

NOTES ON AFRICAN HAEMAPHYSALIS TICKS: XVI. *H. (RHIPISTOMA) SUBTERRA* SP. N., A NEW MEMBER OF THE *LEACHI* GROUP (IXODOIDEA: IXODIDAE)

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ABSTRACT - The female, male, nymph, and larva of *Haemaphysalis (Rhipistoma) subterra* sp. n. are described. This species is a small-sized member of the *H. leachi* group with 3/3 dental formula, curving ventral spurs on palpal segment 3, and a moderately punctated scutum. It is recorded from Ethiopia, Kenya, South Africa, Tanzania, Zaire, Zambia, and Zimbabwe. Hosts of adults are carnivores [*Herpestes sanguineus* (Ruppell), *H. ichneumon* (Linnaeus), *Ichneumia albicauda* (Cuvier), *Mungos mungo* (Gmelin), *Atilax paludinosus* (Cuvier), *Genetta maculata* (Gray)], while immatures are collected chiefly from rodents [*Aethomys chrysophilus* (De Winton), *Tachyoryctes splendens* Ruppell, *Praomys natalensis* (Smith)]. One nymph was collected from *H. sanguineus*, a carnivore, in Zimbabwe.

INTRODUCTION

The female, male, nymph, and larva of *Haemaphysalis (Rhipistoma) subterra* sp. n. are described. This species is a small-sized member of the *H. (R.) leachi* group recognized from Ethiopia, Kenya, South Africa, Tanzania, Zaire, Zambia, and Zimbabwe. The adults are parasites of African carnivores, while the immatures are collected chiefly from rodents.

*Haemaphysalis (Rhipistoma) subterra* sp. n.

(Figs. 1-20)

Holotype: Male, from *Herpestes sanguineus* (Ruppell), Ngong, thick scrub in Rift Valley floor about 25 miles SW of Nairobi on Magadi Road, Rift Valley, Kenya, (1°22'S, 36°39'E), ca. 1,000 m altitude, 9 July 1956, H. Hoogstraal (HH40,331); deposited in the Hoogstraal Collection, Institute of Arthropodology and Parasitology, Georgia Southern College, Statesboro, GA, USA.

Allotype: Female, with the same data as the holotype; also deposited in the Hoogstraal Collection.

Paratypes: Eleven M (male), with the same collection data as the holotype and allotype, and 13 F (female) from *Tachyoryctes splendens* Ruppell nest, Sagana,

Sigona, Kikuyu, Central Province, Kenya, (01°13'S, 36°39'E), ca. 2,300 m altitude, 22 June 1948, H. Hoogstraal (HH6173); with the same data as the allotype were selected as paratypes. Paratypes are deposited in the J. L. Camicas Collection at ORSTOM and the Hoogstraal Collection.

DESCRIPTION

Male (Figs. 1-2, 5-12):

Length from palpal apices to posterior body margin ca. 1.3-1.5 (avg 1.4) mm.; width ca. 0.7-0.8-(avg. 0.77) mm. Color yellowish to yellowish brown.

Capitulum (Figs. 5-7): Basic capituli dorsally 2.1 times as broad (anteriorly) as long (including cornua), external margins abruptly diverging anteriorly; cornua broadly triangular, ca. one-fifth as long as base of basis capituli. Basis capituli ventrally as illustrated, several pairs posteroexternal setae, 1 pair hypostomal setae. Palpi broadly salient (*leachi* type; dorsal profile angle relatively sharp as in *spinulosa*); combined palpal breadth ca. 1.7 times breadth of basis capituli; each palpus ca. 1.1 times as broad as long (from posterior margin of segment 2, excluding spur, to apex of segment 3). Segment 1 minute, 1 ventral seta. In ventral profile, lengths of segments 2 and 3 subequal. Segment 2 ca. 2 times as broad as long, posterodorsal margin straight or

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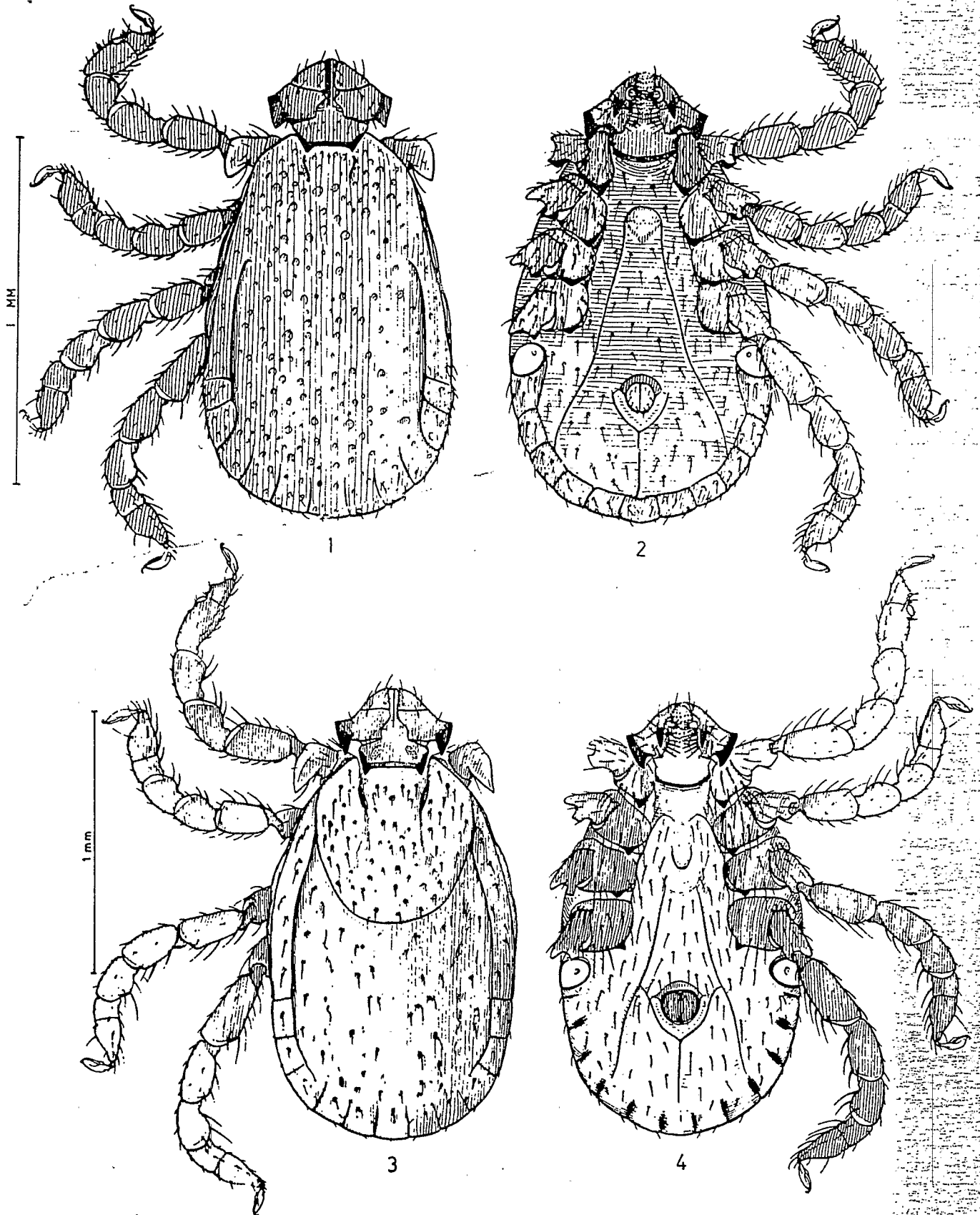
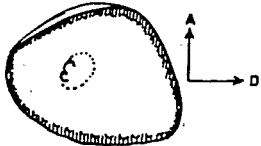
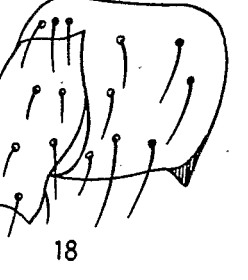
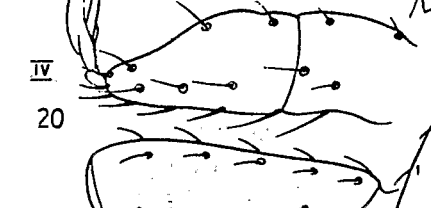
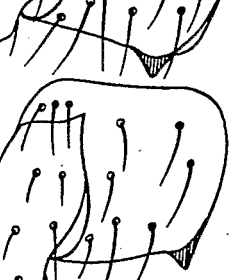
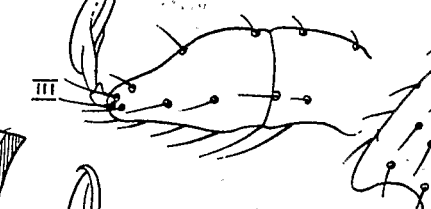
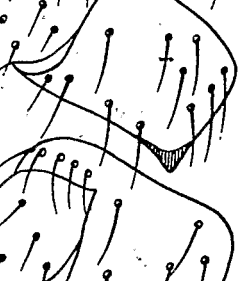
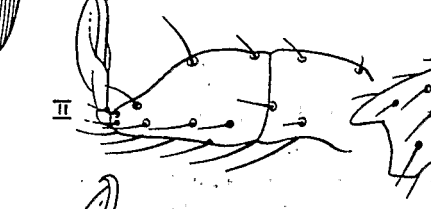
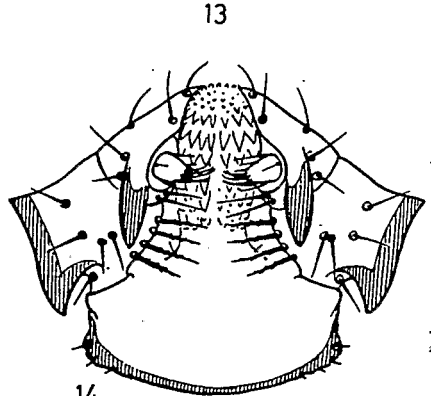
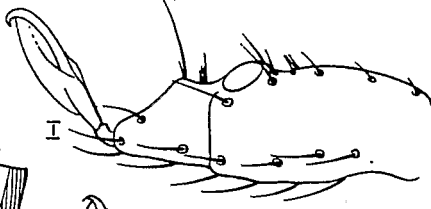
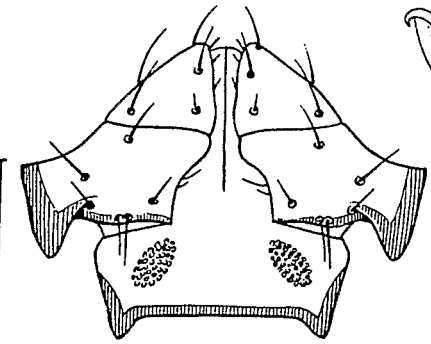
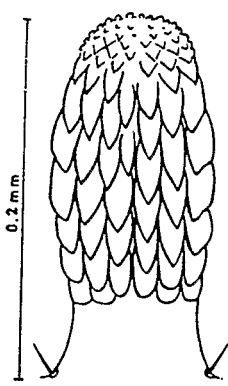
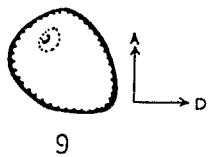
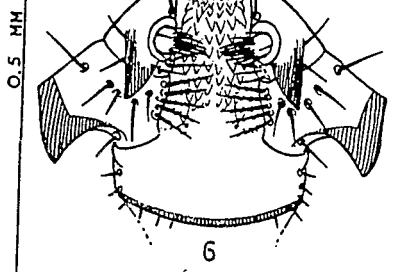
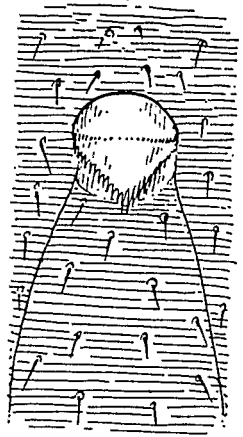
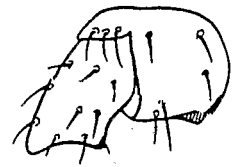
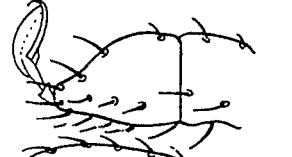
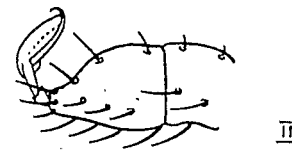
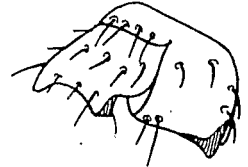
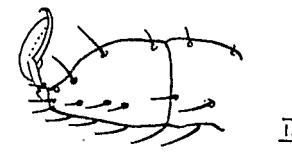
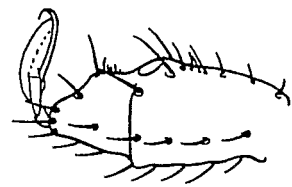
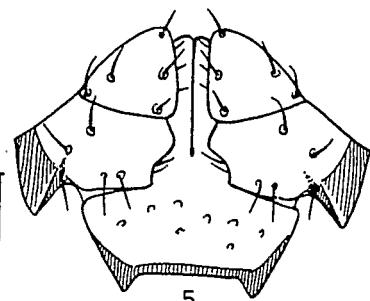
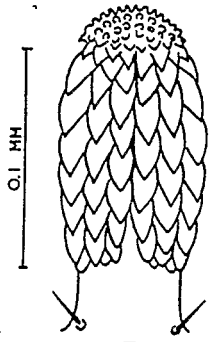


Fig. 1-4. Adult *Haemaphysalis (Rhipistoma) subterra* sp. n., paratypes, Kenya (M HH 40,331; F HH 6,173): 1-2. male, dorsal and ventral aspect; 3-4. female, dorsal and ventral aspect.



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slightly convex from insertion to two-thirds of breadth, thence forming elevated, posteriorly directed spur which is longer than broad and sharply triangular, external margin of spur continuing anteriorly to obtuse posteroexternal juncture at level of segment midlength; posteroventral margin concave between insertion and elongately triangular spur. Internodorsal margin greatly bulging subanteriorly; dorsointernal setae number 2; ventrointernal setae number 4 or 5, fringed; dorsal and ventral setae each number 5. Segment 3 triangular, 1.5 times as broad as long, ca. 0.8 times as long as segment 2; posterodorsal margin almost straight; ventral spine broadly triangular extending to or somewhat beyond midlength of segment 2; setae: 5 dorsally, 4 dorsoanteriorly, 4 ventrally, 2 or 3 from internodorsal margin posteriorly, and ca. 4 (small) from near internodorsal margin. Hypostome (Fig. 7) almost as long as palpi, ca. 2.6 times as long as broad; apex broadly rounded, corona present; dental formula 3/3, denticles in files of 6-8.

Scutum (Fig. 1): 1.8 times as long as broad; anterior emargination broad, shallow; scapulae pointed to bluntly rounded; margins gradually rounded. Lateral grooves distinct, extend to anterior one-fourth of scutal length; enclosing 2 festoons. Cervical grooves short. Punctations few, large and medium size, shallow, relatively evenly distributed, some setiferous. Festoons number 11.

Venter (Fig. 2) and genital area (Fig. 8): As illustrated. Spiracular plates (Fig. 9) subovate, slightly longer than broad; dorsal projection obsolete.

Legs (Figs. 1, 2, 10-12): Moderately long. Coxae (Fig. 10) each with small, broadly triangular spur extending somewhat beyond coxal margin, spur I slightly longer than II; spurs III and IV each smaller than I and II. Trochanters, dorsally (Fig. 1) with triangular shield; ventrally (Fig. 10) unarmed. Femur IV (Fig. 11) with 5 ventrointernal setae, more than one-half as long as breadth of femur at point of insertion. Tarsi (Fig. 12) short, stout dorsal surfaces flat, abruptly tapering apically; ventrally surfaces lack hook or ridge. Claws moderate. Pulvilli long, reaching apical curvature of claws.

#### Female (Figs. 3, 4, 13-20):

The female differs from the male in sexual characters but is similar in diagnostic details. Length (unengorged) ca. 1.7-2.1 (avg. 1.9) mm; breadth ca. 0.9-1.2 (avg. 1.03) mm.

Capitulum (Figs. 13-15): Basis capituli dorsally ca. 2.4 times as broad as long (including cornua); external margins slightly diverging anteriorly; cornua broadly triangular, bluntly pointed, ca. one-seventh as long as base of basis capituli; porose areas oval, shallow, widely spaced. Basis capituli ventrally as illustrated. Palpi as in male except as follows: Posterodorsal margin spur of segment smaller; posteroventral marginal spur slightly shorter and broader. Segment 3 slightly longer. In ventral profile, segment 2 slightly longer than 3. Hypostome (Fig. 15) 2.2 times as long as broad, dental formula 3/3 (rarely 4/4); denticles in files of 7-9.

Scutum (Fig. 3): Oval, ca. 1.2 times as long as broad; outline broadest at level of anterior one-fourth of length, thence gradually tapering, posteriorly gradually rounded. Cervical grooves deep converging for short distance thence shallow and subparallel to 2/3 of scutal length. Punctations as in male, more numerous in cervical field. Setae as in male.

Dorsum (Fig. 3) and venter (Figs. 4, 16, 17): As illustrated.

Genital aperture (Fig. 16): Broadly rounded posteriorly. Spiracular plates (Fig. 17): Oval, slightly broader than long.

Legs (Figs. 3, 4, 18-20): As in male, except as follows: Coxae spurs and ridges reduced; setae (excluding anteroexternal group) number 10-12 each on I, II, and III, 8 on IV. Femur IV ventrointernal setae number 6.

#### Nymph (Figs. 21, 22, 27-29):

Length (unfed): From palpal apices to posterior body margin ca. 1.4 mm; breadth ca. 0.9 mm.

Capitulum (Figs. 25, 26): Basis capituli dorsally ca. 2.8 times as broad as long (including cornua); margins slightly diverging anteriorly; cornua small, triangular, ca. one-third as long as base of basis capituli; ventrally comparatively large, rounded with small cornua, 2 setae externally, 1 pair posthypostomal. Palpi broadly salient; dorsally combined breadth ca. 1.7 times breadth of basis capituli; each palpus as long as broad. Segment I dorsally reduced to minute segment. Segment 2 posterodorsal margin straight from insertion to ca. two-third of segment breadth then curved sharply forming pronounced posteriorly directed spur; ventrally strongly concave after insertion then strongly directed posteriorly forming long spur; external profile long, slightly concave, and abruptly converging anteriorly; internodorsal margin bulging anteriorly

Fig. 5-20. Adult *Haemaphysalis (Rhipistoma) subterra* sp. n., paratypes, Kenya (M HH 40,331; F HH 6,173): 5-6. male capitulum, dorsal and ventral views; 7. male hypostome, ventral view; 8. male genital area; 9. male spiracular plate; 10. male coxae and trochanters I to IV; 11. male femur IV, internal view; 12. male tarsi I to IV, external view; 13-14. female capitulum, dorsal and ventral views; 15. female hypostome, ventral view; 16. female genital area; 17. female spiracular plate; 18. female coxae and trochanters I to IV; 19. female femur IV, internal view; 20. female tarsi I to IV, external view. (A = anterior; D = dorsal).

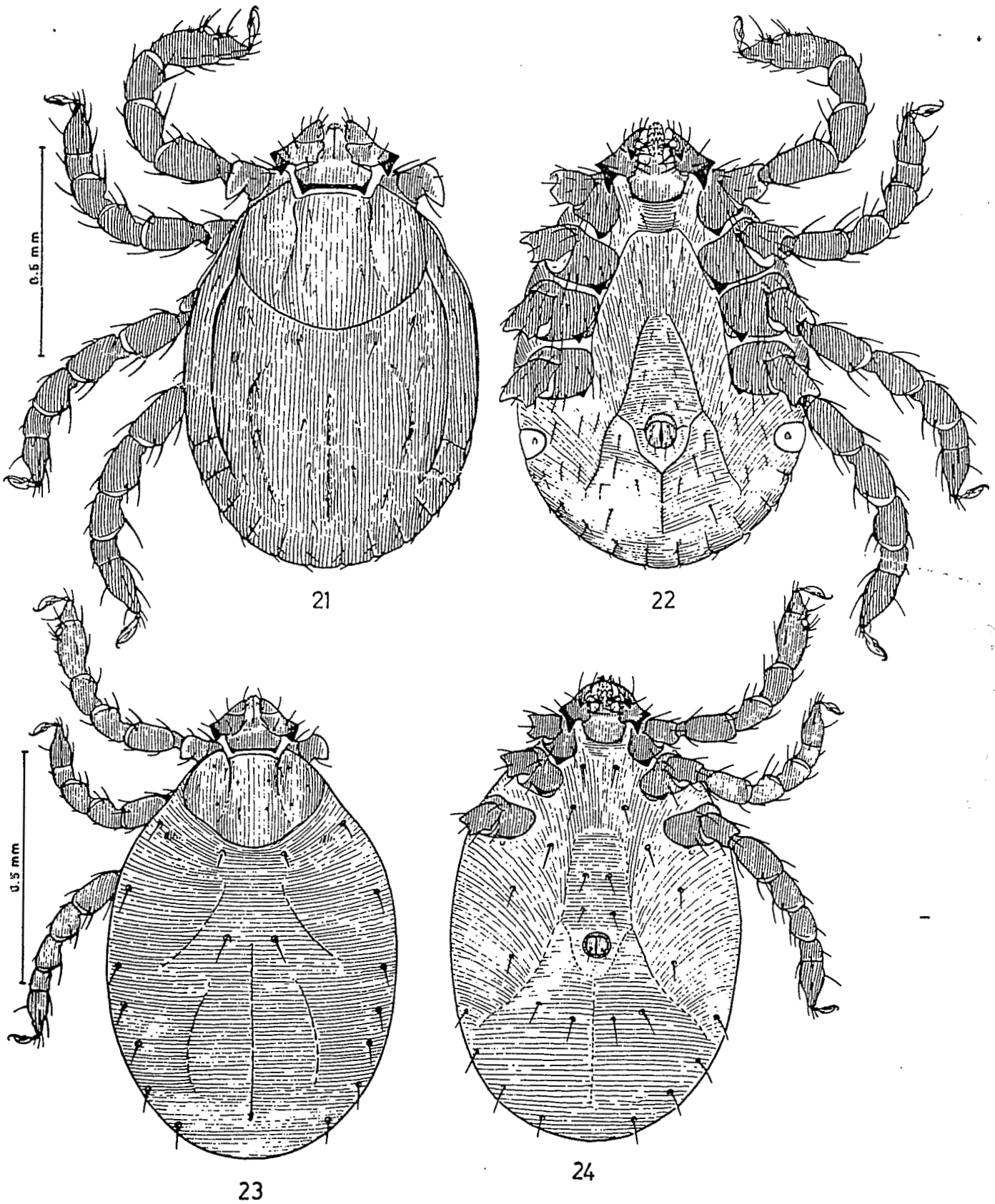


Fig. 17-24. Immature *Haemaphysalis (Rhipistoma) subterra* sp. n., paratypes, Kenya (HH 6,173): 21-22. nymph, dorsal and ventral aspect; 23-24. larva, dorsal and ventral aspect.

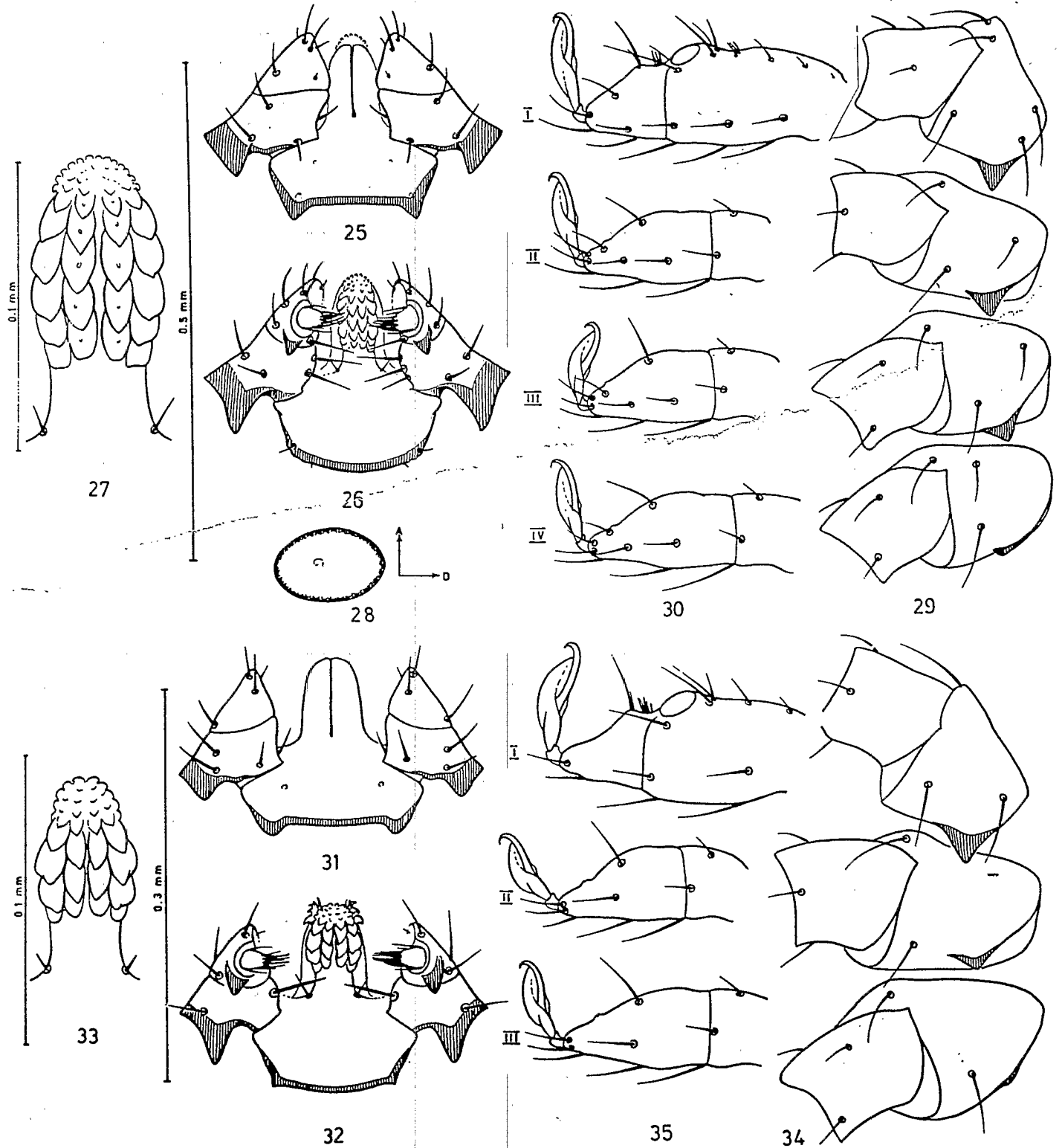


Fig. 25-35. Immature *Haemaphysalis (Rhipistoma) subterra* sp. n., paratypes, Kenya (HH 6,173): 25-26. nymph capitulum, dorsal and ventral views; 27. nymph hypostome, ventral view; 28. nymph spiracular plate; 29. nymph coxae and trochanters I to IV; 30. nymph male tarsi I to IV, external view; 31-32. larva capitulum, dorsal and ventral views; 33. larva hypostome, ventral view; 34. larva coxae and trochanters I to III; 35. larva tarsi I to III, external view. (A = anterior; D = dorsal).

thence slightly concave; dorsointernal and ventrointernal setae number 1 and 2 respectively; dorsal and ventral setae number 3 and 2 respectively. Segment 3 triangular, ca. 0.75 as long as internodorsal margin of segment 2, ventral spur small, setae number 4 dorsally; 3 ventrally, 1 internoventrally. Hypostome (Fig. 27) as long as or slightly shorter than palpi, ca. 2.3 times as long as broad; corona small, hooklets 3 rows; dental formula 2/2, denticles in files of 5 or 6.

Scutum (Fig. 21): 0.9 times as long as broad; anterior emargination shallow; scapulae pointed; margins diverging for anterior one-third, then parallel for two-thirds of scutal length, and converging to form rounded posterior margin. Cervical grooves short. Punctations very few.

Dorsum (Fig. 21) and ventral (Fig. 22): As illustrated. Spiracular plates (Fig. 28) oval.

Legs (Figs. 21, 22, 30): Coxae (Fig. 29) I, II, III spurs subequal, IV reduced to small spur. Setae number 2 anteroexternally, 3 elsewhere on I; I anteroexternally, 2 elsewhere on II to IV. Trochanter I dorsal shield (Fig. 21) large, pointed; trochanters ventrally (Fig. 29) lacking shield. Tarsi (Fig. 30) I large, II to IV moderately elongate gradually tapering distally. Claw I to IV large. Pulvilli large, almost reaching apical curvature of claws.

#### Larva (Figs. 23, 24, 31-35):

Length (unfed) ca. 0.8 mm; breadth ca. 0.5 mm. Capitulum (Figs. 31, 32): Basis capituli dorsally ca. three times as broad as long; margins slightly diverging anteriorly; cornua small, broadly triangular, ventrally with posteroexternal junctures, 1 pair posthypostomal setae. Palpi salient, almost as long as broad; outlines as in nymphs but not so broad. Segment I without setae. Segment 2 internodorsal margin slightly bulging anteriorly; dorsointernal and ventrointernal setae each single; setae dorsally and ventrally number 3 and 2 respectively. Segment 3 triangular; ventral spur extending beyond intersegmental suture; setae dorsally and ventrally 3 and 2 respectively. Hypostome (Fig. 33) as long as or slightly longer than palpi, ca. two times as long as broad; corona large; dental formula 2/2, denticles in files of 3 or 4.

Scutum (Fig. 23): ca. 0.7 times as broad as long, anterior emargination broad and shallow; scapulae pointed; margins abruptly diverging anteriorly, convex to about midlength, thence converging posteriorly, narrowly blunt. Cervical grooves subparallel. Punctations very few.

Dorsum (Fig. 23) and venter (Fig. 24): As illustrated. Coxae (Fig. 34) I spur as in nymph; II ca. one half as long as in I, II reduced to a small ridge. Setae number 1 anteroexternally, 2 elsewhere on I; I anteroexternally, 1 posteriorly on II and III. Trochanter I dorsal shield (Fig. 23) short, trochanters ventrally (Fig. 34)

lack spurs. Tarsi, claws, and pulvilli as illustrated (Fig. 35); tarsus and claws I exceptionally large.

#### MATERIAL EXAMINED

Total: 71M, 101 F, 41 N, 102 L.

Ethiopia: 1 M (without data).

Kenya: 47 M, 70 F, 40 N. 101 L, *T. splendens* and *H. sanguineus*, from Rift Valley Province and Nairobi, 2,300 m altitude.

South Africa: 3 M, *Herpestes* sp., from Bady, Mufolosi.

Tanzania: 11 M, 7 F, *H. sanguineus*, from Arusha, 1,250 m altitude, and Dodoma Provinces.

Zaire: 3 M, 3F, 1 L, rodent (hair), *T. splendens*, from Oriental and Kivu.

Zambia: 6 M, 1F, *H. sanguineus*, *Praomys natalensis* (Smith), *Aethomys chrysophilus* (De Winton), *Genetta maculata* (Gray), *Mungos mungo* (Gmelin), from Eastern and Mt. Makulu.

Zimbabwe: 20 F, 1 N, *H. sanguineus*, *H. ichneumon* (Linnaeus), *Ichneumia albicauda* (Cuvier), *Atilax paludinosus* (Cuvier), from Mashonaland South and Victoria.

#### RELATED SPECIES

*Haemaphysalis subterra* is the smallest recognized member of the *H. leachi* group. The average size of *H. subterra* is 1.4 x 0.8 mm (M), and 1.9 x 1.03 mm (F); comparable sizes for other species in this group are as follows: *H. spinulosa* 1.9 x 1.0 mm (M), 2.22 x 1.13 (F) (Hoogstraal, 1964); *H. zumpti* 1.8 x 0.95 mm (M), 2.14 x 1.14 (F) (Hoogstraal and El Kammah, 1974); *H. moreli* 2.0 x 0.9 (M), 2.4 x 1.2 (F) (Camicas et al., 1972); *H. punctaleachi* 2.65 x 1.29 (M); 2.8 x 1.4 (F) (Camicas et al., 1973); *H. paraleachi* 3.85 x 1.82 mm (M) 3.37 x 1.63 (F) (Camicas et al., 1983).

This species is also the only member in this group which has a dental formula of 3/3; all others have 4/4 except *H. paraleachi* which has 5/5 or 6/6 (Camicas et al., 1983).

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## LITERATURE CITED

- Camicas, J. L., H. Hoogstraal and K. M. El Kammah. 1972. Notes on African *Haemaphysalis* ticks. VIII. *H. (Rhipistoma) moreli* sp. n., a carnivore parasite of the *H. (R.) leachi* group (Ixodoidea: Ixodidae). J. Parasitol. 58: 1185-1196.
- Camicas, J. L., H. Hoogstraal and K. M. El Kammah. 1983. Notes on African *Haemaphysalis* ticks. XIV. Description of adults of *H. (Rhipistoma) paraleachi* sp. n., a carnivore parasite of the *H. (R.) leachi* group (Ixodoidea: Ixodidae). J. Parasitol. 69: 400-404.
- Hoogstraal, H. 1964. Notes on African *Haemaphysalis* ticks. VI. *H. spinulosa* Neumann, and its relation to biological and nomenclatorial problems in the *H. leachi* group of Africa and Asia (Ixodoidea, Ixodidae). J. Parasitol. 50: 786-791.
- Hoogstraal, H. and K. M. El Kammah. 1974. Notes on African *Haemaphysalis* ticks. XII. *H. (Rhipistoma) zumpti* sp. n., a parasite of small carnivores and squirrels in Southern Africa (Ixodoidea: Ixodidae). J. Parasitol. 60: 188-197.

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