

**Description of a new species of *Heterocheylus*
Lombardini from Africa, with notes on the classi-
fication of the Pseudocheyletidae.**

By

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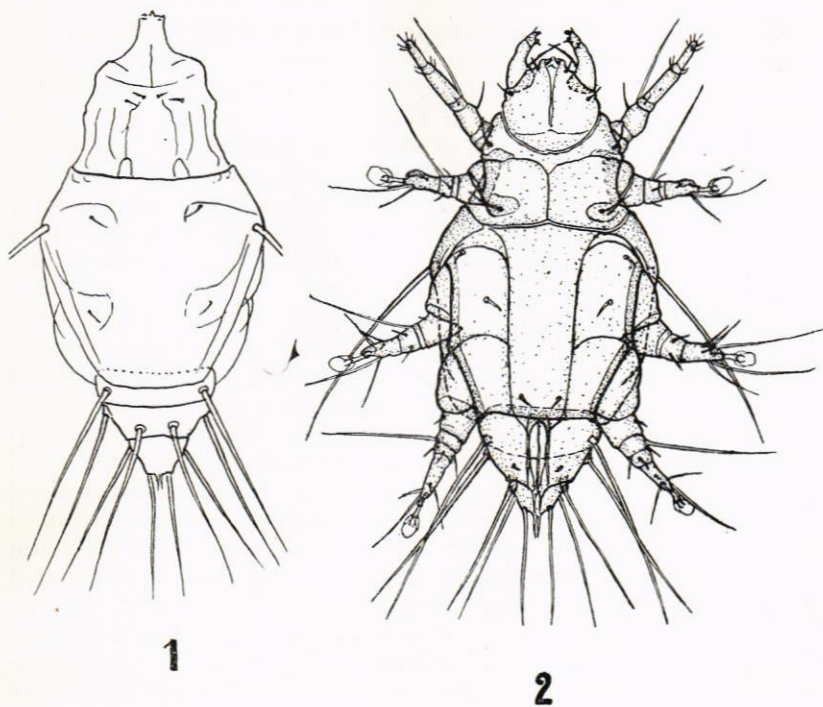
In 1926 G. Lombardini (Boll. Soc. Entom. Italiana, vol. 57, nr. I, p. 160—161, figs. 3 & 4) established a new genus, *Heterocheylus* with *H. fusiformis nov. spec.* as type species. The species had been found on a Passalide from Brazil.

Since that time the genus does not appear to have been recorded and it is therefore of great interest that the genus has now been found in Africa, on a Passalide, collected by the Swedish Missionary dr. K. A. Loman at Unkimbungu in Belgian Congo. Loman who was a keen collector to the Museum of Natural History in Stockholm sent many insects home amongst these the *Passalus*, on which I discovered the mite some years ago.

The species from Belgian Congo is closely related to that from Brazil but is a distinct species which I have called *H. lomani*. Indeed there are numerous small differences between the two species but as Lombardini's description is rather short and the accompanying figures are too small to show all the minute details, it may well be that at least some of the differences are due to the fact, that some of the minute structures have escaped the notice of Lombardini. It is, however, fairly easy to distinguish between two classes of differences, one being presumably due to omission, the other to differences in the shape and proportions of the different organs.

Heterocheylus lomani nov. spec.

Diagnosis. Epimera II contiguous with the suture between the proterosoma and hysterosoma. Ventral side of segment I of hysterosoma of uniform width throughout, not wider than epimera III and IV. Posterior hair of epimera II situated in the postero-lateral angles.



Heterocheylus lomani n. sp. ♂.

Fig. 1. Dorsal side (legs omitted). Fig. 2. Ventral side.

Male.

Gnathosoma (fig. 3). On the ventral side the hairs at the base of the palps are much longer than in *H. fusiformis*. The mandibles have very powerful, strongly curved and sharply pointed claws which in the single specimen present point forwards so that they act together, forming an organ eminently fitted for piercing the cuticle of an arthropod. When once the skin is pierced the hooks presumably turn outwards and backwards, acting as barbs which enable the mite to retain its position when sucking the blood of the victim.

This organ recalls vividly the shape of the mandibles in many larvae of the *Trombididae* as illustrated by Oudemans in his big monograph (1912). It cannot be doubted that the mandibles of *Heterocheylus* serve the double purpose of first piercing the cuticle of the hosts and afterwards to enable the parasites to retain the foothold on the hosts.

But, this being the case, it follows that the genus *Heterocheylus* is not a free-living carnivore, as are all other

Pseudocheyletidae but is an ectoparasite not only in its larval stage, as the *Tromidiidae*, but even as adult.

The *palps* (fig. 2 and 3) are long, slightly curved, tapering forwards towards the middle, then almost cylindrical. They have three pairs of hairs on the dorsal side, one of which, inserted near the base of the palp, is slightly curved and as long as the palp, the second hair is only $\frac{1}{3}$ of the length of the basal hair and placed near the anterior end, and on the exterior side of this there is a very small hair. The claws are short, edentate and rather blunt and at their base there is a very small, blunt tooth beside two minute hairs.

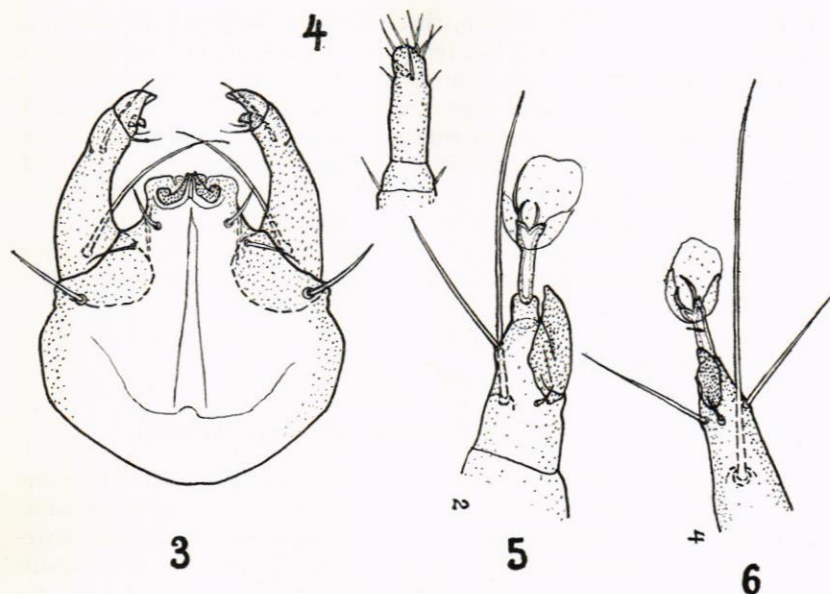
If we compare this type of palps with that generally found in the *Cheyletidae* it striles us immediately how different their shape is. In the *Cheyletidae* the terminal tooth of the palp is long and sharply pointed and provided with a row of sharp teeth and in addition to this it has 2—3 comblike and a few sicklelike setae. In *Heterocheylus* a blunt, edentate terminal tooth and no sickle- or combshaped setae.

The *propodosoma* (figs. 1 and 2) has near the anterior margin, close to the median line, a group of two pairs of very small hairs which have possibly been overlooked by Lombardini. The shape of the claviform sensillae I have not been able to see, because the mite was mounted ventral side up and hence the drawing fig. 1 has been made from the ventral side, this part of the body being obscured by guanidin crystals.

The ventral side (fig. 2). No epimera I. Epimera II almost quadrangular, their median margin being contiguous throughout their entire length and the posterior margin being contiguous with the suture between the proterosoma and the hysterosoma. The single pair of hairs is placed in the postero-lateral angles, not, as in *H. fusiformis*, near the middle, and, moreover, surrounded by small, oval shields.

The *hysterosoma* (figs. 1 and 2) is divided into four segments of which the three posterior ones taper gradually towards the tip, forming a kind of tail, and are together only half as long as the first segment. The *dorsal side* has, a little in front of the big lateral hairs, a pair of fine sutures which curve backwards at their median ends, surrounding a pair of very small hairs. Further back there is a pair of similar sutures, running from near the lateral hairs obliquely backwards towards the median line and then outwards and forwards, forming a kind of loop, surrounding a pair of small hairs. These structures are not delineated by Lombardini who, on the other hand, draws a curved, transverse line across the segment on a level with coxae III.

Ventral side. Epimera III and IV are fused with one another on each side, only a faint, curved line indicating the fusion. They form elongated shields which extend almost to the anterior margin of the segment, leaving unprotected a median space as wide as the epimera themselves. Near the anterior margin of epimeron III a small hair, a little behind the middle of epimeron III there is a second pair of hairs



Heterocheylus lomani n. sp. ♂.

Fig. 3. Gnathorsoma. ventral view. Fig. 4. Tarsus I. Fig. 5. Tarsus II.
Fig. 6. Tarsus IV.

and close to the hind margin of the ventral shield there is another, pair of still smaller hairs.

Segment II very short, ring-shaped, its anterior margin being covered by the posterior edge of segment I. It has laterally and submarginally a pair of long, straight bristles. These hairs point forwards in Lombardini's figure but this is probably not their original direction. Segment III is twice as long as the second one and has two pairs of long, straight bristles, directed backwards, one on the lateral side, the other on the dorsal side, behind the middle.

Segment IV triangular in outline but rounded at the tip, with two pairs of long, straight bristles, one laterally, near the hind margin, the other terminally. The penis is as long as segments II—IV together, ending with a pair of slender appendages.

The legs (figs. 1 and 2—4), Lombardini has only recognized five segments viz. coxa, trochanter, femur, tibia and tarsus (l.c. fig. 3). Actually there are seven segments because it is easy to recognize a short but distinct, ring-shaped genu with one hair and between tibia and tarsus there is another short segment which may be interpreted as a basitarsus and has two pairs of small hairs. Leg I has a cylindrical

tarsus (fig. 4) rounded at the tip, three times as long as it is wide and without claws or empodia; it has ten pairs of hairs, four in a ring round the base of the terminal $1/4$, the other on the tip of the tarsus.

Legs II—IV shorter than legs I, directed straight outwards, with one straight hair on the anterior side of femur, beside three small hairs; tarsus without basitarsus, tapering gradually towards the tip, with stout, tooth-shaped bristle near the middle (fig. 5) on the anterior side. It has two long hairs on the posterior side and one small hair at the base of the tooth-shaped bristle. The ambulacres have slender peduncles, two slender, slightly curved claws and a large, oval, disc-shaped empodium (figs. 5 and 6).

Locality. Unkimbungu, Belgian Congo, dr. K. A. Loman collegit on a *Passalus* one male.

On the systematic position of *Heterocheylus*.

Lombardini referred the genus to the *Anystidae* although the name he gave implies that he considered it related to the *Pseudocheyletidae*. It cannot be doubted that *Heterocheylus* belongs to the *Pseudocheyletidae*. But, on the other hand, there are several differences in the organization which render it necessary to establish a distinct family for *Heterocheylus*. These are the following:

1. The mandibles are provided with sharp, strongly curved hooks which, when the hooks are turned one towards the other, act together as an organ for piercing the skin of the host but when turned outwards after the skin has been pierced act as barbs, enabling the mite to adhere firmly to its host. This structure so vividly recalls that of the mandibles of many larvae of *Trombidiidae* which live as ectoparasites on mammals, birds, reptiles and insects that it is perfectly safe to conclude, even without any observations on the biology of the mite, that it as an ectoparasite. But there is of course the difference that *Heterocheylus* is an ectoparasite in its adult stage (and probably also as larva and nymph), whereas the *Trombidiidae* are ectoparasites only in their larval stage.

Heterocheylus differs therefore from all other *Pseudocheyletidae* which, as far as it is known, are free-living.

2. The conclusion that *Heterocheylus* is an ectoparasite is strongly supported by the evidence gathered from the shape both of the palps and the legs. The shape of the palps corresponds to that of the mandibles. In the free-living carnivorous *Cheyletidae* the terminal tooth of the palps is sharp and furnished with a row of sharp teeth and in addition there is a varying number of comb-like and sickle-shaped hairs the function of which is to catch hold of the victims. In *Heterocheylus*, on the other hand, the terminal tooth is edentate and quite blunt and there are not comb-like or sickle-shaped hairs, obviously because in an ectoparasite these organs would be quite superfluous.

3. The legs show also special adaptations to the mode of living of *Heterocheylus*. The first pairs of legs are antenniform, having neither claws nor ambulacres, the tarsus being provided with a bunch of fine, tactile hairs which probably aid the mite in finding the proper place for inserting the hooks of the mandibles through the skin of the victim. In this respect *Heterocheylus* agrees with a large number of other genera living permanently or temporarily on insects and other arthropods, as f.i. the *Paramegistidae*, the *Celaenopsina*, the *Fedriziina* a.o.

The other legs are adapted both for walking and for adhering to insects. Thus on the tarsus there is a strong, tooth-shaped bristle, evidently used for walking purposes. But, on the other hand, the feet are provided with very weak, slightly curved claws and with large, disc-shaped empodia eminently fitted for fixing the mite on their host in cooperation with the hooks of the mandibles, acting as barbs.

4. The epimera. In the *Cheyletidae* epimera I and II, resp. III and IV are contiguous with one another. In *Heterocheylus*, on the other hand epimera I are reduced, evidently because the first pairs of legs are not used for running but are antenniform. Epimera II are large, quadrangular plates, contiguous along the median line and extending backwards to the hind margin of the propodosoma. Epimera III and IV are fused with one another on each side, a faint line showing the line of coalescence; they occupy together $2/3$ of the ventral side of the first hysterosomal segment.

From the comparison made above between the organization of *Heterocheylus* and the *Cheyletidae* it is evident that the former genus represents a new and very unexpected departure amongst the group, having changed its originally free-living habits to that of an ectoparasite. And as all parasites must have originally descended from free-living forms, the ectoparasitic way of living of *Heterocheylus* must be regarded as a secondary change of habits, involving the profound changes in structure which it manifests.

Hence it becomes necessary to establish a new subfamily, the *Heterocheylinae* for the present genus and refer the other genera to the new subfamily *Cheyletinae*.

Key to the subfamilies of the Pseudocheyletidae.

1. Mandibles stylet-shaped, palps with large, sharply pointed, dentate terminal tooth and a varying number of comb-shaped or sickle-shaped hairs. All legs with claws subfam. *Pseudocheyletinae*
2. Mandibles with strongly curved, sharp terminal tooth of the same type as in the larvae of the *Trombidiidae*. Palps with blunt, edentate terminal tooth, no comb-shaped or sickle-shaped hairs. Legs I antenniform, legs II—IV with tooth-shaped subterminal bristle and large, disc-shaped empodium. Subfam. *Heterocheylinae*.

Key to the species of *Heterocheylus*.

1. Posterior margin of epimera II obliquely cut off, not contiguous with posterior margin of proterosoma. Ventral side of first segment of hysterosoma twice as wide at the anterior as at the posterior end *H. fusiformis* Lomb.
 2. Epimera II quadrangular, contiguous with one another throughout along the median line; their posterior margin contiguous with that of the proterosoma. Ventral side of first segment of the hysterosoma of uniform width throughout, not wider than the epimera *H. lomani* nov. spec.
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