

NOTES ON ACARI.

With Plate 10.

BY

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(Hoplophora) magna NICOLET.

H. NICOLET mentions this species as being 1.46 millimeters in length (Arch. Mus. Paris, VII, p. 472). I found specimens of 1.5 millimeters, but also of 1.25, 1.2, 1.125, 1.1, 1.0, 0.9 and of 0.5, nay even of 2.0 millimeters. Have we here as many species, or are these different measurements the result of different influences? I have not been able to observe any other differences in the specimens but their lengths.

Oppia confervae SCHRANK.

FRANCISCUS DE PAULA SCHRANK gives in his *Enumeratio Insectorum Austriae indigenorum*, 1781, sub n° 1054, the following description of an *Acarus* found by him under water and amongst the threads of *Confervaceae*:

« 1054. CONFERVAE, Confervemilbe ».

« *Acarus fuscus ovatus*, pedum geniculo secundo minimo, tertio seta longa armato ».

« *Descr.* Minimus, vix nisi ope lentis visibilis; fuscus; pedibus pallidioribus. Figura globosa, antice acuminata. Pedes aequalis longitudinis & structurae. Si bases pedum non computes, articulis constant quinque; primus, tertius, quartus teretes, in apice tertii

seta longa porrigitur. Articulus secundus brevis, fere globosus, quintus itidem brevis, sed oblongus, apice unguiculis armatus. Pedes omnes pilis nonnullis brevibus sparsis leviter horrent, sed corpus nudum, nec nisi ad rostrum setis duabus, quasi antennis, brevibus instructum ».

« *Habitat* in conferva; extra aquam moritur; in aqua superficiem nunquam petit, nec vagatur, sed in filamentis confervae obambulat ».

« *Lectus* sub finem Martii ».

SCHRANK gives a very imperfect figure of the animal in question in his Tab. III, fig. 5. I have reproduced it in my Tab. 10 fig. 1. On the back of the metasoma (abdomen) and on the left side of the snout respectively 1 and 2 spade-shaped appendages are delineated, which according to SCHRANK'S *Explicatio tabularum* are *Vorticellae*:

« Polypi campanulati species (*Vorticella ringens*, MULL.) insecto adhaerens ».

This *Acarus* is mentioned by GMELIN in his *Systema Naturae* sub n°. 59, 1790, by TURTON in his *System of Nature*, p. 707, 1802, and by GERVAIS in his *Histoire naturelle des Insectes, Aptères*, III, p. 253, 1844, under the name of *Acarus confervae*, but without any further information; evidently these authors did not know this *Acarus* by own observation.

ALBERT D. MICHAEL in his *British Oribatidae*, London, 1884, Vol. I, p. 57, speaks of an aquatic monodactyle *Notaspis*, which he calls *Notaspis lacustris*. I am not aware of he having described or figured this species elsewhere. Yet I am fully convinced of the fact that SCHRANK'S *Acarus confervae* and MICHAEL'S *Notaspis lacustris* are one and the same species.

As to the generic name, I am of opinion that *Notaspis* cannot be employed, for the following reason.

HERMANN'S genus *Notaspis* (*Mémoire Aptérologique*, Strassburg, 1804, p. 12, 15, 87) having *Acarus coleoptratus* LINNÉ as type, is synonym to LATREILLE'S genus *Oribates* (OLIVIER'S *Encyclopédie méthodique*, 1795), which has *Acarus coleoptratus* LINNÉ as type too.

NICOLET (Arch. Mus. VII.) used HERMANN'S name *Notaspis* as generic name for *Notaspis bipilis* HERM. as type. But as WALKER

already used this name for certain *Hymenoptera* in 1834, and KOCH for certain *Gamasides* in 1836, the name *Notaspis* NIC. cannot be kept as generic name.

GRUBE (Arch. f. Naturgesch. Liv-, Ehst- und Kurlands (2) I, p. 463), though wrongly, proposed KOCH's name *Oppia* as the generic name, to take the place of *Notaspis* of NICOLET, and herein he was followed by CANESTRINI and FANZAGO (Atti del Reale Istituto Veneto di Scienze Lettere et Arti, 5th. series, Vol. IV, p. 9 and 20).

KOCH (Deutschlands Crustaceen Myriapoden und Arachniden, Heft 3, n°. 9, 1836) used already the generic name *Oppia* for *Oppia glaucina* KOCH; but as this animal is nothing else but a nymph of *Belba geniculata* LINNÉ, totally bereaved from its hairs, perhaps by rough manipulation, the name *Oppia* KOCH, 1836 is synonym to *Belba* HEYD, 1826. — Consequently *Oppia* GRUBE (non KOCH) can be used to take the place of *Notaspis* NIC.

As to the specific name, SCHRANK's denomination of *confervae* must be adopted by the rules of priority. So the animal must be called *Oppia confervae* SCHRANK.

Synonyms: *Acarus confervae* SCHRANK.

Notaspis lacustris MICHAEL.

I have now to point out that SCHRANK's *Acarus confervae* is the same as the animal which I found amongst *Confervaceae*, attached on the roots of *Lemna*, etc., but always under water, and moving slowly.

Really the animal is oval and brown, with the second article of the legs (genual) being the smallest, and with the third of them (tibia) being provided with a long hair (see fig. 2). It is small; brown with paler legs. Its figure is globular, viz. arched above, flat below, and anteriorly acuminated. The legs are equal in length and structure. If the bases (coxae) are out of consideration, there are constantly five articles. If we compare SCHRANK's figure (see fig. 1), we observe that his fifth article is a strong claw, perfectly as in our animal (see fig. 2). The first, the third and the fourth article (femur, tibia, tarsus) are slender, on the distal end of the third article (tibia) a long hair projects. The 2d article (genual) is small;

SCHRANK says «nearly globular», but this mistake must be attributed to his imperfect microscopes. The fifth article is small too, but lengthened and provided with a claw. The imperfect magnifying glass in SCHRANK'S time is cause that he did not interpret this article as it really was. SCHRANK'S fifth article is nothing else but one enormously developed claw (see fig. 1, 2 and 4). The legs are provided here and there with some smaller hairs, but the body is smooth, except that there are two hairs on the snout, looking like antennae.

It is found in *Confervaceae*; it dies when it is kept out of the water; it does not come to the surface, nor does it vagabund, but it crawls amongst the threadformed Algae. SCHRANK picked it up in the last half of March. I however found it in March, April, May und June, and I think it will be found during the whole year when *Confervaceae* and *Lemnaceae* are abundant in our ditches.

To this description I have to add the following:

Its length varies from 0.471 to 0.529 millimeters, its breadth from 0.297 to 0.355 millimeters, the females being in average longer and broader than the males.

The colour is with the naked eye nearly black, with the microscope brown, with a yellowish spot on the fore part of the metasoma (abdomen).

The metasoma (abdomen) is oval and polished, but it shows 9 pairs of dermal pori, each provided with a small and smooth hair (fig. 2 and 5). The prosoma (cephalothorax) is pentagonal, having its broadest side anchylosed to the metasoma (abdomen). The furrow which separates this last from the prosoma is indistinct in the median line, just before the yellow spot of the metasoma. At the top of the pentagon the two hairs «like antennae» (SCHRANK) are distinctly seen. On the end of the metasoma there are two hairs too; moreover the prosoma shows two oval figures, formed by a wall-like outgrow of the chitinous skin, prolonged by an other nearly straight wall-like outgrow, the lamella (MICHAEL), directed forward and inward. At the end of this last there is a pore. This spectacles-shaped figure is overlooked by SCHRANK.

The tectopodia are six in number, protecting with a shield-kind processus resp. the bases (coxae) of the first, second and fourth pair of legs (fig. 2).

The legs may be grouped in two parts, viz. the two fore-pairs and the two hind-pairs. The coxae of the two fore-pairs are not visible, whilst those of the hind-pairs are so. These coxae are nearly globular, and those of the third pair of legs have a sharp pointed right angle on their fore-side, directed towards the metasoma.

The tarsi of the two hind-pairs are more elongated than those of the two fore-pairs. Moreover the four pairs of legs are identical even in the position of their hairs (fig. 2).

On the under-side (fig. 3) we observe the camerostome with the labium, the maxillary lips and maxillae (masticatory part of the maxillipedes) and the palpi (tactil part of the maxillipedes), the first pair of epimera fused together, the second, third and fourth pair of epimera all free, the genital opening with the genital plates, the anal opening shut by the anal plates, and the furrow between the ventral and the dorsal shield. Moreover we observe 14 pairs of large dermal pori, arranged exactly as our fig. shows. Just before the anal split there is a very small chitinised third medial valve or protuberance. Hitherto I did not find any mentioning of this object anywhere in works on Acari.

The animal's hairs are smooth, feathered, comb- or saw-like, or club-shaped.

The very small hairs accompanying the pori (fig. 5), and the long straight hairs on the legs are smooth, the two hairs on the forepart of the prosoma (cephalotorax) are feathered (fig. 6). The small and curved hairs on the legs are feathered on one side, comb- or saw-like (fig. 7). On the under (inner) side of the tarsi of the two foremost legs *of the males* we observe a club-shaped hair, transparent like glass (fig. 4).

The genital and anal plates are normal.

The protecting hair (NICOLET) or pseudostigmatic organ (MICHAEL) is spool shaped in its proximal, and filiform in its distal end (fig. 8).

Special organ. I believe that the club-shaped hair on the tarsi of

the first pair of legs in the males (fig. 4) has a special function. Its form is like that of the tactil or olfactory hairs of *Tyroglyphina*, but its insertion in a hard chitinous ring reminds me of the auditory organ in *Ixodei*, both discovered by G. HALLER. Most probably its function is to discover the other sex.

But most probably again this is a necessary result of its aquatic habits, for — and this is a very striking fact — I did not discover this organ in three other species of *Oppia*, which fell into my observation, and all are living in the air, viz. *Oppia* sp., *Oppia bipilis* Herm., and *Oppia exilis* Nic.

The tracheae are normal, notwithstanding the animal's aquatic habits; consequently the animal *must* come from time to time to the surface of the water.

The 6 to 8 well developed eggs when still in the ovarial tubes, measured 0.135 millimeters in length and 0.08 in breadth.

A nympha of Cepheus sp.

In fig. 9 I have figured the remains of a nympha of a *Cepheus* sp., found by me in decaying leaves in Lochem, Aug. 1895. The larval skin and the first nymphal skin are absent, only the second and the last nymphal skin remain. The nymphal skins bear on their edge 18 flat light brown coloured appendages. Each appendage, except the two foremost pairs, bears itself a transparent lanceolated, movable, leaf-like appendage or hair, which shows nerves (fig. 13).

These nerves are hollow and end in open holes (seen with oil-immersion). Are these canals the endings of a circulatory, nephridial, exsudating or breathing apparatus? In my dead nympha I am unable to loose this problem, but certainly they have any function.

The nympha of *Cepheus* (*Tegeocranus*) *latus* KOCH has, if MICHAEL'S figure (Brit. Orib. I, tab. XIX, fig. 2) is right, not such transparent colourless movable leaf-like hairs with a system of canals, but only feathered hairs, which have nearly the same appearance as the two hairs of our present nympha, one of which is represented in our fig. 12 (see below). In fig. 14 I have copied

from MICHAEL (*loc. cit.*) one of these feathered hairs of the nympha of *Cepheus latus* *KOCH, for comparison with our fig. 13.

The dorsal surface of the second nymphal skin shows a reticulated appearance. This drawing is not seen on the margins of the dorsal surface of the last nymphal skin. In fig. 10 a part of this skin is delineated under higher powers.

Fig. 11 shows us one of the somewhat spatulate pseudostigmatic organs, and fig. 12 one of the cow-horn-curved hairs of the flat appendages on the foremost edge of the metasoma. This hair is not smooth but has here and there some little spines.

Fig. 15 is a rough sketch of the under side of this nympha, with the position of the genital and anal openings and plates, and four (five?) genital «suckers».

The length of the animal without the leaf-like hairs is 0.674, the greatest breadth 0.478 millimeters.

As I found in the same locality the adult *Cepheus minutus* KOCH and another *Cepheus* sp., the nympha may be that of one of these two species, but I am not certain of it.

Belba geniculata Linné.

Synonyms: 1746. *Acarus niger; geniculis femorum globosis*, De Geer. LINN. Faun. Suec. Ed. 1, n°. 1210.

1758. *Acarus geniculatus* LINN. Syst. Nat. Ed. 10, n°. 17.

1762. *Acarus petrarum niger, abdomine globoso lucido, femoribus subclavatis* GEOFFR. Hist. abr. Ins. II, p. 626, n°. 11.

1776. *Acarus femoribus omnibus clavatis* SCHRANK. Beytr. Naturg. p. 126, n°. 26, t. 6, f. 9—10.

1804. *Notaspis clavipes* HERM. Apt. p. 88, t. 4, f. 7, D, E, t. 9, f. U, V.

1804. *Notaspis geniculatus* HERM. Apt. p. 92.

1806. *Oribata geniculata* LATR. Gen. Crust. Ins. p. 149, n°. 1.

1817. *Oribata clavipes* LATR. in Cuv. Regn. An. III, p. 119.

1836. *Oppia glaucina* KOCH. Deu. Cr. Myr. Ar. 3, 9.

1839. *Damaeus nodipes* KOCH. Deu. Cr. Myr. Ar. 30, 6.

1877. *Damaeus geniculatus* MURR. Econ. Ent. Apt. p. 213.

There is still very little clearness in the development of the species of the genus *Belba* VON HEYD.

I am now able to give descriptions and figures of the larva and nymph of *Belba geniculata* LINN. (*non* KOCH, *non* NICOLET).

Larva. (fig. 16). Its length is 0.471, its breadth 0.1, and its height 0.216 millimeters. Its colour is a uniform pale yellow (« lausfarbig » as the Germans say). The skin is very finely granulated. The six legs are slender; the *coxae* are the smallest articles, those of the hind-feet are double in length as those of the two fore-feet. The femores, genuals, tibiae are approximately cylindrical, whilst the tarsi are tapering to their distal end, and bear a movable claw.

The pseudostigma is perfectly round; its pseudostigmatic organ long, nearly filiform, somewhat thickened in the middle; it measures 0.135 millimeters; its most striking peculiarity is that it is provided for a great part with somewhat transparent globular appendages like dew-drops, which gave to the whole the aspect as if dust were adhering to it. But as all the other hairs and the body itself were quite free from dust sticking to it, the idea of dust must at once be abandoned (fig. 18).

One single very small and smooth hair is planted on the belly. Each of the chelicerae (mandibels) bears a little hair (fig. 17) on its dorsal surface. The tactile part of the maxillipedes (the palpi) consists of 4 articles with some few little hairs. On the dorsal surface of the *thorax*, that part of the body which bears the legs, and which in our larva is distinctly separated from the abdomen by a tolerably deep furrow, there are four pairs of long hairs. The foremost pair is situated nearly in the line of the insertion of the maxillipedes and is directed forward as if with tactile functions. The three other pairs are situated far more backwards and all behind the line of the pseudostigmae; they are longer and directed upwards and somewhat curved hindwards. The very abdomen shows five pairs of hairs, whose lengths, curvature, and position is clearly shown in the figure (fig. 16) which represents the animal seen from its right side. All these hairs are planted

upon dermal protuberances. Purposely I have abandoned to delineate the legs of the left side.

Nympha. KOCH in his Deutschland's Crustaceen Myriapoden und Arachniden, has already figured it under the name of *Oppia glauca*, but his specimen was totally deprived from its hairs, perhaps by rough manipulation. And indeed the hairs are as brittle as glass. As to the colour of the animal KOCH has exaggerated its hue; the so-called cephalothorax (prosoma) is too brick-red, the so-called abdomen (metasoma) too sap-green; in reality the animal is totally louse-coloured with a greenish hue; it may be however that any food colours the prosoma and the legs with a more reddish hue, like KOCH's specimen shows in his drawing.

Fig. 19 shows us a nympha more correct than KOCH's drawing, but at once one may recognize the same animal.

The prosoma is granulated, like the whole skin of the larva, but the metasoma is reticulated. Here is no distinct furrow between the thorax and the abdomen, but like in other Acari only between the prosoma and the metasoma.

Four little curved hairs are planted on the fore-part of the prosoma (on the snout), four larger bristles on the fore-part of the metasoma nearly exactly in a line, followed by four of the same thickness and length, nearly exactly in a line, then three times again four long bristles but each time they are less thick and a little smaller in length, and finally two long setae on the hindmost end of the metasoma.

The pseudostigmata and the pseudostigmatic organs are exactly like those of the larva.

The femores have still their cylindrical form whilst those of the imago have their distal ends swollen: *geniculis femorum globosis* DE GEER, LINNÉ.

Imago. The imago is known enough by the descriptions and figures of the different authors who wrote on it. The cuticle is polished, not reticulated. The pseudostigmatic organs are like those of the larva and nympha, but I don't observe on them the transparent globular dew-drop shaped covering.

Remark. NICOLET has figured in the Archives du Museum d'Histoire Naturelle à Paris, Vol. VII, tab. 2, fig. 8, a nymph, which with the most probability is nothing but KOCH's *Oppia glauca*, consequently the nymph of *Belba geniculata* LINNÉ (non KOCH, non NICOLET).

NICOLET says, *ibid.* p. 396, that this nymph belongs to *Damaeus geniculatus*, but the animal described and figured by him under this name, is at all events quite another species than that of LINNÉ and also quite another than that of KOCH.

He seems to be very incorrect as to the interpretation of the different larvae and nymphae. *Hypochthonius rufulus* is a typical species and even a typical genus amongst all the *Oribatei*; but NICOLET asserts it is the nymph of *Leiosoma ovata* KOCH!

Belba torva Koch.

Synonyms: 1836, *Damaeus torvus* KOCH, Deu. Cr. Myr. Ar. Heft 3, n^o. 14 (*nympha*).

1855, *Damaeus verticillipes* NICOLET, Arch. Mus. Par. Vol. VII, p. 396, 462, tab. 8, fig. 2, 2a (*imago*).

KOCH has described and figured under the name of *Damaeus torvus* in his Deutschlands Crustaceen, Myriapoden und Arachniden Heft 3, tab. 14, the nymph of a species of *Belba*, of which NICOLET described and figured the imago under the name of *Damaeus verticillipes*.

His figure however is badly drawn, and therefore I give here another more correctly represented (fig. 20). On comparing KOCH's figure with mine, one will be soon convinced of the fact that the two figures represent the same animal. Again KOCH's specimen had its bristles broken off, and KOCH in restoring them, drew them too short.

The imago is figured by NICOLET not quite correct enough. The legs viz. are represented far too slender; they are indeed much thicker.

MICHAEL says in describing the nymph of *Belba torva* (called

by him *Damaeus verticillipes*) (Journ. Roy. Micr. Soc. Apr. 1880, Vol. III, p. 199):

« This is probably what is described and figured by Koch as a separate species under the name of *Nothrus pollinosus*, fasc. 29, pl. 12; it is possible, however, that *pollinosus* may be the nymph of NICOLET'S allied species *Damaeus papillipes*, which he considers to be identical with Koch's *pulverulentus*, fasc. 29, pl. 3 ».

In his first consideration MICHAEL has been mistaken, his following supposition, however, is right: KOCH'S *Nothrus pollinosus* is the nymph of *Belba pulverulenta* KOCH (*Damaeus papillipes* NIC.) carrying its larval and nymphal skins on its back. And KOCH'S *Nothrus pulverulentus* is the imago.

The nympha delineated by me, fig. 20, is a young one, having carried only one nymphal skin on its back. The skin of the prosoma is granulated, that of the metasoma reticulated (fig. 22); that of the legs granulated too and all these granulae are insertions of very little smooth but curled hairs, but they soon fall off, so that only some bushes of them are still remaining on some parts of the legs (fig. 21) and on the fore-part of the metasoma, as shows our fig. 20.

The pseudostigmatic organs are smooth except their distal halves which are like powdered with a transparent powder, perfectly as in the nympha of *Belba geniculata* LINNÉ (fig. 18).

The long bristles, straight in their proximal halves, graciously bent in their distal halves, and the hook-shaped thick hairs on the legs are provided with numerous prickles, and their colour is smoky black (fig. 21), whilst the body is translucent yellowish, louse-coloured. KOCH represents the prosoma as being reddish, my specimen on the contrary has a brownish hue in the middle of the metasoma, evidently caused by a food-mass in the stomach.

Curious are the two very long and at their distal ends curled « tail-hairs », the single median and totally smooth spine on the back part of the metasoma, directed upwards and backwards, and the long transparent, somewhat feathered hairs in the axils of the common hairs on the tibiae of the first pair of legs (fig. 21). Such

hairs but shorter stand also in the axils of the hairs of the other tibiae, and of the tarsi and genuals of the first and second pair. Most probably these hairs have a special function, a tactile one, or they have to observe sounds.

I have also a nympha which is older, and which carries its larval and two nymphal skins. Its prosoma and its legs are coloured light brown, like KOCH's figure of *Damaeus torvus*. The circumference of the body is more rounded, not with such sinuosities as the nympha described above (fig. 20). The legs are stronger and thicker than those of the first nympha, and they resemble still more those of the adult animal. This nympha is much more covered with woolly hairs than the other one. The pseudostigmae are funneled (fig. 23).

The imago has, as I already observed above much thicker legs than NICOLET has represented them. The hairs of the legs are thick and inflexible, but they are not so spiny as those of the nympha, and more transparent. The imago has a pair of stiff hairs, just as long and as thick as the pseudostigmatic organs, and standing between the pseudostigmae, each hair next to one of these singular organs. They are directed upwards and forwards. The single median spine or hair on the hindpart of the metasoma has disappeared. The cuticula is polished.

I have imagines which are bare, and others which carry one or two or even three reticulated nymphal skins.

Explication of the figures (Tab. 10).

Fig. 1. *Oppia confervae* SCHRANK, copied from SCHRANK.

- » 2. Ditto, drawn from nature.
- » 3. Ditto, under-side.
- » 4. Ditto, tarsus and claw of first pair of legs of the male, with special organ.
- » 5. Ditto, porus and its hair on the back of the metasoma.
- » 6. Ditto, foremost hair, on the snout.
- » 7. Ditto, saw-like hair on the coxa of the first pair of legs.
- » 8. Pseudostigma and its organ.

- Fig. 9. *Cepheus* Sp., nympha, carrying a nymphal skin.
- » 10. Ditto, part of the cast nymphal skin carried by the nympha on its back.
 - » 11. Ditto, pseudostigma and its organ.
 - » 12. Ditto, one of the cow-horn curved hairs on the foremost pair of the flat and brown coloured appendages.
 - » 13. Ditto, one of the fourth pair of flat appendages with its leaf-like transparent hair.
 - » 14. The same appendage of *Cepheus latus* KOCH copied from MICHAEL.
 - » 15. The same nympha as fig. 9, under-side.
 - » 16. *Belba geniculata* LINNÉ, larva, seen from its right side.
 - » 17. Ditto, chelicera or mandibel of larva.
 - » 18. Ditto, pseudostigma and its organ, of larva.
 - » 19. Ditto, nympha.
 - » 20. *Belba torva* Koch, young nympha, 2d. stadium.
 - » 21. Ditto, tibia.
 - » 22. Ditto, part of skin.
 - » 23. Ditto, pseudostigma.

Sneek, June 24th. 1896.



Oudemans, A. C. 1896. "Notes on Acari." *Tijdschrift voor entomologie* 39, 175–187.

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