

THE MORPHOLOGY OF THE PALP IN TWO FAMILIES OF  
TICKS (ACARIDA: IXODINA).  
A CONTRIBUTION TO THE STUDY OF THE ANACTINO-  
TRICHIDA <sup>1)</sup>

by

L. VAN DER HAMMEN

Rijksmuseum van Natuurlijke Historie, Leiden

The mite order Anactinotrichida consists of three distinctly related suborders, viz., Holothyrina, Ixodina, and Gamasina <sup>2)</sup>. Recently, in a morphological study of a species of *Holothyrus* (Van der Hammen, 1961), I published a short list of ordinal characters, in which I mentioned that the tarsus of the palp is relatively small.

At first sight this character does not hold good for the tick family Argasidae, where the terminal palpal segment is of normal length. It must be noted, however, that the palp of the ticks consists of four segments only (one of these being apparently a fusion of two), so that they are generally referred to by the numbers 1 to 4.

In the course of a morphological investigation of the Ixodina according to the method used for my *Holothyrus* paper, I studied the palp of two species of ticks, viz., *Ornithodoros* (*Ornithodoros*) *savignyi* (Audouin) and *Hyalomma dromedarii* C. L. Koch, respectively belonging to the Argasidae and to the Ixodidae (the two main tick families) <sup>3)</sup>.

The present paper contains the result of this comparative study; the two

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1) The present paper is dedicated to Prof. Dr. H. Boschma, on the occasion of his 70th birthday.

2) The name Mesostigmata is abandoned here and replaced by Gamasina for the sake of uniformity. Leach (1815) already distinguished Gammasides (later on spelled as Gamasides, Gamasei, Gamasinae, etc.) and Ixodides. The three subdivisions of the Anactinotrichida are regarded here as groups of subordinal rank. The endings of the names are in accordance with the common usage (cf. Petrunkevitch, 1955). I remark that up to now the name Gamasina is in use for a cohort or division; this name must consequently be corrected into Gamasini.

3) My thanks are due to Dr. Harry Hoogstraal (U.S. Naval Medical Research Unit No. 3, Cairo, Egypt), who generously supplied me with a rich tick collection consisting of several identified species.

palps are described and figured, and an attempt is made to draw preliminary conclusions on the homology of the segments. Complete data on the material are given with each species.

DESCRIPTION OF THE PALP OF A SPECIES OF THE FAMILY ARGASIDAE (fig. 1)

*Ornithodoros (Ornithodoros) savignyi* is dealt with here as an example of the Argasidae. The material investigated for this study consists of numerous specimens from a sheep resting place, Mansuriya, Imbaba, Giza

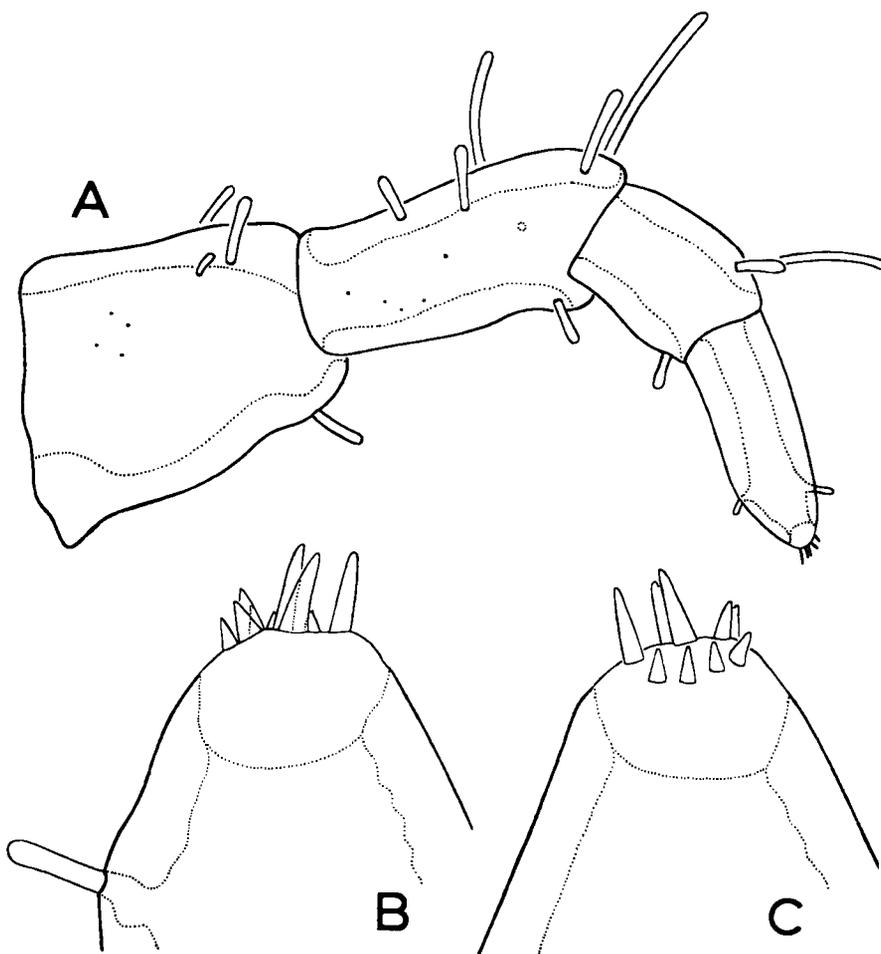


Fig. 1. *Ornithodoros (Ornithodoros) savignyi* (Audouin), right palp of the female. A, lateral (antiaxial) face; B, lateral (antiaxial) face of tarsus and distal part of tibia; C, idem, paraxial face. A,  $\times 120$ ; B, C,  $\times 830$ .

Governorate, Egypt, February 7, 1962. The palp consists of four segments that have nearly the same length, with the exception of segment 3 that is slightly shorter without showing, however, the shape of a specialized genu. All segments bear thick, blunt setae that are apparently hollow, although the walls are thicker and the central canals narrower than in the solenidions of the Actinotrichida. Segment 4 bears, moreover, some nine setae of a different type; although these are also hollow, they are shorter and more or less pointed, which gives them the appearance of eupathidia (because of the absence of the birefringent actinopilin the hollow hairs cannot easily be identified with the various types of hairs of the Actinotrichida). The number of setae in the figured specimen is 4 - 6 - 3 - 2 + 9. Segments 1 and 2 present moreover a number of pores; these pores are very small, but the corresponding tubes are large and resemble the tubes of the lyrifissures of the legs. I remark that a claw-bearing apotela is absent in the ticks.

In my opinion segment 1 is apparently a trochanter with only a subterminal group of setae. Segment 2, with two groups of setae, probably represents the normal condition of a femur being composed of a basifemur and a telofemur. Segment 3, apparently the genu, has again a subterminal group. In segment 4 we recognize at last some traces which point to a fusion of two parts, i.e., a tibia and a tarsus. Here the thick wall does not reach up to the tip, but suddenly narrows, so that the small terminal part (of which the length is about  $\frac{1}{10}$  of the total length of segment 4) has a thin wall. A vague suture can be seen at the border of the two parts (fig. 1 B, C). The small tip bears the pseudo-eupathidia, the larger part the blunt setae. Obviously the tip represents the tarsus, whilst the remaining part of segment 4 must be regarded as the tibia; the blunt setae are consequently the subterminals of the last-mentioned segment.

In this way the tarsus of the Argasid palp is easily comparable with the corresponding segment in Holothyrida and most Gamasina although not yet with that of the family Ixodidae.

#### DESCRIPTION OF THE PALP OF A SPECIES OF THE FAMILY IXODIDAE (figs. 2, 3)

*Hyalomma dromedarii* C. L. Koch is dealt with here as an example of the Ixodidae. The material investigated consists of several specimens from camel, Abu Rawash, Imbaba, Giza Governorate, Egypt, February 8, 1962. The palp of this species is not leg-like with fusiform segments as in the Argasidae, but presents a specialized shape as shown in fig. 2; the paraxial surface is strongly different from the antiaxial. There are four palpal segments, of which the numbers 2 and 3 are distinctly longer than 1 and 4; the last-mentioned segment has a ventral position and is strikingly small.

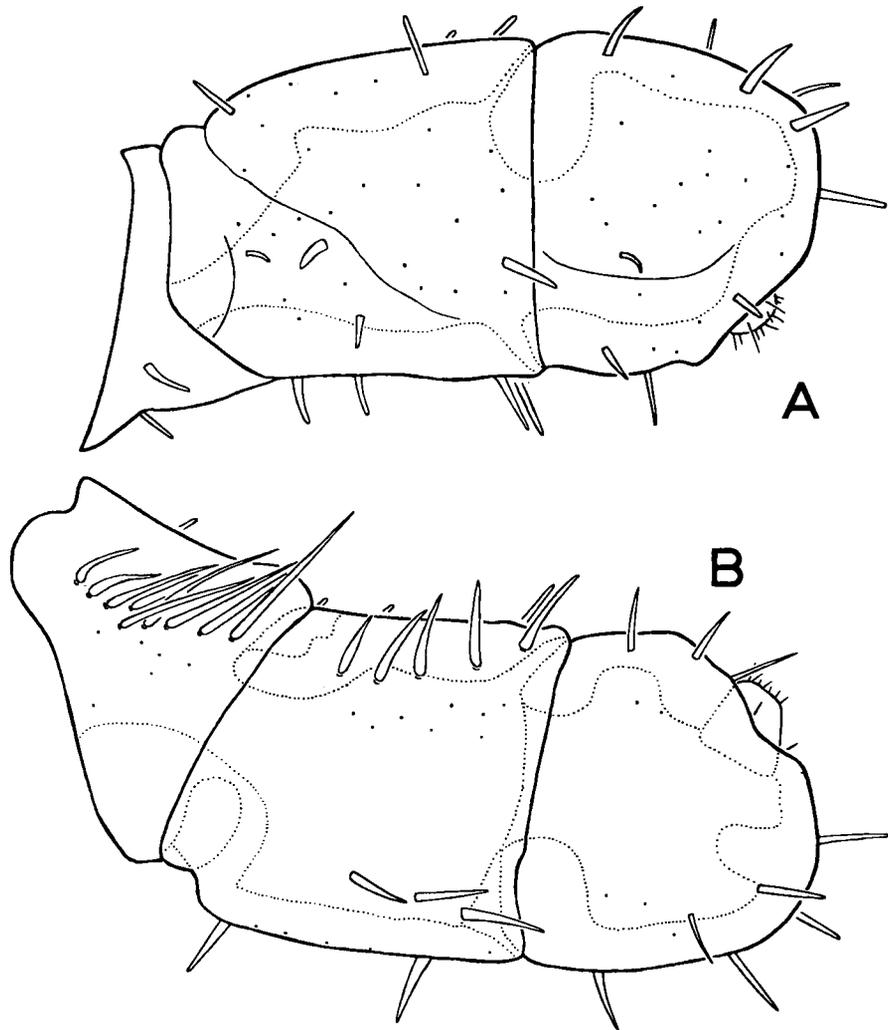


Fig. 2. *Hyalomma dromedarii* C. L. Koch, right palp of the male. A, lateral (antiaxial) face; B, lateral (paraxial) face. A, B,  $\times 120$ .

Segments 1 to 3 present a large number of irregularly arranged hollow setae, and a considerable number of pores (cf. fig. 2 A, B). The paraxial surface is especially interesting. It presents a ventral comb of setae on segments 1 and 2 (fig. 3A, B), which reminds of the comb on the palpal tibia of *Holothyrus* and probably has a similar (still unknown) function. In the figured specimen the comb on the first segment has 9 setae, that on the second segment 4 + 1. In a female of the same species, I observed a regular

row of 7 setae on segment 1, and a similar regular row of 7 + 1 on segment 2. Segment 4 is represented in fig. 3 C; it bears a number of terminal pseudo-eupathidia and some other setae.

It is difficult to homologize the segments of the Ixodid palp. Probably segments 1 and 2 represent trochanter and femur respectively; it is, however, difficult to decide if segment 3 is a genotibia, or if segment 4 represents a tibiotarsus. In the last mentioned case the tibia would have been subject

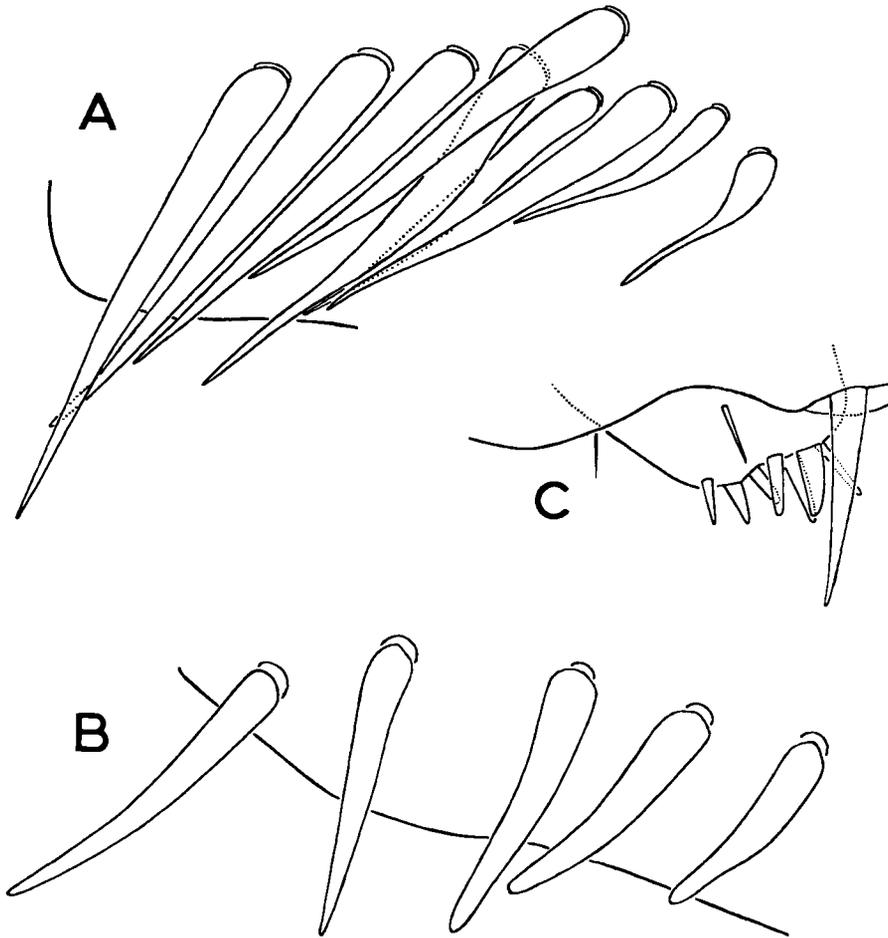


Fig. 3. *Hyalomma dromedarii* C. L. Koch, right palp of the male. A, lateral view of the ventral paraxial comb of the trochanter; B, lateral view of the ventral paraxial comb of the femur; C, lateral (paraxial) face of segment 4 and distal part of segment 3. A-C,  $\times 375$ .

to a considerable regression. A comparative study of the palpal chaetotaxy of an important number of Ixodid species will be necessary in order to arrive at a definitive solution of this problem.

#### REFERENCES

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