

# NOTES ON ACARI

THIRD SERIES <sup>1)</sup>

BY

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(With Plates I—III).

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## 1. Acari of unknown countries.

In the *Tijdschrift voor Entomologie*, vol. 39, p. 192, I mentioned that Dr. A. W. M. VAN HASSELT presented me (in 1878) with an *Amblyomma*, the locality of which was not noted down. Prof. G. NEUMANN of Toulouse recognized it as a *Hyalomma affine* Nn. ♂.

Again, on p. 193 of the same volume mention was made of a *Hyalomma* of unknown locality. With NEUMANN's valuable work I have easily determined it as a *Rhipicephalus sanguineus* Latr. ♀.

## 2. Acari of Sumatra.

In the *Tijdschrift voor Entomologie*, vol. 39, p. 137, I mentioned that in February 1882, Mr. J. A. VAN DEN BRINK, of Utrecht, presented me with several specimens of a *Laelaps* found by him on a large beetle, related to *Oryctes*, of Sumatra, and that this species bore so striking a resemblance to that which I had found on a *Putorius erminea* at Sneek (Netherlands) the preceding year,

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1) The First Series entitled „Notes on Acari”, appeared 15, I, 1897 in the *Tijdschrift voor Entomologie*, vol. 39, p. 175—187. — The Second Series, entitled „Further Notes on Acari”, appeared 5, IX, 1900, in the *Tijdschrift voor Entomologie*, vol. 43, p. 99—128. — These Series are independent from one another. O.



that I could not observe any difference between them. Indeed I have examined the insects carefully; they are of the same species, viz. *Laelaps celeripediformis* Oudms., described by me in the *Tijdschrift voor Entomologie*. (This description may not appear before the year 1902). So the geographical distribution of this species is wide. The beetle was caught during the Sumatra-Expedition of 1877.

On p. 193 of the same volume of the above-mentioned *Tijdschrift* I noted the receipt of a species of *Rhipistoma* from Mr. SNELLEMAN (Sumatra-Expedition of 1877). Prof. G. NEUMANN, of Toulouse, recognized them to be *Haemaphysalis leachi* (Andouin), 2 ♂. They were found on *Felis tigris* L.

On the same page I mentioned two kinds of *Rhipicephalus*, found on *Bos bubalus* in Sumatra (Expedition of 1877). Prof. G. NEUMANN determined them as *Rhipicephalus annulatus caudatus* Nn. ♂ and *Haemaphysalis cornigera* Nn. ♂.

### 3. Acari of Italy.

In the *Tijdschrift voor Entomologie*, vol. 39, p. 137, I noted that Dr. EVERTS presented me with a *Laelaps* sp. of Naples. These insects are *Macrocheles marginatus* (Herm.), viz. a *tritonympha homoiomorpha feminina* and an adult female. They are of 1879.

Mr. S. A. POPPE, of Vegesack, sent me a tube with *Acari* found on a *Rhinolophus ferrum equinum*, at Triest, 27, I, 1898. They all belonged to one species, which is new to science, and which I will call *Liponyssus rhinolophi* Oudms., **nov. sp.** (see below).

### 4. Acari of Cochin China.

In 1879 Dr. HENRI W. DE GRAAF presented me with two *Amblyomma* found on a kind of *Testudo* in Cochin China. See the *Tijdschrift voor Entomologie*, vol. 39, p. 192. Prof. G. NEUMANN, of Toulouse, kindly determined them as *Hyalomma affine* Nn. ♂.



### 5. Acari of Java.

The *Uropoda*, mentioned in the *Tijdschrift voor Entomologie*, vol. 39, p. 137, and found by me in a bale of kĕtan, a kind of rice, arrived in April 1880 from Java, has not yet been described. I will call it *Uropoda javensis* Oudms., **nov. sp.** (see below). The »other *Acari*», found together with this new species in kĕtan, were *Tyroglyphus siro* Latr., *Glycyphagus domesticus* (de Geer) and *Cheyletus eruditus* (Schränk).

On the same page, mentioned above, I wrote: »I received a big species, nearly a line in length and three quarters of a line in breadth, from my brother, Mr. G. J. OUDEMANS, of Temangoeng, in the province of Kĕdoe, Java, in June 1883.» To-day, April 16, 1891, examining the mite, I discovered it to be *Greenia perkinsi* Oudms., **nov. gen., nov. sp.** (see below), which I had already found in the acarid-chamber of *Xylocopa* (*Koptorthosoma*) *tenuiscapa* Westw. in November of last year. I immediately asked my brother, if he recollected having found, in 1883, a big mite within the abdomen of a big, black wood-bee. By postcard of May 17, he wrote to say that he did not.

On the same page, mentioned above, I noted the receipt of another mite sent to me by my brother. As it is new to science I will call it *Neoparasitus oudemansi* Oudms., **nov. gen., nov. sp.** (see below).

In March 1895 I found on a *Triglyphodon dendrophilum*, a snake of Java, a few specimens of *Ixodidae*, which I determined (see *Tijdschrift voor Entomologie*, vol. 39, p. 192 and 193) as *Amblyomma helvolum* C. L. Koch. I then thought *Amblyomma decoratum* C. L. Koch the ♂ of *helvolum*, because my ♀ resembled *helvolum* and my ♂ *decoratum*. Prof. NEUMANN, of Toulouse, does not share my opinion. He considers *A. helvolum*, *A. decoratum* and the species found by me different from one another, only thinking it probable that the new species (*A. quadrimaculatum* Nn.) may be a variety of *decoratum*. As I had treated my females with caustic kali and picrocarmin in order to study the exoskeleton,



Prof. NEUMANN describes only the ♂ (*Mémoires de la Société Zoologique de France*, 1899, p. 245 et 278).

Mr. S. A. POPPE, of Vegesack, sent me a tube with *Acari*, found by Prof. K. KNUTH in the acarid-chamber of *Xylocopa* (*Koptorthosoma*) *tenuiscapa* Westw. of Java, XII, 1898. There were 4 species, viz:

*Glycyphagus ornatus* Kram.

*Hypopus minutus* Oudms., **nov. sp.** (see below).

*Greenia perkinsi* Oudms., **nov. sp.** (see below).

*Trichotarsus koptorthosomae* Oudms., **nov. sp.** (see below).

*Remark:* The presence of *Glycyphagus ornatus* Kram. in the acarid-chamber is most probably a proof, that Prof. K. KNUTH examined a specimen of *Xylocopa*, which was preserved dry for a long time in a collection of *Hymenoptera*.

Dr. KOHLBRUGGE of Buitenzorg (now at Utrecht) presented me with 6 nymphae, 24 ♂ and 6 ♀ of an *Amblyomma*, caught in 1889 on *Manis javanica* Desm. in Java. Prof. NEUMANN, of Toulouse, determined them as *Amblyomma badium* Nn.

In July 1900 I myself received a *Heliocoprís bucephalus* with mites of Java. I found on it the following species:

*Pachylaelaps ctenophorus* Oudms., **nov. sp.**

*Pachylaelaps minutus* Oudms., **nov. sp.**

*Cillibano heliocopridis* Oudms., **nov. sp.**

*Tyroglyphus trifolium* Oudms., **nov. sp.**

## 6. *Neoparasitus* Oudms., **nov. gen.**

*Neoparasitus* is nearest related to *Hydrogamasus* Berl., differing, however, from it in the narrow ventri-anal shield of the female; in the singular form of the ventri-anal shield of the male; in the single jugular shields; and in the absence of accessory claws. *Neoparasitus* lives free among decaying leaves.

## 7. *Neoparasitus oudemansi* Oudms., **nov. sp.**

(With Plate I, fig. 1—9)

Named after my brother, Mr. G. J. OUDEMANS, Assistant-Resident of Kědoe, Java, who sent me a female in 1883.



Length of ♂ 2125  $\mu$ .; of ♀ varying from 1750 to 2050  $\mu$ .

Colour very dark brown.

*Male.* *Dorsal side* covered with one shield, as in *Hydrogamasus*. The hairs on the dorsum are distributed as in the ♀ (Fig. 1); they are, however, much stronger. The hairs on the centre of the back are much smaller than those of the margins.

The most remarkable features of the *ventral side* (Fig. 2) are the following. There are two narrow jugular shields. The genital aperture is sunk in an incision of the sternal shield, a position which is intermediate between the two common types. The sterni-genital shield is very broad between the coxae 2 and 3, very narrow between the coxae 4. It bears 8 bristles. Between the coxae 4 it shows two lighter spots lying side by side, and two almost black chitinizations in the median line. The ventri-anal shield looks as if it were simply a fusion of a distinct ventral and a distinct anal one. The anterior margin of the ventral portion is in the middle and on the sides elegantly curved forward. The ring in which the 4<sup>th</sup> leg fits is strongly chitinized on its hind- and side-edges. The ventral portion has, like the genital shield, an almost black internal chitinization in the median line.

The *epistoma* is like that of the ♀ (Fig. 1 and 3).

The *hypostoma* resembles that of the ♀ (Fig. 4).

The *chelae* are stronger (Fig. 3, 5, 6), especially the movable finger. The latter bears on its outer side distally a long curved sporn or copulation-organ. This is directed first upward and backward, then it is curved inward, so that both organs of each mandible meet in the median line; then they are curved downward and finally forward again. Fig. 3 represents the insect's head (capitulum or pseudo-capitulum) with epistoma, maxillar palps and the two mandibles with their copulation-organ. Fig. 5 represents the left mandible as seen from the left (outer) side, and Fig. 6 the right mandible seen from the left (inner) side.

*Legs.* The femur of the 2nd leg (Fig. 7) bears on its ventral side a thumb-like sporn; the genu and the tibia a smaller process; the tarsus has a knob half-way, and a pin on its distal end. The



trochanter 3 and 4 bear distally a sharp prick on the dorsal (anterior) side (Fig. 2); the femur 4 two such spines ventrally (posteriorly).

*Female.* Fig. 1 shows us the general aspect of a female; the male has thicker legs 2. The *dorsal side* (Fig. 1) has been described above.

The *ventral side* (Fig. 8) is characterized by its nearly hexagonal sternal shield, by its genital shield being rounded anteriorly, truncated posteriorly, and by its elongate ventri-anal shield. There are two minute metapodial shields. The ring in which the leg 4 fits, is exactly like that in the male.

*Epistoma* and *hypostoma* like those of the male (Fig. 1, 3 and 4).

*Mandibles* (Fig. 9). Fixed finger with long cheek-tooth, strong dog-tooth, two very small incisors and one strong one. Sense-organ distinct. Movable finger with one dog-tooth and one incisor.

All that may be said of the *legs* is shown in Fig. 1. Legs 1 and 4 somewhat longer than the body. Leg 2 the shortest and thickest. Trochanter 3 and 4 with distal dorsal (anterior) spine.

*Habitat*: decaying leaves.

*Patria*: Java, Borneo.

## 8. *Pachylaelaps ctenophorus* Oudms., nov. sp.

(With Plate I, fig. 10—12)

*Nympha generans feminina.* Length 1330  $\mu$ . Colour a brownish-yellow. *General aspect* (Fig. 10) like that of *Pachylaelaps siculus* Berl. *nympha generans feminina*, with the following differences though: 1. The apex is pointed and bears two bristles. 2. The hairs on the dorsum are half or a third their size, except those on the shoulders, which are stronger. 3. The insect is larger, measuring 1330  $\mu$ ., whilst the *nympha generans feminina* of *Pachylaelaps siculus* Berl. is only 875  $\mu$ . in length.

*Ventral side* (Fig. 11). The great difference lies in the form of the genital and anal shields. The genital shield is subtrapezoidal, with rounded anterior and posterior margins, and concave sides, resembling a church-bell. Its posterior margin lies in the



same curve as the outer margins of the fused lateral and metapodial shields. The anal shield is small, much narrower than the genital shield.

The *epistoma* is of the common type.

The *hypostoma* has two horns which have half the size of those of *P. siculus* Berl. The inner malae form a long feathered spine.

The *mandible* (Fig. 12) is provided with three teeth on each finger, the cheek- and canine-teeth directed somewhat backward; the upper incisor large, projecting beyond the lower one.

*Habitat*: *Helicoprism bucephalus*.

*Patria*: Java.

### 9. *Pachylaelaps minutus* Oudms., nov. sp.

(With Plate I, fig. 13—16, 18—19, 21—25, Plate II, fig. 17, 20, 26—29)

The species was found by me on *Helicoprism bucephalus*, one of the most common beetles (*Copridae*) of Java. Nymphs, males and females were present.

*Nymph* (Fig. 13). The nymph is a real nymph, without genital characters. Its *length* is about 420  $\mu$ .; its *shape* somewhat oval, its length twice its breadth, it is somewhat shouldered, and has nearly parallel sides. The *colour* is that of the known species of *Pachylaelaps*, a brighter yellow than of *Parasitus coleoptratorum* and others. The *ventral side* (Fig. 14) is characterized by the following particulars. The sternal shield is anteriorly prolonged by a piece, intercalated between it and the capitulum. I will call this piece a *praesternal shield*. It bears the small mentum on its anterior edge. The sternal shield itself bears 8 hairs, and its hind-half, comparable to a genital shield, two little hairs. The part between the coxae 4 is narrow. There is a subquadrangular anal shield, two very elongate lateral shields with the peritremata, and two small metapodial shields. The *epistoma* (Fig. 15) ends in a semicircular denticulated comb; the middle and a lateral tooth twice the length of the others. The *hypostoma* (Fig. 16) is typical. The bases of the maxillae are coa-



lesced without visible suture. The corniculae hypostomatis or exterior malae are normal. The interior, however, long, filiform. The legs are slender, those of the first pair as long as the body; the others shorter, scarcely longer than the breadth of the body.

*Male.* Length about 450  $\mu$ . Shape (Fig. 17); well shouldered, broadest at the shoulders, tapering rapidly toward the apex, with a second indication of a shoulder near the first pair of legs, and tapering very slowly toward the posterior end of the abdomen. Behind the shoulders the side is somewhat concave. The colour is that usually shown by *Pachylaelaps*. The dorsal shield shows exactly the same distribution of hairs as that in the nymph. The shields of the ventral side (Fig. 18) have all coalesced. The sternal part projects forward and ventrally with an undulated edge, so that the mentum is situated between this prolongation and the jugular region. The epistoma (Fig. 19) differs from that of the nymph, as the comb is placed immediately on the base, which has a denticulated edge and therefore strongly reminds us of that of the genus *Macrocheles*. The hypostoma (Fig. 20) differs greatly from that of the nymph. The bases of the maxillae are coalesced so that they leave a nearly circular opening through which the base of the ligula is visible. The malae interiores are blade-like, very transparent. The malae exteriores long, well chitinized. The movable finger of the chelae (Fig. 21—23) bears an almost S-shaped broad and flat copulation-organ, provided with about three blunt teeth on its distal end and one blunt tooth on its inner side. The genu and tibia of leg 1 (Fig. 24) are distally provided with two little teeth. The femur of leg 2 (Fig. 25) has a strong thorn directed forward; the tibia a thumb-like apophysis directed backward; and the tarsus bears a little thorn distally, on the outer side, next to the praetarsus.

*Female.* Length about 450  $\mu$ . Colour like that of the nymph and the male. Shape (Fig. 26) between those of the nymph and the male. Dorsal side. Distribution and number of the hairs exactly like those in the nymph and the male. On the ventral side (Fig. 27) we observe the coalesced sternal, lateral and meta-



podial shields, but here too the mentum is planted between an anteriorly directed prolongation of the sternal part and the jugular region. The geniti-ventral shield is nearly hexagonal; its three fore-margins follow the margins of the metapodial and sternal shields; its three hind-margins form distinct angles. The anal shield is nearly triangular. There are 8 hairs on the sternal shield, 2 between the genital and metapodial shields, 2 on the hinderhalf of the genital shield, two on the anal shield one on each side of the anus, and two between the genital and anal shields. *Epistoma* about the same (Fig. 28) as that of the male. *Hypostoma* (Fig. 29) with exterior malae abruptly broken distally, and sharp, nearly triangular inner malae. The bases of the maxillae leave a broad split, through which the base of the ligula is visible.

*Habitat: Heliocopris bucephalus.*

*Patria: Java.*

## 10. Key to the species of *Pachylaelaps*.

### *Nympha*.

Only one nympha known. . . . *P. minutus* Oudms.

### *Nympha generans masculina*.

- |   |   |  |
|---|---|--|
| 1 | { | Tarsus 2 distally with a strong<br>thorn right and left. . . . <i>P. siculus</i> Berl. |
|   | { | Tarsus 2 ventrally tridenticulate <i>P. pectinifer</i> (G. et R. Can.).                |

### *Nympha generans feminina*.

- |   |   |   |
|---|---|---|
| 1 | { | Geneti-ventral shield church-<br>bell-shaped . . . . . <i>P. ctenophorus</i> Oudms.           |
|   | { | Geneti-ventral shield otherwise 2.  |
| 2 | { | Geneti-ventral shield more long<br>than broad . . . . . <i>P. siculus</i> Berl.               |
|   | { | Geneti-ventral shield more broad<br>than long . . . . . <i>P. pectinifer</i> (G. et R. Can.). |



*Male.*

- 1 { Comb of epistoma sessil . . *P. minutus* Oudms.  
 1 { Comb of epistoma with long  
 peduncle. . . . . 2.  
 2 { Article 4 of palp ventrally with  
 big tubercle . . . . . *P. siculus* Berl.  
 2 { Article 4 of palp unarmed . *P. pectinifer* (G. et R. Can.).

*Female.*

- 1 { Comb of epistoma sessil . . *P. minutus* Oudms.  
 1 { Comb of epistoma with long  
 peduncle. . . . . 2.  
 2 { Genu and tibia 2 without tubercle *P. pectinifer* (G. et R. Can.).  
 2 { Genu and tibia 2 with tubercle  
 ventrally. . . . . *P. siculus* Berl.

**11. Key to the genera of Parasitinae.**

- 1 { Free in moss, decayed leaves, or else-  
 where; shields well chitinized. . . 2.  
 1 { Parasitic on vertebrates; skin soft,  
 scarcely shielded . . . . . 12.  
 2 { ♀ ventral shield not fused with genital 3.  
 2 { ♀ ventral shield fused with genital, not  
 with anal . . . . . 11.  
 3 { ♀ genital shield triangular, anteriorly  
 pointed, fitted in incised sternum . *Parasitus* Latr.  
 3 { ♀ genital shield otherwise . . . . . 4.  
 4 { ♀ genital shield with rounded anterior  
 margin, parallel to rounded posterior  
 margin of sternal shield . . . . 5.  
 4 { ♀ genital shield almost hexagonal, an-  
 teriorly truncated . . . . . 10.  
 5 { Legs 1 with ambulacrum . . . . . 6.  
 5 { Legs 1 without ambulacrum. . . . . 9.



- 6 { Dorsal shield in both sexes divided or  
nearly divided into two parts. . . 7.  
Dorsal shield, even in nymphs undivided 8.
- 7 { ♂ movable finger of mandible about as  
long as fixed one. . . . . *Cyrtolaelaps* Berl.  
♂ movable finger of mandible enorm-  
ously developed, cultrate; fixed finger  
very small . . . . . *Euryparasitus* Oudms.
- 8 { Jugular shields single; no accessory claws *Neoparasitus* Oudms.  
Jugular shields double; two accessory claws *Hydrogamasus* Berl.
- 9 Only one genus . . . . . *Macrocheles* Latr.
- 10 Only one genus . . . . . *Pseudoparasitus* Oudms.
- 11 Only one genus . . . . . *Pachylaelaps* Berl.
- 12 Only one genus . . . . . *Haemogamasus* Berl.

## 12. *Greenia* Oudms., nov. gen.

(With Plate II, fig. 30—35)

As the male is unknown, it is not certain to which subfamily this insect belongs. As to the general habitus (Fig. 30), it may be a member of the subfamily of *Parasitinae*, or of the *Laelaptinae*. The undivided dorsal shield, the simple epistoma (Fig. 33), the elongate genital shield (Fig. 31), however, induce us to place it in the subfamily of *Laelaptinae*.

As the stigma misses a tubular peritrema (Fig. 31 and 35), the nearest related to *Iphiopsis*. But it differs from this genus in the presence of claws on the 1st leg.

Named in honor of Mr. EDWARD ERNEST GREEN, Tea Planter, Eton Estate, Punduloya, Ceylon, investigator of Coccidae, discoverer of the symbiosis between *Koptorthosoma* and *Greenia*.

## 13. *Greenia perkinsi* Oudms., nov. sp.

(With Plate II, fig. 30—35).

Named in honor of Mr. R. C. L. PERKINS, who first directed the attention of investigators to the symbiosis of *Koptorthosoma* and *Greenia*, discovered by Mr. E. E. GREEN of Ceylon.



*Travelling nymph.* Length 2500—3000  $\mu$ . Colour: the usual brownish-yellow of mites living on *Bombus*, etc.; yet the front-half of the mite is darker than the hinder-part; this is already visible to the naked eye.

*Dorsal side* (Fig. 30). It is protected by only one shield of a peculiar form. It is as it were formed by the fusion of two shields, an anterior and a posterior one; the former covering somewhat more than the fore-half, the latter being somewhat narrower, leaving the sides of the hinder-part bare. To the right and to the left the angles, formed by these two parts are as if eroded. The two eroded parts of one and the same individual are never alike. Sometimes it may even happen, that in the shield a part is weak (see Fig. 30 to the left), and sometimes quite the contrary is the case (see Fig. 30 to the right). The hairs are strong, short, curved, ranged in two or three rows along the sides; part of the dorsum is nearly destitute of hairs, whilst there are some small ones in the centre.

The *ventral side* shows us the following particulars (Fig. 31). The sternal shield is sub-semi-circular; its hind-margin showing erosion. The genital shield is long, with rounded hind-margin and indistinct fore-margin. The anal shield is subtriangular. Eight long bristles are planted in the space occupied by the sternal and genital shields. On the sides of the genital shield two long bristles. Mentum present.

*Hypostoma* (Fig. 32) dark coloured, with transparent broad and flat horns, and long feathered interior malae.

*Epistoma* (Fig. 33) triangular, transparent, with plain edges.

*Chelae* (Fig. 34) small; immovable finger with indistinct cheek-tooth, distinct, but small dog-tooth, and well developed sense-hair. Movable finger larger than the immovable one, similar to it. Flagellum only indicated by a few hairs.

*Stigma* without tubular peritrema, but provided with an oblong vestibulum, a kind of pan, the edges of which are directed toward the centre, and striated (Fig. 31). When we crush the mite and examine the stigma on its inner side (Fig. 35), the bottom



of the pan is roughly undulate, and a hole, the stigma itself is large and distinctly visible. I think we must consider this pan as a rudiment of a peritrema. I have not yet had an opportunity to examine *Iphiopsis mirabilis*, but I think its singular »stigma'', drawn by BERLESE will prove to be of the same kind.

The *legs* (Fig. 30) are short, having nearly the breadth of the mite in length, and strong. The spines are short and strong; in the distal joints of the fore-legs they have a tendency to stand perpendicular on the axe of the limb, nay are sometimes directed backward. On the dorsal side of the proximal end of the genu 1, and on the ventral side of the tarsus 1 and 2 there are two short chitinous bars or thorns. On the ventral side of the coxae 1, 2 and 3 (Fig. 31) there are two short, more or less spool-shaped spines, on coxa 4 only one.

*Habitat*: the acarid-chamber in the first abdominal ring of *Xylocopa* (*Koptorthosoma*) *tenuiscapa* Westw.

*Patria*: Java, India.

#### 14. Key to the genera of Laelaptinae.

- |   |   |   |                         |
|---|---|---|-------------------------|
| 1 | { | Peritrema a pan . . . . .   | 2.                      |
|   | { | Peritrema tubular . . . . .   | 3.                      |
| 2 | { | Legs 1 with ambulacrum . . . . .                                    | <i>Greenia</i> Oudms.   |
|   | { | Legs 1 without ambulacrum . . . . .                                 | <i>Iphiopsis</i> Berl.  |
| 3 | { | Legs 1 with ambulacrum . . . . .                                    | 4.                      |
|   | { | Legs 1 without ambulacrum . . . . .                                 | 10.                     |
| 4 | { | ♀ femur 4 without spur . . . . .                                    | 5.                      |
|   | { | ♀ femur 4 with spur . . . . .                                       | 9.                      |
| 5 | { | Mandibles chelate in both sexes . . . . .                           | 6.                      |
|   | { | Mandibles of ♀ chelate, of ♂ not . . . . .                          | 8.                      |
| 6 | { | ♂ with sterni-geniti-ventri-anal shield. <i>Laelaps</i> C. L. Koch. |                         |
|   | { | ♂ with anal shield separate . . . . .                               | 7.                      |
| 7 | { | Body not shouldered; epistoma with                                  |                         |
|   | { | long feathered mucro . . . . .                                      | <i>Emeus</i> Mégn.      |
|   | { | Body shouldered; epistoma scarcely pointed                          | <i>Seiulus</i> Berlese. |



- 8 { ♀ mandibles normal; ♂ a style . . . . *Stylochirus* G. et R. Can.  
 { Mandibles a pin with an appendage den-  
 { tate on outside . . . . . *Berlesia* G. Can.  
 9 Only one genus . . . . . *Neoberlesia* Berl.  
 10 { Legs 1 normal . . . . . *Neopodocinum* Oudms.  
 { Legs 1 very long . . . . . *Podocinum* Berl.

### 15. *Liponyssus* Klti.

In 1859 KOLENATI formed the genera *Liponyssus* (Sitzsb. d. math. naturw. Cl. Kais. Ak. Wiss. Wien, Vol. 35, p. 172), *Ichoronyssus* (ibid. p. 173), *Macronyssus* (ibid. p. 178), *Lepronyssus* (ibid. p. 180), *Steatonyssus* (ibid. p. 186) and *Pimelonyssus* (ibid. p. 188). All the mites belonging to these genera, and drawn by him, have the external features of those which belong to the genus *Leiognathus* of CANESTRINI, 1885.

*Liponyssus setosus*, the type of the genus *Liponyssus*, may be a *Laelaps*, e. g. *Laelaps arcualis* (C. L. Koch) var. *marginata* (C. L. Koch), though it is not likely. But as long as it is only a supposition, we have no right to deny the relationship, or even the conformity, of *Lyponyssus* to *Leiognathus*.

All the species belonging to the above named genera and to *Leiognathus*, may provisionally be placed in one genus, viz. *Liponyssus* Klti, till the genus shall be broken up into two or more subgenera, or genera, in which case we shall have to observe that each of these genera has its proper type, which is inseparable from its genus.

The characters mentioned by KOLENATI himself are too vague to be understood, and this author seems to have been a careful observer in some instances and a very inaccurate one in others. I don't think it superfluous to give the following key to KOLENATI's genera:

- 1 { a. Rückenschild einfach. . . . . 2.  
 { b. Rückenschild zwei- oder dreiteilig . . . 5.



- 2 { a. Rückenschild nicht sculptirt . . . . . 3.  
 { b. Rückenschild mit dicht schlangenschup-  
 { piger Grundsculptur . . . . . 4.
- 3 { a. An der Bauchseite zwischen den Füßen  
 { ein schuppig sculptirtes Schildchen . *Liponyssus* Klti.  
 { b. An der Bauchseite zwischen den Beinen  
 { ein längliches, entweder länglich- oder  
 { seltener schuppig-sculptirtes Leder-  
 { schildchen, welches der Quere nach  
 { gebrochen ist . . . . . *Ichoronyssus* Klti.
- 4 { a. An der Bauchseite zwischen den Hinter-  
 { füßen ein sehr kleines Schildchen . *Macronyssus* Klti.  
 { b. An der Bauchseite ein kleines Schildchen *Lepronyssus* Klti.
- 5 { a. Rückenschild durch eine Querteilung  
 { gebrochen . . . . . *Steatonyssus* Klti.  
 { b. Rückenschild dreiteilig . . . . . *Pimelonyssus* Klti.

REMARKS. Ad 1*b* and 5*b*. I am convinced that KOLENATI's *Pimelonyssus* is based only on nymphs, and that his words: »Rückenschild dreiteilig; die einzelnen Teile von verschiedener Grundsculptur'' must be explained as follows: There are two dorsal shields, at some distance from each other, the space between these shields is wrinkled (see my figg. 36 and 38 on Plate II). This is confirmed by KOLENATI's own words (l. c. p. 188): »der mittlere Teil dünn, lederig-wellig'' and (l. c. p. 189): »der mittlere Teil am Discus mit 4 im Viereck stehenden runden Grübchen''.

Ad 3*a*. Here KOLENATI seems to have meant a sternal shield between the coxae 1 and 2 (in which case his mites were females) or amidst the coxae, in which case his mites were nympheae (see fig. 37).

Ad 3*b*. KOLENATI has probably meant two shields: a sternal and a genital one; and his mites may have been females or males.

Ad. 4*a*. This must have been a genital shield, and his mites must have been females, but then KOLENATI has overlooked the sternal shield.



Ad 4b. Here he has apparently meant a sternal shield. His mites may have been females or nymphae.

Ad 5a. His mites may have been females. A. o. the female of *Liponyssus musculi* (C. L. Koch) has *two* dorsal shields.

# 16. *Liponyssus rhinolophi* Oudms., nov. sp.

(With Plate II, fig. 36 and 37)

*Nympha*. Length 450—560  $\mu$ . Colour white, or pale. Shape like that of the nymphae of other species of *Liponyssus*, e. g. *Lip. musculi* (C. L. Koch), but at once distinguished from it by the longer legs. Body well shouldered. *Dorsal side* (Fig. 36). It is protected by two larger and six smaller shields. The anterior shield is subpentagonal, with distinct shoulders, sinuated on its posterior margin, and with scaly surface. It protects more than one half of the dorsum, provided the nympha be not swollen. It bears 10 pair of hairs which are nearly placed in four longitudinal rows of 4 and 6 hairs each; the two marginal hairs of the posterior half of this shield are stronger than the others. The posterior dorsal shield is subpentagonal, with top turned forward, and scaly surface. Three pair of very small hairs are planted on its lateral margins; one pair in the centre and two pair of longer hairs on the posterior margin, of which the middle pair is the longer and projects far beyond the posterior margin of the abdomen. Between the two shields there are three pair of intermediate shields and four pair of hairs of which the anterior two are smaller. The soft part of the dorsum is wrinkled transversally and has nine pair of lateral hairs, which project far beyond the margin of the body.

*Ventral side* (Fig. 37). There is a wide scaly sternal shield with 3 pair of long hairs, an anal shield with the usual 3 hairs, 4 pair of intermediate hairs, 2 pair flanking the anal shield and 5 pair on the posterior margin of the abdomen. The *peritrema* is of the common nymphal type.

*Legs*. These are slenderer than those in any of the known species. Legs 1 and 2 are a little thicker than 3 and 4. Tarsus 1 bears



two distinct tactile hairs. Coxa 2 (Fig. 37), is provided with a spur direct forward.

*Habitat*: *Rhinolophus ferrum equinum*.

*Patria*: Italy.

### 17. *Liponyssus saurorum* Oudms., nov. sp.

(With Plate II, fig. 38—40, 42 and Plate III, fig. 41, 43—44)

This species has already been mentioned in my paper entitled *New List of Dutch Acari, 2nd Part, Parasitidae*, concluded 8 April 1901, but not yet published. The mites were caught in large numbers on *Lacerta agilis* at Rotterdam, by Mr. K. SCHÜTZ. They may, however, have immigrated there on *Lacerta viridis* from Hungary.

*Nympha*. Length 525—650  $\mu$ . Shield 210  $\mu$ . First leg 315  $\mu$ . including the coxa. Colour pale when fasting, brown with numerous black spots when partly fed, bloodred when well fed. Shape oval, only somewhat shouldered when fasting. On the *dorsal side* (Fig. 38) the nymph shows a pentagonal anterior shield, scaly, and covering the anterior half of the dorsum. Behind this shield there are two pair of *intermediate shields*. Posteriorly a small, round scaly *posterior shield* protects the top of the abdomen. The anterior shield bears 20 hairs arranged symmetrically. The posterior shield bears two bristly hairs which are nearly wholly visible beyond the margin of the abdomen. The abdomen is finely wrinkled except in the shields, and provided with a few bristly hairs. The nymphs can be known at once, even when seen with low powers, by 4 hairs projecting beyond the margin of the abdomen. *Ventral side* (Fig. 39). The sternal shield is small, subheptagonal with top backward, between the coxae 4. The anal shield is small, oval, with top backward and with cribrum, like all the species of *Liponyssus*.

*Male*. Length 500—535  $\mu$ . Shield 500  $\mu$ . First leg, seen from below, inclusive the coxa, 385  $\mu$ . Colour like that of the nymph, though I saw none of a blood-red colour. Shape oval, with the top directed backward, slightly shouldered. *Dorsal side* (Fig. 40). It is



protected by one single scaly shield, provided with hairs, which are arranged exactly like those on the dorsal side of the nympha. Only the marginal hairs are stronger. The *ventral side* (Fig. 41) shows us two shields. One of them I may call a scaly sterni-geniti-ventral and the other an anal one. The former occupies the space between the coxae and nearly the foremost half of the venter, and shows the genital aperture in front and 12 little hairs. The anal shield like that of the nymph. The *peritrema* runs forward, passing the coxa 3. The ♂ are recognizable by their 8 or 10 hairs on the posterior margin of the abdomen.

*Female.* Length 670—790  $\mu$ . when fasting or scarcely fed, reaching 1300  $\mu$ . when well fed. Shield 665  $\mu$ .; first leg 700  $\mu$ ., including the coxa. *Colour* like that of the nymph. *Shape* long-oval, scarcely shouldered, with its top backward when fasting (Fig. 42); broad-oval, not shouldered and with its top forward, when well-fed (Fig. 43). The *dorsal side* is hairy; the hairs are short, distinctly curved; there is one long scaly dorsal shield, the foremost third of which corresponds to the nymphal shield; the hairs on this shield have exactly the same number and places as the hairs on the dorsum of the nympha. The hindmost top of this shield corresponds to the posterior dorsal shield of the nympha. The dorsal shield gets a little narrower towards in the middle.

On the *ventral side* (Fig. 43) there are three shields distinct, viz. 1. a trapezoidal sternal shield, excavated roundly posteriorly, bearing four hairs and having a chitinous marking with a median point forward; 2. a genital shield corresponding to the geniti-ventral portion of the large ventral shield of the male, distinct posteriorly, indistinct, rounded and longitudinally folded anteriorly; 3. the anal shield, closely resembling those of the nymph and the male, but larger. The *peritrema* runs forward almost passing the legs 1.

Of the *legs* of the nymph, the male and the female I can observe only that the femurs 1 and 2 are provided dorsally with two hairs, stronger and more spiny than the others, and diverging; and that the femurs 3 and 4 and genus 3 and 4 have one similar hair on their fore-side.



The *epistoma*, the *hypostoma* and the *mandibles* are of the usual type, like those of *Liponyssus lacertarum* (Contar.).

*Habitat*: *Lacerta agilis*, *Lacerta viridis*?, (in terrario).

*Patria*: Netherlands, Hungary?

## 18. Key to the species of *Liponyssus* Klti.

### *Nymphs.*

- 1 { With 6 intermediate shields . . . *L. rhinolophi* Oudms.  
With 4 intermediate shields . . . 2.
- 2 { Posterior dorsal shield half as wide  
as anterior . . . . . *L. lacertarum* (Contar).  
Posterior dorsal shield much narrower *L. saurarum* Oudms.

### *Males.*

- 1 { With broom of bristles around anus *L. corethroproctus* (Oudms.)  
Without broom . . . . . 2.
- 2 { With two enormous curved spines  
on each side . . . . . *L. uncinatus* (Can.).  
Without such unci . . . . . 3.
- 3 { Dorsal shield narrow, surrounded by  
unprotected skin . . . . . *L. musculi* (C. L. Koch).  
Dorsal shield wide, occasionally sur-  
rounded by unprotected skin . . 4.
- 4 { Femur 3 with spur . . . . . *L. lacertarum* (Contar).  
Femur 3 without spur . . . . . 5.
- 5 { Peritrema passing the coxae 3 . . *L. saurarum* Oudms.  
Peritrema reaching coxae 1. . . *L. albatu*s C. L. Koch.

### *Females.*

- 1 { Two dorsal shields . . . . . *L. musculi* (C. L. Koch).  
One dorsal shield . . . . . 2.
- 2 { With sternal shield . . . . . 3.  
Without sternal shield . . . . *L. uncinatus* (Can.).



- 3 { Sternal shield trapezoidal . . . . 4.  
 { Sternal shield linear . . . . . *L. sylviarum* (Can. et Fanz.)
- 4 { Dorsal shield wide, occasionally sur-  
 { rounded by narrow margin of un-  
 { protected skin . . . . . 5.  
 { Dorsal shield narrow, surrounded by  
 { unprotected hairy skin . . . . 6.
- 5 { Coxa 2 with two spines, one for-  
 { ward and one backward; coxae 3  
 { with 2 spines backward . . . *L. albatus* (C. L. Koch).  
 { Coxa 2 with one spine forward . *L. corethroproctus* Oudms.
- 6 { Dorsal shield without constriction in  
 { the middle; peritrema reaching  
 { coxa 2 . . . . . *L. lacertarum* (Contar).  
 { Dorsal shield with constriction in the  
 { middle; peritrema passing coxa 1 *L. saurarum* (Oudms.).

### 19. Subfamily Spinturnicinae.

The principal characteristic of this subfamily has always been the dorsal situation of the stigmata. This characteristic does not exist, as at least one of the species even of the genus *Spinturnix* von Heyden has *ventral* stigmata, as I will prove in a subsequent paper on *Acari*.

Therefore the diagnose of the subfamily should be: Body generally short and oval; abdomen generally very small; legs generally short and thick, sternum generally surrounded by the coxae; dorsum generally protected by only one shield, ventral side by two or more shields; stigmata generally dorsal; anal shield generally without cribrum; no mentum.

As you will observe the only fundamental difference between *Dermanyssinae* and *Spinturnicinae* is in the presence or absence of the mentum.

What seems rather strange, KOLENATI has — as far as I know — only once mentioned the stigma and the peritrema! In Vol. 35 of the *Sitzb. d. math. naturw. Cl. d. Kais. Akad. d.*



Wiss. Wien, 1859, p. 189 describing *Pimelonyssus trichorion* Klti. he says: »in der Richtung der stark hervortretenden Stigmenwulste....." etc. And yet, the length and the direction of the peritrema and the situation of the stigma in *Spinturnicinae* may be a good characteristic.

In no case can the *direction* of the hairs be a characteristic, as it is too often considered to be by KOLENATI. This direction is very variable in the same species; it all depends on the amount of food, if not on other circumstances.

In no case can the *situation* of the stigma on the dorsal or ventral side always be a specific characteristic, as in fact it is ventral (in most species) in nymphae and females, dorsal in males; but when the nymphae and females are fasting, the stigma becomes quite lateral, nay even often dorsal. And when the stigma is in fact ventral, the observer is usually mistaken owing to the extraordinary transparency of the skin, so that with low powers the stigma always seems to be dorsal!

Erosionsgruben (KOLENATI!) are pits or groups of small pits, which in living or dried, specimens are distinctly visible through a pocket magnifying glass, when the animal is viewed a little obliquely. The general arrangement of these pits may be a very good characteristic for distinguishing species, but in no case can the *number* be used for this purpose, as KOLENATI has too often done.

There are no hexapod larvae, but *the newly born octopod mite is a nymph*, provided with stigmata and peritremata! By authors on *Acari* in general, or on *Parasitidae* in general, or on *Spinturnicinae* in particular this nymph is always called a *larva*! As is well known, larvae are provided with 6 legs and have no tracheae! This phenomenon must be explained by the parasitism on flying mammals. Nymphae are stronger than larvae and more adapted to its manner of living. The phenomenon is similar to that of *Pinnipeds*, in which the newly born pups have their permanent dentition at once, whilst the deciduous dentition is rudimentary, never truly functional, and generally not persistent beyond the foetal stage of the animal.



The legs of the *Spinturnicinae* are provided with *six* rows of hairs, two rows on the dorsal side of the legs, two lateral rows and two ventral rows. The *relative* length of the dorsal hairs on the different joints of the four legs, is a good specific characteristic. Similarly the outer ventral row may have long hairs on some of the joints, very small ones on the others. As there are two pair of legs directed forward and two backward, we may speak of inner and outer rows.

As I have found back again KOLENATI's *Diplostaspis mystacinus* and a new species of *Periglischrus*, I have read his paper carefully and come to the conclusion, that his genera and species are easily distinguished.

## 20. Key to the genera of Spinturnicinae.

- 1 { Legs 1 have the rostrum between the  
coxae . . . . . 2.  
Coxae 1 contiguous above the rostrum 10.
- 2 { Legs slender; mites *Dermanyssus*-like: *Ptilonyssus* Berl. et Trt.  
Legs short and thick; mites *Spin-*  
*turnix*-like . . . . . 3.
- 3 { All the legs subequal in thickness . 4.  
Legs 1 as thick again as the others 9.
- 4 { Two dorsal shields (in adults). . . 5.  
One dorsal shield . . . . . 6.
- 5 { ♀ with genital shield. . . . . *Periglischrus* Klti.  
♀ without genital shield. . . . . *Tristaspis* Klti.
- 6 { With sternal shield . . . . . 7.  
Without sternal shield . . . . . 8.
- 7 { Dorsal shield without oval central field *Spinturnix* von Heyden  
(= *Celeripes* Mont., = *Pteroptus* Duf., incl. *Tinoglischrus* Klti.,  
and *Diplostaspis* Klti.)  
Dorsal shield with oval central field *Heterostaspis* Klti.
- 8 Only one genus . . . . . *Monostaspis* Klti.
- 9 Only one genus . . . . . *Meristaspis* Klti.



- 10 { All the legs equal in size, provided  
 { with claws and sucker . . . . *Sternostoma* Berl. et Trt.  
 { Legs 1 very thick, without sucker . *Ancystropus* Klti.

## 21. *Uropoda javensis* Oudms., nov. sp.

(With Plate III, fig. 45—48)

*Uropoda javensis* is closely related to *Uropoda krameri* Can.

Length of male 595  $\mu$ ., of female 630  $\mu$ . Colour a dark brownish-red. Form oval.

Fig. 45 shows us a *female* seen dorsally. The dorsal side is quite polished, with numerous fine hairs. Near each hair there is a dull patch, which when seen with low powers, resembles a pore. The median shield is distinct, only anteriorly coalesced with the circumjacent ring formed by the fusion of the lateral and posterior shields.

Fig. 46 and 47 represent the ventral sides of *female* and *male*. Sternal and anal shields coalesced; metapodial shields distinct. The stigma is small; the peritreme runs obliquely forward and outward, till it reaches the margin just before the chitinous ridge which separates the pits for the third and second legs, then it bends and follows the margin till it reaches the pit for the first leg. The tectum ends in a broom of spines.

Of the *chelae* (Fig. 48) the movable finger is crooked and scarcely longer than the immovable one.

The genital aperture of the *male* (Fig. 47) is nearly circular and situated on a line running between the coxae 2 and 3. The coxae of the first pair bear chitinous knobs on their outer side.

The genital aperture of the *female* (Fig. 46) is very large, occupying nearly the whole space between the coxae. The coxae of the first pair are not so knobby as those of the male.

The tarsus of the first pair of *legs* is nearly cylindrical; those of the other legs taper gradually toward the end. All the femurs bear a longitudinal chitinous blade on their ventral side.

*Habitat*: a bale of kêtan (a kind of rice).

*Patria*: Java.



22. Key to the species of *Uropoda* Latr.

- 1 { Median dorsal shield ornated with chitinous ridges . . . . . 2.
- 1 { Median dorsal shield without such ridges 4.
- 2 { Anterior part of abdomen simulates a cephalothorax. . . . . *U. berlesiana* Berl.
- 2 { No simulation of cephalothorax . . 3.
- 3 { Two suboval spaces on dorsum joined by a median line . . . . . *U. festiva* Berl.
- 3 { No such arrangement. . . . . *U. laminosa* Can.
- 4 { Anterior margin with chitinous membrane . . . . . 5.
- 4 { No such membranes . . . . . 6.
- 5 { Body subpyriform; membranes extending to legs 4 . . . . . *U. canestriniana* Berl.
- 5 { Body broad-oval; membranes extending to legs 2 . . . . . *U. cristiceps* Can.
- 6 { Dorsum concave; margins upward . *U. carinata* Berl.
- 6 { Dorsum convex; margins not upward 7.
- 7 { Anal shield distinct, separate from ventral shield. . . . . 8.
- 7 { Anal shield fused with ventral shield 11.
- 8 { Sternal shield posteriorly denticulate; anal shield crescent-shaped . . . 9.
- 8 { Sternal shield indistinct, or posteriorly not denticulate . . . . . 10.
- 9 { Dorsal shield hairy. . . . . *U. paradoxa* Can. et B.
- 9 { Dorsal shield hairless . . . . . *U. pusilla* Berl.
- 10 { Anal shield small, sub-semicircular . *U. obovata* Can. et B.
- 10 { Anal shield large, crescent-shaped . *U. elimata* Berl.
- 11 { With posterior dorsal shield . . . 12.
- 11 { Without posterior dorsal shield . . 13.
- 12 { Posterior dorsal shield small; body hairy *U. obscura* (C. L. Koch).
- 12 { Posterior dorsal shield crescent-shaped; body hairless . . . . . *U. tecta* Kram.



- 13 { Dorsal shield rough, punctulate . . . 14.  
       Dorsal shield polished . . . . . 16.
- 14 { Dorsal shield surrounded by broad margin *U. elegans* Kram.  
       Dorsal shield without margin . . . . . 15.
- 15 { Margin. and dorsal hairs minute, smooth *U. ovalis* (C. L. Koch).  
       Marginal and dorsal hairs clavate and  
       plumose . . . . . *U. patavina* Can.
- 16 { Metapodial shields fused with ventri-  
       anal shield . . . . . 17.  
       Metapodial shields distinct . . . . . 20.
- 17 { Anus terminal . . . . . *U. lagena* Berl.  
       Anus ventral. . . . . 18.
- 18 { Two little vertical hairs directed forward *U. tridentina* Can.  
       No such hairs . . . . . 19.
- 19 { Legs 4 in the middle of the body . *U. hypopoides* Berl.  
       Legs 4 far more backward . . . . *U. ricasoliana* Berl.
- 20 { Four hairs longer than body posteriorly  
       on ventral shield . . . . . *U. longiseta* Berl.  
       No such hairs . . . . . 21.
- 21 { Median dorsal shield surrounded by  
       marginal shield except anteriorly . 22.  
       Only one dorsal shield . . . . . *U. campomolendina* Berl.
- 22 { Metapodial shields with acute posterior  
       angle . . . . . *U. Kramerii* Berl.  
       Metap. sh. with rounded post. angle. *U. javensis* Oudms.

### 23. *Cillibano heliocopridis* Oudms., nov. sp.

(With Plate III, fig. 49—52)

*Deutonympha*. Length 434—525  $\mu$ . Colour pale. Shape flat, somewhat convex dorsally; circumference broad oval, subheptagonal. The *dorsal side* (Fig. 49) is perfectly smooth, hairless, polished, only about 40 pores are arranged symmetrically, of which 14 at about equal distances follow the margin. All the dorsal shields have fused into a single one. *Ventral side* (Fig. 50). The most char-



acteristic features are: 1. The sterni-genital shield is long and occupies the space between the legs and the small ventri-anal shield; it is perfectly smooth, polished, hairless, and has 12 large pores and in the middle numerous small pores. 2. The tubular *peritrema* shows *two* wrinkles, one between the pits of legs 3 and 2, and one between the pit of leg 2 and the coxa 1. Moreover the former wrinkle has a blind apendage directed outward, a fact *not yet met with*. Fig. 51 shows us the palp; Fig. 52 represents the tarsus 1, with sensorial hairs.

*Habitat*: *Heliocopris bucephalus*.

*Patria*: Java.

#### 24. Key to the species of Cillibano, v. Heyd.

- 1 { Posterior part of dorsum unprotected *C. splendidus* (Kram.).
- 1 { Posterior part of dorsum protected. 2.
- 2 { Dorsum concave . . . . . *C. venustus* (Berl.).
- 2 { Dorsum convex . . . . . 3.
- 3 { Median dorsal shield surrounded by
- 3 { hairy marginal ring-shield . . . 4.
- 3 { All the dorsal shields fused, hairless 6.
- 4 { Body circular . . . . . *C. cassideus* (Herm.).
- 4 { Body nearly oval. . . . . 5.
- 5 { Tarsus 1 distally with a hair, ending
- 5 { in a triangle . . . . . *C. vegetans* (Dug.).
- 5 { Tarsus 1 without such hair . . . *C. minor* (Berl.).
- 6 { Peritrema curved outward. . . . *C. romanus* (G. et R. Can.).
- 6 { Peritrema complicate . . . . . *C. heliocopridis* Oudms.

#### 25. *Camisia horrida*, *biverrucata*, *berlesei*, *nicoletii*, and *fischeri*.

When I compared my collection of *Camisia* with the figures in MICHAEL'S *British Oribatidae*, v. 2 a second time, I was struck with the resemblance of the figure of *Camisia biverrucata* (C. L. Koch) to that of my *C. fischeri*. I observed that the two protub-



erances of the abdomen had only *one* feathered hair; the other so called feathered hair, delineated by me in the *Tijdschrift voor Entomologie*, vol. 43, p. 109, tab. 5, Fig. 1, is nothing but a feather-shaped exsudation of wax on one side and the removed broken feather of the corner of the abdomen on the other side (my figure does not show these feathers on the corners). Further MICHAEL's drawing shows a little hair behind the central depression, on each side. I have found it in my specimen too.

#### *Observations :*

1. Just as I have been mistaken in the interpretation of the number of hairs of the protuberances of the abdomen, others may have been so too. Yet this *supposition* is not a *proof* that NICOLET and BERLESE were wrong in delineating their *Nothrus horridus* with *two* hairs on the protuberances. And therefore we are obliged to adopt their species, but to change their names, as I already did (*Tijdschrift voor Entomologie*, vol. 43, p. 109 and 110).

2. The wrinkles in the skin of my specimen are arranged otherwise than in MICHAEL's. In my specimen the edge of the central depression is anteriorly indistinct; and the depression is not divided by a transversal ridge. Yet I consider my specimen perfectly identical to MICHAEL's *Camisia biverrucata* (C. L. Koch). In vol. 43, p. 111, of the *Tijdschrift voor Entomologie* I said: »I believe that these ridges are of no great value, and that they will disappear the more the animal is fed. But I have no material to settle the question." Of this there can now be hardly any doubt.

3. So contrary to my opinion expressed in the above mentioned volume, I now consider *Nothrus horridus* of NICOLET (Arch. Mus. Par. vol. 7, tab. 31, Fig. 1) identical to *Nothrus horridus* of BERLESE (Ac. Myr. Scorp. Ital. 17, 1), but I have no reason to doubt the identity of this species to *Nothrus horridus* of HERMANN and MICHAEL, and to *Nothrus biverrucatus* (C. L. Koch) of MICHAEL. It is true that the shape of the pseudostigmatic organ of the species in question corresponds to that of *biverrucatus*, but the presence of *two* feathered hairs on the abdominal apophyses,



and the rhomboid figure on the cephalothorax correspond neither to those of *biverrucatus* nor to those of *horridus*.

I therefore adopt *Camisia horrida* (Herm.), *Camisia nicoletii* Oudms. (= *horrida* Nic., = *horrida* Berl.), and *Camisia biverrucata* (C. L. Koch).

Consequently *Camisia berlesi* Oudms. and *Camisia fischeri* Oudms. do not exist.

## 26. Emendation in the key to the species of *Camisia*.

(Das Tierreich, Oribatidae, p. 69).

- 16 { Central projection with tubercles at corners, each bearing one hair . . . . 16a.  
 { Central projection with tubercles at corners, each bearing two hairs . . . . *C. nicoletii* Oudms.  
 16a = 16 of the table.

## 27. *Eremaeus confervae* Schrank.

In the *Tijdschrift voor Entomologie*, vol. 39, p. 175, I mentioned my capture of a mite, living in water amongst *Confer-vaceae*, which I considered to be identical to *Acarus confervae* of Schrank. On p. 177 I explained the reasons on which I based my supposition. I maintain my suggestion.

On p. 176 I wrote: »ALBERT D. MICHAEL in his *British Oribatidae*, London, 1884, vol. I, p. 57, speaks of an aquatic *Notaspis*, which he calls *Notaspis lacustris*. I am not aware that he has described and drawn this species elsewhere. Yet I am fully convinced, that SCHRANK'S *Acarus confervae* and MICHAEL'S *Notaspis lacustris* are one and the same species."

It is true: that at that time, April 1896, I was not aware of the existence of MICHAEL'S vol. II.

In January 1897 I wrote Mr. MICHAEL in consequence of some remarks he had made in a letter, and stated among other things that I had not yet been able to consult his vol. II.

In reply I received a most courteous letter and a copy of the



above mentioned second part of his valuable work on *British Oribatidae*.

My opinion was changed, and I thought *Notaspis lacustris* (Michael) was altogether different from my *Eremaeus confervae* (Schrank), but being otherwise engaged at the time, I did not publish it.

In July 1898 appeared MICHAEL'S *Oribatidae*, a number of *Das Tierreich*. This induced me to revise my collection. The first part of a *New List of Dutch Acari* appeared 5 September 1900 in the *Tijdschrift voor Entomologie*, vol. 43, p. 150—171, in which I pointed out satisfactorily, I think, the necessity of admitting *two* species, *Eremaeus confervae* (Schrank) and *E. lacustris* (Michael).

In MICHAEL'S *Oribatidae* (*Das Tierreich*), p. 50, sub *Notaspis lacustris*, I read not without surprise: »Oudemans identifies this species with *Acarus confervae* Schrank, but does not give any reason for doing so, except habitat." Now, this assertion is not quite true. I described and drew a species which I considered to be the same as SCHRANK'S *Acarus confervae*, and expressed a supposition that MICHAEL'S *Notaspis lacustris* were the same species. MICHAEL could immediately observe, in comparing my drawings and description with his, that I had been mistaken, and that my species, called by me *Eremaeus confervae* Schrank, was quite different from his *lacustris*. Why then has he not adopted it in his *Oribatidae* (*Das Tierreich*)?

I repeat here, that my description and drawing of the pseudostigmatic organ, as given in vol. 39, p. 179, were wrong; I gave a better description of it in vol. 43, p. 164.

From Dr. A. R. SPOOF of °Abo, Finland, I received 5 specimens of the species in question. They are exceedingly light coloured. They have all their pseudostigmatic organs. They have all the lamellae and the pseudostigmata exactly as I have described and figured them. But they differ from the Dutch specimens in having long hairs on their abdomen. These hairs stand exactly on the spots where I have delineated points in my figure (*Tijdschr. v. Entom.* vol. 39, tab. 10, Fig. 2). It is remarkable that Dr. SPOOF found them in *subsaline* algae.



## 28. *Scutovertex spoofi* Oudms. = *bilineatus* Michael.

I have received from Dr. A. R. SPOOF, of Åbo, Finland, 2 larvae, 27 nymphae and 46 adults. With this material I am able to rectify my communication about this insect published in the *Tijdschrift voor Entomologie*, vol. 43, p. 112.

When in 1899 I determined my single specimen, received from Dr. SPOOF in 1896, I used the table on p. 29 of *Das Tierreich, Oribatidae*. With this table, such as it is, my species with *tridactyle* claws and without pseudostigmata and pseudostigmatic organs could not but be new to science! and I called the species *Scutovertex spoofi*. And a *Camisia*-like nymph, which Dr. SPOOF indicated as the young of it was took by me for its young one.

Being all at once provided with good material I immediately observed that my former nymph did not in the least correspond to any of the 27 real nymphae!

My new nymphae at once reminded me of a figure in MICHAEL'S *British Oribatidae*. Indeed my species proved to be *Scutovertex bilineatus* Michael. Among the 46 adult ones there was only one specimen, transparent enough to enable me to observe distinctly the two ridges on the back (not delineated in my figure in the *Tijdschr. v. Entom.*, vol. 43, tab. 5, Fig. 6).

MICHAEL'S drawing (*British Oribatidae*, vol. 2, tab. 54, Fig. 8) shows *monodactyle* claws, the table (key) to the species of *Scutovertex* in his *British Oribatidae* vol. 2, p. 567, and that in his *Oribatidae* (*Das Tierreich*), p. 29, mentions *monodactyle* claws; in his description of the legs in his *British Oribatidae*, vol. 2, p. 572 and in his *Oribatidae* (*Das Tierreich*), p. 29, he calls them *monodactyle*. And yet my specimens are distinctly *tridactyle*. It seems that the lateral claws of British specimens are less developed, for MICHAEL describes them (*British Oribatidae* vol. 2, p. 572) as follows: »but there is a minute projection at each side of the claw, and two longish, fine hairs, sharply hooked at their distal ends, on either side of each claw." And yet MICHAEL has delineated



these »fine” hairs (*British Oribatidae*, vol. 2, tab. 54, Fig. 13, 14, 15, 16) so coarse, that they resemble heterodactyl claws rather than »fine hairs”.

So I will subjoin a new key to the species of *Scutovertex* in which the claws of *Sc. bilineatus* are not referred to.

### 29. Key to the species of *Scutovertex* Michael.

- 1 { Lam. narrow, or only thickened bars,  
or ridges, or scarcely visible . . . 2.
- 1 { Lam. broad, horizontal; C. lam. long,  
large, with rounded ends . . . 8.
- 2 { With psstg. and psstg. org. . . 3.
- 2 { Without psstg. and psstg. org. . . 7.
- 3 { Lam. blade on edge. . . . . *S. ovalis* (Berl.).
- 3 { Lam. and Trlam. thickened bars, or  
ridges, or scarcely visible . . . 4.
- 4 { No indentations in post. margin of Abd. 5.
- 4 { Two indentations in post. margin of Abd.;  
aspine on each . . . . . 6.
- 5 { Dors. of Abd. slightly curved . . . *S. corrugatus* Michael.
- 5 { Dors. of Abd. with arched centre and  
broad, flat, peripheral band . . . *S. maculatus* Michael.
- 6 Only one species. . . . . *S. harioti* Michael.
- 7 Only one species. . . . . *S. bilineatus* Michael.
- 8 { Ung. trid. . . . . *S. sculptus* Michael.
- 8 { Ung. monod. . . . . 9.
- 9 { Abd. without wing-like margin . . . *S. caelatus* Berl.
- 9 { Abd. with wing-like margin on shoulder *S. velatus* (Michael).

### 30. *Scutovertex spoofi*, nympha, = *Hermannia convexa* (C. L. Koch), nympha.

As stated above, my nymph, described and drawn in the *Tijdschr. v. Entom.* vol. 43, p. 113 and 114, tab. 5, Fig. 11—16, is nothing but a nymph of *Hermannia convexa* (C. L. Koch)



which has become wrinkled owing to its being preserved in dam-marbalsam by Dr. A. R. SPOOF.

It is a fact worth noting that this nymph is caught alive in subsaline water in the spawn of *Limnaea stagnalis*.

### 31. *Notaspis alatus* Herm.

An individual sent to me by Dr. A. R. SPOOF, from °Abo, is a real *alatus* Herm., with short and *clavate* pseudostigmatic organs. They are already discernable as such through a common pocket magnifying glass.

I also received a specimen caught at Apeldoorn (summer-Residence of our Queen), with short and *clavate* pseudostigmatic organs.

### 32. *Trichotarsus koptorthosomae* Oudms., nov. sp.

(With Plate III, fig. 53 and 54)

*Hypopus*. Length about 200—240  $\mu$ . The creature is related to *Trichotarsus xylocopae* Dormad. *Dorsal side* (Fig. 53). The anterior crescent-shaped portion shows about ten wrinkles and 4 pair of strong bristles. These are stronger than those of *T. xylocopae*. The posterior round or oval portion is protected by a shield which is very finely punctured, without showing the known marking of *Trichotarsus osmiae* (Duf.), etc. The dorsum, however, shows a characteristic chitinization. In the posterior half of the shield there is a figure like a pair of sugar-tongs. Between the tongs the dorsum is concave, as it is before and on either side of the tongs. The posterior margin of the abdomen is strongly chitinized and brown coloured. In connexion with these strong chitinizations the posterior edge of the abdomen has a median projection and a concavity on either side of it. The projection bears two little hairs.

*Ventral side*. The epimera 1 meet in the median line, forming an Y. Those of the 3d leg are bent rectangularly. The sucker-plate is small, does not extend beyond the posterior edge of the abdomen, and bears 8 suckers, of which the foremost pair are small, situated one on each side of the anus; two large ones are placed more



backward, whilst four smaller ones of nearly equal size form a third transversal row. Behind the sucker plate the projection of the abdomen bears two hairs.

*Legs.* Legs 1—3 bear robust claws, leg 4 is clawless. Tarsi 1 and 2 are ornated by two lanceolate hairs, one on each side. The outer lanceolate hair is larger than the inner, and shows a nerve. Tarsus 1 has a tactile hair extending beyond the claw; and tibia 2 one projecting even beyond the top of the largest lanceolate hair. Tarsus 3 has only one lanceolate hair, one common hair and one tactile hair as long as the leg 3. Leg 4 ends in a single long hair, 320—380  $\mu$ . It is true, that at the proximal end of this hair two minute hairs of about 3  $\mu$ . length are observable; most probably, however, they have no specific value.

*Habitat:* In the acarid-chamber of the first abdominal ring of *Xylocopa* (*Koptorthosoma*) *tenuiscapa* Westw.

*Patria:* India, Java.

### 33. Key to the species of *Trichotarsus* Can.

#### *Hypopi.*

- |   |   |  |  |
|---|---|--|--|
| 1 | { | Two dorsal shields; tarsi 1—4 with                                 |  |
|   |   | minute claws; circumference of body                                |  |
|   |   | suboval; dorsum almost hairless . 2.                               |  |
|   |   | Tarsus 4 without claw . . . . . 5.                                 |  |
| 2 | { | Tarsi 1—3 without leaf-like hairs . 3.                             |  |
|   |   | Tarsi 1—3 with 4 leaf-like hairs . 4.                              |  |
| 3 | { | Sucker-plate with 6 suckers . . . . <i>Tr. manicati</i> Giard.     |  |
|   |   | Sucker-plate with 8 suckers . . . . <i>Tr. trifilis</i> Canestr.   |  |
| 4 |   | Only one species . . . . . <i>Tr. ornatus</i> Oudms.               |  |
| 5 | { | Two dorsal shields; the anterior triang. <i>Tr. osmiae</i> (Duf.). |  |
|   |   | One dorsal shield, posteriorly . . . 6.                            |  |
| 6 | { | Tarsi 1—3 with 2 claws . . . . <i>Tr. alfkeni</i> Oudms.           |  |
|   |   | Tarsi 1—3 with 1 claw . . . . . 7.                                 |  |
| 7 | { | Tarsus 4 with 1 hair . . . . . 8.                                  |  |
|   |   | Tarsus 4 with 2 hairs . . . . . 9.                                 |  |



- 8 { Tarsus 1 without lanceolate hairs *Tr. xylocopae* (Donnad).  
 { Tarsus 1 with 2 lanceolate hairs *Tr. koptorthosomae* Oudms.
- 9 { Tarsi 1—3 without lanceolate hairs *Tr. bifilis* Can.  
 { Tarsi 1—3 with 4 lanceolate hairs *Tr. japonicus* Oudms.

### 34. *Glycyphagus ornatus* Kram.

KRAMER (Zeitschr. d. ges. Naturw., vol. 54, p. 437) says of this species: »Das Tarsalglied des vierten Fusspaares trägt unten in der Mitte des innern Seitenrandes zwei kurze behaarte Borsten.» I fail to observe these hairs. KRAMER does not say whether the tarsi are hairy or not. They are richly hairy, as in *Glycyphagus spinipes* (C. L. Koch).

BERLESE (Ac. Myr. Scorp. Ital. 29, 3) describes the tibia of the first and second pair as bearing a pectiniform apophysis, but he does not mention that this peculiarity occurs *only in the male*. The tarsus he describes as: »setis destitutus, nudus.» He seems to have drawn a *hermaphrodite*, for the pectinated hairs on the tibiae 1 and 2 are *male*, and the copulation-tube is a *female* characteristic.

My specimen has the characteristic bifurcated and feathered hair and the oblong pseudostigma between the coxae 1 and 2.

The skin is finely granulated.

*Nywph.* Here I observe *no* hairs on the tarsi, and only *one* feathered hair in the middle of the underside of the tarsus 4.

*Query.* Have KRAMER and BERLESE described the tarsi of the nymph, instead of those of the adult?

### 35. *Labidophorus* Kram.

As the genera of *Tyroglyphinae* have each their special and characteristic form of hypopus, we are obliged to adopt the genus *Labidophorus* of KRAMER, because its hypopus has two claspers on the ventral side of the posterior abdomen whilst it has *no* suckers. The only species hitherto described is *Labidophorus talpae* Kram. (*Glycyphagus krameri* Michael).



## 36. Key to the genera of Tyroglyphinae.

- 1 { Mandibles chelate . . . . . 2.
- 1 { Mandibles not chelate. . . . . 23.
- 2 { Maxillar palp common . . . . . 3.
- 2 { Maxillar palp clavate distally . . . . . 22.
- 3 { Claws of legs 1 and 2 distal . . . . . 4.
- 3 { Claws of legs 1 pedunculate and inserted  
on side of tarsus . . . . . 21.
- 4 { ♂ without anal suckers . . . . . 5.
- 4 { ♂ with anal suckers . . . . . 12.
- 5 { ♀ without genital suckers . . . . . *Hericia* Can.
- 5 { ♀ with genital suckers . . . . . 6.
- 6 { ♀ without copulation-tube . . . . . 7.
- 6 { ♀ with copulation-tube . . . . . 11.
- 7 { Cephth. and Abd. separate . . . . . *Saproglyphus* Berl.
- 7 { Cephth. and Abd. fused . . . . . 8.
- 8 { Epimera 2 free . . . . . 9.
- 8 { Epimera 2 joined to epimera 1 . . . . . 10.
- 9 { Edge of vertex common . . . . . *Dermacarus* Hall.
- 9 { Edge of vertex with chitinous band with  
a sucker on each end . . . . . *Trichotarsus* Can.
- 10 Only one genus . . . . . *Carpoglyphus* Robin.
- 11 { Cephth. common . . . . . *Glycyphagus* Hering.
- 11 { Cephth. with 2 high ridges. . . . . *Labidophorus* Kram.
- 12 { Cephth. and Abd. separate . . . . . 13.
- 12 { Cephth. and Abd. fused . . . . . 20.
- 13 { ♂ legs 1 common . . . . . 14.
- 13 { ♂ legs 1 thick and armed with thorn . . . . . 19.
- 14 { Anus and anal suckers common . . . . . 15.
- 14 { Anus and anal suckers surrounded by  
chitinous ring . . . . . 18.
- 15 { Legs 4 of ♂ without suckers . . . . . 16.
- 15 { Legs 4 of ♂ with suckers . . . . . 17.
- 16 { ♂ Abd. common . . . . . *Hypopus* Duj.
- 16 { ♂ Abd. with post. chitinous plate . . . . . *Histiogaster* Latr.



- 17 Only one genus. . . . . *Tyroglyphus* Latr.  
 18 Only one genus. . . . . *Mealia* Trt.  
 19 Only one genus. . . . . *Aleurobius* Can.  
 20 Only one genus. . . . . *Chortoglyphus* Berl.  
 21 Only one genus. . . . . *Lentungula* Mich.  
 22 Only one genus. . . . . *Nodipalpus* Karp.  
 23 Only one genus. . . . . *Anoetus* Duj.

### 37. *Hypopus minutus* Oudms., nov. sp.

(With Plate III, fig. 55 and 56)

*Nympha.* As nymphae of *Hypopus* have exactly the same features as the adults, except that they have no genital apparatus, I don't hesitate to describe this nympha and give it the above name, by which I mean to say that even the adult must be a minute creature.

*Length* 168  $\mu$ . *Colour* white, with straw-coloured hue, and white legs. *Stature* robust, resembling that of *Hypopus spinitarsus* (Herm.) (*Rhizoglyphus echinopus* (Fum. et Rob.)). On the *dorsal side* (Fig. 55) the demarcation between the head and the thorax, and that between the thorax and the abdomen are distinct. There are only two cervical hairs, two posterior thoracal hairs, which are very long, two shoulder-hairs, which are planted nearly midway between the anterior and posterior margins, and three pair of marginal hair. On the *ventral side* (Fig. 56) we observe the maxillae and the palps, not remarkable for any particulars; the anus, nearly terminal, flanked by two long hairs bent sideward and forward. These hairs are characteristic. *Legs.* The legs 1 and 2 are much stronger than 3 and 4, as in *Hypopus spinitarsus* (Herm.). The tarsi 1 and 2 are provided with a little olfactoric hair; the tibiae 1 and 2 and the tarsi 3 and 4 with a tactile hair.

*Habitat:* The creature was found by Prof. Dr. K. KNUTH, on *Xylocopa* (*Koptorthosoma*) *tenuiscapa* Westw., in Dec. 1898 and by Mr. S. A. POPPE on *Vesperugo serotinus*.

*Patria:* Java, Germany.



### 38. Key to the species of *Hypopus*.

- 1 { Legs 1 and 2 without strong spines or  
thorns . . . . . 2.
- 1 { Legs 1 and 2 with strong thorns. . 3.
- 2 { On each side of the anus a very long hair *H. minutus* Oudms.  
No long hair. . . . . *H. crassipes* (Haller).
- 3 { Heterom. ♂ with 2 little spines on tarsi *H. trouessarti* (Berl.).  
Heterom. ♂ with strong spines on all  
the joints of the legs . . . . . *H. spinitarsus* (Herm.).

### 39. *Tyroglyphus trifolium* Oudms., nov. sp.

(With Plate III, fig. 57—61)

*Nympha*. Length about 430  $\mu$ . *Shape* like that of *Tyroglyphus siro* Latr. *Colour* white, opaque. *Dorsal side* (Fig. 57) polished, with distinct but only superficial demarcation between cephalothorax and abdomen. The species is specially characterized by *six* robust hairs as long as the abdomen. Two are situated on the cephalothorax, directed forward and outward; two on the shoulders, directed sideward, and two on the posterior margin of the abdomen, directed backward and outward. Two thick vertical bristles are directed forward. *Ventral side* (Fig. 58) polished; no demarcation visible. The epimera 1 form an Y. Anus a longitudinal split, flanked by two strong hairs, directed backward and as long as the breadth of the abdomen. *Legs* 1, 2 and 3 ending in a tibia with long tactile hair, and a tarsus with three hairs with leaf-like distal end, resembling a clover-leaf (Fig. 59, 60). The tarsus 4 has only *one* hair like this (Fig. 61). Every tarsus ends in a strong claw and a minute sucker.

*Habitat*: *Heliocopriss bucephalus*.

*Patria*: Java.

### 40. Key to the species of *Tyroglyphus* Latr.

- 1 { Femur 4 crooked. . . . . *T. diversipes* Karp.
- 1 { Femur 4 straight. . . . . 2.



- 2 { Hinder-part of Cepth. with 2 hairs . *T. trifolium* Oudms.  
 { Hinder-part of Cepth. with 4 hairs . 3.
- 3 { Hinder-part of Cepth. with 2 unequal pair  
 { of hairs; the inner pair minute . . 4.  
 { Hinder-part of Cepth. w. equal pair of hairs 6.
- 4 { Tarsi 1 and 2 with 2 lanceolate hairs *T. mycophagus* Mégn.  
 { Tarsi 1 and 2 without such hairs . . 5.
- 5 { On each shoulder two hairs; the fore-  
 { most short . . . . . *T. agilis* Can.  
 { On each shoulder 1 hair . . . . . *T. ovatus* Troupeau.
- 6 { Hairs of dorsum distally clavate. . . *T. wasmanni* Monz.  
 { Hairs of dorsum common . . . . . 7.
- 7 { Tarsus 4 longer than genu 4 + tibia 4 8.  
 { Tarsus 4 shorter than genu 4 + tibia 4 9.
- 8 { Palpi common. . . . . *T. longior* Gervais.  
 { Palpi thickened distally. . . . . *T. longisetosus* Karp.
- 9 { The two inner longitudinal rows of dorsal  
 { hairs long . . . . . *T. siculus* Fum. Rob.  
 { The two inner rows short or wanting 10.
- 10 { The two inner rows short. . . . . *T. krameri* Berl.  
 { No inner rows . . . . . 11.
- 11 { Tarsi unarmed. . . . . *T. siro* Latr.  
 { Tarsi in with 2 strong thorns the middle *T. sironiformis* Robin.

Arnhem, 10 Aug. 1901.

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## EXPLANATION OF PLATES I—III

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### PLATE I

- Fig. 1—9. *Neoparasitus oudemansi*, n. sp.  
» 10—12. *Pachylaelaps ctenophorus*, n. sp., nympha generans feminina.  
» 13—16, 18—19, 21—25. *Pachylaelaps minutus*, n. sp.

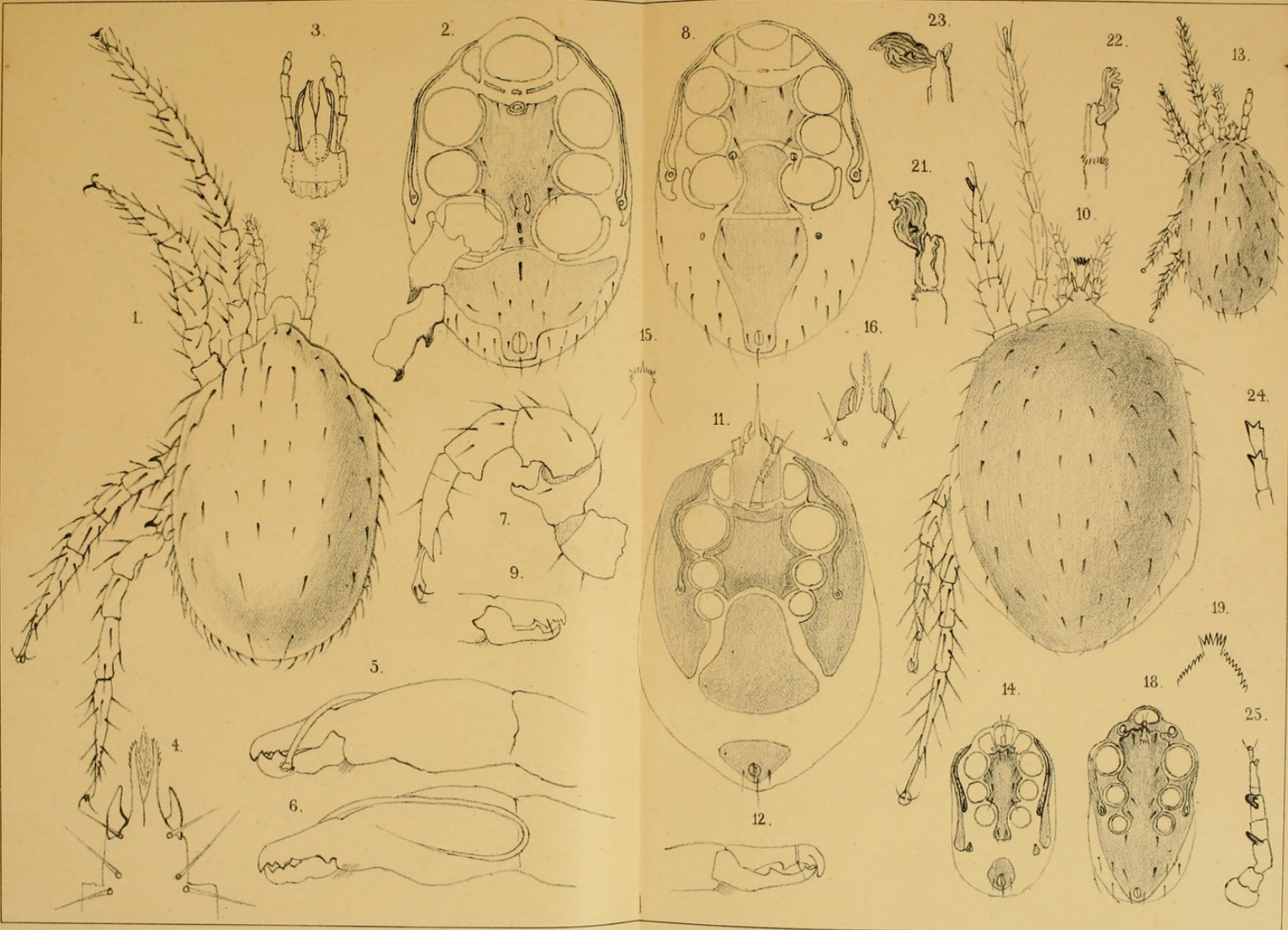
### PLATE II

- » 17, 20, 26—29. *Pachylaelaps minutus*, n. sp.  
» 30—35. *Greenia perkinsi*, n. sp., travelling nymph.  
» 36—37. *Liponyssus rhinolophi*, n. sp., nymph.  
» 38—40, 42. *Liponyssus saurorum*, n. sp.

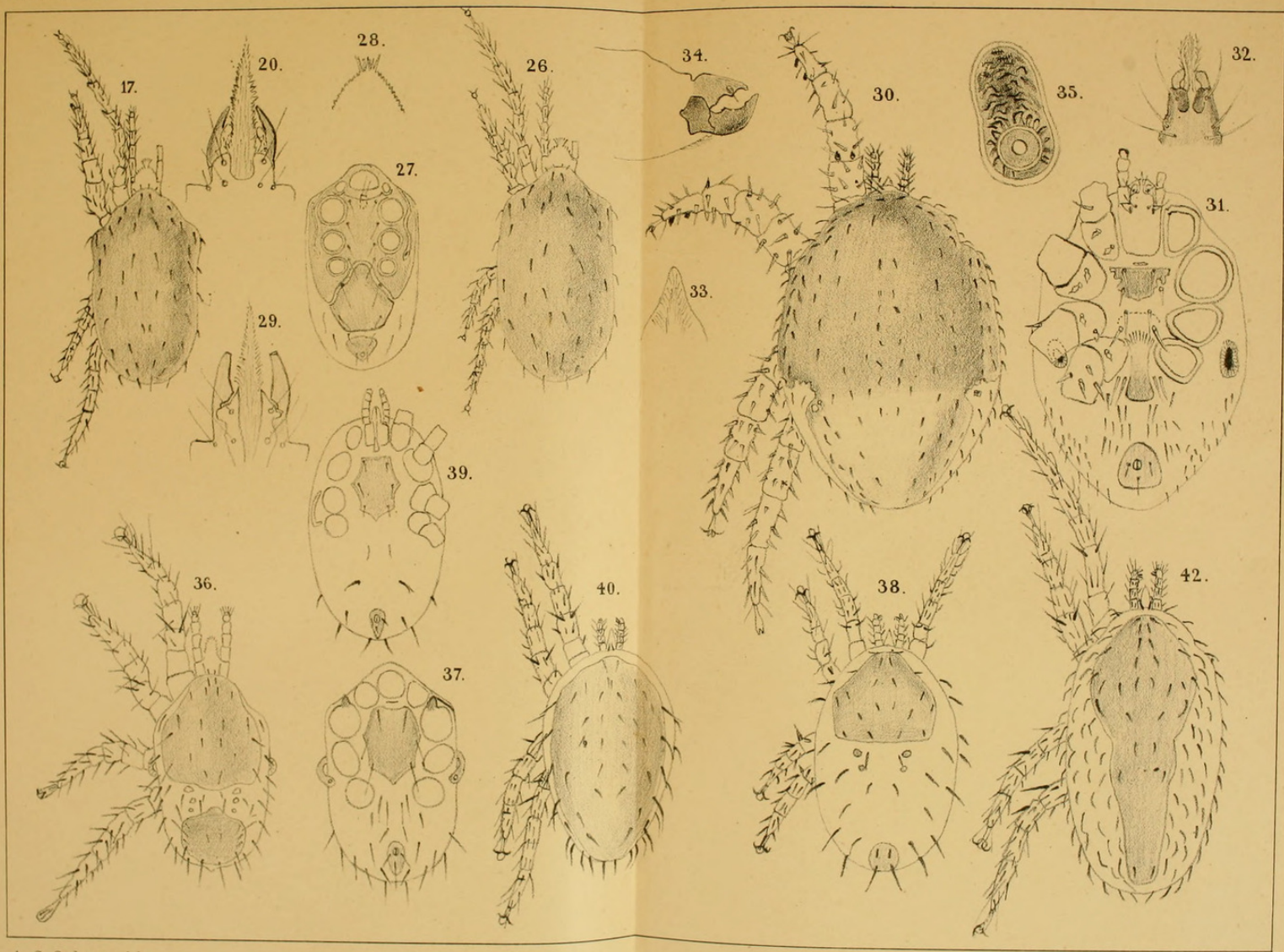
### PLATE III

- » 41, 43, 44. *Liponyssus saurorum*, n. sp.  
» 45—48. *Uropoda javensis*, n. sp.  
» 49—52. *Cillibano heliocopridis*, n. sp., deutonympha.  
» 53—54. *Trichotarsus koptorthosomae*, n. sp., hypopus.  
» 55—56. *Hypopus minutus*, n. sp., nymph.  
» 57—61. *Tyroglyphus trifolium*, n. sp., nymph.
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Oudemans, A. C. 1901. "Notes on Acari. Third series." *Tijdschrift der Nederlandsche Dierkundige Vereeniging* 7, 50–88.

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