

MARGAROPUS WILEYI SP. NOV. (IXODOIDEA, IXODIDAE), A NEW SPECIES OF TICK FROM THE RETICULATED GIRAFFE

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ABSTRACT

WALKER, JANE B. & LAURENCE, B. R. *Margaropus wileyi* sp. nov. (Ixodoidea, Ixodidae), a new species of tick from the reticulated giraffe. *Onderstepoort J. vet. Res.* 40(1), 13-22 (1973).

Descriptions are given of the male and female of *Margaropus wileyi* sp. nov. collected from the reticulated giraffe in Kenya. A key is given to the three species now known in the genus *Margaropus* and their differential diagnosis is discussed.

INTRODUCTION

A detailed review of the genus *Margaropus* and the two species known at the time, *M. winthemi* Karsh, 1878 (the South African winter horse tick or beady-legged tick) and *M. reidi* Hoogstraal, 1956 (the Sudanese beady-legged tick), is given by Hoogstraal, 1956. A third species, *M. wileyi* sp. nov., has recently been collected from the reticulated giraffe in Kenya by G. Rilling and is described below. It is named after the late A. J. Wiley, formerly of the Veterinary Research Laboratory, Kabete, Kenya, in recognition of his valuable contributions to our knowledge of the ticks of Kenya.

Margaropus wileyi SP. NOV.*

Holotype

Male collected from reticulated giraffe (*Giraffa camelopardalis reticulata* de Winton, 1899), approximately 24 km south-east of Isiolo, Meru District, Eastern Province, Kenya in 1969 by G. Rilling. Deposited in the British Museum (Natural History), London, Ref. No. 1972-743.

Allotype

Female, data and depository as for holotype, Ref. No. 1972-744.

Paratypes

Total: 64♂♂, 111♀♀, same data as holotype and allotype, deposited in the following collections: 15♂♂, 24♀♀ in the British Museum (Natural History), Ref. No. 1972-745; 10♂♂, 20♀♀ in the Veterinary Research Institute, Onderstepoort, Ref. No. 3140; 13♂♂, 18♀♀ in the London School of Hygiene and Tropical Medicine; 10♂♂, 15♀♀ in the Hoogstraal collection, Ref. No. H.H. 102,005; 10♂♂, 20♀♀ in the Rocky Mountain Laboratory, Hamilton; 3♂♂, 7♀♀ in the Veterinary Research Laboratory, Kabete; and 3♂♂, 7♀♀ in the South African Institute for Medical Research, Johannesburg.

*The illustrations in this paper were kindly furnished by Dr. H. Hoogstraal of the United States Naval Medical Research Unit No. 3 (NAMRU-3), Cairo. Those of *M. wileyi* were prepared under the auspices of Agreement 03-005-01 between the U.S. National Institutes of Health (National Institute of Allergy and Infectious Diseases) and NAMRU-3 by Madam Rifkea Abu Bakr.

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DESCRIPTION

Margaropus wileyi sp. nov.

Male (Fig. 1, 2, 5-9)

Diagnosis: A small, inornate, very setose tick. Body deep golden brown in colour with paler legs. Conscutum tongue-shaped, reaching to the posterior end of the body but not covering it laterally. Eyes inconspicuous, flush with the conscutum. Fine white setae numerous on the scapulae but sparser elsewhere on the conscutum. Conspicuous shining white setae thickly cover the integument laterally, obscuring the margin of the conscutum, and form tufts round the posterior end of the body. Anal and accessory anal plates long and narrow, terminating in sharp, strongly chitinized points that project backwards to or nearly to the body margin.

Detailed description: Dorsal surface: Length overall \times breadth ranging from 2,25 \times 1,12 to 2,52 \times 1,33 mm. Since the conscutum does not entirely cover the dorsal surface in this species the maximum breadth will vary according to the degree of engorgement of the tick. No caudal protrusion even in well-fed specimens.

Capitulum: Broader than long, the length \times breadth varying from 0,38 \times 0,48 to 0,42 \times 0,55 mm.

Basis capituli: Ranging from well over twice as broad as long in the smaller specimens to about twice as broad as long in the larger specimens, the length \times breadth varying from 0,20 \times 0,48 to 0,28 \times 0,55 mm. Antero-lateral margins short and straight, meeting the long, concave postero-lateral margins in blunt points; posterior margin concave; cornua bluntly rounded. A discontinuous line of fine white setae present across the basis capituli. Ventrally a transverse flange-like ridge present at the junction of the straight antero-lateral and concave postero-lateral margins; posterior margin smoothly rounded.

Palps: Segment I in the form of a short, broad, easily visible pedicle. Segment II a little broader than long; outer margin short, convex; inner margin longer, slightly concave, meeting the posterior margin in a bluntly rounded spur. Segment III over twice as broad as long, broader than II, which it overhangs posteriorly; more or less triangular in shape with a slightly concave, thickened posterior margin. Each segment bears several long, fine, white setae. Ventrally the posterior margins of segments I, II and III are somewhat thickened; retrograde spurs are present on I and III.

Hypostome: Dentition usually 4/4 throughout, occasionally 5/5 anteriorly, 4/4 posteriorly, with five to eight teeth per file.

Anterior process of coxa I: Strongly chitinized, sharp and easily visible from the dorsal surface.

Body: Elongate oval in shape, the length \times breadth varying from $1,95 \times 1,12$ to $2,25 \times 1,20$ mm. Conscutum tongue-shaped; anteriorly covering the body but at the level of the second pair of legs the margins curve in towards the mid-dorsal line, skirt the eyes and then run either almost parallel to each other or slightly sinuously to the hind end of the body where they join in a smooth curve. The lateral margins are usually partially obscured by setae and difficult to see unless the tick is turned at right angles to the light source. Anterior emargination very deep. Eyes level with the second pair of legs, flush with the conscutum, inconspicuous. Cervical grooves broad, shallow and divergent, extending well beyond the eyes. Postero-median and postero-lateral grooves, when present, ranging from faint lines to very shallow grooves.

One of the more conspicuous features of this tick is the pattern formed by the numerous shiny white setae. On the conscutum they arise from well-marked punctations, and are longest and thickest on the scapulae, where they form broad bands which are continuous with those on the lateral integument. They are also quite long and thick just behind the emargination. The setae on the postero-dorsal part of the conscutum, from about eye-level backwards, are noticeably shorter and finer. These tend to be concentrated in two groups; the first, usually starting at eye level, is roughly triangular in shape and the second is in the form of a long, narrow inverted V projecting back either side of the postero-median groove. On the integument at the sides of the body the setae are particularly long and dense, forming bands that extend backwards to about the level of the spiracles. Round the posterior end of the body similar setae are grouped in eight to ten more or less well-defined tufts.

Ventral surface: Quite thickly covered with fine white setae from approximately the level of Coxa II as far back as the anus.

Genital aperture: On a level with the interval between Coxa I and II.

Anal and accessory anal plates: Long and narrow, tapering to sharp, strongly chitinized points that reach the posterior margin of the body in a few, but not all, the specimens examined. In well-fed specimens the plates project freely from the surface of the body on a broad bulge of the integument for about half their length.

Spiracle: Roughly oval in shape with about eight aeropyles round its perimeter.

Legs: Yellowish with dark brown annulations distally on each segment; large, strong and very setose, with beady-looking segments. Coxa I roughly triangular with a stout, sharp anterior projection; posterior margin quite deeply cleft, forming two bluntly-rounded, thick spurs. Coxa II also cleft posteriorly, though not quite so deeply, and the spurs broader than in I. Coxa III with a small cleft in the posterior margin and much reduced spurs. Coxa IV with a slightly indented ridge along the posterior margin. Tarsi relatively broad, with a sharp spur-like hook apically; II, III and IV also have a short ventral subapical spur.

Female (Fig. 3, 4, 10-14)

Diagnosis: A small, inornate, moderately setose tick. Scutum deep golden brown, alloscutum yellowish-

grey and legs paler in colour. Body smoothly oval in shape in unengorged specimens. Lateral margins of the scutum slightly convex, interrupted about halfway back by bulging eyes; posterior margin smoothly curved. Fine white setae on the scutum, most numerous on the scapulae and behind the margination, elsewhere sparse; setae on the alloscutum quite numerous laterally but sparser along the mid line.

Detailed description: Dorsal surface: In four unengorged specimens length overall \times breadth ranging from $2,55 \times 1,1$ to $2,68 \times 1,3$ mm; in the largest, apparently fully engorged, specimen length overall \times breadth $7,2 \times 4,4$ mm.

Capitulum: About one-and-a-half times as broad as long; in 10 specimens, the length \times breadth ranging from $0,4 \times 0,62$ to $0,45 \times 0,70$ mm.

Basis capituli: Ranging from about three times as broad as long in the smallest specimens to over twice as broad as long in the largest specimens, the length \times breadth varying from $0,2 \times 0,62$ to $0,25 \times 0,69$ mm. Antero-lateral margins more or less straight and very short, postero-lateral margins concave and about twice as long as anterior, so that the lateral angles are far forward; posterior margin slightly concave; cornua small, bluntly rounded. Porose areas large, separated by a space measuring less than their own diameter. Ventrally triangular in general shape, with a broad flange-like ridge present at the junction of the antero-lateral and postero-lateral margins.

Palps: Segment I in the form of a short broad pedicle, not distinctly separated from Segment II. Segment II broader than long, external margin convex, internal margin slightly concave, postero-internal corner thickened to form a broad spur. Segment III much broader than long, overhanging Segment II slightly; apex broadly rounded, posterior margin convex and slightly thickened. Each segment bears several long, fine white setae. Ventrally the junction between Segments I and II cannot be distinguished; posterior margin of Segment III straight and thickened with a retrograde spur postero-internally.

Hypostome: Dentition usually 4/4, occasionally 5/5 anteriorly, 4/4 posteriorly, with seven to ten teeth per file.

Anterior process of Coxa I: Sometimes just visible dorsally, depending on the degree of engorgement of the specimen.

Body: Elongate oval in shape, the length \times breadth varying from $2,2 \times 0,98$ to $2,31 \times 1,3$ mm in the four unengorged specimens measured.

Scutum: A little longer than broad, the length \times breadth varying from $0,85 \times 0,65$ to $1,15 \times 0,81$ mm. Lateral margins slightly convex, interrupted about halfway back by the rather large, bulging eyes; posterior margin smoothly rounded. Cervical grooves broad, shallow, reaching the lateral margins just behind the eyes and dividing the scutum into three. Very fine white setae numerous on the scapulae and posterior to the emargination, elsewhere sparse.

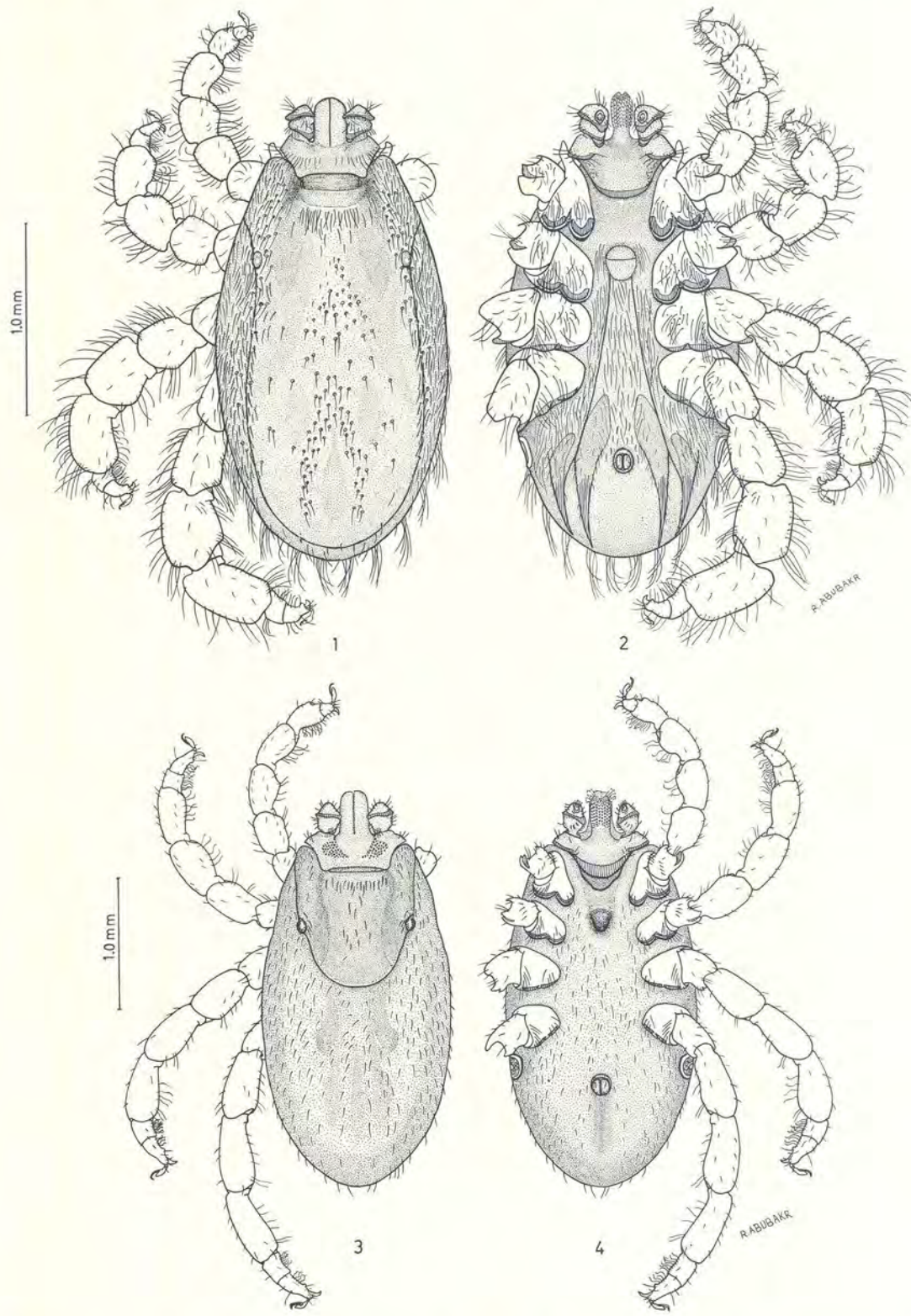
Alloscutum: Fine white setae numerous on the sides of the body, much sparser mid-dorsally; nowhere are they as long or as thick as they are on the male.

Ventral surface: Scattered fine white setae present from the level of the posterior margin of Coxa I as far as the anus and thence along the sides of the body. A row of setae is also present on each side of the mid-ventral line in the post-anal area.

Genital aperture: In line with the interval between Coxae I and II.

Spiracle: More or less oval in shape, with a rather irregular outline; aeropyles in a single row anteriorly and a double row posteriorly.

Legs: Yellowish with faint to well-marked brown annulations distally on each segment; well-developed and moderately setose. Coxa I roughly triangular, with its posterior margin deeply cleft, separating two broadly rounded, heavily chitinized spurs. Depth of cleft and



Margaropus wileyi sp. nov. Fig. 1: Male, dorsal view. Fig. 2: Male, ventral view. Fig. 3: Female, dorsal view. Fig. 4: Female, ventral view

size of spurs decreasing progressively from Coxae II to IV: on IV they are just visible. Tarsi more slender and tapering than in the male, each with a sharp spur-like hook apically; II, III and IV also have a short ventral, subapical spur.

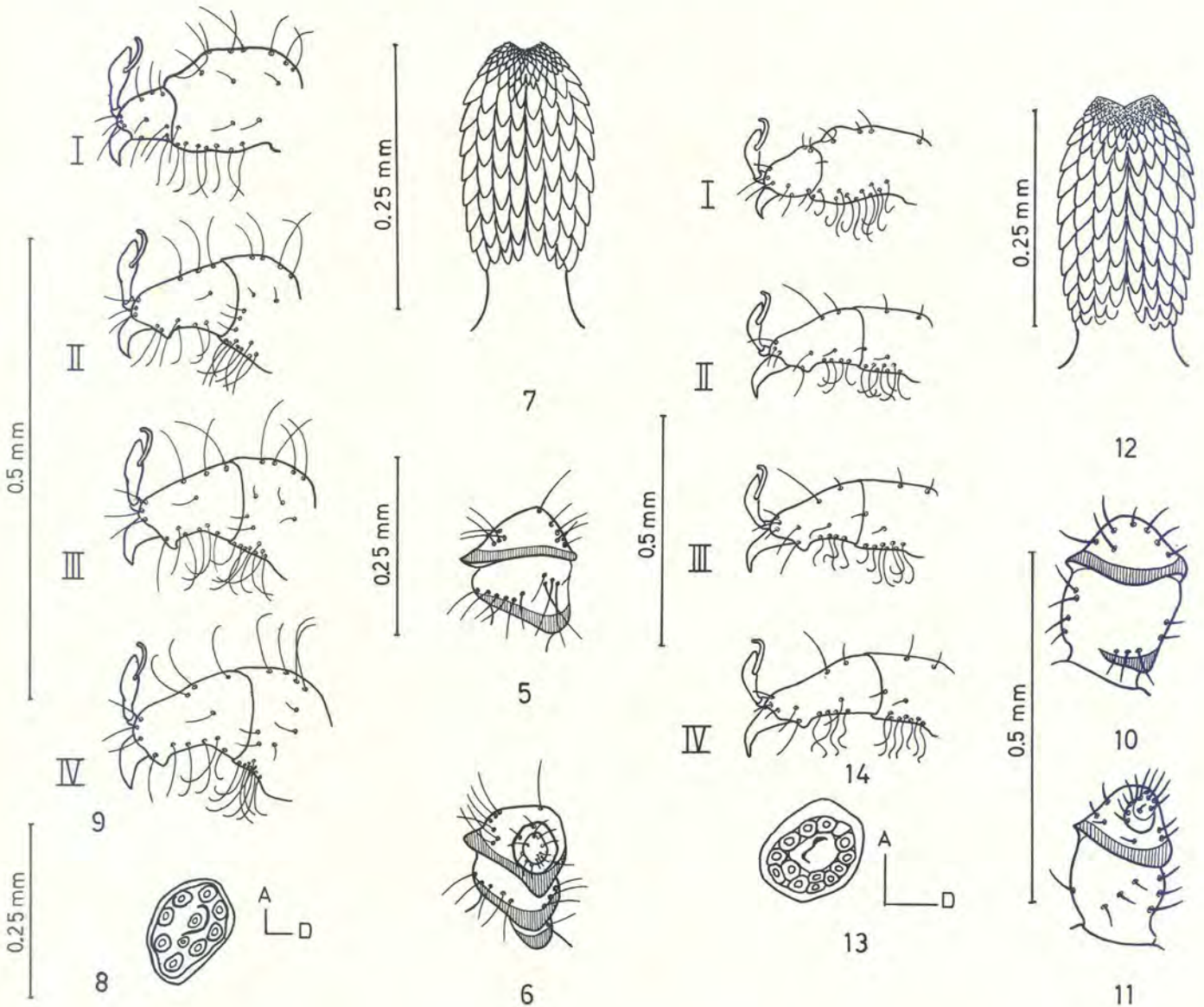
BIOLOGY

The only known host of *M. wileyi* is the reticulated giraffe. According to G. Rilling (personal communication, 1970) the host was found dead about 24 km south-east of Isiolo (at c. 00° 15'N., 37°25'E.), in Meru District, Eastern Province, Kenya. This area is at about

1 300 m in altitude, in *Wooded and/or Bushed Grassland* with a mean annual rainfall of a little over 1 000 mm. It lies on the edge of Ecological Zone IV as defined by Pratt, Greenway & Gwynne (1966), which is regarded as having a semi-arid climate with moisture indices of -30 to -40.

DIFFERENTIATION OF THE *Margaropus* SPECIES

The genus *Margaropus* is defined by Hoogstraal (1956) as follows: "Males with expanded leg segments that are more or less deeply separated from each other

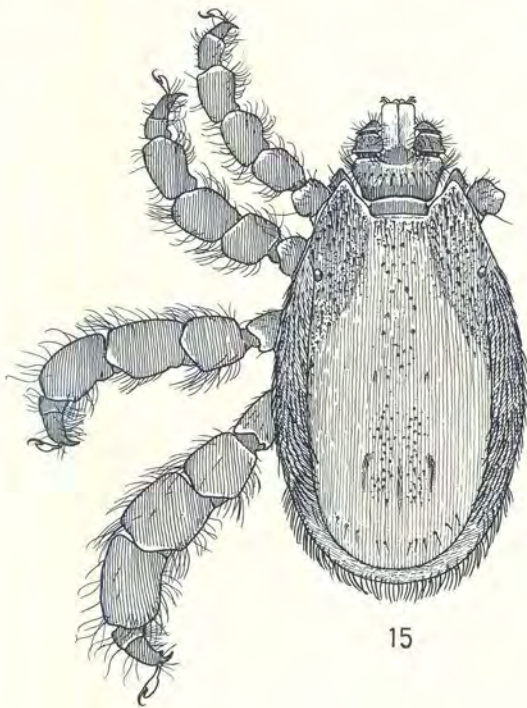


Margaropus wileyi sp. nov. Fig. 5: Male palp, dorsal view. Fig. 6: Male palp, ventral view. Fig. 7: Male hypostome. Fig. 8: Male spiracle. Fig. 9: Male Tarsi I to IV. Fig. 10: Female palp, dorsal view. Fig. 11: Female palp, ventral view. Fig. 12: Female hypostome. Fig. 13: Female spiracle. Fig. 14: Female Tarsi I to IV

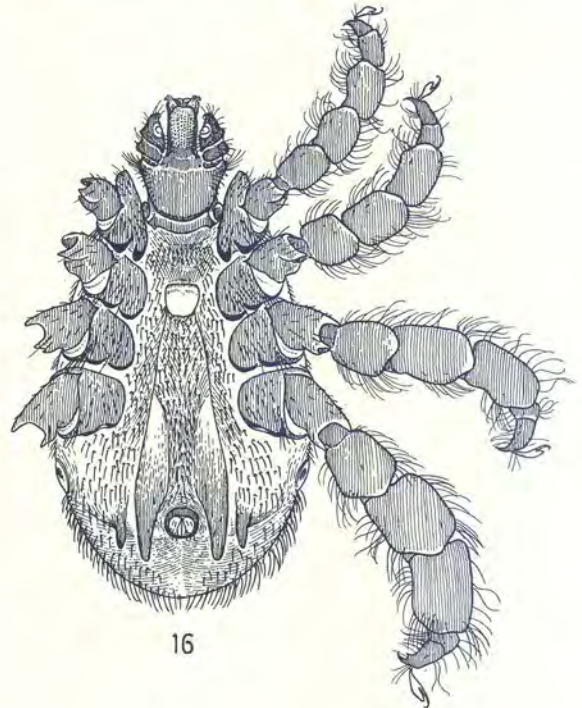
(partially non-contiguous); adanal shields arising at level of coxa IV and extended posterior of anus; tarsi elongate, narrow, tapering, with a large apical hooklike projection; palpi intermediate between those of *Boophilus* and *Rhipicephalus*, not ridged as in former genus; integument with conspicuous hairs posteriorly; with eyes (may be indistinct in *M. winthemi*); unornamented. Females with leg segments not greatly widened

but other leg characters similar to those of male. Palpi intermediate between those of *Rhipicephalus* and *Boophilus*. Eyes distinct". To this definition it is only necessary to add that the eyes in the males of *M. wileyi* are also indistinct.

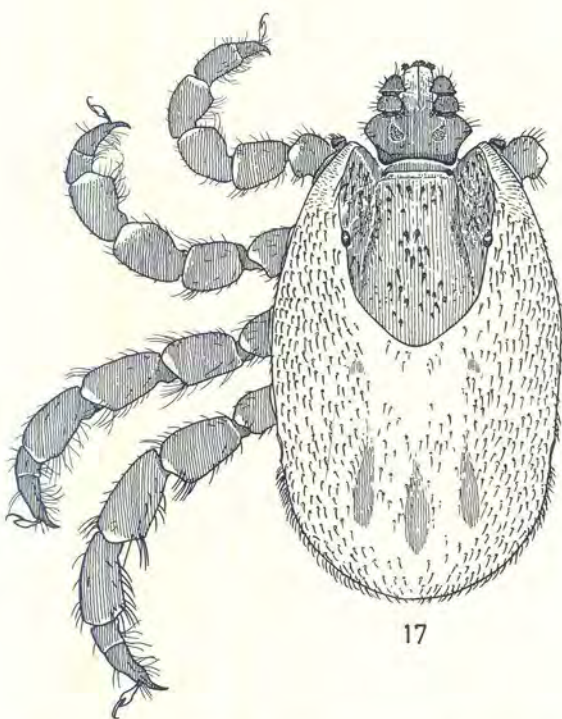
The three species now known in this genus may be identified with the following key, adapted from that given by Hoogstraal (1956):



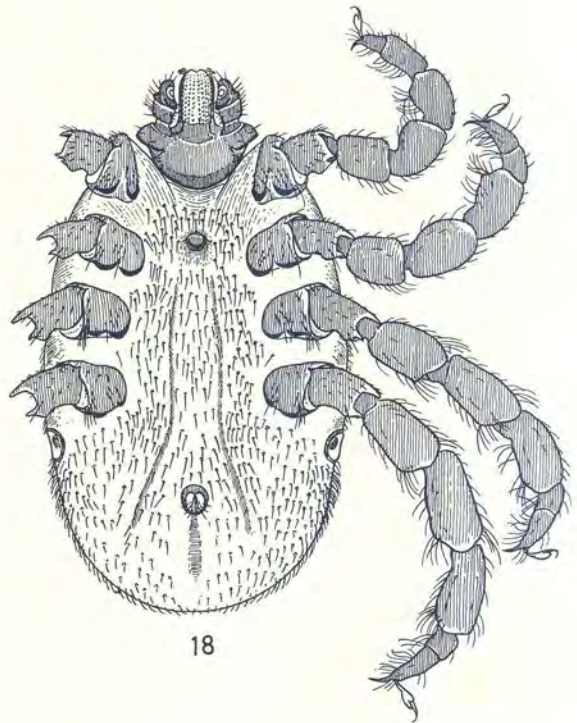
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16



17



18

Margaropus reidi. Fig 15: Male, dorsal view. Fig. 16: Male, ventral view. Fig. 17: Female, dorsal view. Fig. 18: Female, ventral view (Reproduced from Hoogstraal, 1956)

Males

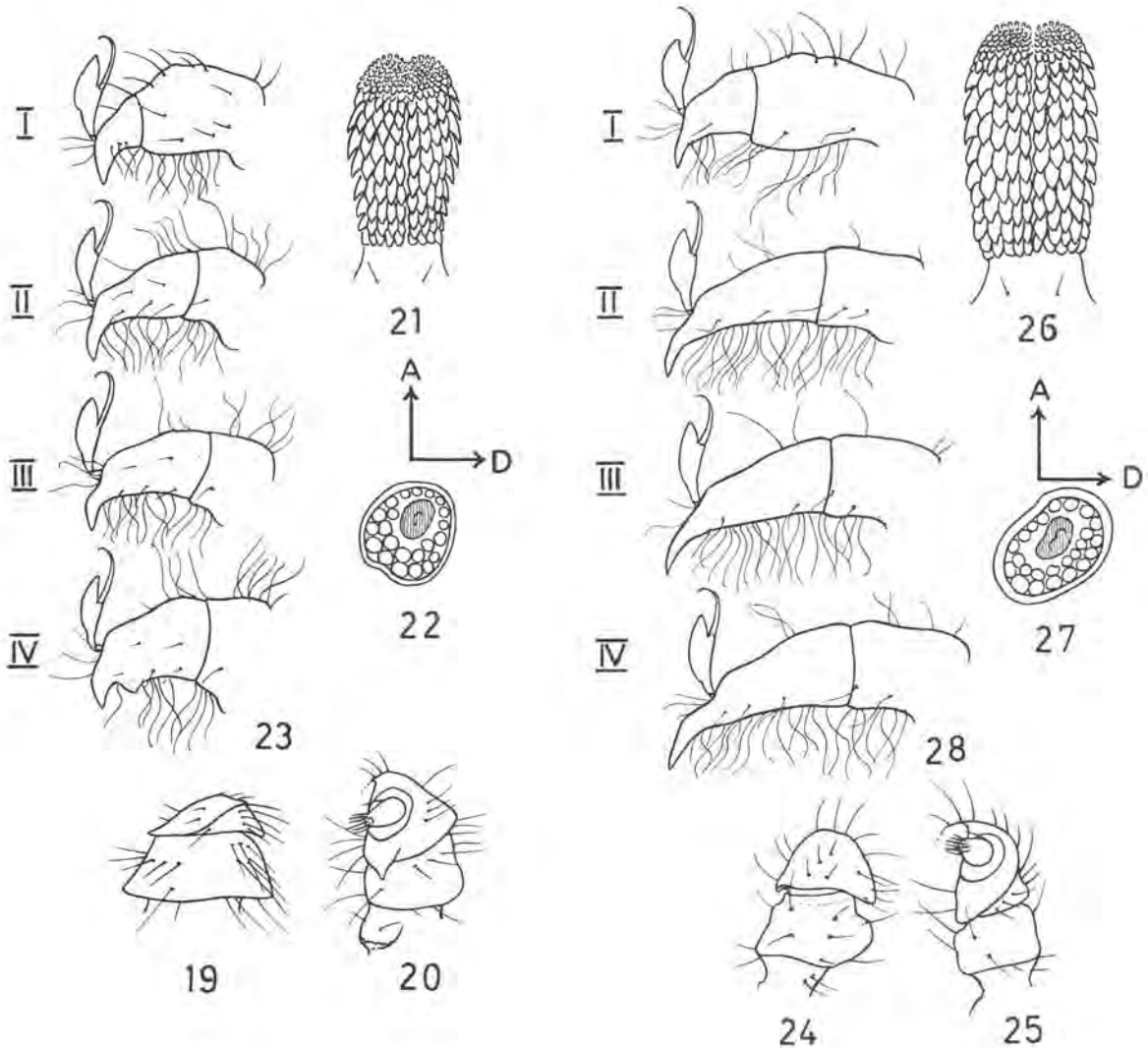
1. Setae around posterior end of body in a continuous fringe. Anal and accessory anal plates relatively bluntly pointed and only extending a short distance behind the anus. Caudal process not known to be present. Scutal margins virtually parallel laterally; scapulae and sides of body moderately setose. (Sudanese giraffe tick)..... *M. reidi*
(Fig. 15, 16, 19-23, from Hoogstraal, 1956).

Setae around posterior end of body in tufts.
Anal plates sharply pointed distally..... 2

2. Anal plates relatively short and straight, only extending about half-way to the body margin. No accessory anal plates present. Ventral hook present on posterior body margin; caudal process present in engorged specimens. Scutal margins convex laterally; scapulae and sides of body sparsely setose. (South African winter horse tick)..... *M. winthemi*
(Fig. 29, 30, 33-37, from Hoogstraal, 1956)

Anal and accessory anal plates present, long, slightly curved and extremely sharply pointed, reaching or nearly reaching the posterior body margin. No ventral hook or caudal process present. Scutal margins concave laterally; scapulae and sides of body thickly covered with shiny white setae. (East African giraffe tick) .. *M. wileyi*
(Fig. 1, 2, 5-9)

As can be seen from a comparison of the figures of the males of these three species, the capitulum of *M. winthemi* differs quite markedly in shape from those of the other two species. In *M. winthemi* the basis capituli is somewhat rounded laterally, or at most extremely bluntly angular, and the palps are very short and broadly rounded apically, whereas in the other species the basis capituli is angular laterally and Segment 3 of the palps is more or less triangular in shape and overhangs Segment 2 posteriorly. *M. winthemi* is also unique in that it lacks accessory anal plates, and it has the most massively developed legs of the three species. *M. reidi* is the only species in which the setae round the posterior end of the body form a continuous fringe and, compared

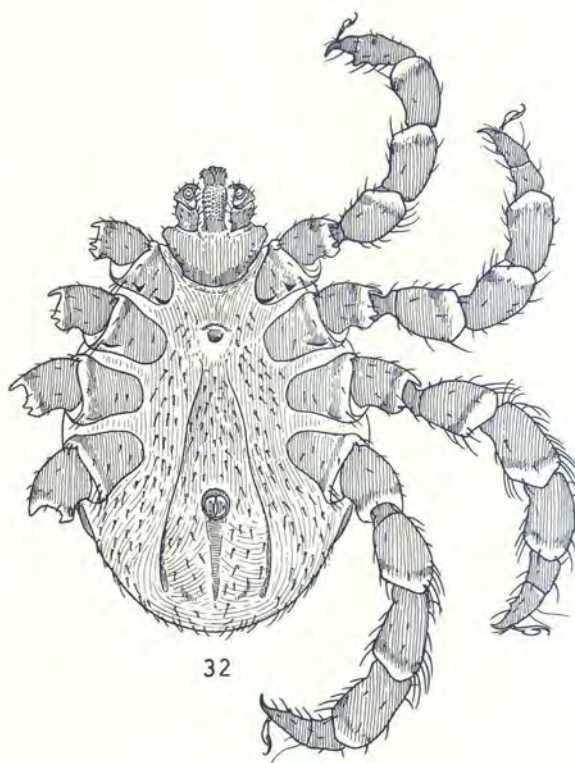
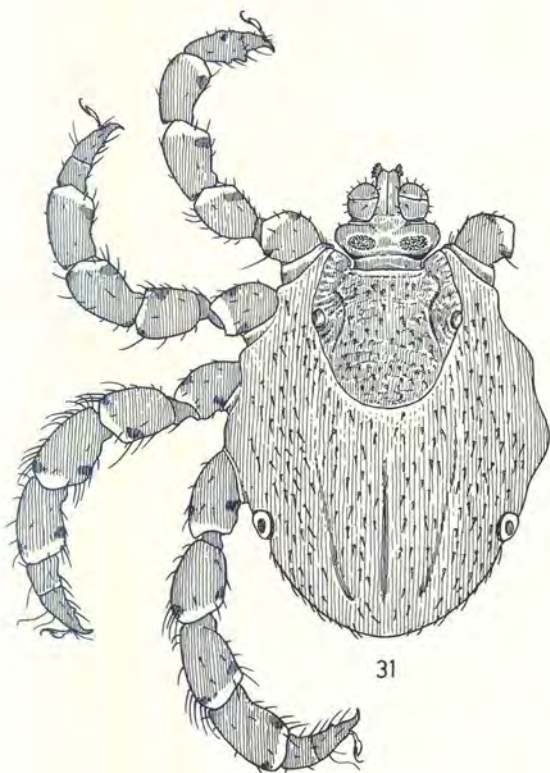
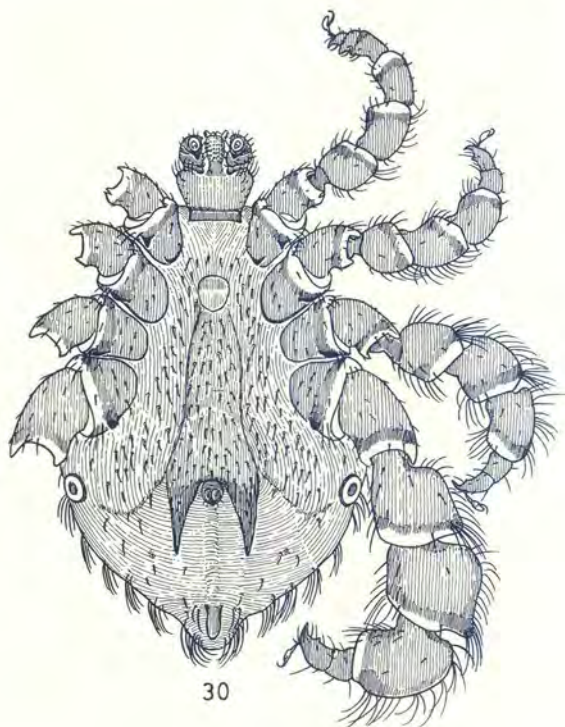
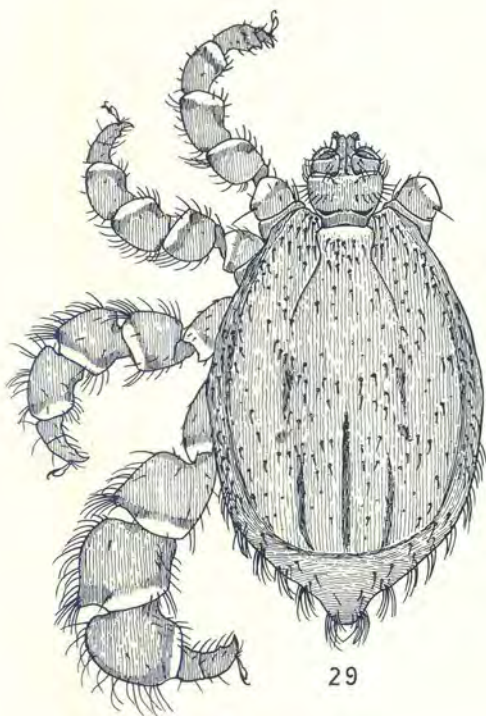


Margaropus reidi. Fig. 19: Male palp, dorsal view. Fig. 20: Male palp, ventral view. Fig. 21: Male hypostome. Fig. 22: Male spiracle. Fig. 23: Male Tarsi I to IV. Fig. 24: Female palp, dorsal view. Fig. 25: Female palp, ventral view. Fig. 26: Female hypostome. Fig. 27: Female spiracle. Fig. 28: Female Tarsi I to IV (Reproduced from Hoogstraal, 1956)

with the other two species, its anal plates are rather bluntly pointed. *M. wileyi* is the most conspicuously setose species of the three and the shape of its long spiny anal and accessory anal plates is also quite remarkable.

Females

1. Palpal Segment 2 sharply constricted distally. Scutum widest midway between the scapulae and eye level..... *M. reidi*
(Fig. 17, 18, 24-28)



Margaropus wintbemi.. Fig. 29: Male, dorsal view. Fig. 30: Male, ventral view. Fig. 31: Female, dorsal view. Fig. 32: Female, ventral view (Reproduced from Hoogstraal, 1956)

COMPARATIVE BIOLOGY OF THE *Margaropus* SPECIES

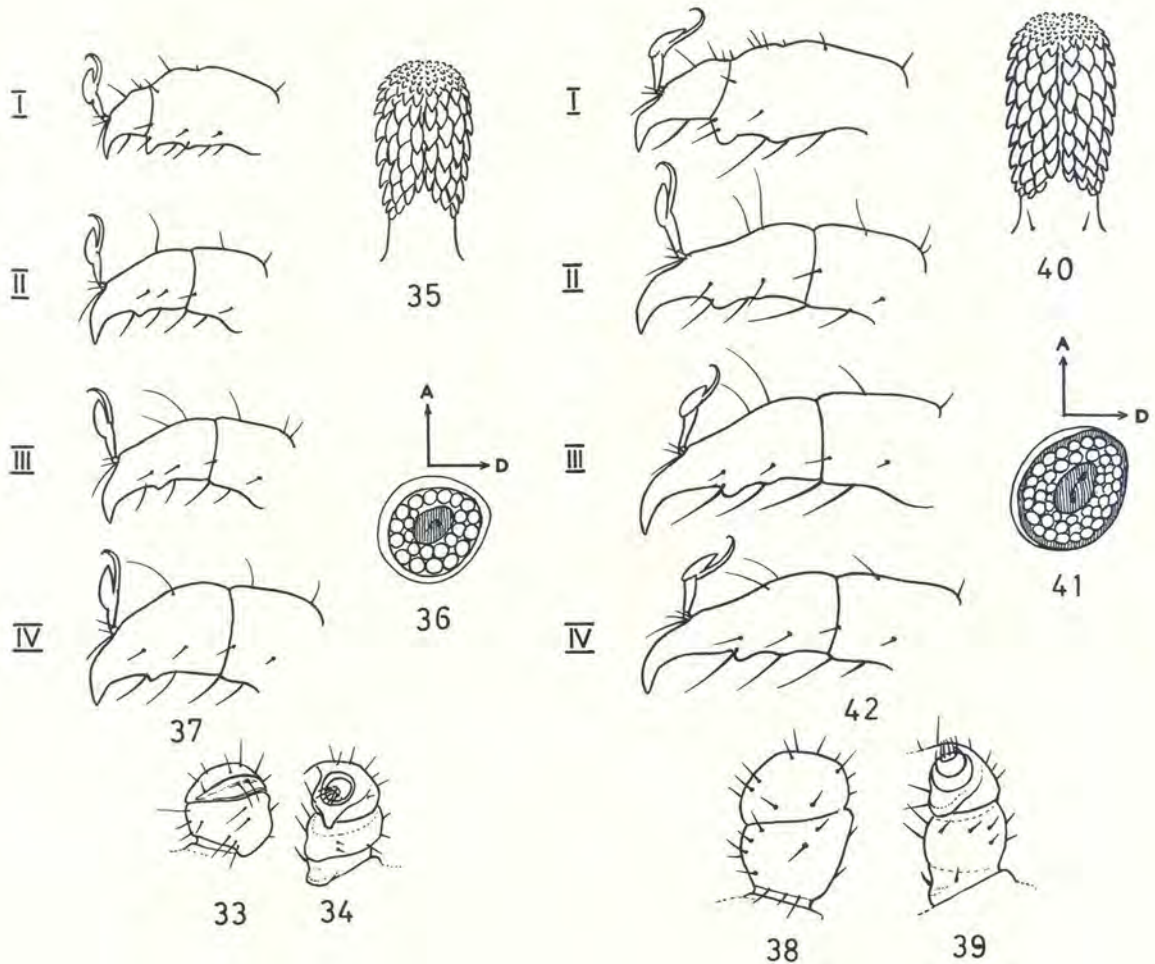
- Palpal Segment 2 not sharply constricted distally..... 2
- 2. Palpal Segment 2 lacking a postero-internal spur. Scutum widest at eye level.. *M. winthemi* (Fig. 31, 32, 38-42)
- Palpal Segment 2 with a blunt postero-internal spur. Scutum widest across the scapulae..... *M. wileyi* (Fig. 3, 4, 10-14)

Although the differences between the *Margaropus* females are not as obvious as are those between the males careful examination, particularly of the capitulum, reveals several variations in form between them. In *M. winthemi* the basis capituli is rounded laterally, whereas it is angular in the other two species, and palpal Segment 3 is broadly rounded apically and does not overhang Segment 2. In both *M. wileyi* and *M. reidi* the posterior border of palpal Segment 3 overhangs Segment 2. This is particularly noticeable in *M. reidi*, in which Segment 2 is constricted distally, so that there is a conspicuous notch on the internal border of each palp.

In *M. winthemi* the porose areas are transversely oval whereas in the other two species they are more sub-triangular in shape and tend to lie at an angle, but this difference is not always as marked as the figures suggest.

Information on the biology of *M. winthemi* is given by Theiler, 1962; Theiler & Salisbury, 1958 and Du Toit & Theiler, 1968. It is a one-host species parasitizing domestic animals almost exclusively, especially horses, though cattle are quite often infested. There is circumstantial evidence suggesting that it may be involved in the transmission of redwater of cattle, caused by *Babesia* spp., but this has not been proved. In general it has rarely been reported to have a harmful effect on its hosts. Geographically it is virtually confined to the Republic of South Africa and Lesotho, with a few records (probably representing chance introductions) from adjacent countries. It is found at altitudes up to about 1 700 m in grasslands and in some types of thorn country and desert shrub with mean annual rainfalls ranging from less than 250 to about 900 mm. It is most active in winter, occurring in many places experiencing over 90 days of frost, but is unable to tolerate, great heat and is absent both from hot, dry areas such as South West Africa and the Kalahari, and from hot damp regions, such as the Transvaal Lowveld and the coastal parts of Natal and Mocambique.

The very limited information available indicates that *M. reidi* and *M. wileyi*, both of which are known only from giraffes, differ markedly from *M. winthemi* in



Margaropus winthemi. Fig. 33: Male palp, dorsal view. Fig. 34: Male palp, ventral view. Fig. 35: Male hypostome. Fig. 36: Male spiracle. Fig. 37: Male Tarsi I to IV. Fig. 38: Female palp, dorsal view. Fig. 39: Female palp, ventral view. Fig. 40: Female hypostome. Fig. 41: Female spiracle. Fig. 42: Female Tarsi I to IV (Reproduced from Hoogstraal, 1956)

their ecological requirements. Hoogstraal (1956) records *M. reidi* from the Sudan, Bahr El Ghazal Province, at Liednham, on the south bank of the Jur River, and at Guar, in the Gual-Nyang Forest. He regards it tentatively as a species of the West African faunal subregion since it was collected in the northern part of the area known as the Raga-Loka. The vegetation in this area consists largely of broad-leafed forests and woodlands and the mean annual rainfall is over 900 mm. The mean monthly maximum temperature only falls below 30°C for a relatively short period; in the hot season it exceeds 35°C. *M. wileyi* is a species of the East African faunal subregion and, as noted above, occurs at about 1 300 m in an area of *Wooded and/or Bushed Grassland* with a mean annual rainfall of a little over 1 000 mm. Here the estimated mean minimum temperature is about 15°C and the mean maximum temperature about 26°C (J. Glover, South African Sugar Association Research Station, Mount Edgecombe, personal communication, 1972).

ACKNOWLEDGEMENTS

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us and for permission to reproduce his figures of *M. reidi* and *M. winthemi*; to Mr. J. Glover for calculating the mean minimum and mean maximum temperatures that may be expected in the Isiolo area, and to Dr. Gertrud Theiler for her helpful criticism of the manuscript. These studies were initiated by a grant to the junior author for the Royal Society as part of the International Biological Programme.

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