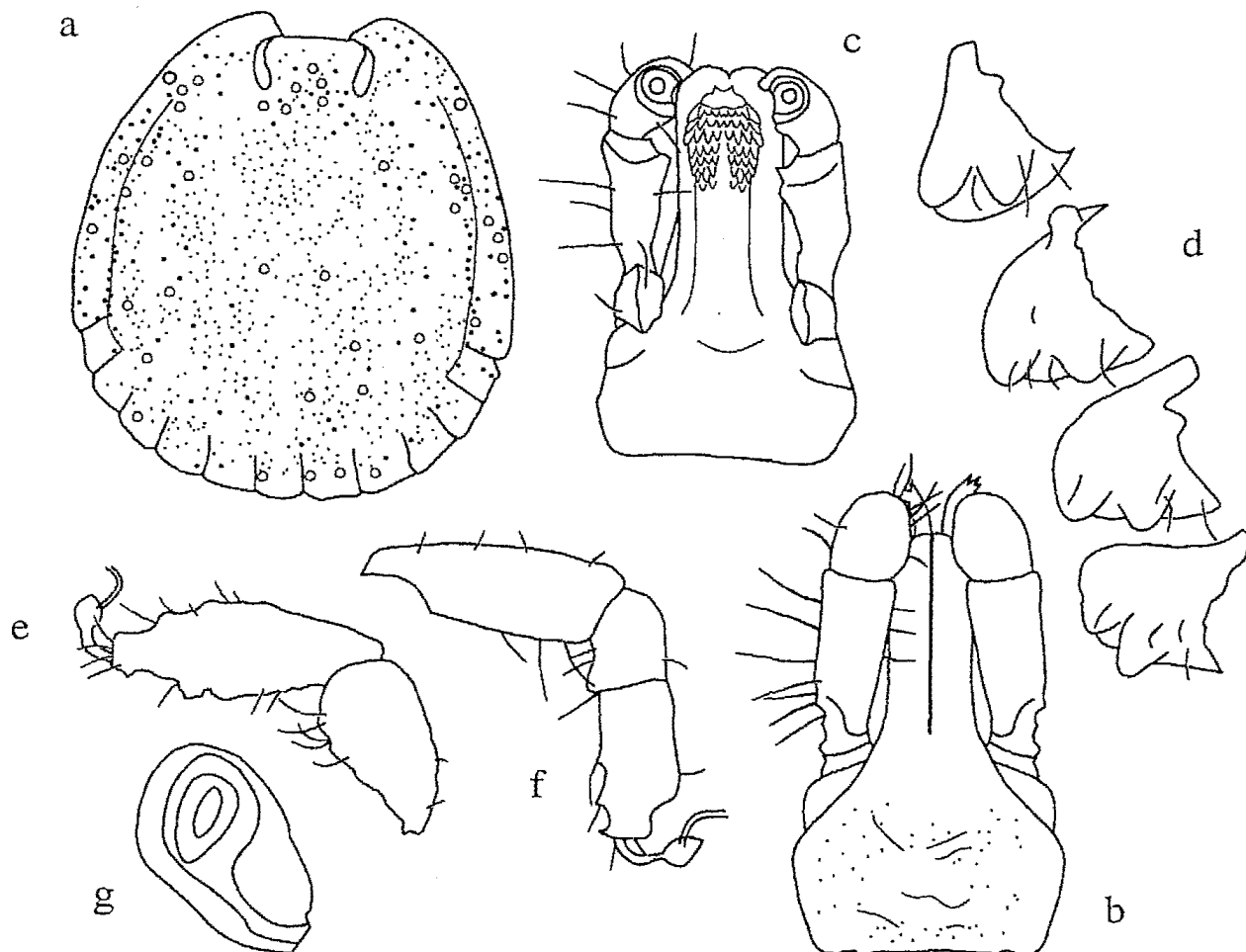


Fig. 60. *Amblyomma sylvaticum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus and tibia I; f — tarsus and tibia IV; g — spiracular plate.

formula 3/3 in the 3 anterior files, then one file 4/4 and 5/5 in the posterior files.

Legs (Fig. 59 d–f). Coxa I with 2 spurs, the external spur large, long, triangular, narrowly rounded, internal spur broader, spatulate. Coxa I with a small, pointed, spur-like callosity anteriorly. Coxae II–III each with a single, very short, broadly rounded, paddle-shaped spur. Coxa IV with a single, relatively long, broadly rounded spur. Trochanters lack spurs. Tarsus I length 1.44, width 0.36, without ventroapical hook but with 2 ventral, small, blunt humps. Tarsus IV length 1.11, breadth 0.29; with 1 strong, pointed ventroapical hook and one triangular, pointed ventral hump. Tibia IV length 1.19, breadth 0.37. Leg segments with yellow annular wheels at distal ends

Medial and lateral margins of spiracular plate diverging, medial and posterior margins straight, dorsal prolongation triangular, relatively long, triangular, forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 59g). Genital aperture “V” shaped, situated between coxae II–III. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Immatures** undescribed.

**Material:** male and female (US National Tick Collection, RML 46466) Cameroon, ex buffalo, coll. Dr. Waldow (in the Dr. Paul Schulze Collection).

***Amblyomma sylvaticum* (De Geer, 1778)**

*Acarus sylvaticus* De Geer, 1778: 162, original description.

*Cynorhaestes sylvaticus* (De Geer, 1778) (*sensu* Hermann, 1804: 68), junior synonym.

*Amblyomma latum* Koch, 1844: 231, junior synonym.

*Hyalomma devium* Koch, 1844: 222, junior synonym.

**Male** (Fig. 60). Length from apices of scapulae to posterior scutal margin 3.6, breadth 3.0. Outline oval broadest at level of spiracular plate. Scutum brown, inornate. Punctations dense, small, shallow and few, larger and more deep. Cervical grooves short, deep, converging. Marginal groove incomplete beginning at level of legs II and embracing first festoon. Festoons rectangular, without sclerotized plates extending posterior margin of the festoons. Eyes small, round, bulging, situated at a distance from scutal margin.

Capitulum (Fig. 60 b,c) length from palpal apices to cornua apices 1.36, breadth 0.73; slightly

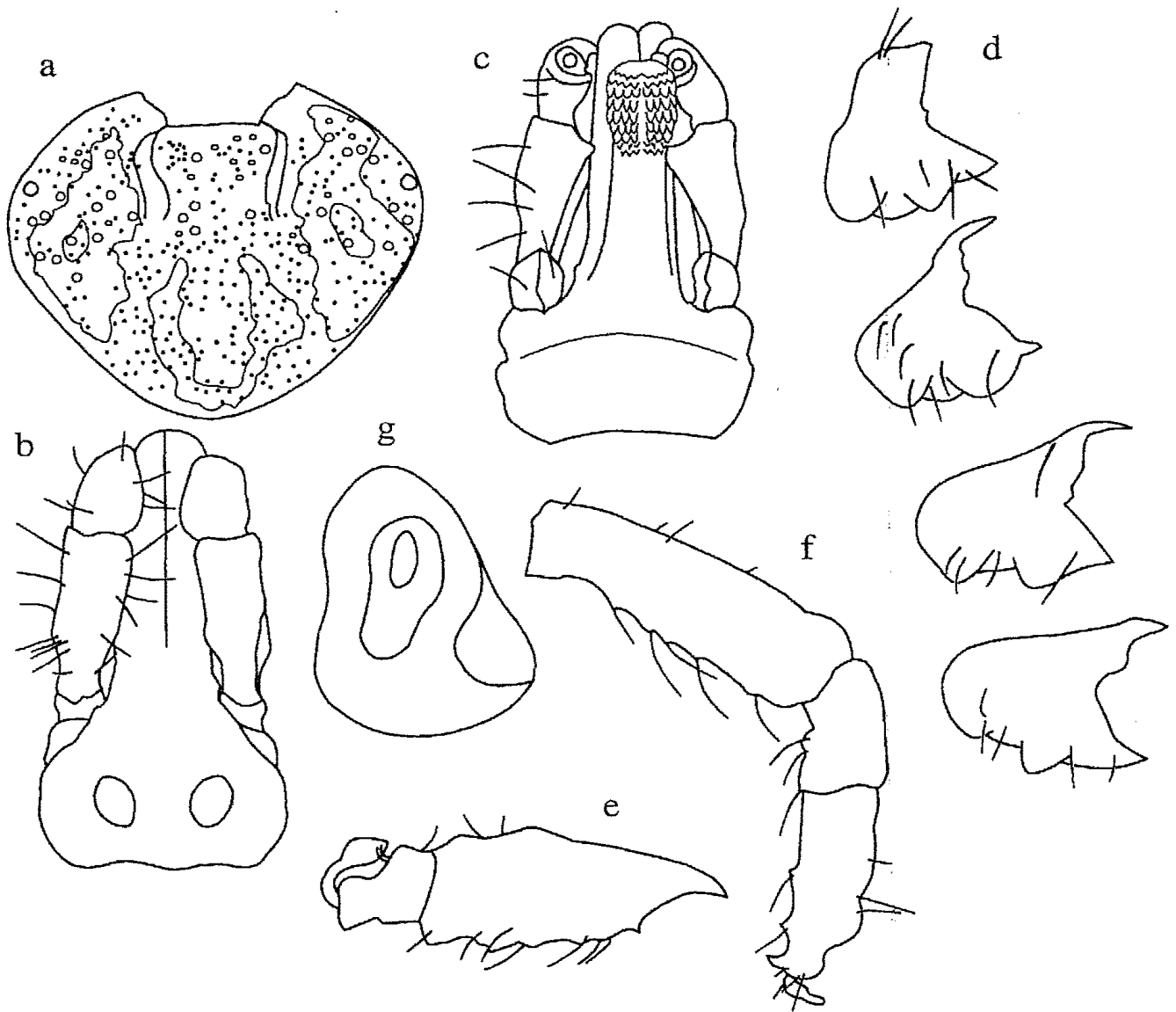


Fig. 61. *Amblyomma sylvaticum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

wrinkled, punctations small, shallow; posterior margin straight; cornua very small, narrowly rounded; external margins almost straight; ventrally posterior margin slightly convex. Palpi length 0.86, breadth 0.21, slightly wrinkled. Segment II ventrally with pointed anteromedial edge. Segment II 1.9 times longer than segment III, length of segment II 0.5, length of segment III 0.27. Segment I ventrally with a slope ridge ending posteriorly with a small, pointed spur. Hypostome length 0.79, length of toothed portion 0.36; with a small corona of fine denticles apically, apex slightly notched, each half of the apex nipple-shaped and pointed; dental formula 4/4.

Legs (Fig. 60 d–f). Coxa I with 2 equal, triangular, broadly rounded spurs. Coxae II–III each with 2 equal, triangular, broadly rounded spurs. Coxa II with a paddle-shaped callosity directed anteriorly. Coxa IV with 2 triangular, broadly rounded spurs, the external spur longer. Trochanters lack

spurs. Tarsus I length 0.71, width 0.29, broadest at level of the middle of length; without ventroapical hook. Tarsus IV length 0.76, breadth 0.21; with 1 small, pointed ventroapical hook and 1 small, pointed ventral hook. Tibia IV length 0.73, breadth 0.26. Leg segments with long, straight setae.

Venter with long, curved, cone-like setae. Genital aperture situated between coxae II. Spiracular plate relatively small, oval, with very long and very narrow dorsal prolongation, perpendicular to anterior-posterior axis of spiracular plate (Fig. 60g). Postanal groove with a shallow, unpaired median groove. Integumentary hard elements of the ventral skeleton of idiosoma absent.

**Female** (Fig. 61). Length from apices of scapulae to posterior body margin 6.7, breadth 5.25. Dorsal body setae few, short, setae around lateral margins of body dense and very long, curved, cone-like. Ventral body setae short, thin, curved. Marginal groove incomplete, beginning near the poste-

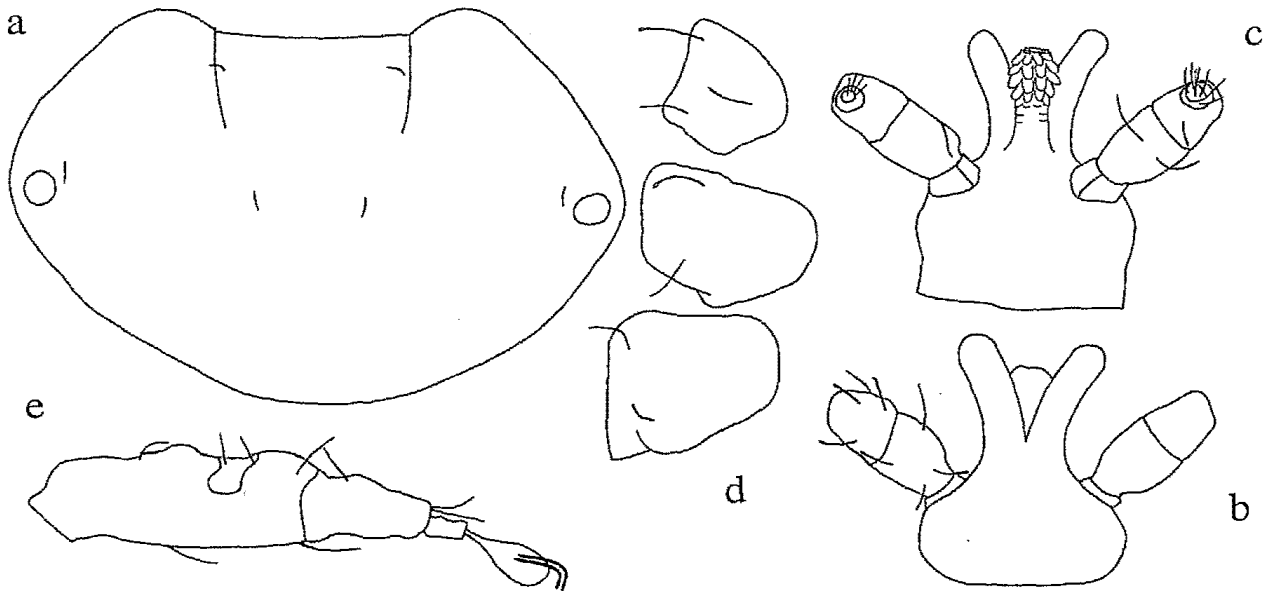


Fig. 62. *Amblyomma sylvaticum*, larva: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I.

rior margin of scutum and embracing first festoon. Festoons evident.

Scutum (Fig. 61a) length 2.6, breadth 3.2; dark-brown, ornate, three metallic, large, gold-pale patches in the each lateral area and in the posterior area. Scutal punctations small, shallow, more numerous in the central third of scutum, plus large and deep in the anterior half of the scutum. Cervical grooves relatively long, deep, almost parallel and wrinkled anteriorly then diverging as shallow depressions. Eyes small, round, very bulging, situated at a distance from scutal margin.

Capitulum (Fig. 61 b,c) length from palpal apices to cornua apices 1.64, breadth 1.0; cornua very short, narrowly rounded; posterior margin sinuous, lateral margins slightly convex, ventrally posterior margin slightly concave. Surface of basis slightly wrinkled. Porose areas oval, deeply depressed, diameter of one area 0.17, interporose area 0.19. Palpi length 1.14, breadth 0.3; wrinkled. Segment II 2.5 times longer than segment III, length of segment II 0.71, length of segment III 0.29. Segment II ventrally with pointed anteromedial edge. Segment I ventrally with a slope, interrupted ridge ending posteriorly with a small, pointed spur. Hypostome length 1.04, length of toothed portion 0.5; with a large corona of fine denticles apically, apex slightly notched, rounded; dental formula 4/4.

Legs (Fig. 61 d-f). Coxa I with 2 equal spurs, the external spur triangular, narrowly rounded, internal spur broadly rounded. Coxae II-III each with 2 equal, triangular, broadly rounded spurs. Coxa II with a cylinder-shaped callosity directed

anteriorly. Coxa IV with 2 triangular, narrowly rounded spurs, the external spur longer. Trochanters lack spurs. Tarsus I length 0.93, width 0.3, with a small, blunt ventroapical hump and with 2 ventral, small, blunt humps. Tarsus IV length 1.06, breadth 0.23, with 1 strong ventroapical hook and a triangular, pointed ventral hump. Tibia IV length 1.09, breadth 0.33.

Medial and lateral margins of spiracular plate almost parallel, medial margin slightly concave, posterior margin convex, dorsal prolongation triangular, pointed, forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 61g). Genital aperture "U" shaped, situated between coxae II-III. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

#### Nymph undescribed.

**Larva** (Fig. 62). Length from apices of scapulae to posterior body margin 1.0; breadth 0.9. Dorsal body setae: 2 central dorsal pairs: j5 broken, J2 broken; 8 marginal dorsal pairs: s3 0.028; s4 broken; s6 0.022; S1 0.022; S2 0.024; S3 0.028; S4 0.03; S5 0.03. Ventral body setae: 3 sternal pairs, St1 0.026; St2 0.03; St3 0.028; 2 preanal pairs Jv3 0.022, Jv5 broken; 4 premarginal pairs Zv1 0.03, Zv2 0.034, Zv4 0.028, Zv5 0.028; 5 marginal ventral pairs Sv1 0.03, Sv2 0.028, Sv3 0.03, Sv4 0.026, Sv5 0.032; and 1 pair on anal valves.

Scutum (Fig. 62a) length 0.44, breadth 0.61, inornate, yellow, darker around the eyes. Posterior margin convex. Cervical grooves long, straight, surface reticulated. Scutal setae: 3 pairs, z2 0.014,

s2 0.014, j3 0.01. Eyes small, round, set at a distance of the lateral margins of scutum.

Capitulum (Fig. 62 b,c) length from palpal apices to posterior margin of basis 0.27, breadth 0.22. Basis capituli dorsally subrectangular, lateral margins bluntly rounded, posterior margin straight, cornua absent. Ventrally posterior margin undulated. Palpi length 0.15, breadth 0.007, smooth. Segment II 0.074 long; segment III 0.07 long. Setae number: on segment II dorsally 4, on segment III dorsally 3, all smooth, thick, with enlarged tops. No setae on segment I. Hypostome length 0.124, length of toothed portion 0.076; dental formula 2/2 with five denticles per file. Apex with a corona consisting of 2 rows of fine denticles.

Legs (Fig. 62 d,e). Coxa I with a single triangular, broadly rounded spur; coxa II with a single short, triangular, rounded spur; coxa III with a single larger, bluntly rounded spur. Coxa I with 3 setae, all smooth, with enlarged tops. Coxae II and III each with 2 smooth setae. Trochanters lack spurs. Tarsus I 0.23 long, 0.07 broad, without hook. Tarsus III 0.2 long, 0.05 broad, without hook.

**Material:** male (US National Tick Collection, RML 119155) South Africa, Cape of Good Hope, ex tortoise, 11.03.88, coll. C.E. Yunker; female (US National Tick Collection, RML 37434) South Africa, Cape Province, ex *Homopus areolatus* (reptile), -06.1961, coll. A. Eglis; larva (US National Tick Collection, RML 121223) South Africa, Cape Province, Moorreesburg, ex *Chersina angulata* (Testudinidae), 8.12.1975, coll. Ian McKay.

#### *Amblyomma tholloni* Neumann, 1899

*Amblyomma tholloni* Neumann, 1899: 242, original description.

*Haemalastor thollini* (Neumann, 1899) (*sensu* Oudemans, 1939: 76), junior synonym.

**Male** (Fig. 63). Length from apices of scapulae to posterior scutal margin 4.6, breadth 3.7. Outline oval broadest at level of the middle of scutum. Scutum light-brown, inornate. There are ornate specimens [Elbl, Anastos, 1966]. Punctations very shallow, in each lateral area and in the posterior area. Cervical grooves short, not very deep, converging. Marginal groove absent. Festoons narrow, without sclerotized plates extending posterior margin of the festoons. Eyes large, flat.

Capitulum (Fig. 63 b,c) length from palpal apices to cornua apices 1.6, breadth 0.86. Punctations of basis capituli few, small and shallow; posterior margin concave, cornua relatively large, narrowly rounded; external margins almost straight;

ventrally posterior margin straight. Palpi length 1.07, breadth 0.2. Segment II ventrally with prominent anteromedial edge. Segment II 1.9 times longer than segment III, length of segment II 0.64, length of segment III 0.33. Segment I ventrally with a sharp, curved ridge ending posteriorly with a small, blunt spur. Hypostome broken, dental formula 3/3 anteriorly and 4/4 posteriorly [Elbl, Anastos, 1966].

Legs (Fig. 63 d-f). Coxa I with 2 spurs, the external spur longer, triangular, internal spur broader. Coxa I with a evident, spur-like callosity anteriorly. Coxae II-III with a single, very short, broadly rounded, paddle-shaped spur. Coxa IV with a single, relatively long, triangular spur directed posteromedially. Trochanters lack spurs. Tarsus I length 1.24, breadth 0.33; without ventroapical hump. Tarsus IV length 0.96, breadth 0.29; with 1 strong ventroapical hook and 1 pointed, triangular ventral hook. Tibia IV length 1.33, breadth 0.39.

Venter with short, thin, almost straight, cone-like setae. Genital aperture situated between coxae II. Medial and lateral margins of spiracular plate parallel, medial and posterior margins slightly convex, dorsal prolongation long, broad, perpendicular to anterior-posterior axis of spiracular plate (Fig. 63g). Postanal groove with a shallow, unpaired median groove. Integumentary hard elements of the ventral skeleton of idiosoma absent.

**Female** (semiengorged) (Fig. 64). Length from apices of scapulae to posterior body margin 8.6, breadth 6.85. Dorsal and ventral body setae few, short, very thin. Marginal groove complete, beginning near the posterior margin of scutum. Festoons rectangular.

Scutum (Fig. 64a) length 3.13, breadth 3.5, brown, ornate, some small, metallic, greenish patches in the posterior area. Scutal punctations small, very shallow, numerous in the each scapular area. Medial margins of scapulae with ledges. Cervical grooves short, thin, converging anteriorly then broader and deep. Eyes large, flat.

Capitulum (Fig. 64 b,c) length from palpal apices to posterior margin of basis 2.04, breadth 1.1; cornua absent; posterior margin slightly concave, lateral margins straight, ventrally posterior margin slightly convex. Surface of basis slightly wrinkled. Porose areas narrowly-oval, diameter of one area 0.17, interporose area 0.29. Palpi length 1.4, breadth 0.29; slightly wrinkled. Segment II 2.4 times longer than segment III, length of segment II 0.86, length of segment III 0.36. Segment I ventrally with a sharp, arcuate ridge ending posteriorly with

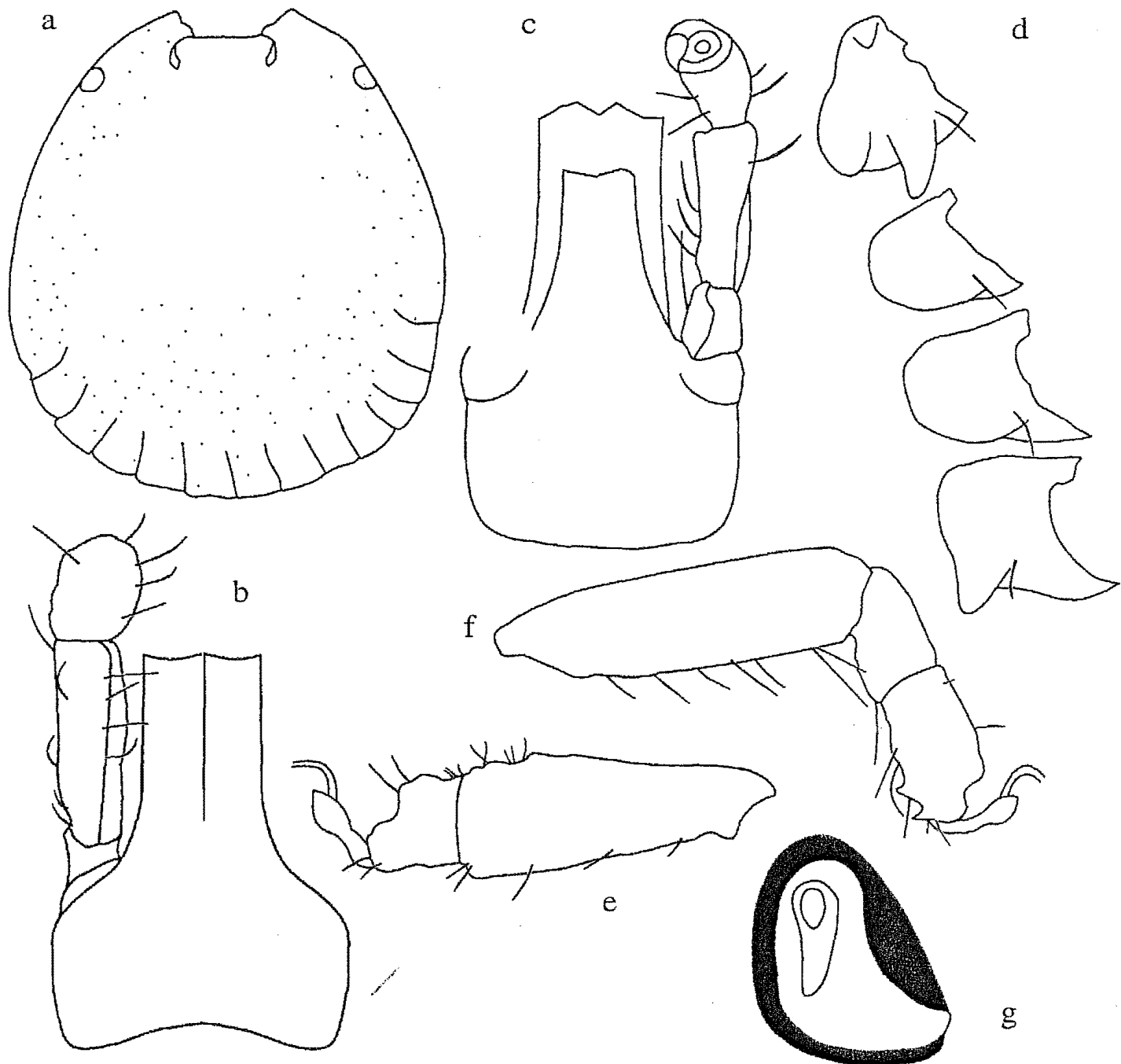


Fig. 63. *Amblyomma tholloni*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

a small, pointed spur. Hypostome broken. Dental formula 4/4 [Elbl, Anastos, 1966].

Legs (Fig. 64 d–f). Coxa I with 2 spurs, the external spur longer, triangular, narrowly rounded, internal spur broadly rounded. Coxa I with a triangular, pointed spur-like callosity anteriorly. Coxae II–III each with a single, very short, broadly rounded, paddle-shaped spur. Coxa IV with a single, short, triangular spur directed posteriorly. Trochanters lack spurs. Tarsus I length 1.53, width 0.43, without ventroapical hump but with 3 blunt, small ventral humps. Tarsus IV length 1.36, breadth 0.33, with a strong ventroapical hook and a trian-

gular, pointed ventral hump. Tibia IV length 1.57, breadth 0.43.

Medial and lateral margins of spiracular plate parallel, medial margin slightly concave, posterior margin slightly convex, dorsal prolongation triangular, forming an acute angle with anterior-posterior axis of spiracular plate (Fig. 64g). Genital aperture “V” shaped, situated between coxae II. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Nymph** (Fig. 65). Length from apices of scapulae to posterior body margin 2.3, breadth 2.0. Dorsal body setae few in number, short, thin, curved.

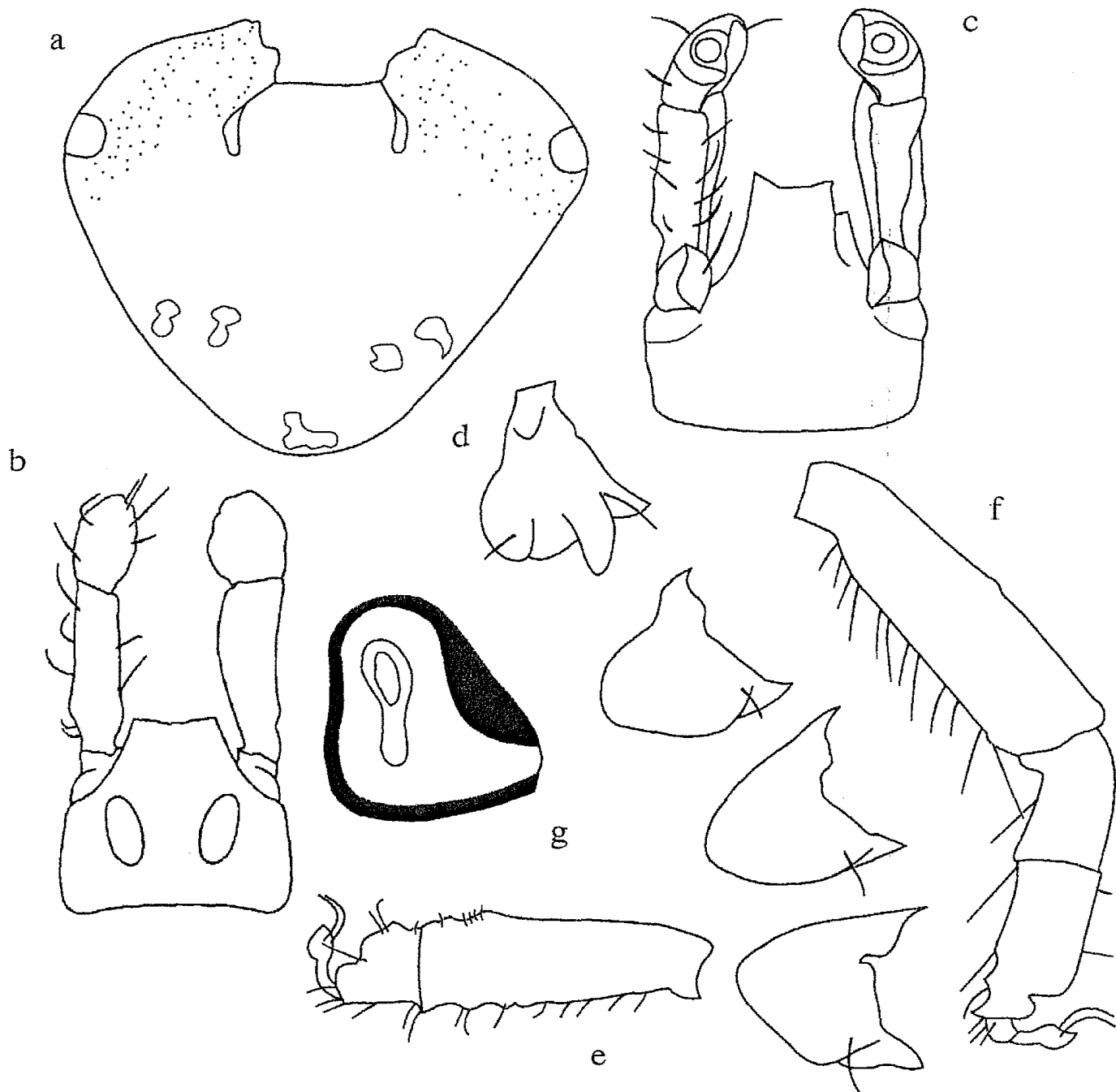


Fig. 64. *Amblyomma tholloni*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

Ventral body setae slightly longer, thin, curved. Marginal groove absent. Festoons evident, narrow.

Scutum (Fig. 65a) length 0.8; breadth 1.0; brown, inornate. Posterior margin rounded, posterolateral margins nearly straight. Punctations deep, relatively large, evenly distributed. Cervical grooves very deep and converging anteriorly, deep and almost straight posteriorly. Eyes slightly bulging, large, marginal.

Capitulum (Fig. 65 b,c) length from palpal apices to posterior margin of basis 0.5; breadth 0.4. Basis capituli subtriangular, posterior margin slightly concave, lateral margins broadly rounded, cornua absent; ventrally posterior margin convex. Punctations of basis capituli small, shallow. Palpi

length 0.37; breadth 0.07. Segment II 2 times longer than segment III, length of segment II 0.2; length of segment III 0.11. Palpi smooth. Segment I ventrally with a sloping ridge ending anteriorly and posteriorly with small, blunt spurs. Hypostome length 0.36; length of toothed portion 0.2; apex rounded; dental formula 2/2 with seven denticles per file.

Legs (Fig. 65 d-f) Coxa I with 2 triangular, narrow spurs, the external spur longer. Coxa II with a single, triangular, narrowly rounded spur. Coxae III-IV each with a single, triangular, pointed spur. Trochanters lack spurs. Tarsus I length 0.47, width 0.11, without ventroapical hook. Tarsus IV length 0.37, breadth 0.1, without ventroapical hook.

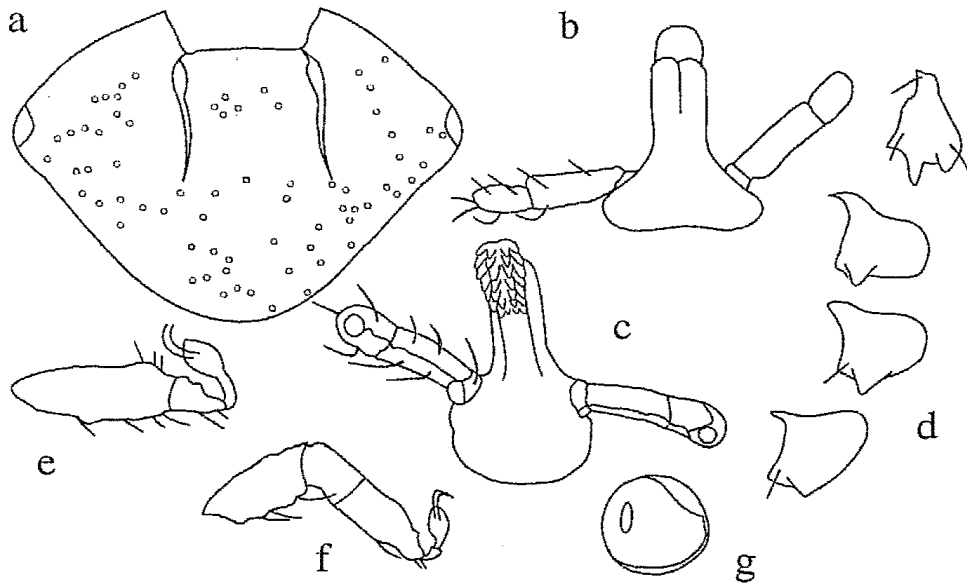


Fig. 65. *Amblyomma tholloni*, nymph: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

Spiracular plate round with very broad, short dorsal prolongation (Fig. 65g). Postanal groove without unpaired, median groove.

**Larva** (Fig. 66) (engorged). Length from apices of scapulae to posterior body margin 1.5, breadth 1.2. Scutum length 0.3, breadth 0.4; brown, inornate. Posterior margin bluntly rounded, anterolateral margins convex, posterolateral margins slightly concave. Scutal punctations very few, small, very shallow; surface reticulated. Cervical grooves deep, straight, parallel, reaching the half of the scutum length. Eyes large, bulging, marginal.

Capitulum (Fig. 66 b,c) length from palpal apices to posterior margin of basis 0.23, breadth 0.17. Basis capituli dorsally subtriangular, posterior margin straight, lateral margins narrowly rounded, cornua absent. Ventrally posterior margin slightly convex. Palpi length 0.15, breadth 0.04. Segment II and segment III equal in length, 0.06 long. Setae number: on segment II — dorsally 3 (0.03–0.04 long), ventrally 2 (0.03), on segment III — dorsally 3 (0.032–0.042), ventrally 2 (0.02–0.03), barbed on its outer surface or split. No setae on segment I. Hypostome length 0.13, length of toothed portion 0.07; dental formula 2/2 with 6 denticles per file. Apex rounded with a small corona consisting of fine denticles.

Legs (Fig. 66 d–f). Coxa I with 2 triangular spurs, the external spur larger. Coxa II with a single, short, triangular, pointed spur. Coxa III with a single, short, broadly rounded spur. Trochanters lack spurs. Tarsus I length 0.2, breadth 0.06, without hook. Tarsus III length 0.15, breadth 0.05, without hook.

**Material:** male and female (US National Tick Collection, RML 86018 HH 34647) Sudan, Equatoria, Torit, Tereteina, ex *Loxodonta africana*, 07.02.1950, coll. H. Hoogstraal; nymph (US National Tick Collection, RML 088822) Uganda, Ruwenzori National Park, Kazinga channel, lake Edward, January 1951, ex *Hippopotamus amphibius*, coll. D. Davis; larva (US National Tick Collection, RML 088822) Uganda, Ruwenzori National Park, Kazinga channel, lake Edward, January 1951, ex *Hippopotamus amphibius*, coll. D. Davis.

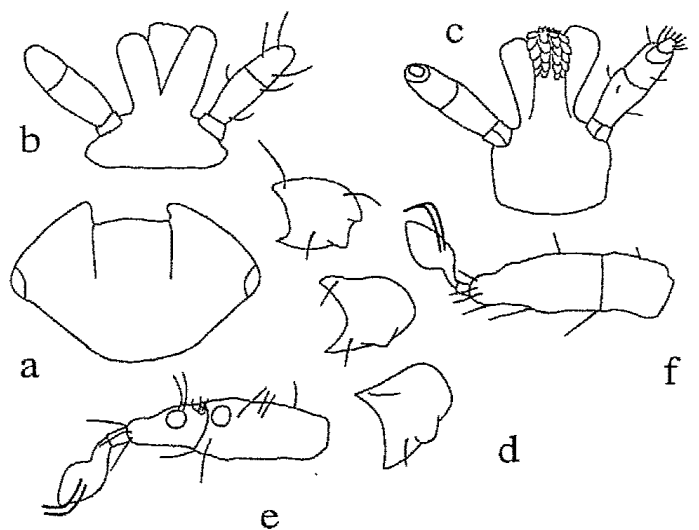


Fig. 66. *Amblyomma tholloni*, larva: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus III.

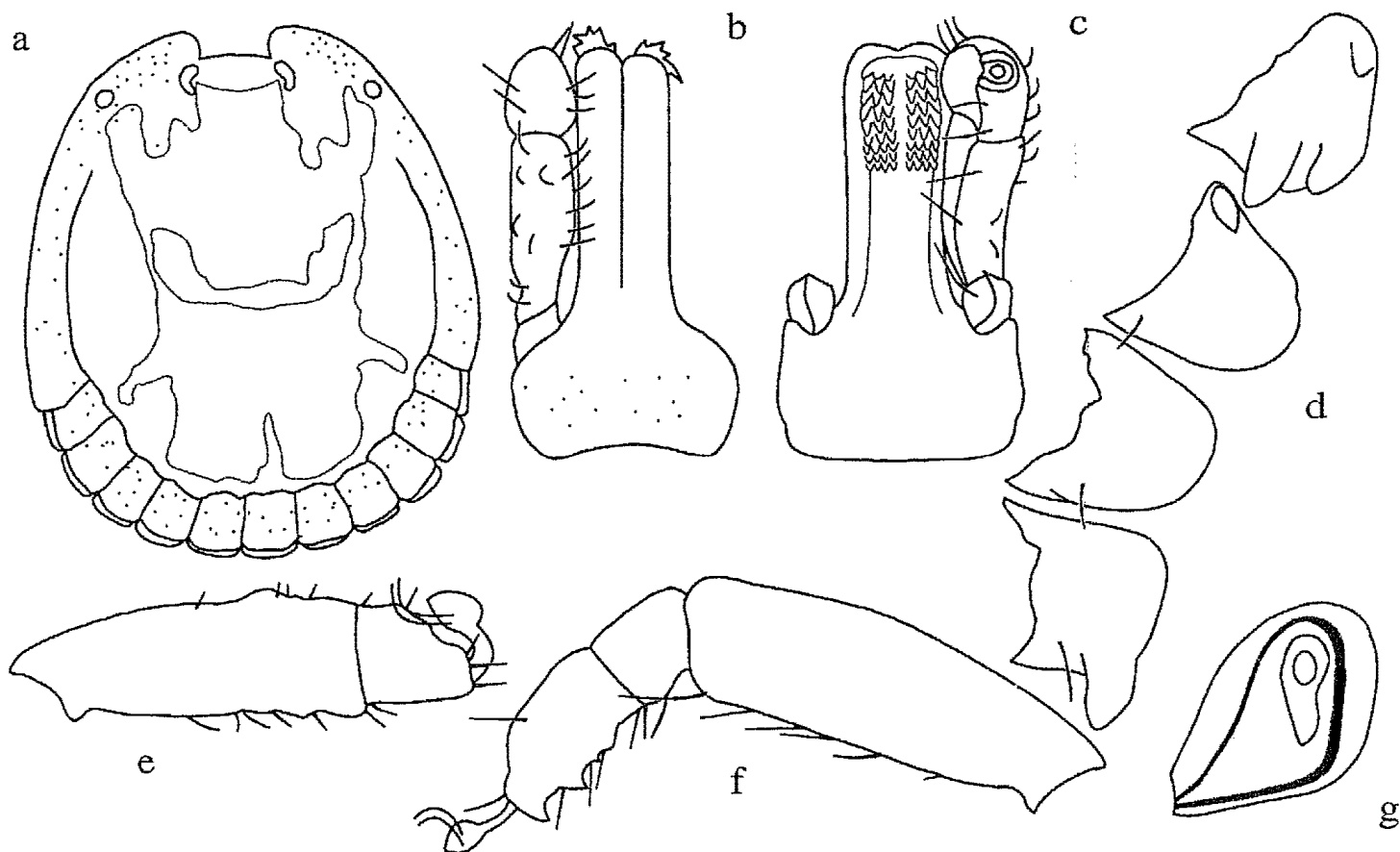


Fig. 67. *Amblyomma variegatum*, male: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

***Amblyomma variegatum* (Fabricius, 1794)**

*Acarus variegatus* Fabricius, 1794: 572, original description

*Ixodes elegans* Guérin Méneville, 1844: 16, junior synonym.

*Amblyomma venustum* Koch, 1844: 224, junior synonym.

*Hyalomma venustum* Michael, 1893: 177, junior synonym.

*Amblyomma variegata* Jarvis, 1904: 177, junior synonym.

*Hyalomma variegatum* Weiss, 1911: 274, junior synonym.

*Amblyomma hebraeum variegatus* (Fabricius, 1794) (*sensu* Patton & Cragg, 1913: 620), junior synonym.

*Amblyomma elegans* (Guérin Méneville, 1844) (*sensu* Schulze, 1941: 516), junior synonym.

*Amblyomma variegatum govurensis* Santos Dias, 1951: 130, 132, fig. 2, junior synonym.

**Male** (Fig. 67). Measurements from 10 specimens. Length from apices of scapulae to posterior scutal margin 5.4 (4.9–5.75), breadth 4.3 (3.75–4.65). Outline oval broadest at level of the middle of scutum. Scutum dark-brown, ornate, very large, almost symmetrical, metallic, gold-crimson with greenish border patch. Scutal punctations small, shallow, more numerous in each scapular area and

around the lateral and posterior margins. Cervical grooves short, deep, bean-like. Marginal groove complete, beginning at level of legs II. Festoons rectangular, with sclerotized plates extending posterior margin of the festoons. Eyes small, round, bulging, situated at a distance from scutal margin.

Capitulum (Fig. 67 b,c) length from palpal apices to cornua apices 2.0 (1.9–2.1), breadth 1.05 (0.92–1.18); punctations few, very small, shallow; posterior margin concave, cornua evident, narrowly rounded; external margins slightly convex or straight; ventrally posterior margin almost straight. Palpi length 1.33 (1.2–1.43), breadth 0.35 (0.26–0.4), slightly wrinkled. Segment II 2.0–2.1 times longer than segment III, length of segment II 0.82 (0.79–0.93), length of segment III 0.4 (0.39–0.45). Segment I ventrally with a sharp, curved ridge ending anteriorly with a small, pointed spur. Segment I dorsally with a small, pointed spur directed dorsoanteriorly. Hypostome length 1.27 (1.21–1.33), length of toothed portion 0.66 (0.6–0.71), with a relatively large corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3 in the anterior files and 4/4 posteriorly.

Legs (Fig. 67 d–f). Coxa I with 2 spurs, the external spur longer and reaching the anterior mar-



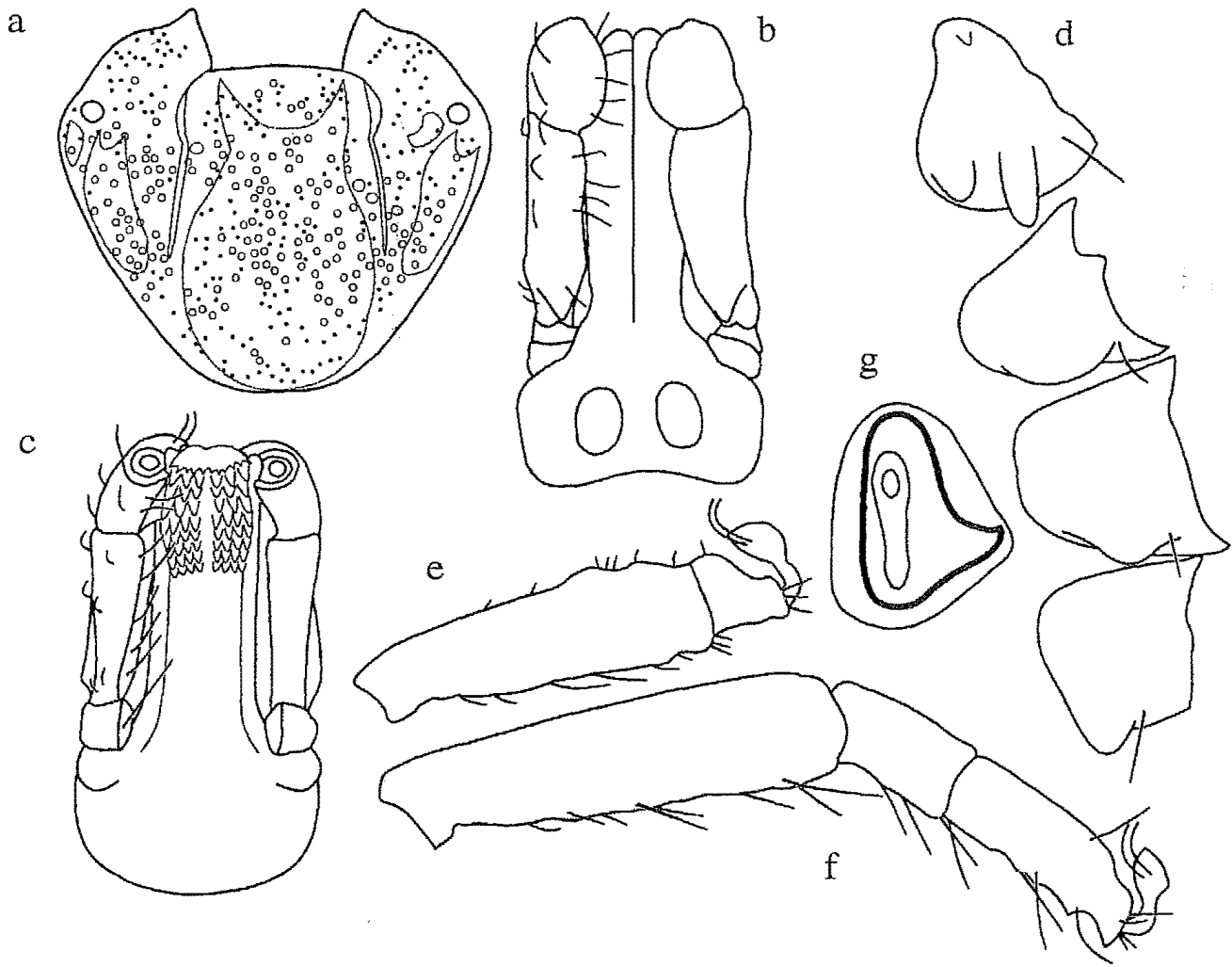


Fig. 68. *Amblyomma variegatum*, female: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

gin of coxa II, triangular, narrowly rounded, internal spur triangular, narrowly rounded, curved. Coxa I with an triangular, spur-like callosity anteriorly. Coxae II–III with a single, short, broadly rounded, paddle-shaped spur. Coxa II with a roller-like callosity anteriorly. Coxa IV with a single, very long, triangular spur directed posteriorly. Trochanters lack spurs. Tarsus I length 1.23 (1.1–1.36), breadth 0.36 (0.33–0.39); without ventroapical hump. Tarsus IV length 1.0 (0.79–1.03), breadth 0.3 (0.27–0.36); with 1 strong ventroapical hook and 1 triangular, pointed ventral hook. Tibia IV length 1.5 (1.4–1.67), breadth 0.49 (0.41–0.57). Leg segments with yellow annular wheels at distal ends.

Venter with short, relatively thick, straight, cone-like setae. Genital aperture situated between coxae II–III. Medial and lateral margins of spiracular plate diverging, medial margin straight, posterior margin straight, dorsal prolongation triangular, forming an obtuse angle with its anterior-posterior axis (Fig. 67g). Postanal groove without a unpaired median groove. Integumentary hard elements of

the ventral skeleton of idiosoma consist of evident unpaired anal and 2 paired postanal shields, and large festoons' shields.

**Female** (Fig. 68). Measurements from 10 specimens. Length from apices of scapulae to posterior body margin 5.5 (5.25–6.4), breadth 4.4 (3.9–5.05). Dorsal body setae short, relatively thick, curved, cone-like. Ventral body setae more thin, short, cone-like. Marginal groove complete, beginning near the posterior margin of scutum. Festoons rectangular.

Scutum (Fig. 68a) length 2.8 (2.4–3.1), breadth 2.8 (2.4–3.1); dark-brown, ornate. A large metallic, pale gold-crimson patche in central area and some small patches in each lateral area. Scutal punctations dense, larger and more deep in each scapular area. Cervical grooves long, deep, converging anteriorly then diverging as shallow depressions. Eyes small, round, bulging, situated at a distance from scutal margin.

Capitulum (Fig. 68 b,c) length from palpal apices to cornua apices 2.1 (1.9–2.33), breadth 1.1 (1.04–1.17); cornua very short, rounded; posterior

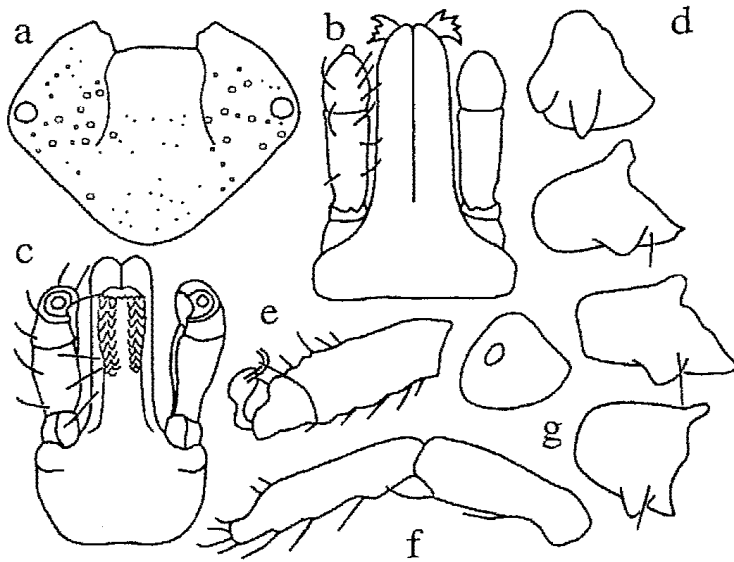


Fig. 69. *Amblyomma variegatum*, nymph: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I; f — tarsus and tibia IV; g — spiracular plate.

margin concave, lateral margins straight, ventrally posterior margin convex. Punctuation of basis very few, small, shallow. Porose areas oval, diameter of one area 0.22 (0.21–0.23), interporose area 0.15 (0.11–0.17). Palpi length 1.48 (1.36–1.66), breadth 0.34 (0.29–0.4); wrinkled. Segment II 2.0–2.5 times longer than segment III, length of segment II 0.93 (0.86–1.04), length of segment III 0.43 (0.37–0.51). Segment I ventrally with a sharp ridge ending anteriorly with a small, pointed spur. Segment I dorsally with a small, pointed spur directed anteriorly. Hypostome length 1.45 (1.39–1.51), length of toothed portion 0.73 (0.71–0.78); with a small corona of fine denticles apically, apex slightly notched, rounded; dental formula 3/3 in the anterior files and 4/4 posteriorly.

Legs (Fig. 68 d–f). Coxa I with 2 spurs, the external spur longer, narrowly rounded, internal spur broadly rounded. Coxa I with an triangular, spur-like callosity anteriorly. Coxae II with a single, very short, broadly rounded, paddle-shaped spur. Coxae III with a single, short, broadly rounded, triangular spur. Coxa IV with a single, triangular spur directed posteriorly. Trochanters lack spurs. Tarsus I length 1.44 (1.3–1.64), width 0.36 (0.31–0.43); without ventroapical hump. Tarsus IV length 1.28 (1.2–1.46), breadth 0.28 (0.26–0.33); with a very strong ventroapical hook and a triangular, pointed ventral hump. Tibia IV length 1.49 (1.36–1.79), breadth 0.43 (0.39–0.47). Leg segments with broad, yellow annular wheels at distal ends.

Medial and lateral margins of spiracular plate diverging, medial margin straight, posterior margin concave, dorsal prolongation triangular, forming

an acute angle with anterior-posterior axis of spiracular plate (Fig. 68g). Genital aperture “U” shaped, situated between coxae II–III. Postanal groove with unpaired, posteriorly directed, median groove extending to the festoon.

**Nymph** (Fig. 69). Measurements from 2 specimens. Length from apices of scapulae to posterior body margin 1.9, breadth 1.53, 1.43. Dorsal and ventral body setae relatively long, curved, thin, cone-like. Marginal groove absent. Festoons evident.

Scutum (Fig. 69a) length 0.86, 0.8, breadth 1.03, 0.99; yellow-brown, more dark between eyes and cervical grooves, inornate. Posterior margin narrowly rounded, postero-lateral margins straight. Punctations deep, both large and small, numerous in each lateral area; surface shagreened. Cervical grooves long, relatively deep, “X”-shaped: converging in the anterior part, then straight and diverging. Eyes round, bulging.

Capitulum (Fig. 69 b,c) length from palpal apices to posterior margin of basis 0.57, 0.63, breadth 0.41, 0.4. Basis capituli rectangular, lateral margins slightly convex, posterior margin straight, cornua absent, ventrally posterior margin almost straight. Punctations of basis capituli few, small, shallow, surface shagreened. Palpi length 0.41, 0.43, breadth 0.1. Segment II 2.7, 2.1 times longer than segment III, length of segment II 0.3, 0.27, length of segment III 0.11, 0.13. Palpi slightly wrinkled. Segment I ventrally with a sloping ridge. Hypostome length 0.41, length of toothed portion 0.21, 0.2, with a large corona of fine denticles apically, apex slightly notched, rounded, dental formula 2/2.

Legs (Fig. 69 d–f). Coxa I with 2 triangular spurs, the external spur larger, pointed, internal spur broader, narrowly rounded, deflected ventrally. Coxae II–III each with a single triangular, narrowly rounded spur. Coxa IV with a single triangular spur more narrow and longer than spurs on coxae II–III. Trochanters lack spurs. Tarsus I length 0.51, width 0.16, without ventroapical hook. Tarsus IV length 0.43, 0.47, breadth 0.1, 0.11, without ventroapical hook.

Spiracular plate (Fig. 69g) triangular, with very short, triangular dorsal prolongation, medial and lateral margins diverging, posterior margin convex. Postanal groove with shallow, unpaired, posteriorly directed, median groove extending to the festoon.

**Larva** (Fig. 70) (semi-engorged). Measurements from 4 specimens. Length from apices of scapulae to posterior body margin 1.65 (1.48–

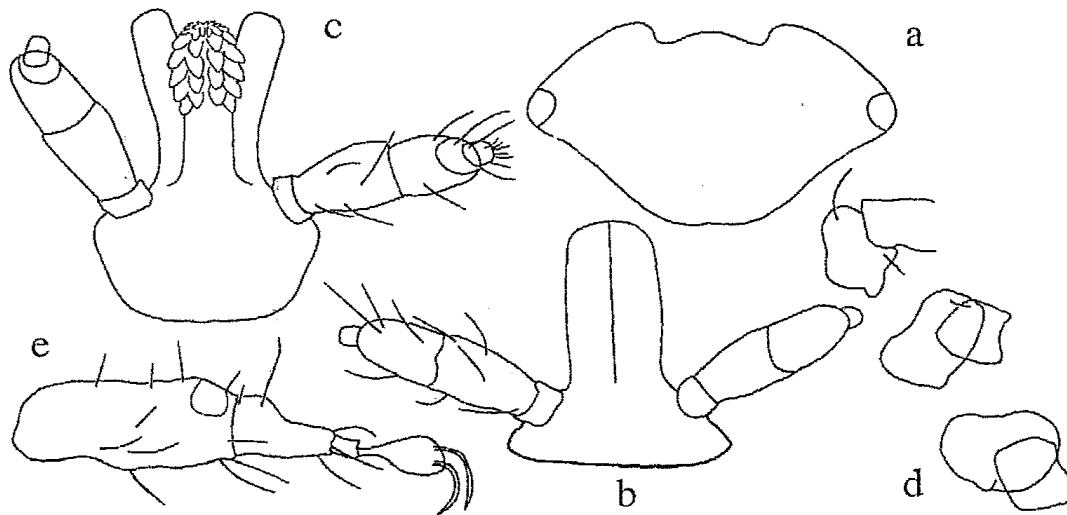


Fig. 70. *Amblyomma variegatum*, larva: a — scutum; b — gnathosoma, dorsal view; c — gnathosoma, ventral view; d — coxae; e — tarsus I.

1.80), breadth 1.19 (1.0–1.36). Dorsal body setae: 2 central dorsal pairs j5 0.028–0.033, J2 0.033; 8 marginal dorsal pairs s3 0.028–0.033, s4 0.028, s6 0.033–0.039, S1 0.028–0.033, S2 0.039, S3 0.039–0.044, S4 0.044, S5 0.044–0.05. Ventral body setae: 3 sternal pairs St1 0.039–0.044, St2 0.039–0.044, St3 0.039; 2 preanal pairs Jv3 0.028, Jv5 0.028; 4 premarginal pairs Zv1 0.033, Zv2 0.033–0.039, Zv4 0.044, Zv5 0.039–0.044; 5 marginal ventral pairs Sv1 0.033, Sv2 0.033, Sv3 0.039–0.044, Sv4 0.039–0.044, Sv5 0.039; and 1 pair on anal valves.

Scutum (Fig. 70a) length 0.28 (0.26–0.3), breadth 0.45 (0.43–0.47), inornate, yellow-brown. Posterior margin concave, posterolateral margins concave, anterolateral margins approximately straight or slightly convex. Scutal punctuations dense, very small, shallow. Cervical grooves shallow, diverging. Scutal setae: 3 pairs z2 0.011, s2 0.011, j3 0.011. Eyes large, bulging.

Capitulum (Fig. 70 b,c) length from palpal apices to posterior margin of basis 0.22 (0.20–0.26), breadth 0.16–0.17. Basis capituli dorsally triangular, posterior margin straight, lateral margins narrowly rounded, cornua absent. Ventrally posterior margin straight. Palpi length 0.15–0.16, breadth 0.048–0.05, smooth. Segment II 1.5 times longer than segment III, segment II 0.079 (0.077–0.08) long; segment III 0.053 (0.05–0.057) long. Setae number: dorsally 3 (0.037, 0.033, 0.046 long), barbed on its outer surface, ventrally 2 (0.044, 0.046 long), serrate on II; dorsally 3 (0.05, 0.055, 0.037 long), ventrally 2 (0.026, 0.033 long) on III, all serrate. No setae on segment I. Hypostome length 0.13–0.14, length of toothed portion 0.086 (0.077–0.09), dental formula 2/2. Apex

rounded, with a corona consisting of 2 rows of fine denticles.

Legs (Fig. 70 d,e). Coxa I with a single, large, broadly rounded, triangular spur. Coxae II–III with a single, shorter and broader spur. Trochanters lack spurs. Tarsus I 0.23–0.24 long, 0.06 broad, without hook. Tarsus III length 0.2, breadth 0.055–0.06, without hook.

**Material:** 5 males and 5 females (ZMMU, Tdi464) Nigeria, from H. Hoogstraal (HH34 230); 5 males and 5 females (ZMMU, Tdi1918, Tdi1919) South Africa, ex *Diceros bicornis*, winter 2002, from taxidermy workshop; 2 nymphs (US National Tick Collection RML 94566) Sudan, Equatoria, Torit, Katire, 2.01.1952, ex pig, coll. H. Hoogstraal; 4 larvae (RML 100406).

#### KEY TO MALES OF THE GENUS *AMBLYOMMA* IN AFRICA

- 1 (4) Coxa II with 2 spurs. .... *A. sylvaticum*
- 2 (3) Coxae III–IV each with 2 spurs. Scutum inornate, marginal groove incomplete beginning at level of legs II and embracing first festoon (Fig. 60) ..... *A. paulopunctatum*
- 3 (2) Coxae III–IV with a single spur. Scutum ornate, with some metallic, gold-pink patches. Marginal groove complete (Fig. 46) ..... *A. paulopunctatum*
- 4 (1) Coxa II with 1 spur.
- 5 (10) Marginal groove absent. Integumentary hard elements of the ventral skeleton of idiosoma absent or poor developed (consist of festoons' shields only or small sclerotized point-plaques in place of anal and postanal shields).
- 6 (7) Integumentary hard elements of the ventral skeleton of idiosoma consist of small sclerotized

point-plaques in place of anal and postanal shields. Festoons with narrow, sclerotized plates extending their posterior margins. Hypostomal dentition 4/4 in anterior part and 5/5 in posterior part. Palpal segment I dorsally with a pointed, small spur directed anteriorly and upwards. Relatively large, scutum with extensive ornamentation (Fig. 48).  
.....*A. personatum*  
7 (6) Integumentary hard elements of the ventral skeleton of idiosoma absent or consist of festoons' shields only. Festoons without sclerotized plates extending their posterior margins. Hypostomal dentition 3/3 or 4/4.  
8 (9) Integumentary hard elements of the ventral skeleton of idiosoma consist of festoons' shields only. Postanal groove without a unpaired median groove. Spiracular plate with triangular, convergent dorsal prolongation forming an acute angle with anterior-posterior axis. Hypostomal dentition 4/4. Relatively large, scutum with extensive ornamentation (Fig. 52).  
.....*A. rhinocerotis*  
9 (8) Integumentary hard elements of the ventral skeleton of idiosoma absent. Postanal groove with a shallow unpaired median groove. Spiracular plate with long, broad dorsal prolongation perpendicular to anterior-posterior axis. Hypostomal dentition 3/3 anteriorly and 4/4 posteriorly. Relatively small, scutum inornate or with small enamel patches in the anterior part (Fig. 630) .....*A. tholloni*  
10 (5) Marginal groove present. Integumentary hard elements of the ventral skeleton of idiosoma consist of unpaired anal and paired postanal shields (or of paired postanal shields only).  
11 (12) Marginal groove incomplete, beginning at level of legs II and ending before the first festoon. Scutum inornate, pyriform, broadest at level of spiracular plates. Hypostomal dentition 3/3. Integumentary hard elements of the ventral skeleton of idiosoma consist of unpaired anal and 2 paired postanal very small shields, and large festoons' shields. Festoons with sclerotized plates extending their posterior margins. Relatively small (Fig. 11).  
.....*A. compressum*  
12 (11) Marginal groove complete. Scutum ornate or inornate.  
13 (22) Spurs on coxa I nearly equal in length, broadly rounded.  
14 (17) Spur on coxa II triangular, rounded. Postanal groove with unpaired, posteriorly directed, median groove. Marginal groove beginning at level of legs III. Hypostomal dentition 3/3.  
15 (16) Relatively small (4.5) with approximately short capitulum (1.3). Apex of hypostome rounded

with a small corona of fine denticles. Integumentary hard elements of the ventral skeleton of idiosoma consist of unpaired anal and 2 paired postanal shields, and festoons' shields (Fig. 4) .....*A. chabaudi*  
16 (15) Relatively large (6.9) with long capitulum (2.1). Hypostomal apex notched, its each half nipple-shaped. Integumentary hard elements of the ventral skeleton of idiosoma consist of 2 small, thin paired postanal shields only (Fig. 19) .....  
.....*A. falsomarmoreum*  
17 (14) Spur on coxa II broadly rounded, paddle-shaped. Postanal groove without unpaired, posteriorly directed, median groove. Marginal groove beginning at level of legs II. Hypostomal dentition 3/3 in the anterior part and 4/4 in the posterior part.  
18 (19) Relatively large (6.7–8.2) with long capitulum (2.1–2.4). Scutum ornate, with small metallic patches in each scapular and lateral areas. Punctations deep, large in the anterior part of the scutum and shallow, small in the posterior part (Fig. 38). ....  
.....*A. marmoreum*  
19 (18) Relatively small (3.4–5.6) with approximately short capitulum (1.0–1.6).  
20 (21) Spur on coxa II very broad, similar to round paddle. Medial margin of spiracular plate slightly convex, dorsal prolongation long, forming an obtuse angle with its anterior-posterior axis. Scutum ornate, with small metallic patches between cervical grooves, in each scapular area, along the lateral margins of the scutum, and on the festoons. Punctations large, very deep, distributed in groups (Fig. 42). .....*A. nuttalli*  
21 (20) Spur on coxa II more narrow, as on coxa III. Medial margin of spiracular plate straight, dorsal prolongation broader, forming an acute angle with its anterior-posterior axis. Scutum ornate, with large metallic patches. Punctations dense, small, shallow on all surface of the scutum and few, larger and more deep in each scapular area and in posterior area. ....*A. geocheleone*  
22 (13) The external spur on coxa I longer than internal, usually more narrow and pointed.  
23 (26) Festoons without sclerotized plates extending their posterior margins.  
24 (25) Postanal groove with a thin, unpaired, posteriorly directed, median groove extending to the unpaired anal shield. Hypostomal dentition 3/3. Coxa I with a triangular, spur-like callosity anteriorly (Fig. 34). .....*A. loculosum*  
25 (24) Postanal groove without a unpaired median groove. Hypostomal dentition 3/3 in the anterior files and 4/4 posteriorly. Coxa I without a triangular, spur-like callosity anteriorly (Fig. 54)...*A. sparsum*

- 26 (23) Fестоons with sclerotized plates extending their posterior margins.
- 27 (34) Postanal groove without a unpaired median groove.
- 28 (29) Coxa I without a spur-like callosity anteriorly (Fig. 58) ..... *A. splendidum*
- 29 (28) Coxa I with a triangular, spur-like callosity anteriorly.
- 30 (31) Posterior margin of basis capituli straight; cornua relatively large. Coxa IV with a single, relatively long, triangular spur directed medially (Fig. 50) ..... *A. pomposum*
- 31 (30) Posterior margin of basis capituli concave. Coxa IV with a single, long spur directed posteriorly.
- 32 (33) The dark, without enamel, transversal strip in the middle of metallic patch on the scutum present. Dorsal prolongation of spiracular plate very narrow (Fig. 67). ..... *A. variegatum*
- 33 (32) The dark, without enamel, transversal strip in the middle of metallic patch on the scutum absent. Dorsal prolongation of spiracular plate relatively broad (Fig. 7) ..... *A. cohaerens*
- 34 (27) Postanal groove with a unpaired median groove.
- 35 (38) Hypostomal dentition 3/3.
- 36 (37) Spiracular plate long and narrow, its medial and lateral margins parallel, posterior and medial margins convex, dorsal prolongation forming an obtuse angle with anterior-posterior axis of spiracular plate. Palpal segment I ventrally with two long setae. Tibia IV oblong and relatively narrow (Fig. 22). ..... *A. gemma*
- 37 (36) Spiracular plate broad and short, its medial and lateral margins diverging, posterior and medial margins nearly straight, relatively broad dorsal prolongation perpendicular to anterior-posterior axis of spiracular plate. Palpal segment I ventrally with a single long seta. Tibia IV broad (Fig. 30). ..... *A. lepidum*
- 38 (35) Hypostomal dentition 3/3 in the anterior files and 4/4 or 5/5 posteriorly.
- 39 (40) Posterior margin of basis capituli nearly straight, cornua very small, almost inconspicuous. Dorsal prolongation of spiracular plate broad (Fig. 15). ..... *A. eburneum*
- 40 (39) Posterior margin of basis capituli concave, cornua evident, broadly rounded. Dorsal prolongation of spiracular plate triangular, convergent.
- 41 (42) Hypostomal dentition 3/3 in the 2 anterior files, then 4/4 in 2 files, and 5/5 in the posterior files. The dark, crescent, without enamel strip in the middle of metallic patch on the scutum present.
- Coxa IV with a single, long, narrow spur directed posteriorly (Fig. 26). ..... *A. hebraeum*
- 42 (41) Hypostomal dentition 3/3 in anterior part and 4/4 in posterior part. The dark, crescent, without enamel strip in the middle of metallic patch on the scutum absent, a large metallic patch covers the central part of the scutum and bifurcates in the its posterior part. Coxa IV with a single, relatively broad, triangular spur (Fig. 1). ..... *A. astrion*

#### KEY TO FEMALES OF THE GENUS *AMBLYOMMA* IN AFRICA

- 1 (4) Coxa II with 2 spurs.
- 2 (3) Coxae III–IV each with 2 spurs. Scutum cordiform, its anterolateral and posterolateral margins slightly convex. Spiracular plate with triangular, pointed dorsal prolongation, its posterior margin convex (Fig. 61). ..... *A. sylvaticum*
- 3 (2) Coxae III–IV with a single spur. Scutum subtriangular, its posterolateral margins straight. Spiracular plate with broad and long dorsal prolongation, its posterior margin straight or slightly concave (Fig. 47). ..... *A. paulopunctatum*
- 4 (1) Coxa II with 1 spur.
- 5 (8) Marginal groove incomplete, beginning from the posterior margin of scutum and embracing 2 or 3 festoons.
- 6 (7) Small; scutum inornate, cordiform. Hypostomal dentition 3/3; palpal segment I dorsomedially without spur. Tarsus I broad, attenuated in talus (Fig. 12). ..... *A. compressum*
- 7 (6) Large; scutum ornate, subtriangular. Hypostomal dentition 5/5; palpal segment I dorsomedially with a pointed, pyramidal spur. Tarsus I long, oblong (Fig. 49). ..... *A. personatum*
- 8 (5) Marginal groove complete.
- 9 (22) Coxae II–III each with a single, rounded, triangular spur.
- 10 (15) Spurs on coxae II–IV equal in length.
- 11 (14) Hypostomal dentition 3/3. Coxa I with an evident, sharp, spur-like callosity anteriorly. Palpal segment I ventrally with two, long setae.
- 12 (13) Large; scutum subtriangular, ornate, with some relatively small, metallic, yellow-reddish patches. Dorsal prolongation of spiracular plate triangular, pointed, perpendicular to its anterior-posterior axis (Fig. 20) ..... *A. falsomarmoreum*
- 13 (12) Relatively small; scutum cordiform, ornate, with gold-crimson, metallic patch covering all the scutum except the cervical grooves. Dorsal prolongation of spiracular plate long, narrow, forming an acute angle with its anterior-posterior axis (Fig. 35) ..... *A. loculosum*

- 14 (11) Hypostomal dentition 3/3 anteriorly and 4/4 posteriorly. Coxa I without spur-like callosity anteriorly. Palpal segment I ventrally with a single, long seta (Fig. 5) ..... *A. chabaudi*
- 15 (10) Spur on coxa IV larger than spurs on coxae II–III.
- 16 (17) Hypostomal dentition 4/4. Coxa IV with a single, long, rounded spur directed posteriorly, femur IV with dense setae. Large; scutum ornate, with large, gold-pinkish-pale, metallic patch covering almost all the surface (Fig. 53) ..... *A. rhinocerotis*
- 17 (16) Hypostomal dentition 3/3 anteriorly and 4/4 posteriorly. Coxa IV with a single, triangular spur directed posteromedially.
- 18 (21) Dorsal prolongation of spiracular plate forming an acute angle with its anterior-posterior axis. Cervical grooves short, deep, converging anteriorly then diverging as shallow depressions.
- 19 (20) Inornate or slightly ornate, occasional specimens with some small, pale patches in the posterior area of the scutum. Lateral margins of basis capituli convex; porose areas oval, separated by a distance less than their shortest diameter. Medial and lateral margins of spiracular plate diverging, dorsal prolongation triangular (Fig. 51) ..... *A. pomposum*
- 20 (19) Ornate, with large, metallic, symmetrical patch. Lateral margins of basis capituli straight; interporose distance equal or large than shortest diameter of porose areas. Medial and lateral margins of spiracular plate parallel, dorsal prolongation narrow (Fig. 55) ..... *A. sparsum*
- 21 (18) Dorsal prolongation of spiracular plate perpendicular to its anterior-posterior axis. Cervical grooves long, very deep, converging anteriorly, then diverging and straight. Large, with relatively short capitulum (Fig. 39) ..... *A. marmoreum*
- 22 (9) Coxae II–III each with a single, broadly rounded, short, paddle-shaped spur.
- 23 (32) Spurs on coxae II–III very short, almost not extending the posterior margins of coxae.
- 24 (27) Coxa IV with a single, narrowly rounded spur directed posterolaterally.
- 25 (26) Cervical grooves short, thin anteriorly and very deep, oval pit-like posteriorly. Eyes small, bulging, orbital. Porose areas separated by a distance less than their shortest diameter (Fig. 8) ....  
..... *A. cohaerens*
- 26 (25) Cervical grooves relatively long, very deep, crescent. Eyes large, slightly bulging, marginal. Interporose distance equal or large than shortest diameter of porose areas (Fig. 16) .... *A. eburneum*
- 27 (24) Coxa IV with a single, broadly rounded, triangular spur directed posteriorly.
- 28 (31) Interporose distance equal or smaller than shortest diameter of porose areas. Scutum ornate, with very large, metallic patches.
- 29 (30) Medial and lateral margins of spiracular plate parallel, dorsal prolongation almost perpendicular to anterior-posterior axis of spiracular plate. Interporose distance equal to shortest diameter of porose areas. Eyes small, bulging, situated at a distance from scutal margin (Fig. 23) .... *A. gemma*
- 30 (29) Medial and lateral margins of spiracular plate diverging, dorsal prolongation forming an acute angle with anterior-posterior axis of spiracular plate. Interporose distance smaller than shortest diameter of porose areas. Eyes large, slightly bulging, marginal (Fig. 59) ..... *A. splendidum*
- 31 (28) Interporose distance large than shortest diameter of porose areas. Scutum slightly ornate, with very small, metallic patches (Fig. 64) .....  
..... *A. tholloni*
- 32 (23) Spurs on coxae II–III relatively longer, extending the posterior margins of coxae.
- 33 (38) Spurs on coxa I nearly equal in length.
- 34 (37) Scutum wider than long. Posterior margin of basis capituli straight, cornua short, narrowly rounded. Diameters of porose areas slightly larger than interporose area. Tarsus I broad, slightly enlarged in the middle of its length.
- 35 (36) Medial and posterior margins of spiracular plate concave, dorsal prolongation long and very narrow. Alloscutum without depressions. Scutum ornate, three very large, pale, gold-crimson patches: two in each lateral area and one in central area incl. between the cervical grooves (Fig. 43) .....  
..... *A. nuttalli*
- 36 (35) Medial margin of spiracular plate straight, posterior margin convex, dorsal prolongation long and broad. Alloscutum with relatively consistent pattern of depressions. Scutum ornate, with large, gold-yellowish patch in posterior half; anterior half of scutum incl. between the cervical grooves dark, without metallic patches or with some very small patches ..... *A. geocheilone*
- 37 (34) Length and width of the scutum equal. Posterior margin of basis capituli concave, cornua very short. Porose areas locating apart, their diameters smaller than interporose area. Tarsus I oblong. Medial and posterior margins of spiracular plate straight, dorsal prolongation triangular (Fig. 31) ..... *A. lepidum*
- 38 (33) The external spur on coxa I larger than internal spur.
- 39 (40) Scutum cordiform, its length and width equal, ornate. Porose areas locating near each other,

diameter of one area larger than interporose area. Posterior margin of spiracular plate concave (Fig. 68). ..... *A. variegatum*

40 (39) Scutum subtriangular, longer than wide, ornate. Porose areas locating apart, their diameters smaller or equal to interporose area. Posterior margin of spiracular plate straight.

41 (42) Porose areas large, round, diameter of one area equal to interporose are. Medial and lateral margins of spiracular plate diverging, dorsal prolongation short, triangular (Fig. 2) ..... *A. astrion*

42 (41) Porose areas oval, diameter of one area smaller than interporose area. Medial and lateral margins of spiracular plate nearly paralleldorsal prolongation narrow, long (Fig. 27) .. *A. hebraeum*

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