KEY TO THE ADULT IXODIDAE OF THE GENUS HAEMAPHYSALIS C. L. KOCH, 1844 OF ETHIOPIAN AFRICA

J. A. TRAVASSOS SANTOS DIAS
Chief of the 2nd Entomological Subsection of the Tripanosomiasis Department
(Mozambique)

Separata dos ANAIS DO INSTITUTO DE MEDICINA TROPICAL, Volume XII, N.º 3
Setembro de 1955

KEY TO THE ADULT IXODIDAE OF THE GENUS HAEMAPHYSALIS C. L. KOCH, 1844 OF ETHIOPIAN AFRICA (*) (1)

J. A. TRAVASSOS SANTOS DIAS
Chief of the 2nd Entomological Subsection of the Tripanosomiasis Department
(Mozambique)

In 1915, the British scientists Nuttall, Warburton and their collaborators submitted a well prepared identification key covering all the species of the genus *Haemaphysalis* then known, in their different stages and sexes.

In spite of the extensive systematic research which they also carried out, those authors were still somewhat confused as to the position of a certain number of species closely related to *H. leachi* (Audouin). If we restrict ourselves to the African Continent, these were *H. leachi indica* Warburton, 1910, *H. spinulosa* Neumann, 1906, *H. numidiana* Neumann, 1905 and *H. obtusa* Dönitz, 1910.

The variety *indica* was set up on the basis of the Indian specimens which differed from the typical form in that they were short, had a 4/4 dental formula and displayed no dorsal spure on the palpal article II.

Those autsors however estimated that it was possible in any particular collection of *H. leachi* to find some typical specimens, specimens related to var. *indica* and yet others which occupy an inter-

(*) Trabalho apresentado ao II Congresso da Sociedade Científica do Oceano Índico, realizado em Perth (Austrália), em Agosto de 1954.

(1) Entregue para publicação em 15/2/55.

mediary place between them. Hence the reason for the reserve with which they accepted the validity of the variety in question.

In material from Mozambique, we have never found any forms which can be considered as strictly intermediary between *H. leachi leachi,* the parasite found on the large carnivorous animals, and *H. leachi indica,* the type which one commonly finds living on the smaller carnivorous wild beasts. For this reason we shall consider them as being a distinct variety even though in the majority of cases the only objective character is the notable difference in size (1).

In connection with the other species mentioned above, we feel that it is opportune to transcribe the opinion put forward by Nuttall, Warburton and their collaborators when discussing their respective validity. «There remains three established species, *H. spinulosa, H. numidiana* and *H. obtusa,* which we think it best to retain for the present, but which eventually may have to be merged in *H. leachi.* They are very closely allied to *H. leachi* and would appear to be recently derived therefrom, but a wider knowledge of them is necessary to determine how far their peculiarities are constant. It is interesting to note that they correspond in size to the two extremes of the range of authentic *H. leachi, H. numidiana* being a large species, while *H. obtusa* is very small».

Subsequent to the appearance of the monograph to which we have just referred, and in as much as concerns the Ethiopian Region of the African continent — the only one with which we are dealing here — the findings in respect to the systematics of the genus *Haemaphysalis* were very sparse.

Thus, in 1929 Bedford described under the name of *H. cooleyi* a species which he found on two small mammals (3 ♂♂, 1 ♀ and 2 NN, in *Procavia capensis coombsi* Roberts and several nymphs in *Pedetes cafer* Pall.) from the Transvaal.

In 1933 Warburton identified as *H. numidiana* 1 ♂ and 1 ♀ collected by Profesor Cooley from *Pedetes cafer* (1/10/1928), in South Africa. Accor-

(1) We should mention that whereas Warburton has characterised his variety as being destitute of dorsal spurs on the palpal article II, this peculiarity does not, in our opinion, appear constant, in view of the fact that the vast majority of specimens which we examined, if not all, possess a clearly visible spur at this point.

dingly, bearing in mind that Bedford stated that various nymphs of *H. cooleyi* had been collected from that species of rodent, he admited the hypothesis that such immature forms should belong to the species *H. numidiana*.

We do not consider that Warburton was right because we find it difficult to believe that, considering Bedford also examined two nymphs collected from the same animal as that from which he had taken the adult specimens of the species he created, he should not have compared them with the specimens collected in *Pedetes cafer*.

Even though Bedford separated his species from *H. hoodi hoodi* Warb. and Nut., principally on account of the shape of the palps and from the subspecies *H. hoodi orientalis* for no specific characteristic («A variety of *hoodi* has been described from specimens taken off *Procavia manningi* in Nyasaland, but it appears to be quite distinct from cooleyi»), there is no doubt that a detailed comparison of the descriptions of these two species could not fail to underline the extreme similarity which exists between them. For example the sizes of the conscutum and scutum, the appearance of these organs in respect to the distribution of punctuations, the shape of the capitulum, and specially of the basis capituli, and the coxal armature are all identical. The principal differences reside in the scutum, which in *H. hoodi orientalis* is more sharply pointed in shape at the rear than that of the type species, whereas in *H. cooleyi* this part is almost round, and in the second article of the palps where the outer edge is more noticeably curved in *H. hoodi* and its variety than in *H. cooleyi*.

Apart from this, one must also consider the fact that both ticks under consideration are parasites of the hiraxes (*Procavia* spp.) a fact which leads us to the synonymity of the two species, which we have not finally established on account of the small differences mentioned above.

Even though it contradicts our hypothesis, we feel that we should mention that Warburton (1933) redescribed the male of *H. cooleyi* based on his observation of three specimens that were submitted by Bedford from South Africa. This leads us to conclude that he had considered as valid the creation of the species in question.

The division of the species to which we refer in our dichotomic key is based on characteristics which are perhaps not very objective and therefore subject to criticism.

In 1925, Bedford and Hewitt described for the first time the male of *H. silacea* Robinson, a species of which only the female was then known.

In 1943, G. Theiler created a new variety for *H. leachi,* which she termed as «*humerosoides*», from her observation of specimens which differed from the type species in the elongated shape of their bodies which are exageratedly long and on account of the spurs on their coxae which were considerably more developed and pointed, and the outer contour of the palps which was not straight, and lastly because of the presence of numberless long hairs on their ventral surface.

Two years later (1945), that author studying some *Haemaphysalis* from South Africa, described the larval and nymphal forms of the species *H. aciculifer* Warburton and *H. silacea* Robinson.

Finally, in 1948, Colas-Belcour and Millot described a new subspecies of tick, which they termed *H. hoodi madagascariensis,* basing themselves on the observation of 1 ♂ and 3 ♀♀, which where taken from the head of a *Centropus madagascariensis,* from Moramanga (Madagascar).

Whereas the majority of the adult forms of *Haemaphysalis* from Ethiopian Region are already known, the same can not be said of the respective immature forms. This can be understood if we bear in mind how contingent is the collection, in nature, of swollen females, in suitable conditions for their descendants to be subsequently studied in the laboratory.

Such a hinderance, however, should not be considered as insurmountable, it being imperative that ixodologists working in Africa should direct their efforts to the study and solution of this as well as other unknown factors, which still swarm in quite large numbers around its ixodological fauna, so rich, so peculiar and so important a part in the concert of tropical, human and veterinary nosology.

For the above reasons the key which follows is only applicable to the adult forms of *Haemaphysalis* from the African portion of the Ethiopian Region, presently represented by thirteen species and five subspecies.

MALES

1. Palpal article II wide, projecting out from the scapulae. 2
— Palpal article II narrow, not projecting out from the scapulae. 13

2. Posterior dorsal margin of palpal article II with a spur. 3
— Posterior dorsal margin of palpal article II without a spur or with an almost obsolet one. 6

3. Marginal grooves long. Coxae with spurs. 4
— Marginal grooves short or absent. Coxae without spurs.

Species of the Reunion Island and Madagascar. Body length 1.5 mm. Parasite of the *Viverridae*.

(11) *H. obtusa* Dönitz, 1910.

4. Coxae with strong and long spurs. 5
— Coxae with short spurs.

Species spread out over the whole African continent.

H. leachi sensu latum.

Median forms. Body length = 2.3 to 3.3 mm. Parasite of the large carnivorous animals.

(1) *H. leachi leachi* (Andouin, 1826).

Short forms. Body longth = 1.3 to 1.5 mm. Parasite of the small carnivorous wild beasts.

(10) *H. leachi indica* Warburton, 1910.

Long forms. Body length above 3.5 mm. Parasite of the large carnivorous animals.

(17) *H. leachi humerosoides* G. Theiler, 1943.

5. Dentition 3/3.

Species found only in Madagascar Island. Body length = 3.0 mm. Parasite of mammals.

(3) *H. elongata* Neumann, 1897.

— Dentition 4/4.

Here may possibly be placed the male form of a species of which only the female sex is known. Uganda. Hosts unknown.

(8) *H. spinulosa* Neumann, 1906.

6. Marginal grooves long. 7
— Marginal grooves short or almost absent. 11

7. Conscutum oval elongated.

This tick reminds one of the *H. leachi* in the shape of the body. Average body length = 3.5 mm. Algeria, Macedonia, Turkestan and South Africa. Parasite of sundry small mammals.

(6) *H. numidiana* Neumann, 1905.

— Conscutum short oval shaped

8. Outer contour of the palpal article II accentuatedly concave. 9
— Outer contour of the palpal article II slightly concave.

Body length = 1.8 to 2.0 mm. South Africa. Parasite of certain rodents.

(16) *H. cooleyi* Bedford, 1929.

9. Basis capituli regularly rectangular, provided with cornuae. 10

— Basis capituli trapezoidal, narrower posteriorly and without cornuae.

Body length = 1.6 to 1.7 mm. Nyasaland. Parasite of of the hiraxes.

(15) *H. hoodi orientalis* Nuttal & Warburton, 1915.

10. Conscutum regular oval shaped. Cornuae pointed. Coxa IV with reduced spur in the posterior internal angle.

Body length = 1.4 to 1.8 mm. The whole of Ethiopian Africa. Parasite of birds.

(9) *H. hoodi hoodi* Warburton & Nuttall, 1909.

— Conscutum oval shaped, narrow anteriorly. Cornuae blunt.
— Coxa IV with a reasonably developed spur at the midle of the posterior margin.

Body length = 2 mm. Madagascar. Parasite of birds.

(18) *H. hoodi madagascariensis* Colas-Belcour & Millot, 1948.

11. Coxae provided with weak spurs. Marginal grooves hardly distinguishable, almost absent.

Species found only in Madagascar Island. Body length = 1.8 mm. Parasite of small mammals.

(4) *H. simplex* Neumann, 1897.

— Coxae with strong spurs. Marginal grooves clearly marked. 12

12. Spurs of the trochanters strong and pointed.

Body length = 1.7 mm. East and South West Africa. Parasite of small mammals.

(5) *H. calcarata calcarata* Neumann, 1902.

— Spurs of the trochanters short and blunt.

Body length = 1.7 mm. Cameroun, Senegal. Parasite of small mammals.

(14) *H. calcarata houyi* Nuttall & Warburton, 1915.

13. Spur o coxa IV short.
— Spur of coxa IV exceptionally long.

Body length = 1.8 to 1.95 mm. The whole of Ethiopian Africa. Parasite of antilopes.

(13) *H. aciculifer* Warburton, 1913.

14. Marginal grooves long. Spur of the coxa I moderately long.

Asiatic species which was also found in Kenya. Body length = 1.45 to 2.3 mm. Parasite of cattle.

(2) *H. bispinosa bispinosa* Neumann, 1897.

— Marginal grooves short, inconspicuous, at times absent. Spur of the coxa I short. 15

15. Posterior dorsal margin of palpal article III with a retrograde triangular spur.

Body length = 1.3 to 1.8 mm. Ethiopian Africa. Parasite of mammals.

(7) *H. parmata* Neumann, 1905.

— Posterior dorsal margin of the palpal article III smooth.

Body length = 2.0 to 2.5 mm. South Africa. Parasite of cattle.

(12) *H. silacea* Robinson, 1911.

FEMALES

1. Palpal article II wide and projecting outside the scapulae. 2
— Palpal article II narrow and not projecting outside the scapulae. 13

2. Posterior dorsal margin of palpal article II with a spur. 3
— Posterior dorsal margin of palpal article II without a spur or with an almost obsolete one. 8

3. Coxae with strong and salient spurs. Very few punctuations on the scutum. 4
— Coxae without spurs or with underdeveloped and short ones. Numerous punctuations on the scutum. 7

4. Scutum longer than wide. Trochanters with spurs. 5
— Scutum as long as broad. Trochanters without spurs.

Scutum: 0.8 mm × 0.8 mm.

(8) *H. spinulosa* Neumann, 1906.

5. Coxae with long and pointed spurs. Hipostoma 3/3.

Scutum: 1,0 mm. × 0.8 mm.

(3) *H. elongata* Neumann, 1897.

— Coxae with moderatly developed spurs. Hipostoma 4/4. 6

6. Spurs of the trochanters well developed.

Scutum: 0.95 mm. × 0,85 mm.

(5) *H. calcarata calcarata* Neumann, 1902.

— Spurs of the trochanters reduced.

Scutum: 0.95 mm. × 0.85 mm.

(14) *H. calcarata houyi* Nuttall & Warburton, 1915.

7. Coxae with spurs. Dental formula varying between 4/4 and 6/6.

H. leachi sensu latum.

Scutum: 1.1 — 1.5 mm. × 0.7 — 1.2 mm.

(1) *H. leachi leachi* (Audouin, 1826).

Scutum: 0.8 mm. × 0.6 mm.

(10) *H. leachi indica* Warburton, 1910.

Scutum: Above 1.5 mm. × 1.2 mm.

(17) *H. leachi humerosoides* G. Theiler, 1943.

— Coxae absolutely without spurs. Hipostoma 2/2.

Here may possibly be placed the female of a species of which only the male is known.

(11) *H. obtusa* Dönitz, 1910.

8. Body long oval shaped. Scutum longer than broad. 12

— Body short oval shaped. Scutum as broad as long or slightly broader than long. 9

9. Outer contour of palpal article II accentuatedly concave. 10
— Outer contour of palpal article II slightly curved.

Scutum: 0.87 mm. × 0.86 mm.

(16) *H. cooleyi* Bedford, 1929.

10. Posterior margin of the scutum blunt. Cornuae present. Spurs of the coxae visible although weak. 11
— Posterior margin of the scutum narrowed. No cornuae. Spurs of coxae practically absent.

Scutum: 0.90 mm × 0.76 to 0.8 mm.

(15) *H. hoodi orientalis* Nuttall & Warburton, 1915.

11. Scutum sensibly as long as broad. Cornuae under developed.

Scutum: 0.75 — 1.0 mm. × 0.75 — 0.9 mm.

(9) *H. hoodi hoodi* Warburton & Nuttall, 1909.

— Scutum longer than broad. Cornuae well developed.

Scutum: 1.4 mm. × 0.8 mm.

(18) *H. hoodi madagascariensis* Colas-Belcour & Millot, 1948.

12. Ventral spur of palpal article III well developed. Cornuae strong.

Scutum: 1.1 mm. × 0.9 mm.

(6) *H. numidiana* Neumann, 1905.

— Ventral spur of palpal article III short. Cornuae short.

Here may possibly be placed a species whose female has not so far been described.

(4) *H. simplex* Neumann, 1897.

13. Scutum broader than long. 14
— Scutum as broad as long or slightly longer than broad. 15

14. Palpal article II longer than broad. Posterior dorsal margin of article II without spur. Spur of coxa IV wide and strong.

Scutum: 1.04 mm. × 1.17 mm.

(12) *H. silacea* Robinson, 1911.

— Palpal article II as long as broad. Posterior dorsal margin of article III with a spur. Spur of coxa IV slightly developed.

Scutum: 0.64 — 0.7 mm. × 0.75 — 0.9 mm.

(7) *H. parmata* Neumann, 1905.

15. Posterior dorsal margin of palpal article II smooth. Postero-interior angle of article II ending in a point. Cornuae strong.

Scutum: 0.8 — 1.0 mm × 0.7 — 0.9 mm.

(13) *H. aciculifer* Warburton, 1913.

— Posterior dorsal margin of palpal article III with a spur. Postero-interior angle of article II blunt. Cornuae weak.

Scutum: 0.7 — 1.25 mm × 0.7 — 1.25 mm.

(2) *H. bispinosa bispinosa* Neumann, 1897.

BIBLIOGRAPHY

BEDFORD (G. A. H.) & HEWITT (John) — Descriptions and records of several new or little known species of ticks from South Africa. S. A. Journ. Nat. Hist., Vol. 5, 1925, pp. 259-266.

BEDFORD (G. A. H.) — Notes on some South African ticks, with descriptions of three new species. 15th. An. Rep. Dir. Vet. Serv. Union South Africa, 1929, pp. 493-499.

COLAS-BELCOUR (J.) & MILLOT (J.) — Contribution à l'étude des ixodidés de Madagascar. Sur une variété nouvelle de *Haemaphysalis hoodi*. Parasitism humain par un Boophilus. Bull. Soc. Path. Exot., T. XLI, 1948, pp. 384-388.

NUTTALL (G. H. F.), WARBURTON (Cecil), COOPER (W. F.) & ROBINSON (L. E.) — Ticks. A monograph of the Ixodidea. Part III. The genus Haemaphysalis. Cambridge, 1915.

THEILER (Gertrud) — Notes on the ticks of domestic stock from Portuguese East Africa. Lourenço Marques, 1943.

THEILER (Gertrud) — Ticks in the South African zoological survey collection. Part V. Three African haemaphysalids parasitic on domestic stock. Ond. Journ. Vet. Sc. Anim. Industry, Vol. 20, n.° 2, 1945, pp. 191-207.

WARBURTON (Cecil) — On five new species of ticks (Arachnida-Ixodoidea) ...with notes on three previously described species. Parasitology, Vol. XXIV, n.° 4, 1933, pp. 558-568.

ZUMPT (F.) — Records of some parasitc Acarina from Madagascar, with description of a new Chiroptonyssus species (Acarina, Parasitiformes). Mem. Inst. Scient. de Madagascar, Sér. A, T. IV, Fasc. 1, 1950, pp. 165-173.

Imprensa Portuguesa ★ Rua Formosa, 108-116 ★ Porto