

# THE ORIBATEI (ACARI) OF THE NETHERLANDS

by

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## INTRODUCTION

The study of the Oribatei (moss mites or beetle mites) of the Netherlands was started by Oudemans, who in 1896 published his "List of Dutch Acari, First Part, Oribatei", that was followed in 1900 and 1902 by a first and by a second part of a "New List". After that time Oudemans repeatedly published papers in which Oribatei of the Netherlands were dealt with, although in his later years he paid less attention to this group of Acari.

Only a part of the moss mites that Oudemans collected were mentioned by him; a preliminary catalogue of his collection, containing some hitherto unpublished faunistical data on Oribatei, appeared after his death (Buitendijk, 1945). Willmann (1930) published a note on interesting Oribatei in the Oudemans Collection, and among these were some species described after Dutch material. Wasmann (1899) recorded four species of Oribatei from ants' nests; these were apparently identified by Michael. Geijskes (1950) collected mites on the small isle of Griend; his list contains five species of moss mites.

In investigations of the soil fauna of recent years much attention has been paid to the Oribatei; important papers on this subject were published by Noordam and De Vlieger (1943), and by Van der Drift (1950), who showed that the Oribatei are the predominating group of inhabitants of the litter. This common occurrence, together with the uncertain identity of many of the species recorded up till now, made it desirable to have a critical revision of the Oribatei of the Netherlands. For this reason I started the present study.

The above mentioned papers together contain the names of about 110 representatives of the group in the Netherlands, forming a list in which many species were erroneously identified, and from which some others had to be removed because of their doubtful identity. As might be expected, the total number of known species considerably increased during my investigation, so that at present our faunal list contains the names of 162 species.

My material gave occasion to the creation of two new genera: *Synchthonius* (Brachychthoniidae) and *Parachipteria* (Achipteriidae); whilst I

discovered 16 species and 1 form new to science: *Eobrachychthonius mooseri* (published as *Brachychthonius mooseri* Van der Hammen, 1950a), *E. oudemansi*, *Synchthonius boschmai*, *Malaconothrus processus*, *M. gracilis*, *M. punctulatus*, *Trimalaconothrus grandis*, *Metabelba cremersi*, *M. lanceolata*, *Suctobelba trigona* (Michael) f. *granulata*, *Zygoribatula terricola*, *Chamobates incisus*, *Parachipteria willmanni*, *Achipteria sellnicki*, *A. oudemansi* (these two *Achipteria* species were not yet discovered in the Netherlands, but a thorough investigation of the genus made it necessary to include them in the revision), *Allogalumna neerlandica*, *Pelops oudemansi*.

I draw the special attention of Acarologists to the following changes in nomenclature: *Eniochthonius grandjeani* nom. nov. (= *E. pallidulus* auct.), *Oppia nova* (Oudemans) (= *O. neerlandica* auct.), *Liacarus subterraneus* (C. L. Koch) (= *L. tremellae*, *L. globosus* auct.), *Chamobates schützi* (Oudemans) (non auct.), *Pelops plicatus* (C. L. Koch) (= *P. auritus* auct.), and I refer to my radical changes in the nomenclature of the Achipteriidae.

As I noted above, a considerable number of species was collected that appeared to be new to our fauna; a part of these were published already in preliminary notes (Van der Hammen, 1949, 1950a) and in one of the annual reports of the Leiden Museum (Boschma, 1950); in the present paper they are, however, still dealt with as faunae novae species. I draw attention to the fact that a part of the names occurring in the cited annual report (Boschma, 1950) are different from the nomenclature used in the present study: *Trhypochthonius trichosus* has to be corrected into *Trhypochthoniellus excavatus* (Willmann), *Malaconothrus egregius* into *M. gracilis* nov. spec., *Suctobelba trigona* into *S. trigona* f. *granulata* nov. f., *Joelia connexa* into *Tectoribates borussicus* (Sellnick), *Phthiracarus borealis* into *P. ferrugineus* (C. L. Koch), whilst *Oppia longilamellata* and *O. willmanni* proved to belong to the genus *Autogneta*, and *Oppia translamellata* had to be removed from the list; *Nanhermannia elegantula* Berlese, *Belba minutissima* (Sellnick), and *Fuscozetes fuscipes* (C. L. Koch), mentioned as faunae novae species, appeared to have been recorded already in earlier papers.

The following list is a complete record of the species that during my investigation appeared to be new to our fauna (novae species not included): *Nanhermannia comitalis* Berlese, *N. nana* (Nicolet), *Brachychthonius succicus* (Forsslund), *B. italicus* Berlese, *Trhypochthonius cladonicola* (Willmann), *Trhypochthoniellus excavatus* (Willmann), *Camisia biverrucata* (C. L. Koch), *Nothrus biciliatus* C. L. Koch, *N. pratensis* Sellnick, *Heminothrus targionii* (Berlese), *Belba corynopus* (Hermann), *Licnodamaeus pulcherrimus* (Paoli), *Suctobelba acutidens* Forsslund, *S. sarekensis* Forsslund, *S. subcornigera* Forsslund, *S. falcata* Forsslund, *S. palustris* Forsslund,

*Oppia falcata* (Paoli), *O. sigma* Strenzke, *O. unicarinata* (Paoli), *O. nitens* (C. L. Koch), *Autogneta longilamellata* (Michael), *A. trågårdhi* Forsslund, *A. dalecarlica* Forsslund, *A. willmanni* (Dyrdowska), *Hydrozetes lemnae* (Coggi), *Hermanniella punctulata* Berlese, *Scutovertex sculptus* Michael, *Odontocephus elongatus* (Michael), *Carabodes minusculus* Berlese, *Protoribates capucinus* Berlese, *Erwardzetes edwardsi* (Nicolet), *Ceratozetes mediocris* Berlese, *Melanozetes mollicomus* (C. L. Koch), *Tectoribates borussicus* (Sellnick), *Parachipteria punctata* (Nicolet), *Galumna alata* (Hermann), *Allogalumna tenuiclavus* (Berlese), *Pelops bilobus* Sellnick, *Steganacarus striculus* (C. L. Koch), *S. spinosus* (Sellnick), *Phthiracarus testudineus* (C. L. Koch), *P. globosus* (C. L. Koch), *P. ferrugineus* (C. L. Koch).

It was of great importance for my investigations that the complete Oudemans Collection is present in the Leiden Museum, consisting of the slides together with the original drawings. The Council of the Netherlands Entomological Society allowed me the use of Oudemans' card files and of Oudemans' private set of his own publications, for which permission I want to express my sincerest thanks, especially to the secretary, Mr. G. L. van Eyndhoven, to whom, moreover, I want to express my sincerest thanks for his untiring help in my search for rare publications in Oudemans' library, and who lent me several papers from his private library.

I am greatly indebted to Professor Boschma, whose valuable suggestions and helpful criticism have increased the importance of this paper.

Several other persons helped me during my work: I mention my colleagues in Acarology Dr. G. Owen Evans (London), Dr. F. Grandjean (Paris), Dr. K. Strenzke (Plön in Holstein), and Dr. C. Willmann (Bremen). Dr. W. Beyerinck (Wijster) facilitated a part of my collecting trip by his great knowledge of the landscape of Drente. Mr. J. J. Barkman (Leiden) identified the mosses that formed a part of my samples.

Finally I am greatly indebted to Ir. H. W. Mooser, Director of the E.N.C.I., Maastricht, for the liberal way in which he supported the investigation of the Sint Pietersberg, including a grant for part of the costs of the present paper; the acarological results obtained in this region and in other parts of Southern Limburg are included in this study.

As I noted above, my investigation consisted of the collecting and the study of own material, and of a revision of the Oribatei in the Oudemans Collection. I obtained my own material from samples (litter, moss) that were taken in various localities throughout the country; a list of the samples is given at the end of this introduction. The mites were either extracted from the samples by means of a modified Tullgren apparatus, or the sample

was simply dried at the air on a wire gauze. No attempts were made to collect mites by beating branches of trees and shrubs, so that arboricolous species as *Camisia segnis* (Hermann), *Ceratoppia bipilis* (Hermann), *Pelops acromios* (Hermann), etc., were obtained only on trunks or accidentally in the litter. With the exception of sphagnum, no samples were taken from the vegetation of ditches, pools, etc., but only a few species (the greater part of which are present in the Oudemans Collection) regularly occur among water plants.

In the systematic part under each species are noted the localities mentioned in literature, those of the specimens in the Oudemans Collection, and those of my own material, accompanied by the numbers of the samples.

In the description of the chaetotaxy of the species I followed the notation used by Grandjean (1934a, and later papers).

Under each species I have added a short note on the surroundings in which I found it, often compared with data from literature. Much more material would have been necessary to give a fully detailed description of the habitat of each species, but as in the present state of our knowledge every detail of the distribution is valuable, I have given a summary of my results.

Repeatedly I have used indications for the layers of the forest floor. The loose litter layer originating from the last autumn is indicated as  $F_0$ , whilst  $F_1$  is the litter of the last autumn but one; generally the layers of the litter under  $F_1$  form together a homogeneous layer that is called the  $F_x$  layer; the last named gradually passes into the humus layer or H layer. Some authors use the indication L for our  $F_0$  and  $F_1$ , and F for  $F_x$ .

In most cases I did not separately collect the layers of the forest floor; in the list I used the word litter, but the samples generally also contained humus.

In the list of samples the nomenclature of the phytosociological units was taken from Westhoff et al. (1946).

#### LIST OF SAMPLES

The localities A 1-A 118 are from seven provinces in the Netherlands, viz., A 1-A 13: Drente; A 14-A 30: Overijssel; A 31-A 51: Gelderland; A 52-A 55: Noord Holland; A 56-A 85: Zuid Holland; A 86-A 88: Noord Brabant; A 89-A 118: Limburg.

A 1-A 2. Dwingelo, 24.VII.1949.

A 1. Meeuwenplas. *Sphagnum cuspidatum* Ehrh. (greater part) and *Sphagnum papillosum* (Schimp.) Lindb. from the vegetation along the border of the pool. *Sphagnum* grows here among tussocks of *Molinia* and *Erica*.

A 2. Heath near A 1. *Cladonia sylvatica* (L.) Hoffm. and *Hypnum cupressiforme*



Hedw. var. *ericetorum* Bryol. eur. from a heath mainly consisting of *Erica*, mixed with some *Calluna*.

A 3. Lhee, "Staatsbossen", 24.VII.1949. *Evernia prunastri* (L.) Ach. growing at a height of 1.50 m on the trunk of rather young oaks.

A 4. "Staatsbossen" between Lhee and Spier, 24.VII.1949. Litter of a forest of *Picea* mixed with some *Larix*. The thickness of the litter layer was about 3 cm.

A 5. Spier, pool between Spier and Wijster, 23.VII.1949. *Sphagnum recurvum* Pal. Beauv. from a vegetation of *Sphagnum*, *Eriophorum*, and *Oxycoccus quadripetalus* Gilib. (Sphagnetum), extending around the pool as a zone of some 30 m.

A 6. Weerdinge, Weerdinge dikbos, 25.VII.1949. Litter of a wood (Querceto-Betuletum).

A 7-A 10. Mantinge, Mantingerbos, 23.VII.1949. The present wood (Querceto-Betuletum) is the remainder of a very old forest; at some places the humus layer has a thickness of some 50 cm.

A 7. Litter from the NW part of the wood, that consists of a dense vegetation of *Ilex aquifolium* L. mixed with some oaks.

A 8. Litter from the eastern part of the wood, that mainly consists of oak (a sample of humus from the same place yielded no mites).

A 9. Moss (for the greater part consisting of *Hypnum cupressiforme* Hedw., further *Dicranum scoparium* Hedw., *Lophocolea heterophylla* (Schrad.) Dum., *Lepraria aeruginosa* (Wigg.) Sm., and *Aulacomnium androgynum* (Hedw.) Schwaegr.) from the foot of an oak in the western part of the wood where the tree layer mainly consists of oak and birch.

A 10. As A 9, but moss (*Dicranum scoparium* Hedw.) collected at the foot of a birch.

A 11. Mantinge, "Bosje van Thijn", 25.VII. 1949. Litter of an oak wood (Querceto-Betuletum).

A 12-A 13. Oosterhesselen, De Klenke, 25.VII.1949.

A 12. Litter of an oak wood (Querceto-Betuletum).

A 13. Moss (*Leucobryum glaucum* (Hedw.) Schimp.), from a beech forest.

A 14. Ambt Vollenhove, De Oldenhof, 22.VII.1949. Litter of a wood of beech and oak.

A 15-A 17. Leg. Dr. T. van der Hammen.

A 15-A 16. Markelo, 29.X.1949.

A 15. Moss (*Polytrichum piliferum* Hedw.) from a plot partly covered with *Calluna*.

A 16. *Erica*, *Cladonia*, and *Sphagnum compactum* D.C. from a heath.

A 17. Brecklenkamp, 30-31.X.1948. Litter of a wood of *Quercus*, *Fagus*, and *Ilex* (Querceto-Carpinetum).

A 18-21. Lattrop, Bergvennen, 22.IV.1949.

A 18. *Sphagnum cuspidatum* Ehrh. from the pool.

A 19. *Sphagnum cuspidatum* Ehrh. and *Sphagnum magellanicum* Brid. from the border of the pool.

A 20. *Sphagnum* cf. *molluscum* Bruch from the heath.

A 21. *Cladonia impexa* Harm. and *Hypnum cupressiforme* Hedw. from the heath.

A 22-A 24. Ootmarsum, Springendal, 22.IV.1949.

A 22. Moss (*Callierygonella cuspidata* (Hedw.) Loeske, *Philonotis* spec.) from a grass land along the brook.

A 23. Moss (*Marchantia polymorpha* L., *Brachythecium rutabulum* (Hedw.) Bryol. eur.) from the steep border of the brook.

A 24. Moss (*Sphagnum recurvum* Pal. Beauv., *Polytrichum commune* Hedw. var. *uliginosum* Hüben, *Aulacomnium palustre* (Hedw.) Schwaegr.) collected near the source of the brook, in the neighbourhood of the alder marsh.

A 25-A 28. Denekamp.

A 25-A 27. Agelerbroek, 21.IV.1949.

- A 25. Moss (*Sphagnum subsecundum* Nees s. lat. and *Pseudoscleropodium purum* (Hedw.) Fleisch.) from a birch and alder swamp NE of the "Hunenborg".
- A 26. As A 25, but moss (*Mnium hornum* Hedw.) mainly from the stumps of *Betula* and *Alnus*.
- A 27. Moss (*Mnium affine* Schwaegr. s. lat., *Calliergonella cuspidata* (Hedw.) Loeske, *Climacium dendroides* (Hedw.) Web. and Mohr) from a very damp alder marsh (Alnetum glutinosae) situated farther to the west than A 25.
- A 28. Hassinkhof, 20.IV.1949. Litter of a wood (Querceto-Carpinetum).
- A 29-A 30. De Lutte, Lutke Bavel, 21.IV.1949, alder marsh near the source of the brook (Alnetum glutinosae cardaminetosum).
- A 29. Moss (*Brachythecium rutabulum* (Hedw.) Bryol. eur.).
- A 30. Litter.
- A 31-A 40. De Hooge Veluwe. A 31-A 35: 10.X.1948; A 36-A 39: 11.X.1948.
- A 31. *Cladonia* and moss (*Polytrichum piliferum* Hedw.) from the Otterlosche Zand (Coryneporetum canescentis); this sample did not yield Oribatei.
- A 32. Moss (*Pleurozium schreberi* (Brid.) Mitt., *Dicranum scoparium* Hedw.) from a fir wood at the eastern border of the Otterlosche Zand.
- A 33. Lichens from the trunk of an oak in a wood (Querceto-Betuletum) at the NE border of the "Deelense Veld".
- A 34. As A 33, but moss (*Hypnum cupressiforme* Hedw., *Dicranoweisia cirrata* (Hedw.) Lindb.) collected at the foot of an oak.
- A 35. Litter of a beech forest.
- A 35a. Litter from beech forest 8 g, V-VI.1949. Leg. Dr. J. van der Drift.
- A 36. *Cladonia* from a heath near Hoenderloo.
- A 37. Litter of a solitary fir in a sandy plot in the Deelense Veld.
- A 38. Moss (*Leucobryum glaucum* (Hedw.) Schimp.) from a heath (Berg en Dal) that mainly consists of *Erica* and *Molinia*.
- A 39. Moss (*Sphagnum subsecundum* Nees s. lat. and *Sphagnum cuspidatum* Ehrh.) from the border of the brook "De IJzeren Man".
- A 40-A 43. Franse Berg, northern slope, 2.VII.1949. Forest (Querceto-Betuletum).
- A 40. Litter from the lower part of the slope.
- A 41. Litter collected halfway the slope.
- A 42. Litter collected near the top of the hill.
- A 43. Moss (*Dicranum scoparium* Hedw. (main part), *Hypnum cupressiforme* Hedw., *Lophocolea heterophylla* (Schrad.) Dum., *Aulaconium androgynum* (Hedw.) Schwaegr.) collected at the foot of an oak, halfway the slope.
- A 44-A 46. Wilp (Gld.), Kleine Noordijk, 10.IX.1949.
- A 44. Litter of a wood of oak, beech and larch (Querceto-Carpinetum).
- A 45. Lichens (*Evernia prunastri* (L.) Ach., *Parmelia physodes* (L.) Ach.) from the trunk of an oak.
- A 46. Moss (*Atrichum undulatum* (Hedw.) Pal. Beauv.) from a small wood that is situated near the pond and consists of *Prunus* and *Corylus*.
- A 47-A 51. Winterswijk.
- A 47-A 50. Buskersbos, 8.IX.1949. Forest (Querceto-Carpinetum).
- A 47. Litter; at the place where the sample was taken the soil was covered with *Rubus*.
- A 48. Litter from a part of the wood, close to the brook.
- A 49. Litter from a part of the wood where the soil was covered with *Vaccinium*.
- A 50. Lichens (*Evernia prunastri* (L.) Ach.) from the trunk of an oak at the outside of the wood.
- A 51. Bekendelle, 9.IX. 1949. Litter of a wood (Querceto-Carpinetum) along the brook.
- A 52-A 55. Texel, De Koog, 7.V.1949. Leg. Dr. L. B. Holthuis.

- A 52. Moss (*Callierygonella cuspidata* (Hedw.) Loeske, *Eurhynchium stokesii* (Turn.) Bryol. eur., *Callierygon* cf. *cordifolium* (Hedw.) Kindb.) collected near a pool.
- A 53. Moss (*Hypnum cupressiforme* Hedw., *Pleurozium schreberi* (Brid.) Mitt., *Dicranum scoparium* Hedw.) from a valley with *Calluna* and *Cladonia*.
- A 54. Moss (*Dicranum scoparium* Hedw., *Cladonia impexa* Harm.) from a slope with *Rosa*, *Ammophila*, and *Corynephorus*.
- A 55. Moss (*Pseudoscleropodium purum* (Hedw.) Fleisch. and *Rhytidiadelphus triquetrus* (Hedw.) Warnst.) from the grass slope of a dike.
- A 56-A 58. Noordwijk aan Zee.
- A 56. "Staatsbossen", 26.II.1949. Moss (*Hypnum cupressiforme* Hedw., *Dicranum scoparium* Hedw.) from a cultivated wood of *Pinus* near the inner border of the sand dunes.
- A 57. Moss (*Camptothecium lutescens* (Hedw.) Bryol. eur., *Tortula ruralis* (Hedw.) Ehrh. var. *arenicola* (Braithw.)) from the sand dunes, 26.II.1949.
- A 58. Moss (*Tortula ruralis* (Hedw.) Ehrh.) from a wall, 5.III.1949.
- A 59-A 74. Meyendel.
- A 59. Bierlap, 10.IX.1948. Litter of a birch wood; the sample mainly consisted of litter of *Sambucus nigra* L.
- A 60. Moss (*Rhacomitrium canescens* (Hedw.) Brid.) from the sand dunes near Kijfhoek, 8.X.1948.
- A 61. *Cladonia* from the sand dunes N of Kijfhoek, 8.X.1948 (this sample did not yield Oribatei).
- A 62. Moss (*Hypnum cupressiforme* Hedw.) from a small sand dune with *Salix repens* L., 8.X.1948.
- A 63-A 64. Moss (*Tortula ruralis* (Hedw.) Ehrh. var. *arenicola* Braithw.) from the sand dunes near Kijfhoek, 22.I.1949.
- A 65. Kijfhoek, 22.I.1949. Litter of an oak at the western border of the birch wood.
- A 66-A 67. Bierlap, 17.II.1949.
- A 66. Litter collected at the foot of a birch in the birch wood.
- A 67. Moss (*Hypnum cupressiforme* Hedw.) and lichens from a tree stump.
- A 68. Kijfhoek, 17.II.1949. Litter and humus of a birch wood.
- A 69-A 73. Sand dunes between "Boerderij" and "Toegang Kijfhoek", 24.III.1949.
- A 69. Moss (*Pseudoscleropodium purum* (Hedw.) Fleisch. and *Hypnum cupressiforme* Hedw. var. *lacunosum* (Brid.) Delogne) from a slope with *Festuca ovina* L. and *Luzula campestris* (L.) D. C., between solitary *Crataegus*, *Rosa*, and *Salix repens* L.
- A 70. Litter of *Salix repens* L.
- A 71. Lichens (*Parmelia physodes* (L.) Ach. and *Evernia prunastri* (L.) Ach.) from the trunk of a birch.
- A 72. Moss (*Hypnum cupressiforme* Hedw.) from the foot of birch A 71.
- A 73. Lichens (*Evernia prunastri* (L.) Ach.) from an oak.
- A 74. Litter of a small wood of *Populus* on a southern slope, N of Kijfhoek, 1.IV.1949.
- A 75-A 76. Maasland, Vlietlanden, 2.IV.1949.
- A 75. Moss (*Mnium hornum* Hedw.) from a small alder wood (*Alnetum glutinosae*).
- A 76. Moss (*Mnium hornum* Hedw.) from a very damp hay field.
- A 77-A 78. Maasland, Broekpolder, 12.VIII.1949. Grass and moss (*Brachythecium rutabulum* (Hedw.) Bryol. eur.) from a meadow.
- A 79-A 81. De Beer, 16.IV. 1949.
- A 79. Moss (*Ceratodon conicus* Lindb.?) from the "Groene Strand".
- A 80. Algae, growing on the beach.
- A 81. Algae from a plot with *Scirpus maritimus* L. along the river Brielse Maas (the samples A 80 and A 81 did not contain moss mites).
- A 82-A 84. Rockanje, Voorne's Duin, 17.IX.1948.

A 82. Litter and moss (*Calliergonella cuspidata* (Hedw.) Loeske) from a damp birch wood.

A 83. Moss (*Calliergonella cuspidata* (Hedw.) Loeske and *Drepanocladus* or *Hypnum*) from a damp valley with *Populus tremula* L.

A 84. Moss from the land-side of the "Groene Strand", among solitary *Hippophaë rhamnoides* L.

A 85. Lekkerkerk, 29.X.1949. Sifted from moss collected at the foot of pollard willows. Leg. Ph. van Hooven.

A 86. Breda, Liesbos, 26.IX.1949. Litter. Leg. Dr. L. D. Brongersma.

A 87. Baarle Nassau, Kromme Hoek, 27.IV.1949. Moss (*Rhytidiadelphus squarrosus* (Hedw.) Warnst. and *Climacium dendroides* (Hedw.) Web. and Mohr) from a meadow along the river Mark. Leg. Dr. L. B. Holthuis.

A 88. Ossendrecht, 23.II.1949. Moss (*Hypnum cupressiforme* Hedw. and *Dicranum scoparium* (Hedw.) from the heath. Leg. Dr. T. van der Hammen.

A 89-93. Neercanne, forest (Querceto-Carpinetum) behind the Castle, 7.V.1949.

A 89. Litter.

A 90. Moss (*Plagiothecium denticulatum* (Hedw.) Bryol. eur., *Dicranella heteromalla* (Hedw.) Schimp., *Mnium hornum* Hedw., *Atrichum undulatum* (Hedw.) Pal. Beauv.) from the border of a path.

A 91. Moss (*Mnium hornum* Hedw., *Hypnum cupressiforme* Hedw.) collected at the foot of an old oak tree.

A 92. Moss (*Dicranoweisia cirrata* (Hedw.) Lindb.) from the branch of a tree.

A 93. Litter of a beech.

A 94-A 118. Sint Pietersberg.

A 94. Small wood near "Fort Sint Pieter", 5.V.1949. Transition from Querceto-Carpinetum typicum to Querceto-Carpinetum orchidetosum. Litter from the slope.

A 95. Small wood in a sink hole, 5.V.1949. Transition from Querceto-Carpinetum typicum to Querceto-Carpinetum stachyetosum. Litter.

A 96-A 98. Encibos, 6.V.1949. Wood consting of *Prunus*, *Crataegus*, *Viburnum*, *Acer*, *Salix*, *Quercus*, etc., cultivated in Arrhenaterion grass land.

A 96. Litter.

A 97. Moss (*Brachythecium rutabulum* (Hedw.) Bryol. eur.) from the foot of a willow.

A 98. Litter.

A 99-A 100. Dry grass land (*Mesobrometum erecti*) on the western slope near "De Wijngaard", 6.V.1949.

A 99. Moss.

A 100. Moss (*Ceratodon purpureus* (Hedw.) Brid.) and some lichens (*Cladonia* spec.).

A 101. De Wijngaard, 6.V.1949. Litter of a thicket of *Prunus spinosa* L. and *Crataegus*.

A 102-A 104. Forest on the eastern slope, 7.V.1949.

A 102. Litter of the lower part of the forest (transition from Querceto-Carpinetum typicum to Querceto-Carpinetum orchidetosum).

A 103. Moss (*Plagiothecium silvaticum* (Brid.) Bryol. eur.) from the foot of a *Robinia*, halfway the slope.

A 104. Litter from the higher part of the forest (Querceto-Carpinetum typicum). The sample contained also small branches with moss (*Oxyrrhynchium praelongum* (Hedw.) Warnst., *Brachythecium rutabulum* (Hedw.) Bryol. eur., *Fissidens pusillus* Wils., *Eurhynchium stokesii* (Turn.) Bryol. eur., *Campylium* spec., *Lophocolea bidentata* (L.) Dum.).

A 105-A 106. Wood between landmarks 54 and 55 (Querceto-Carpinetum typicum), 8.V.1949.

- A 105. Litter.
- A 106. Moss (*Plagiothecium denticulatum* (Hedw.) Bryol. eur. s. lat., *Dicranella heteromalla* (Hedw.) Schimp.) from the foot of an oak.
- A 107. Wood between landmarks 57 and 58 (cultivated wood on grass land), 8.V.1949. Litter.
- A 108. Moss (*Brachythecium rutabulum* (Hedw.) Bryol. eur.) from a meadow at the "Zonnebergweg" (Lolieto-Cynosuretum with Bromion species), 20.IX.1949.
- A 109. Moss (*Brachythecium rutabulum* (Hedw.) Bryol. eur.) from a meadow at the "Lichtenbergweg" (Lolieto-Cynosuretum), 20.IX.1949.
- A 110. Military drill-ground, 20.IX.1949. Moss (*Bryum argenteum* Hedw. var. *lanatum* (Pal. Beauv.) Bryol. eur., *Bryum* spec., *Brachythecium* spec.) from a grass land (Lolieto-Cynosuretum with Bromion species).
- A 111. Moss (*Brachythecium rutabulum* (Hedw.) Bryol. eur.) from a meadow near "Bergrust" (Lolieto-Cynosuretum with Bromion species), 20.IX.1949.
- A 112. Moss (*Bryum* spec., *Barbula unguiculata* Hedw.) from a grass slope near "Franse Batterij" (Arrhenaterion), 20.IX.1949.
- A 113. Franse Batterij, 20.IX.1949. Litter of a beech in a small wood (Querceto-Carpinetum typicum).
- A 114. Litter of a thicket of *Prunus spinosa* L. and *Crataegus* near "Franse Batterij", 22.IX.1949.
- A 115. Litter of a thicket of *Crataegus* near the upper border of the "Encibos", 22.IX.1949.
- A 116. Litter of a thicket of *Prunus spinosa* L. and *Crataegus* near Slavante, 22.IX.1949.
- A 117. Forest of Slavante (Querceto-Carpinetum typicum), 22.IX.1949. Litter.
- A 118. Caves of the system "Zonneberg", 21.IX.1949. Horse-dung and straw from old mushroom beds.

The collection of samples was started in 1948, whilst in 1949 the sampling was done on a much larger scale. All these samples (nos. A 1-A 118) were fully examined, so that from each the number of specimens of every species, including the number of immature forms, is known. Of the numerous samples collected in later years, and of the material received from other collectors, the more striking results have been mentioned in the systematic part. Whilst the samples from the years 1948 and 1949 are recorded by the numbers A 1-A 118, the data of later years are noted in a more complete manner.

## SYSTEMATIC PART

### NANHERMANNIIDAE

#### **Nanhermannia comitalis** Berlese, 1917 (fig. 4 a)

*Nanhermannia comitalis* Berlese, 1917 b, p. 335; Sellnick, 1928 a, p. 17; Willmann, 1931, p. 96, fig. 13.

Own material. Maasland, A 76, 9 ad.

Berlese's original description of this species is very short, but nevertheless it contains some important characters. He states that the external shape bears

a striking resemblance to that of a *Hermannia* species although the animals are much smaller; he gives as measurements  $660 \times 340 \mu$ .

Both Sellnick and Willmann regard as distinguishing characters the presence of a bifid hair on the interior and on the exterior sides of genu and tibia I and II. However, the species is moreover easy to recognize by its measurements. In my specimens these are: medium length 0.650 mm (extremes 0.620-0.670), medium width 0.330 mm (extremes 0.320-0.350), that is larger than in both our remaining species. Further, the relation length: width = 1:0.51, which shows the relatively larger width of the present species. Together with the rather convex hysterosoma, it gives the animal the shape of a *Hermannia*.

In the structure of the notogaster our three species show slight differences (fig. 4 a-c). In *N. elegantula* the "pores" in the notogaster are larger and of a more irregular shape, and they are more widespread. The "pores" of *N. comitalis* and *N. nana* are smaller and more numerous. In *N. comitalis* the depth of the pores is nearly twice as large as in *N. nana*. These distances are approximately: 1.6  $\mu$  in *N. comitalis*, and 0.8  $\mu$  in *N. elegantula* and *N. nana*.

*Nanhermannia comitalis*, an apparently rare species, is new to our fauna. I collected my specimens in a wet hayfield. Willmann (l.c.), who noted only a few localities, recorded as habitat: "In feuchtem Moos von nassen Wiesen, quelligen Stellen und hier und da im Moor". Frenzel (1936) collected the species in a moist meadow with many Cyperaceae ("Cyperaceenwiese") only. Willmann (1939, p. 439) considers *N. comitalis* one of the "Charaktertiere der Wiesenmoore oder überhaupt sehr feuchter Wiesen".

Berlese made the description of this species after a specimen from Longny (Orne, France).

### ***Nanhermannia elegantula* Berlese, 1913 (fig. 4 b)**

*Nanhermannia elegantula* Berlese, 1913, p. 100, pl. 7 fig. 84; Sellnick, 1928 a, p. 17; Willmann, 1931, p. 96, fig. 15; Noordam and De Vlieger, 1943, p. 10; Van der Drift, 1950, p. 81.

*Nanhermannia nana* (p. p.), Buitendijk, 1943, p. 373.

Oudemans Collection. Haarlem.

Own material. Oosterhesselen, A 12, 1 ad. Denekamp, A 26, 3 ad., 5 n. Hooge Veluwe, A 35a, 3 ad.; A 40, 3 ad.; A 42, 3 ad. Wilp, A 46, 4 ad. Winterswijk, A 48, 1 ad.; A 49, 1 ad. Rockanje, A 82, 2 ad., 1 n. Breda, A 86, 1 ad.

Locality from literature. Hooge Veluwe (Noordam and De Vlieger, Van der Drift).

Berlese's original description is short but it is accompanied by a good figure, which makes it easy to recognise the species. The measurements of his specimen ( $510 \times 215 \mu$ ), however, are considerably smaller than those

of my specimens: medium length 0.580 mm (extremes 0.550-0.600), medium width 0.255 mm (extremes 0.250-0.270); relation length: width = 1:0.44.

Jacot (1937, p. 238) regards this species as a form of *Nanhermannia dorsalis* (Banks, 1896, p. 77) (= *Nanhermannia coronata* Berlese, 1913, p. 100, pl. 7 fig. 85), as in the United States of America both species may be found in the same handful of litter. According to him *Nanhermannia dorsalis elegantula* would be the form with two posterior apophyses on the propodosoma.

I doubt whether Jacot is right, as there appear to be more differences. According to Berlese the pores in the notogaster of *N. coronata* are smaller and occur with greater density. As far as I can judge, *N. coronata* is more closely allied to *N. nana*, although the small knobs along the posterior ridge are larger. For the present I see no reason to accept Jacot's conclusions.

Noordam and De Vlioger were the first to record this species as belonging to our fauna. In the Oudemans Collection there is one slide labelled *Nanhermannia nanus*, containing two specimens. One of these, however, is *N. elegantula*; the other specimen is in a bad condition. Consequently the literature record concerning these specimens (*Hermannia nanus*, Oudemans, 1900 d, p. 156) at least partly relates to *N. elegantula*.

I collected my specimens in the soil of forests mainly. These forests belong to the following types: Querceto-Betuletum, Querceto-Carpinetum, beech forest, moist birch-wood in the sand dunes, and birch-swamp. In the forest floor investigated by Van der Drift the species chiefly occurred in the F<sub>x</sub> layer.

#### ***Nanhermannia nana* (Nicolet, 1855) (fig. 4 c)**

*Nothrus nanus* Nicolet, 1855, p. 458, pl. 7 fig. 5.

*Hermannia nanus*, Michael, 1888, p. 455, pl. 43 figs. 1-7.

*Nanhermannia nana*, Sellnick, 1928 a, p. 17 fig. 34; Willmann, 1931, p. 96, figs. 12, 14.

Own material. Spier, A 5, 1 ad., 1 n. Mantinge, A 7, 1 ad.; A 11, 1 n. Lattrop, A 20, 2 ad., 1 n. Ootmarsum, A 24, 34 ad., 16 n. De Lutte, A 29, 60 ad. Hooge Veluwe, A 39, 15 ad., 15 n., Maasland, A 76, 2 ad.; A 78, 1 ad.

The original description by Nicolet is very short and the figure very perfunctory. Nevertheless Nicolet mentions "une protubérance mamelonnée entre les stigmates", so that the identity of the species is certain.

In the lists of synonyms most authors beside *Nothrus nanus* Nicolet record *Hermannia nana* (Berlese, 1892, vol. 63 (1)). The latter description, however, does not accord with the original description by Nicolet. Berlese does not mention the small knobs at the ridge near the posterior border of the propodosoma, nor does he draw them. On the contrary, he describes and

draws two apophyses near the posterior border just like those of *N. elegantula*; moreover, the size and the density of the "pores" in the notogaster point to *N. elegantula*. Further, the habitat ("in agri Patavini montium muscis") shows little correspondence with the moist habitat of *N. nana*.

Measurements. Medium length 0.535 mm (extremes 0.515-0.620), medium width 0.255 mm (extremes 0.250-0.260). Relation length: width = 1:0.48.

The nymphs of *N. nana* and *N. elegantula* show a close resemblance to the adults and by that they are easily recognizable.

I collected my specimens in moist surroundings: moist sphagnum, moist moss near the source of a brook, moist hayfield, meadow, litter of forests (near Mantinge).

In comparison with *N. elegantula* the species appears to have a greater preference for damp environments; moreover it appears to occur less often in the litter of forests.

## HYPOCHTHONIIDAE

### **Hypochthonius rufulus** C. L. Koch, 1836

*Hypochthonius rufulus* C. L. Koch, 1836, vol. 3 (19); Michael, 1888, p. 534, pl. 49 figs. 6-13; Berlese, 1896, vol. 78 (6); Oudemans, 1900 d, pp. 152, 157; 1917 a, p. 22, figs. 45-50; Sellnick, 1928 a, p. 22, fig. 47; Willmann, 1931, p. 99, figs. 19, 20 c, d; Noordam and De Vlieger, 1943, p. 10; (p. p.), Buitendijk, 1945, p. 373; Van der Drift, 1950, p. 81.

*Hypochthonius pallidulus* C. L. Koch, 1836, vol. 3 (20); Oudemans, 1896, p. 56.

*Leiosoma ovata* (p. p.), Nicolet, 1855, p. 395, pl. 2 fig. 5.

Oudemans Collection. Haarlem, The Hague.

Own material. Spier, A 5, 1 ad. Mantinge, A 7, 1 n. Ootmarsum, A 24, 1 n. Denekamp, A 25, 3 ad., 1 n.; A 26, 5 ad., 3 n. Denekamp, A 28, 3 ad., 1 n., 1 lv. De Lutte, A 29, 8 ad., 1 n. Hooge Veluwe, A 35, 2 ad.; A 35a, 12 ad., 6 juv.; A 40, 1 ad. Winterswijk, A 51, 1 ad. Maasland, A 75, 1 ad., 1 n. Rockanje, A 82, 1 ad. Baarle Nassau, A 87, 1 ad. Neercanne, A 90, 1 n.

Localities from literature. Ruurloo, Haarlem, The Hague (Oudemans); Hooge Veluwe (Noordam and De Vlieger, Van der Drift).

As mentioned below, Grandjean drew attention to the fact that *H. pallidulus* Koch is the nymph of *H. rufulus* Koch. Nicolet was wrong when describing this species as the nymph of *Leiosoma ovata*; Buitendijk was wrong when recording *Hypochthonius luteus* as a synonym of this species.

*H. rufulus* is a rather common species. I collected specimens in different biotopes, such as: litter and moss from Querceto-Carpinetum and Querceto-Betuletum, sphagnum from various places, moss from a birch-swamp, moss from alder-marshes, soil of a moist birch wood in the sand dunes, hayfield, and meadow. These biotopes are more or less damp, as those referred to



by Dyradowska (1931, p. 142), who characterizes the species as hygrophilous. During their investigations on the "Franse Berg" in the National Park "De Hooge Veluwe", Noordam and De Vlieger collected larger numbers of this species on the northern slope than on the southern. They supposed that the preference for moss was the cause of this distribution.

Cooreman (1941, p. 5), however, collected the species not only in sphagnum, but also "dans les aiguilles de Pins de la Forêt de Soignes qui forment un biotope relativement sec."

According to Van der Drift this species has a preference for the lower litter layers (both  $F_1$  and  $F_x$ ); with extreme drought or frost the species is almost non-existent in  $F_0$  and  $F_1$ .

### **Hypochthonius luteus** Oudemans, 1917

*Hypochthonius rufulus*, Oudemans, 1914, A 10, p. 24, pl. 16 figs. 16-19.

*Hypochthonius luteus* Oudemans, 1917, p. 343; 1917 a, p. 21; Sellnick, 1928 a, p. 22; Willmann, 1931, p. 99, fig. 20 a, b.

*Hypochthonius rufulus* (p. p.), Buitendijk, 1945, p. 373.

Oudemans Collection. Plate no. 1889.

Locality from literature. Valkenburg (Oudemans).

In the Oudemans Collection this species is represented by a plate only, drawn after the type specimen of *H. luteus* but originally published with the name *H. rufulus*. Later Oudemans realized that the specimen represents a new species. The type specimen is perhaps in the Heselhaus Collection.

According to Oudemans the type specimen was collected in a mole's nest. I draw attention to the fact that Willmann erroneously cites Sittard as type locality. Buitendijk erroneously recorded this species as a synonym of *H. rufulus*.

### **Eniochthonius grandjeani** nom. nov.

*Hypochthonius pallidulus*, Michael, 1888, p. 537, pl. 49 figs. 1-5.

*Hypochthoniella pallidula*, Sellnick, 1928 a, p. 22, fig. 48; Willmann, 1931, p. 100, figs. 21, 22; Noordam and De Vlieger, 1943, p. 10.

*Eniochthonius pallidulus*, Grandjean, 1933, p. 32.

Own material. Mantinge, A 7, 16 ad.; A 8, 4 ad. Oosterhesselen, A 13, 1 ad. Winterswijk, A 47, 1 ad. Sint Pietersberg, A 102, 1 ad.

Locality from literature. Hooge Veluwe (Noordam and De Vlieger).

During a long time this species has been identified as *Hypochthonius pallidulus* Koch. Grandjean drew attention to the fact that *Hypochthonius pallidulus* Koch is the nymph of *H. rufulus* Koch, and not the same species as *H. pallidulus* Michael.

The genera *Hypochthoniella* Berlese, 1910, and *Arthrochthonius* Ewing, 1917, have been erected for *H. pallidulus* Koch, and therefore they are synonyms of *Hypochthonius*. For that reason Grandjean created a new genus *Eniochthonius* for *Hypochthonius pallidulus* Michael, and named the species *Eniochthonius pallidulus* (Michael). However, this is not in accordance with the rules of nomenclature, as *H. pallidulus* Michael is preoccupied by *H. pallidulus* Koch. Therefore I propose to name the species *Eniochthonius grandjeani*.

The species was for the first time recorded as belonging to our fauna by Noordam and De Vlieger, who collected it in the litter of an oak wood (Querceto-Betuletum) on "De Hooge Veluwe". I obtained my specimens from the soil of forests belonging to the Querceto-Carpinetum and the Querceto-Betuletum.

Willmann found his specimens "immer nur einzeln". The greater part of my samples also contained few specimens with the exception of sample A 7 that yielded 16 specimens. This sample was collected in a forest (Querceto-Betuletum) on a place where there has been a forest for more than a thousand years, resulting in a humus layer of some 50 cm.

#### BRACHYCHTHONIIDAE

There exists some confusion as to the generic names of the family Brachychthoniidae. The genus *Brachychthonius* was erected by Berlese (1910, p. 219), who gave a description of the genus and designated *Brachychthonius brevis* (Michael) as the type. He did not describe the last named species, but he represented it in pl. 19 fig. 39. The figured specimen, however, is not Michael's species, but a species later on named *Brachychthonius berlesei* by Willmann (1928 a, p. 160).

Jacot (1938 a, p. 130) created the genus *Brachychochthonius* with *B. jugatus* as the type. According to the definition of this genus, *B. berlesei* Willmann, however, also belongs to it, whilst *B. brevis* (Michael) belongs to *Brachychthonius* sensu stricto. All authors have followed Jacot in the conception of these two genera, till recently Grandjean (1947, p. 224) doubted the validity of the name *Brachychochthonius*.

I have exchanged letters with Dr. G. Owen Evans on these difficulties. For the moment Dr. Evans is revising the generic concept of the family whilst redescribing *Hypochthonius brevis* Michael; he regards *B. berlesei* as the type of the genus *Brachychthonius* Berlese, whilst he intends to rename the genus that has *Hypochthonius brevis* Michael as its type (*Brachychthonius* sensu Jacot); consequently the name *Brachychochthonius* becomes a synonym of *Brachychthonius*.

I am very grateful that Dr. Evans allowed me the use of his unpublished views that in the near future will appear in the *Ann. Mag. Nat. Hist.* The description of the new genus *Synchthonius*, that I give below, fits into his concept of the genera of the family.

**Eobrachychthonius mooseri** (Van der Hammen, 1950) (fig. 1 a)

*Brachychthonius mooseri* Van der Hammen, 1950 a, p. 130, fig. 1.

Own material. Sint Pietersberg, A 101, 1 ad. (holotype).

I have given a short description of this species in 1950. A thorough investigation of the type specimen showed some new characters, very difficult to see in my nearly colourless specimen. Below I give a more detailed description (fig. 1 a).

Colour pale yellow. The mounted specimen is transparent and nearly colourless.

Measurements: length 0.250 mm, width 0.180 mm.

Propodosoma narrower than hysterosoma. Anterior part of the rostrum trapeziform with completely straight frontal border. Rostral hairs rather long, close to the frontal border. The rostrum passes into the remaining part of the propodosoma by means of two scalariform elevations. The anterior border of the first elevation has two points. The anterior border of the second elevation runs just in front of the lamellar hairs, that are rather long, longer than the rostral hairs. Pseudostigmatic organ rather short, with short stem and broadened head; this head is slightly (but not very regularly) acuminate towards the end, and is beset with very short hardly visible hairs. Anterior exopseudostigmatic hairs rather strong, situated on a semicircular ridge. Posterior exopseudostigmatic hair present as place of insertion only, situated on a small ridge. Posterior part of the propodosoma (partly covered by the hysterosoma) with 4 pairs of oval spots, that are much wider than long.

Hysterosoma relatively wide, nearly parallel-sided. Anterior border on both sides with a small projection. Dorsal plates separated by two granulate areas (not shown in the figure). The anterior border of these areas (the posterior border of the plates) is very distinct, the posterior border much less so. The first and second dorsal plates each have one pair of spots; the third dorsal plate shows two rows of 4 spots. Still more spots may be present, but if so they are invisible in the nearly colourless specimen. The hairs of the dorsal surface are rather long and strong. The parts of the dorsal plates containing the hairs  $D_3$ ,  $E_2$ , and  $F_2$  (according to the notation by Grandjean) are more or less separated from the remaining part of the

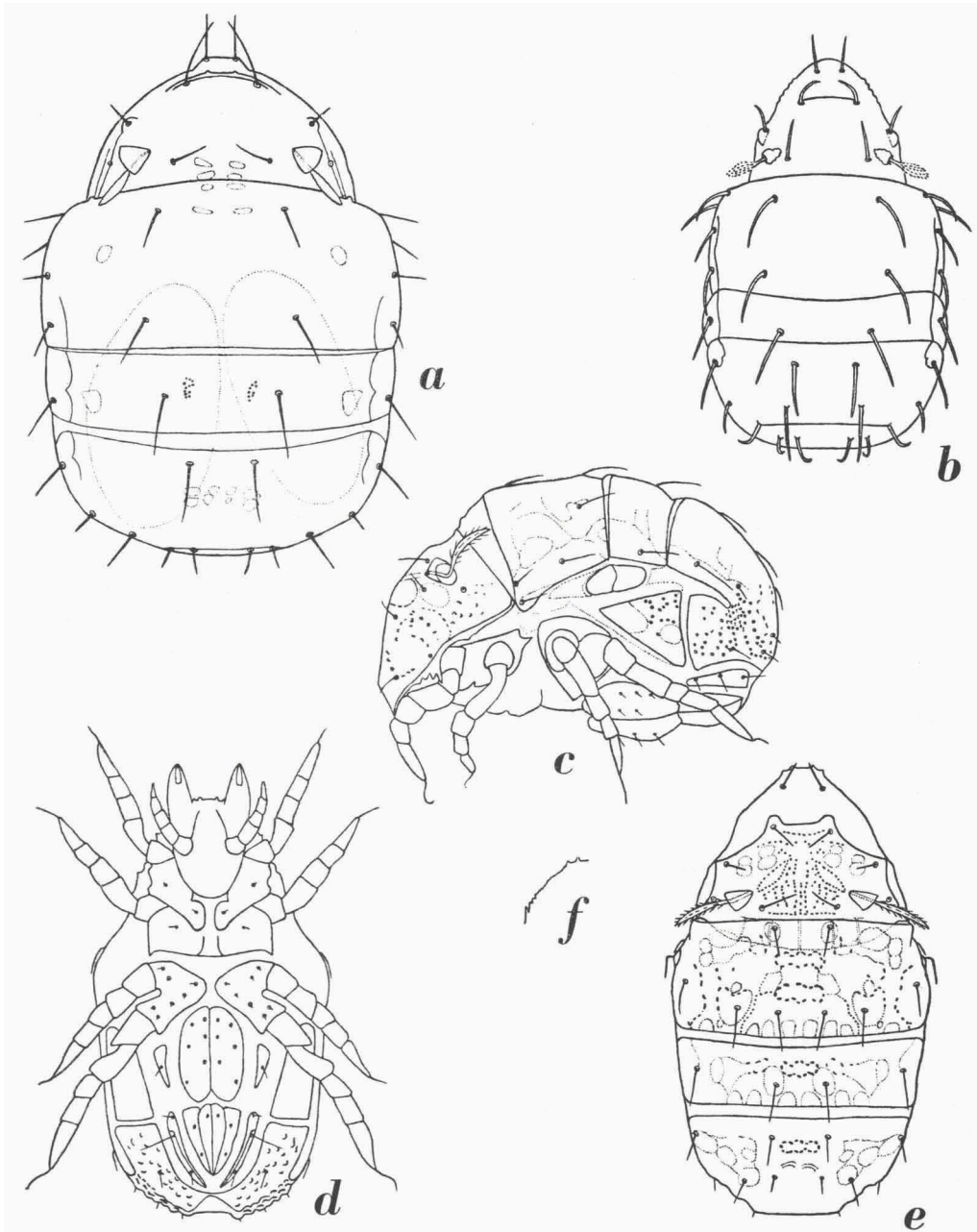


Fig. 1. a, *Eobrachychthonius mooseri* (Van der Hammen), dorsal view; b, *Eobrachychthonius oudemansi* nov. spec., dorsal view; c-f, *Synchthonius boschmai* nov. spec.: c, lateral view; d, ventral view; e, dorsal view; f, lateral border of the rostrum seen from above and a little from the side. a, c-f,  $\times 275$ ; b,  $\times 200$ .

dorsal plates by a suture. Centre of the second dorsal plate with two granulate areas. The specimen, a female, contains two eggs.

With difficulty I have distinguished lateral plates. I could not obtain a lateral view of my specimen, but the ventral surface shows the first lateral plate containing the hairs  $C_3$ , and vague borders of the remaining lateral plates. On account of the presence of these lateral plates the species has to be placed in the genus *Eobrachychthonius*.

*Eobrachychthonius mooseri* is closely related to *Eobrachychthonius sexnotatus* Jacot (1936 a, p. 24, pl. 1 figs. 3, 4). It differs from this species in the following characters. The anterior border of the first scalariform elevation has two points; the lamellar hairs are longer; the pseudostigmatic organ is beset with very small hairs; the centre of the propodosoma has four pairs of spots instead of three; the notogastral hairs are stronger; I observed a smaller number of spots on the dorsal surface of the hysterosoma; finally the female specimen contains two eggs, while Jacot draws attention to the fact that the females of *E. sexnotatus* seem to bear but one egg at a time.

*E. sexnotatus* was described from North Carolina.

I collected my specimen in the litter of a thicket of *Prunus spinosa*. A second specimen possibly belonging to the species was collected in the litter of another thicket of the same type; this specimen however, got lost before being completely identified.

#### ***Eobrachychthonius oudemansi* nov. spec. (fig. 1 b)**

Oudemans Collection. Burgst near Breda, 1.V.1912, 1 ad. (holotype).

The slide of this species present in the Oudemans Collection is labelled "*Brachychthonius laetepictus* Berl.??". It is not impossible that Willmann, who studied the Oribatei of the Oudemans Collection (cf. Willmann, 1930 a), used this slide for his figure of *B. laetepictus* (1931, p. 101, fig. 27), as in this figure the position of the hairs accords in all particulars with that of the mounted specimen just as it appeared in its original position (at present it is remounted). Willmann kindly wrote to me that my suppositions may be correct; he inserted the species in his monograph because Sellnick (1928a) recorded *B. laetepictus*.

In the course of the years the slide had turned rather opaque and in this state the upper surface of the specimen only was visible. Among the plates drawn by Oudemans, now in the possession of the Leiden Museum, there is one of a *Brachychthonius* species evidently drawn after the present specimen, as general habitus and locality are exactly in agreement. The original

plate at its back bears the name *Cosmochthonius*, and as such it was recorded in the preliminary catalogue (Buitendijk, 1943, p. 374).

The plate revealed many more details than the bad slide showed. Therefore I remounted the specimen and made it transparent. Besides the characters to be derived from Oudemans' drawing, this process brought to light some new details, as I could distinguish vague borders of four lateral plates, the first of which contains the hair  $C_3$ ; consequently the species has to be placed in the genus *Eobrachychthonius*.

As mentioned above, Oudemans labelled the slide "*Brachychthonius laetepictus* Berl." The original description of *B. laetepictus* (Berlese, 1910 b, p. 380), however, is, as many of Berlese's descriptions, very short, and it is not accompanied by a figure. One of the few characters is: "pilis dorsi sat brevibus". In contradistinction to this the bristles of my specimen are rather long, proving that I cannot identify it as Berlese's species. It is also impossible to identify my specimen as one of the other known species of *Eobrachychthonius*, so that I regard it as representing a new species, the description of which follows here.

Colour yellow (perhaps partly caused by the old mountant that has turned yellow).

Measurements: length 0.275 mm, width 0.160 mm.

Propodosoma (fig. 1 b) narrower than hysterosoma. Rostrum when seen from above with a few small indistinct teeth at anterior and lateral margins. Rostral hairs rather long and rather thin. Pseudostigmatic organ beset with a great number of distinct hairs. Remaining bristles on propodosoma rather strong. Anterior exopseudostigmatic hair on a semicircular ridge.

Hysterosoma relatively wide with rounded posterior border. Notogastral hairs long, rather strong, and slightly flattened. The dorsal surface shows no spots. The epimeres of the first and second pairs of legs are grown together to a plate with a straight posterior border. The epimeres of the third and fourth pairs of legs are also grown together.

This species is related to *Eobrachychthonius borealis* Forsslund (1942, p. 2, fig. 1), in which the lateral plates are also rather indistinct. In *E. borealis*, however, the top of the rostrum is "schwach ausgebuchtet", while the rostral hairs are inserted near the anterior margin, further the notogastral hairs are less strong and not flattened, and finally the total length is smaller, while relatively the width is still smaller.

According to Oudemans the present specimen was collected in decaying leaves.

**Brachychthonius suecicus** (Forsslund, 1942)

*Brachychochthonius jugatus* var. *suecica* Forsslund, 1942, p. 8, fig. 11; Strenzke, 1950, p. 246; Evans, 1952a, p. 236.

Own material. Hooge Veluwe, 24.X.1942, leg. J. van der Drift, 2 ad.

Forsslund (1942) described the present species as a variety of *Brachychochthonius jugatus* Jacot (1938a, p. 130, figs. 10, 11). The description of *B. jugatus* was based on material from North Carolina (U.S.A.); in comparison with *B. suecicus* it is characterized by slight differences in the sculpturing of the dorsal surface, and by much broader notogastral hairs. In my opinion the last mentioned difference is of such importance that I regard Forsslund's "variety" *suecica* as a species, *Brachychthonius suecicus* (Forsslund).

*B. suecicus* is known from Sweden, Holstein (Germany), and England, whilst recently (Hammer, 1952) it was also recorded from arctic Canada. The species is new to our fauna; it was collected by Van der Drift in a beech forest; according to him (Van der Drift, 1950, p. 51) *Brachychthonius* species (our species is one of these) have their greatest density in the F<sub>1</sub> layer.

**Brachychthonius italicus** Berlese, 1910

*Brachychthonius brevis* var. *italicus* Berlese, 1910, p. 220, pl. 19 fig. 40.

*Brachychthonius italicus*, Strenzke, 1951, p. 245, figs. 10, 11.

Own material. Gronsveld (Limburg), Eijdsdenerbos, 14.IX.1950, 12 ad.

In accordance with Strenzke's description of the species some of the sculptured areas on the propodosoma are less distinct, though these are better visible than in his figure.

*Brachychthonius italicus* is new to our fauna; it was obtained from the litter of a forest (Querceto-Carpinetum) on a southern slope; it was previously recorded from southern Europe and from Holstein (Germany).

**Synchthonius** nov. gen.

Among the mites sent to me for identification by Dr. Van der Drift there is one new species of the family Brachychthoniidae that appeared to differ in important characters from the known genera. The same species was recently discovered in England by Dr. Evans, and after an exchange of letters we both arrived to the conclusion that it represents a new genus, that is characterized in the following way.

Dorsal surface of the hysterosoma with two longitudinal ridges as in

*Brachychthonius*, but the hair  $C_3$  does not stand on a separate plate, whilst the hair  $D_2$  has an extraordinary position near  $D_1$  and not under  $D_3$ ; the ventral shield in its anterior part is separated from the pygidial shield, whilst the posterior parts of both shields are grown together (a peculiarity expressed by the Greek word *syn* (= together) in the compound *Synchthonius*).

The type and only representative of the genus is *Synchthonius boschmai* nov. spec.

***Synchthonius boschmai*** nov. spec. (fig. 1 c-f)

Own material. Eext, 11.V.1943, leg. Dr. J. van der Drift, 6 ad. (1 holotype, 5 paratypes).

Colour yellow.

Measurements: medium length 0.210 mm (extremes 0.200-0.235), medium width 0.125 mm (extremes 0.120-0.130).

Rostrum when seen from above with four points (fig. 1 e); a lateral view (figs. 1 c, f) shows that these points form part of a row that starts in front with the two teeth on both sides, also visible from above. Behind these two teeth there is row of very small teeth followed in their turn by four larger teeth, of which the posterior, situated just in front of the first leg, is the largest. Between the first and the second legs another two teeth are visible.

Propodosoma with chitinous ridges, shaped like lamellae and translamella (in some of my specimens the "cuspidata" are smaller than in fig. 1 e), bordering a higher central part that contains the lamellar hairs (situated in the angle between "lamella" and "translamella"), two pairs of exopseudostigmatic hairs (of the posterior the place of insertion only is visible), the interlamellar hairs, and the pseudostigmatic organ. The pseudostigmatic organ is spindle-shaped, beset with relatively long hairs. The room between translamella, pseudostigmatic organs, and the anterior border of the hysterosoma has a structure of granules arranged in rows as shown in fig. 1 e. Anterolaterally of the rows of granules some round spots are visible. The posterior part of the propodosoma is covered by the hysterosoma; it shows a transverse row of large quadrangular spots situated close to each other and each bordered by granules.

The dorsal surface of the hysterosoma shows a characteristic complicated structure. The first outstanding character is the presence of a number of centrally situated trilobate spots. The first part of the hysterosoma has two of such spots, the two following parts one each. The border of these spots consists of small chitinous thickenings. Elsewhere on the hysterosoma



these thickenings are also present, but generally arranged in lines. At the posterior border of the first and the second part of the hysterosoma an even number of rounded quadrangular spots is visible that have no pronounced border. Further the hysterosoma contains some dispersed spots and lines arranged as drawn in fig. 1 e. The hairs on the hysterosoma are rather long, but not especially strong. The hairs  $D_2$  of the first dorsal plate are at a fairly large distance from the lateral margin.

A lateral view (fig. 1 c) shows lateral plates between the dorsal and ventral plates, the exact number of which is difficult to determine. One plate only is distinctly visible as it possesses the same degree of scleritisation as the dorsal and the ventral plates; it is distinctly bordered, and divided into two parts by a transverse suture. In my opinion, however, this suture is not an indication of an original segmentation, as the situation of the whole plate corresponds with that of the second dorsal plate.

Anteriorly of this lateral plate vague borders are visible of what probably is another lateral plate. There is, however, no lateral plate containing the hair  $C_3$ , as this hair is inserted on the first dorsal shield.

A lateral as well as a ventral view shows no complete separation between the second ventral plate and the third dorsal (pygidial) shield; in the posterior part they are grown together.

A ventral view (fig. 1 d) further shows the following that is worthy of mention. The epimeres of the first and second pairs of legs are grown together to a plate. The posterior and lateral borders of epimere II meet in a sharp point (invisible in some of my specimens). On epimere I, I saw only two hairs distinctly; further I saw one hair on epimere II. Epimeres III and IV are grown together to a plate, but the left and the right plates are sharply separated. I observed three hairs on epimere III and four on epimere IV.

This new species has very pronounced characters; it cannot be confounded with one of the known species of the Brachychthoniidae. I summarise as the outstanding characters of my species (generic characters excluded): rostrum when seen from above with 4 points, central part of propodosoma with a structure of granules that are more or less arranged in rows, dorsal surface of hysterosoma in the median part with 4 trilobate spots with granulate borders, one lateral plate distinctly visible and divided by a transverse suture.

My specimens were collected in the litter of a cultivated forest of *Larix*, strongly mixed with *Alnus*.

## COSMOCHTHONIIDAE

**Haplochthonius simplex** Willmann, 1930

*Cosmochthonius (Haplochthonius) simplex* Willmann, 1930 a, p. 2, figs. 1-2.  
*Haplochthonius simplex*, Grandjean, 1947, p. 224, figs. 2-6.

Oudemans Collection. Empty slide, labelled Valkeveen.

No specimen is present on the slide in the Oudemans Collection. Apparently this slide has been remounted, and probably the specimen got lost during the process. As Willmann described the species after the specimen from the Oudemans Collection, there is no doubt concerning its identity.

According to Grandjean (l.c.) in France the species generally occurs inside houses only; if it is contained in an outdoor sample, the specimens certainly originated from a house. Around the Mediterranean the species commonly occurs outdoors in "débris végétaux très secs" (Grandjean, 1934 d, p. 240).

On the label of the slide in the Oudemans Collection, Oudemans wrote that the specimen was collected at Valkeveen in decaying leaves, consequently in rather damp surroundings. Grandjean (1947) suggested that it probably had fallen into the sample somewhere in a house. Consequently it appears safer to regard the locality Valkeveen as not altogether certain.

It is not impossible that an investigation of the fauna of houses will show that the species is more common. Possibly such an investigation would show that also other species that seem to be restricted to houses (*Cosmochthonius* species, *Aphelacarus acarinus* (Berlese)) prove to occur in our country.

**Cosmochthonius lanatus** (Michael, 1885)

*Hypochthonius lanatus* Michael, 1885, p. 396, pl. 7 fig. 11; 1888, p. 541, pl. 49 figs. 15-22.

*Cosmochthonius lanatus*, Sellnick, 1928a, p. 22, fig. 46; Willmann, 1931, p. 101, figs. 28, 29; Buitendijk, 1945, p. 374; Van der Drift, 1950, p. 82.

*Cosmochthonius domesticus* Grandjean, 1948 b, p. 354, fig. 3 A; 1950, p. 79.

Oudemans Collection. Franeker.

Own material. Hooze Veluwe, 14.VII.1944, leg. J. van der Drift, 1 ad.

Locality from literature. Hooze Veluwe (Van der Drift).

In my specimens tarsus I is bidactylous, and the tarsi II, III, and IV are tridactylous. Dr. G. Owen Evans wrote to me that the number of claws in Michael's original material is just the same; Michael made an error when describing the tarsi as monodactylous. Consequently it is no longer necessary to use the name *C. domesticus* Grandjean, created for the specimens with two claws on leg I and three claws on the remaining legs.

According to the descriptions by Sellnick and by Willmann the German specimens are tridactylous on all legs; probably this statement is incorrect.

The specimens in the Oudemans Collection originate from a farmhouse. Michael collected his specimens in a thatched roof and in old wooden boxes. Grandjean (1947, p. 225) collected two species of *Cosmochthonius* inside houses. In our country *Cosmochthonius lanatus* certainly is not common outside houses, though Van der Drift repeatedly collected the species in the soil of the beech forest investigated by him.

#### TRHYPOCHTHONIIDAE

##### ***Trhypochthonius tectorum*** (Berlese, 1896)

*Hypochthonius tectorum* Berlese 1896, vol. 78 (8).

*Nothrus tectorum*, Pearce and Warburton, 1905, p. 568, pl. 20 fig. 4.

*Trhypochthonius tectorum*, Sellnick, 1928 a, p. 22, fig. 45; Willmann, 1931, p. 103, fig. 32; Buitendijk, 1945, p. 374.

Oudemans Collection. Bergen (Noord-Holland).

The species is easily recognizable from Berlese's description and plate, though the figures are not altogether correct as far as concerns the hairs. Near the anterior border of the hysterosoma the figure shows one pair of hairs in excess to those occurring in the species. Further the structure of the hysterosoma is a little too coarsely drawn. Berlese classified the species in the genus *Hypochthonius* as in his opinion the hysterosoma was divided by a transverse groove; Pearce and Warburton (1905) already pointed out that this transverse groove was an artefact.

The length of our specimen is 0.730 mm, corresponding with the measurement as given by Berlese. Sellnick and Willmann mention 0.680 and 0.660-0.690 mm respectively. Willmann erroneously draws the interlamellar, lamellar, and rostral hairs thin and smooth. In Berlese's description as well as in our specimen these hairs resemble the remaining hairs. Willmann records the propodosoma as smooth; in our specimen, however, this structure is like that of the hysterosoma, but only a little finer, more or less as Berlese figures it.

The specimen in the Oudemans Collection was obtained from moss in the sand dunes. Most authors recorded this species from moss on roofs and walls. Dyradowska (1931, p. 142) characterized it as xerophilous.

##### ***Trhypochthonius cladonicola*** (Willmann, 1919) (fig. 4 d)

*Camisia cladonicola* Willmann, 1919, p. 553, fig. 4.

*Trilohmannia cladonicola*, Willmann, 1923 a, p. 475.

*Trhypochthonius cladonicola*, Sellnick, 1928 a, p. 22; Willmann, 1931, p. 103, fig. 34.

Own material. Lattrop, A 21, 16 ad., 16 n. Hooge Veluwe, A 36, 17 ad., 27 n.

The surfaces of propodosoma and of notogaster present a punctated structure combined with a reticulate system.

In the nymph (fig. 4 d) the anterior two-thirds of the notogaster is strongly wrinkled, whilst the punctated structure as noted for the adults is present in the anterior part of the propodosoma (in front of the pseudo-stigmatic organs and the interlamellar hairs) and in the posterior part of the notogaster. The hairs on the propodosoma resemble those of the adult; among the notogastral hairs  $C_1$ - $C_3$  and  $D_1$ - $D_3$  are small and difficult to distinguish, whilst the remaining hairs are larger and thicker.

The species is new to our fauna. In the two localities the specimens were found in the heath (in moss and in *Cladonia*), an environment corresponding with Willmann's definition of the habitat: "Cladoniapolster der Heiden und Moore".

Willmann (1923 a, p. 475, pl. 7 figs. 4-7) described a var. *sclerotricha*, characterized by thick, stiff and rough bristles; I did not find this variety among my material.

### ***Trhypochthoniellus excavatus* (Willmann, 1919)**

*Camisia excavata* Willmann, 1919, p. 552, fig. 3.

*Trhypochthonius excavatus*, Sellnick, 1928 a, p. 21; Willmann, 1931, p. 104, fig. 36.

*Trhypochthoniellus excavatus*, Grandjean, 1939 a, p. 306.

Own material. Hooge Veluwe, A 39, 29 ad., 5 n.

Grandjean (1939 a) pointed to the relation between this species and *Trhypochthoniellus setosus*, which is much closer than that between *T. excavatus* and *Trhypochthonius tectorum*, for which reason he placed *T. excavatus* in the genus *Trhypochthoniellus*.

The species was not yet recorded from our country. I collected it in very damp sphagnum. In literature it is regarded as a typical inhabitant of this biotope.

## MALACONOTHRIDAE

### ***Malaconothrus***

The species of the genus *Malaconothrus* are small, yellowish brown mites with a shield-shaped hysterosoma. The body is for the greater part covered with a granulate cerotegument; under this layer the notogaster may show a different structure. The species are difficult to distinguish and only a few of them have been described; these descriptions are, moreover, for the greater part very indistinct, so that the species have repeatedly been confounded with each other.

Willmann (1931, p. 107) was the first to compare a number of species of the genus with each other, but his identifications appear to be incorrect. *M. globiger* sensu Willmann differs from the original description by Trägårdh by the presence of long, unfeathered, notogastral hairs, and by the long anal plates; *M. egregius* sensu Willmann differs from Berlese's original description by the smaller length, the parallel-sided hysterosoma, and the small width of the propodosoma; *M. monodactylus* sensu Willmann differs from *Nothrus monodactylus* Michael by the oval genital and anal plates that adjoin only in one point, and by the shape of the hysterosoma that has its greatest width in the median part.

Up till now no *Malaconothrus* species was known from the Netherlands. Oudemans (1925, p. 409) recorded from Wijster (Drente) a specimen identified by him as *Camisia monodactylus* (= *Malaconothrus monodactylus*), but Oudemans' drawing, representing the specimen, proves that it belongs to *Trimalaconothrus novus* (Selln.).

I collected a fairly large number of specimens of the genus; these belong to three species that show important differences from the known forms, accordingly they are here described as new.

I want to draw attention to the fact that the propodosoma of the Malaconothridae shows four pairs of hairs, of which the two hairs near the lateral projection often have been interpreted as pseudostigmatic organ and exopseudostigmatic hair. Grandjean (1939 a, p. 305), however, pointed out that the longer hair is not the pseudostigmatic organ (that is absent in the family), but the interlamellar hair.

***Malaconothrus processus*** nov. spec. (fig. 2 a, b, e, h, i)

Own material. Denekamp, A 25, 2 ad.; A 26, 9 ad.; A 27, 2 ad. Maasland, A 76, 10 ad. Rockanje, A 82, 2 ad.; A 83, 16 ad. Baarle Nassau, A 87, 4 ad. (holotype in A 83).

Length 0.375-0.440 mm (average 0.410 mm).

Propodosoma, notogaster, and epimeres are covered with a layer of cerotegument that shows a dense, granulate structure; the granulations may be of equal size and density (fig. 2 h) or those on the notogaster may be slightly smaller and wider apart (fig. 2 i). After removing the cerotegument I could not distinguish any structure of the notogaster.

Between the first and the second legs a distinct projection or processus is visible that in a dorsal (fig. 2 a) as well as in a lateral (fig. 2 e) view appears as slightly oblong with rounded top. The palp is rather slender.

The hysterosoma is shield-shaped, posteriorly slightly pointed. The notogastral hairs are rather long, especially those of the posterior part. The anal

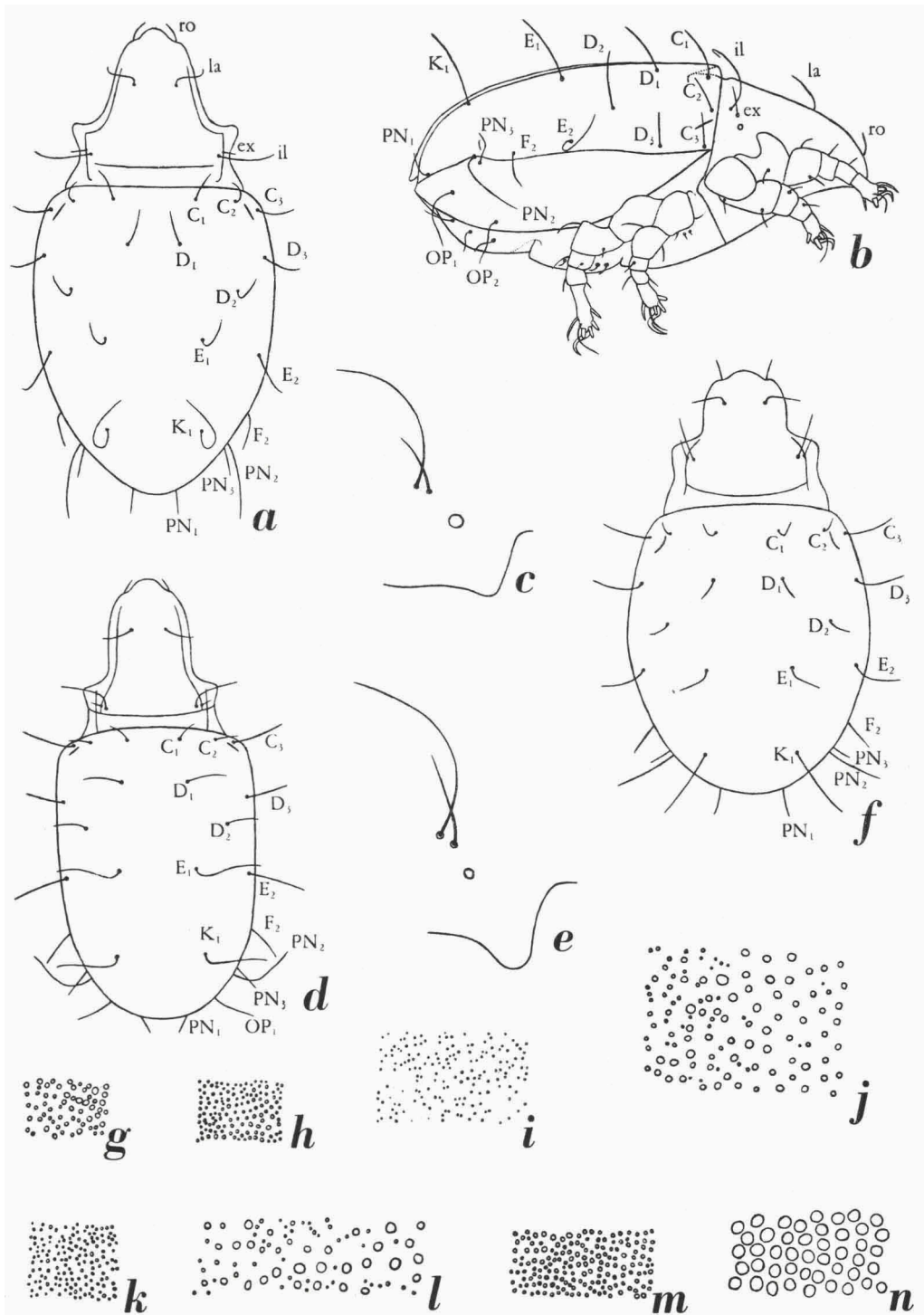


Fig. 2. a, b, e, h, i, *Malaconothrus processus* nov. spec.: a, dorsal view; b, lateral view; e, lateral view of interlamellar hair, exopseudostigmatic hair, and lateral projection; h, cerotegument of the propodosoma; i, cerotegument of the central part of the notogaster. c, d, g, k, l, *Malaconothrus gracilis* nov. spec.: c, lateral view of interlamellar hair, exopseudostigmatic hair, and lateral projection; d, dorsal view; g, k, cerotegument of the propodosoma; l, cerotegument of the notogaster. f, j, m, n, *Malaconothrus punctulatus* nov. spec.: f, dorsal view; j, cerotegument of the centre of the notogaster, in the left part of the figure the transition to the structure of anterior and lateral parts; m, cerotegument of the propodosoma; n, structure of the notogaster. a, b, f,  $\times 157$ ; c, e, g-n,  $\times 450$ ; d,  $\times 152$ . (The indications K<sub>1</sub> and PN<sub>1</sub> have erroneously been interchanged).

opening is longer ( $\frac{6}{5}$ ) than the genital; both adjoin each other with their full width.

The species is at once recognizable by the shape of the projection between the first and the second legs, and by the structure of the cerotegument on the notogaster.

I collected *M. processus* in moss and in litter in a damp birch wood in the sand dunes, in moss in birch and alder marshes, and in damp grass lands.

***Malaconothrus gracilis*** nov. spec. (fig. 2 c, d, g, k, l)

Own material. Ootmarsum, A 24, 7 ad. De Lutte, A 29, 14 ad. (holotype in A 29).

Length 0.405-0.455 mm (average 0.430 mm).

The cerotegument on the propodosoma is densely granulate (granulations slightly variable in size, cf. fig. 2 g, k); that on the notogaster shows granulations that are much larger and more widely separated (fig. 2 l). The structure of the notogaster is coarsely punctate and resembles that of *M. punctulatus*.

The species is rather narrow in comparison with its length; the propodosoma is relatively long. The projection between the first and the second legs (fig. 2 c, d) has the shape of a right angle with rounded top. The last joint of the palp is globular, but the penultimate joint is not outstandingly narrow.

The hysterosoma is parallel-sided, with rounded posterior border. The notogastral hairs are long, especially in the posterior part. The anal opening is longer ( $\frac{5}{4}$ ) than the genital opening.

The species shows some resemblance to *M. globiger* sensu Willmann, but the penultimate joint of the palp is not extraordinarily narrow, whilst the hysterosoma is parallel-sided. The species shows also some resemblance to *M. egregius* sensu Willmann, but differs by the long anal opening, and by the long notogastral hairs.

I collected *M. gracilis* in moss in an alder marsh and near the source of a brook.

***Malaconothrus punctulatus*** nov. spec. (fig. 2 f, j, m, n)

Own material. Spier, A 5, 6 ad. Mantinge, A 7, 2 ad.; A 11, 3 ad. Lattrop, A 19, 2 ad.; A 20, 4 ad. Maasland, A 75, 10 ad. (holotype in A 5).

Length 0.330-0.405 mm (average 0.365).

The cerotegument (fig. 2 j, m) resembles that of *M. gracilis*; the structure of the notogaster is coarsely punctate and very distinct (fig. 2 n).

The species is relatively broad and short, and generally slightly curved

downwards when seen from above. The hysterosoma is in the median part broader than in front; posteriorly it is rounded (fig. 2 f).

The projection between the first and the second legs resembles that of *M. gracilis*. The interlamellar and the exopseudostigmatic hairs are inserted rather far to the front. The hairs in the central part of the notogaster are shorter than in *M. gracilis*. The anal opening is longer ( $5/4$ ) than the genital opening.

*M. punctulatus* resembles *M. gracilis*, but is recognizable by the shorter and broader body, by the notogastral hairs that are partly shorter, and by the interlamellar and exopseudostigmatic hairs that are inserted rather far to the front.

I collected the species in a sphagnetum, in moss and sphagnum in the heath, in moss in a small alder wood, and in the litter of forests (Querceto-Betuletum).

### **Trimalaconothrus novus** (Sellnick, 1921)

*Malacothonrus novus* Sellnick, 1921, p. 76, figs. 3, 4.

*Camisia monodactylus*, Oudemans, 1925, p. 409.

*Trimalaconothrus novus*, Sellnick, 1928 a, p. 18, figs. 38, 39; Willmann, 1928 a, p. 159; 1931, p. 106, figs. 39, 42.

*Trimalaconothrus novus*, *T. tardus*, Buitendijk, 1945, p. 374.

Oudemans Collection. Wijster, Kaatsheuvel naar 's Hertogenbosch.

Own material. Lattrop, A 18, 130 ad., 131 juv. Hooge Veluwe, A 39, 4 ad., 1 n.

Locality from literature. Wijster (Oudemans).

As I noted above, Oudemans (1925) recorded the species from Wijster as *Camisia monodactylus*; on the unpublished drawing of the specimen Oudemans had already corrected the name into *T. novus*; the specimen itself is still present in the collection, but there it bears the name *T. tardus*.

*T. novus* is known to occur abundantly in very wet spagnum, which corresponds with my observations.

### **Trimalaconothrus grandis** nov. spec. (fig. 3 a, b)

Own material. Rockanje, A 83, 17 ad., 50 n. (holotype and paratypes).

Length 0.625 mm; breadth 0.330-0.470 mm. Colour yellowish brown or brown.

Propodosoma and notogaster are covered by a granulate cerotegument and often also by some adhering dirt; at the borders of the hysterosoma and especially of the propodosoma the granulations may appear as small clubs.

The structure of the hysterosoma and the propodosoma is very densely



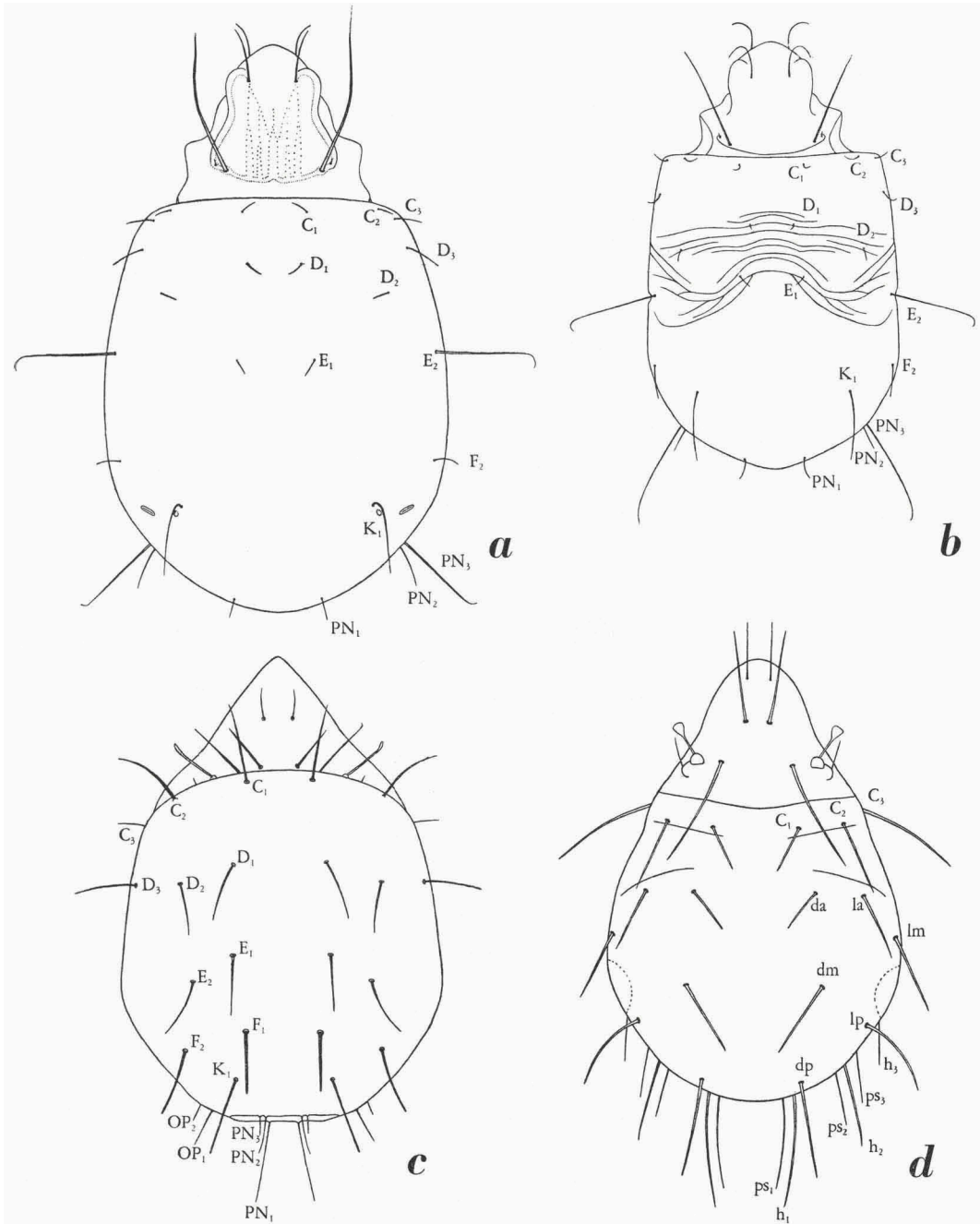


Fig. 3. a, b, *Trimalaconothrus grandis* nov. spec.: a, dorsal view of the adult; b, dorsal view of nymph II. c, *Hermanniella granulata* (Nicolet), dorsal view of nymph III. d, *Trichoribates trimaculatus* (C. L. Koch), dorsal view of nymph III. a, b,  $\times 100$ ; c,  $\times 95$ ; d,  $\times 115$ . (The indications  $K_1$  and  $PN_1$  have erroneously been interchanged).

punctate; at the posterior declivity it may be seen (especially in lactic acid) that this punctate structure is combined with a reticulate system.

The propodosoma (fig. 3 a) has a raised median part that is bordered at each side by an S-shaped ridge; the ridge starts in front of the lamellar hairs, curves to the outside, and forms a rounded projection that is at a distinctly higher level than the blunt rostrum, then it curves inward, after which it runs parallel with the outside of the propodosoma, and finally it curves inward near the exopseudostigmatic hair, and joins a low transverse ridge just along the insertions of the exopseudostigmatic and interlamellar hairs; from this transverse ridge some very faint, indistinct ridges run to the front. Between the first and the second legs there is a distinct projection with slightly rounded top.

Interlamellar hairs long and strong; exopseudostigmatic hairs very short; rostral hairs and lamellar hairs of medium size, generally curved. The legs are heterodactylous.

Hysterosoma shield-shaped. Anterior notogastral hairs rather short; PN<sub>1</sub>, and especially the third (E<sub>2</sub>) and the fifth (PN<sub>3</sub>) lateral hairs much longer and stronger.

Some of my specimens contain larvae, so that the species appears to be viviparous, which was also recorded for some other species of the genus.

The nymph of the species (fig. 3 b) shows a close resemblance to the adult, although it is paler, but the lateral, S-shaped ridges on the propodosoma are less strong, and the notogaster shows a wrinkled zone, containing the hairs D<sub>1</sub>, D<sub>2</sub>, E<sub>1</sub>, and E<sub>2</sub>.

*T. grandis* shows some resemblance to *T. glaber* sensu Willmann (1931). It is, however, at once recognizable by the S-shaped ridges on the propodosoma, the reticulate structure of the notogaster, and the greater length.

I collected the species in moss in a damp, wooded valley in the sand dunes.

## CAMISIIDAE

### **Camisia biverrucata** (C. L. Koch, 1839) (fig. 4 g)

*Nothrus biverrucatus* C. L. Koch, 1839, vol. 29 (15); Michael, 1888, p. 510, pl. 47 A figs. 6-10.

*Camisia fischeri*, Oudemans, 1900, p. 109, pl. 5 figs. 1-5.

*Camisia biverrucata*, Oudemans, 1901, p. 75; Sellnick, 1928 a, p. 20; Willmann, 1931, p. 109, figs. 57, 58.

Own material. Meyendel, A 70, 4 n.; A 72, 2 ad., 3 n.

Oudemans (1926, p. 347; 1929 a, p. 771; 1937, p. 2546) regards this species as identical with *Acarus scaber* Linnaeus; it appears, however, that the reasons for this identification are insufficient. With Jacot (1932, p. 59)

I consider it more probable that *Acarus scaber* is identical with *Nothrus segnis* Michael (= *Camisia exuvialis* Grandjean).

Oudemans described the species as *Camisia fischeri*, but later on (1901) he pointed out that his specimens were identical with *Camisia biverrucata*. I have studied the type specimen of *C. fischeri* (from Macognaga, Italy), and came to the conclusion that it is *C. biverrucata* indeed.

The nymph of this species resembles the nymph of *Camisia horrida* as it was figured by Michael (1888, pl. 47 fig. 3), but there appears to be a slight difference in the posterior part of the notogaster (fig. 4 g). In contradistinction to Michael's plate in my specimens of *C. biverrucata* the hairs PN<sub>2</sub> are smaller and not placed on large tubercles; whilst the hairs K<sub>1</sub> are slightly longer. My adult specimens measure: length 1.065-1.1000 mm; breadth 0.585 mm.

The species is new to our fauna. I collected my specimens in the sand dunes in moss at the foot of a birch and in dry litter of *Salix repens*. According to Willmann (1931) the species is "nur spärlich verbreitet".

#### **Camisia segnis** (Hermann, 1804) (= *bicarinata* auct.)

*Notaspis segnis* Hermann, 1804, p. 94, pl. 4 fig. 8, pl. 9 figs. X, Y.

*Nothrus bicarinatus* C. L. Koch, 1839, vol. 29 (16); Nicolet, 1855, p. 456, pl. 7 fig. 3; Berlese, 1885, vol. 17 (4); Michael, 1888, p. 514, pl. 47 A figs. 1-5.

*Nothrus* spec., Oudemans, 1896, p. 56 (no. 41).

*Camisia bicarinata*, Oudemans, 1900 d, pp. 151, 156; Sellnick, 1928 a, p. 20; Willmann, 1931, p. 110, figs. 60, 61; Buitendijk, 1945, p. 374.

*Camisia segnis*, Grandjean, 1936, p. 38, figs. 1, 2.

Oudemans Collection. Oosterbeek, Ruurloo, Hilversum.

Own material. Sint Pietersberg, A 116, 1 ad.

Localities from literature. Ruurloo, Plasmolen (Oudemans).

Most authors regarded *Nothrus segnis* C. L. Koch identical with *Notaspis segnis* Hermann; Grandjean, however, proved that *Nothrus bicarinatus* C. L. Koch is a synonym of Hermann's species, while *Nothrus segnis* C. L. Koch is a different species to which Grandjean gave a new name (*Camisia exuvialis*).

According to Grandjean (1936) *Camisia segnis* is an arboricolous mite. "Si on le rencontre à terre, dans les mousses, ce qui arrive souvent, c'est qu'il y est tombé". I collected my specimen in the soil of a thicket of *Prunus spinosa*.

#### **Camisia spinifer** (C. L. Koch, 1836)

*Nothrus spinifer* C. L. Koch, 1836, vol. 2 (18); Berlese, 1885, vol. 17 (3).

*Nothrus spiniger* Nicolet, 1855, p. 455, pl. 2 fig. 9, pl. 7 fig. 2; Michael, 1888, p. 497, pl. 48 figs. 7-13.

*Camisia spinifer*, Sellnick, 1928 a, p. 20; Willmann, 1931, p. 110, fig. 62; Noordam and De Vlieger, 1943, p. 10; Buitendijk, 1945, p. 374.

Oudemans Collection. Hilversum.

Own material. Dwingelo, A 2, 1 ad., 1 n. Lhee, A 3, 1 ad. "Staatsbossen" between Lhee and Spier, A 4, 1 n. Hooge Veluwe, A 32, 3 ad.; A 34, 1 ad.; A 35, 4 ad.; A 35 a, 3 ad., 1 n. Ossendrecht, A 88, 4 ad., 1 n.

Locality from literature. Hooge Veluwe (Noordam and De Vlieger).

I collected this species in the soil of forests, in epiphytic mosses, and in the heath (in moss and in *Cladonia*). According to Willmann (1931) this species is "überall verbreitet"; Cooreman (1941, p. 9) writes that it is "généralement répandue dans les mousses mais toujours en très petit nombre". Noordam and De Vlieger observed that during drought this species is absent from the upper layers.

### ***Camisia exuvialis* Grandjean, 1939**

*Nothrus segnis* C. L. Koch, 1839, vol. 30 (1); Berlese, 1885, vol. 17 (2); Michael, 1888, p. 517, pl. 48 figs. 1-6.

*Camisia segnis*, Sellnick, 1928 a, p. 20, fig. 43; Willmann, 1931, p. 110, fig. 63; Buitendijk, 1945, p. 374.

*Camisia exuvialis* Grandjean, 1939 a, p. 305.

*Uronothrus segnis*, Willmann, 1939, p. 432.

*Uronothrus kochi* Willmann, 1943, p. 226.

Oudemans Collection. Putten, Wageningen, The Hague.

Own material. Dwingelo, A 2, 1 ad.; Noordwijk aan Zee, A 56, 2 ad.

As I noted above, Grandjean (1936) drew attention to the fact that *Nothrus segnis* Koch is not the same species as *Notaspis segnis* Hermann, and therefore, in 1939, he renamed Koch's species *Camisia exuvialis*<sup>1)</sup>.

Willmann, who in 1939 (p. 432) used the name *Uronothrus segnis* (C. L. Koch) for the species, renamed it in 1943 (p. 226) *Uronothrus kochi* nom. nov. As, however, Grandjean's trivial name *exuvialis* has priority against Willmann's *kochi*, the latter becomes a synonym.

As to the generic name *Uronothrus* I want to remark that Berlese (1913, p. 98) erected it for *Nothrus segnis* (Herm.). The genus *Camisia* Von Heyden (1826), however, has the same species (*Notaspis segnis* (Herm.)) as type. Though in other papers Berlese used the name *Nothrus segnis* in Koch's sense, this does not alter the fact that he designated *Nothrus segnis* (Herm.) as the type, so that *Uronothrus* is a synonym of *Camisia*. At present I do not consider it necessary to create a new genus for *Camisia exuvialis*.

<sup>1)</sup> Balogh (1943, pp. 27, 113, pl. 5 fig. 4) apparently identifies the species as *Camisia biurus* (C. L. Koch).

I found my specimens in the heath (in moss and in *Cladonia*), and in moss in a cultivated fir wood in the sand dunes. According to Grandjean (1936, p. 41) this species is rare in France; Willmann (1943) mentions as range of distribution the greater part of Europe, "aber immer nur einzeln".

### **Nothrus palustris** C. L. Koch, 1839

*Nothrus palustris* C. L. Koch, 1839, vol. 29 (13); Nicolet, 1855, p. 457, pl. 7 fig. 6; Berlese, 1886, vol. 30 (4); Michael, 1888, p. 494, pl. 46 figs. 8-13; Sellnick, 1928 a, p. 19, figs. 40, 41; Willmann, 1931, p. 111, figs. 56, 65; Buitendijk, 1945, p. 375.

*Nothrus pallens* C. L. Koch, 1841, vol. 38 (4); Canestrini and Fanzago, 1877, p. 93; Oudemans, 1896, p. 56.

*Camisia palustris*, Oudemans, 1900 d, pp. 151, 156.

Oudemans Collection. Lochem, Haarlem, The Hague.

Own material. Mantinge, A 7, 1 ad., 1 lv. Denekamp, A 28, 2 n., 1 lv. Wilp, A 46, 2 ad., 2 n. Winterswijk, A 48, 1 ad.; A 51, 2 n. Neercanne, A 89, 1 n.; A 90, 2 n. Sint Pietersberg, A 104, 1 ad.; A 115, 1 ad.

Localities from literature. Lochem, Haarlem, The Hague (Oudemans).

According to Willmann (1931) the species lives "in sehr feuchten Moospolstern der Moore und Sümpfe, ist aber ziemlich selten"; Cooreman (1941) characterizes it as "un Oribate assez rare, qui ne vit que dans les endroits très humides en très petit nombre ou isolé."

My specimens as well as those from the Oudemans Collection were obtained from forest soils. I found the species in the Querceto-Betuletum, in the Querceto-Carpinetum, and in thickets of *Prunus spinosa* and *Crataegus*. In all these localities the soil was not very dry, but certainly also not extraordinarily moist.

### **Nothrus biciliatus** C. L. Koch, 1841

*Nothrus biciliatus* C. L. Koch, 1841, vol. 38 (2); Oudemans, 1929, p. 452; Willmann, 1930 a, p. 10, figs. 13-15; 1931, p. 111, fig. 66; Van der Hammen, 1950 a, p. 130, fig. 2.

*Camisia biciliata*, Oudemans, 1902 f, p. 54; 1904, p. 22, pl. 3 figs. 69-71.

Own material. Sint Pietersberg, A 114, 2 ad.

I recorded this species as new to our fauna in 1950; it is apparently rare as there are not many records of it in literature.

Oudemans (1904) definitely proved that the species is different from *Nothrus silvestris* Nic. His single slide of *N. biciliatus*, containing two specimens from San Remo, was later on studied by Willmann, who apparently was not aware of Oudemans' earlier publication concerning the species, for in 1930 he published a note on the species, based on the specimens from the Oudemans Collection, dealing with some details supplementary to Koch's description; in this note *Nothrus borussicus* Sellnick

(1928) was mentioned as a synonym. Later on, the figures of the cited paper, together with an up to that time unpublished drawing of the pseudostigmatic organ, appeared in "Die Tierwelt Deutschlands" (Willmann, 1931). These figures, however, are rather misleading. Oudemans described the pseudostigmatic organ as "lisse", Willmann as rough. Willmann's figure shows a pseudostigmatic organ with a rather large base, ending in a sharp point, and beset with rather long hairs, whilst in Oudemans' figure the organ is not tapering and not covered with hairs. As the specimens in the Oudemans Collection are damaged, I could study my own specimens only. In these the pseudostigmatic organ has the shape of a long hair and it is beset with minute hairs, that look like small teeth. Although never mentioned, these small hairs are also present in *Nothrus silvestris*, where they are, however, much smaller. The hairs on the posterior border of the hysterosoma are larger than those figured by Willmann.

Supplementary details (I refer to my earlier (Van der Hammen, 1950 a) figure). Measurements  $1.050 \times 0.500$  mm and  $1.035 \times 0.535$  mm. Length of the damaged specimens in the Oudemans Collection 0.865-1.015 mm.

Propodosoma and notogaster with a distinct reticulate structure that is much finer at the border of the hysterosoma, which part is distinctly separated from the centre of the notogaster by a narrow band without any reticulation.

The pseudostigmatic organ is rather short, 0.235 mm long, and beset with a few very small hairs. The rostral hairs are simple and thin, as mentioned by Willmann, and not clavate as figured by Oudemans. The greater part of the notogastral hairs<sup>1)</sup> are only slightly thickened, but the hairs near the posterior border ( $F_2$ ,  $K_1$ ,  $PN_1$ ,  $PN_3$ ) are more thickened, especially towards their ends;  $K_1$  and  $PN_1$  moreover are longer ( $1/10$  of the total length, just as in the specimens of the Oudemans Collection).

Willmann (1935) compared *Nothrus biciliatus* with *Nothrus borussicus*, and concluded that these are two different species. The length of the bristles at the posterior border of the hysterosoma in *N. borussicus* is  $1/5-1/7$  of the total length.

My specimens were collected in the litter of a thicket of *Prunus spinosa*.

### **Nothrus silvestris** Nicolet, 1855

*Nothrus silvestris* Nicolet, 1855, p. 458, pl. 7 fig. 4; Willmann, 1931, p. 111, fig. 67; Noordam and De Vlieger, 1943, p. 10; Van der Drift, 1949, p. 13; 1950, p. 82.

1) The homologisation of the hairs in the posterior part of the notogaster is difficult, as the derivation from the *Platynothrus* type is not easy. For the moment I follow my 1950 a notation, with the single alteration that  $PN_2$  has to be changed into  $PN_3$ .

- Nothrus anauniensis*, Berlese, 1885, vol. 17 (7).  
*Nothrus sylvestris*, Michael, 1888, p. 490, pl. 46 figs. 1-7.  
*Nothrus* spec., Oudemans, 1896, p. 56 (no. 40).  
*Camisia sylvestris*, *Camisia anauniensis*, Oudemans, 1900 d, p. 156.  
*Nothrus biciliatus*, Sellnick, 1928 a, p. 19.  
*Heminothrus silvestris*, Buitendijk, 1945, p. 375.

Oudemans Collection. Ruurloo, Haarlem.

Own material. Mantinge, A 7, 1 ad., 2 n. Oosterhesselen, A 13, 2 ad. Ootmarsum, A 24, 1 ad. Hooge Veluwe, A 32, 2 ad.; A 35, 4 ad., 4 n.; A 35a, 7 ad., 8 n., 1 lv.; A 38, 11 ad., 58 juv.; A 40, 1 ad., 1 n.; A 41, 1 n.; A 42, 1 ad. Wilp, A 44, 1 ad.; A 46, 2 ad. Winterswijk, A 49, 2 ad. Meyendel, A 68, 2 ad., 1 n. Breda, A 86, 1 ad. Neercanne, A 90, 1 ad. Sint Pietersberg, A 95, 1 n.; A 102, 1 ad., 2 n., 1 lv.; A 104, 1 n.; A 106, 5 n.; A 107, 1 ad., 2 n.; A 117, 2 ad.

Localities from literature. Langweer, Ruurloo, Lochem, Zutphen, Haarlem (Oudemans); Hooge Veluwe (Noordam and De Vlieger, Van der Drift).

The bidactylous form of this species has generally been named *anauniensis* Canestrini et Fanzago (1876, p. 99); most authors regard this form as a variety of *Nothrus silvestris*. In 1877 (p. 92, pl. 1 fig. 2) Canestrini and Fanzago gave a new description of their *Nothrus anauniensis*. I doubt whether this second description indeed refers to *Nothrus silvestris*, as the authors mentioned 1 mm as length, which is much larger than that of *Nothrus silvestris*, and points to *Nothrus biciliatus* or a related species.

*Nothrus anauniensis* Berlese is *N. silvestris* indeed. Turk (1946, p. 817) recorded *N. anauniensis* from Great Britain; it is not impossible that this record is based on *N. biciliatus* or a related species, as he regards the tridactylous (not bidactylous) condition of the legs as one of the specific characters.

With the exception of sample A 38 all specimens were collected in moss or litter in forests of different types. The specimens of sample A 38 were found in moss (*Leucobryum*) in the heath. Most authors record the species from forest soils. According to Van der Drift (1950) it has its greatest density in the F<sub>x</sub> layer; Noordam and De Vlieger (1943) remark that the species is absent from the upper layer during drought.

### ***Nothrus pratensis* Sellnick, 1928**

*Nothrus pratensis*, Sellnick, 1928 a, p. 19; 1929, p. 347, fig. 9; Willmann, 1931, p. III, figs. 64, 68.

Own material. Spier, A 5, 2 ad., 3 n. Hooge Veluwe, A 39, 6 n.

The species is new to our fauna. In the two localities I found the specimens in sphagnum. According to Willmann (1931) the species occurs "in Sphagnum der Moore und in anderen Sumpfmossen"; Cooreman (1941, p. 8) writes: "cette espèce est caractéristique des tourbières et des endroits marécageux".

**Platynothrus peltifer** (C. L. Koch, 1839)

- Nothrus peltifer* C. L. Koch, 1839, vol. 29 (9).  
*Nothrus palliatus* C. L. Koch, 1839, vol. 30 (4).  
*Nothrus bistriatus*, Nicolet, 1855, pl. 7 fig. 7; Berlese, 1885, vol. 17 (9).  
*Hermannia bistriata*, Michael, 1888, p. 462, pl. 42 figs. 8-14; Oudemans, 1900 d, p. 156.  
*Hermannia spec.*, Oudemans, 1896, p. 55 (nos. 34, 36).  
*Nothrus spec.*, Oudemans, 1896, p. 56 (nos. 39, 42).  
*Camisia palliata*, Oudemans, 1913 a, p. 282; 1915 b, p. 173, pls. 1, 2; Buitendijk, 1945, p. 374.  
*Platynothrus peltifer*, Sellnick, 1928 a, p. 20, fig. 42; Willmann, 1931, p. 112, figs. 69, 70; Noordam and De Vlieger, 1943, p. 10; Buitendijk, 1945, p. 375; Van der Drift, 1949, p. 13; 1950, p. 85; Geijskes, 1950, p. 240.

Oudemans Collection. Langweer, Zuidwolde. Assel near Apeldoorn, Arnhem, De Steeg, Lochem, Delden, Haarlem, Hilversum, Leiden, Burgst near Breda, Nuland near 's-Hertogenbosch.

Own material. Spier, A 5, 1 ad. Mantinge, A 7, 10 ad., 9 n.; A 11, 2 ad.; Oosterhesselen, A 12, 11 ad., 9 n. Brecklenkamp, A 17, 3 ad., 3 n. Lattrop, A 18, 1 n.; A 19, 1 ad., 5 n.; A 20, 1 n. Ootmarsum, A 22, 6 n.; A 23, 2 ad., 1 n.; A 24, 4 ad., 15 n., 1 lv. Denekamp, A 25, 12 ad., 8 n.; A 26, 5 ad., 4 n.; A 27, 35 ad., 20 n.; A 28, 4 n. De Lutte, A 29, 168 ad., 45 n.; A 30, 16 ad., 40 n. Hooge Veluwe, A 32, 3 ad.; A 35, 3 ad., 5 n.; A 35 a, 1 ad., 1 n.; A 39, 1 ad.; A 40, 6 ad., 8 n.; A 41, 8 n.; A 42, 3 ad., 7 n. Winterswijk, A 47, 10 ad., 4 n., 1 lv.; A 48, 3 ad.; A 51, 10 ad., 2 n. Texel, A 55, 1 ad. Meyendel, A 59, 6 ad.; A 66, 1 n.; A 68, 4 ad., 52 juv. Maasland, A 75, 7 juv.; A 76, 1 ad., 2 n.; A 77, 2 n. Rockanje, A 83, 1 ad.; A 84, 13 ad. Lekkerkerk, A 85, 1 ad. Neercanne, A 89, 7 n. Sint Pietersberg, A 101, 3 ad., 3 n.; A 107, 2 n., A 114, 32 ad., 8 n., 6 lv.; A 115, 36 ad., 12 n., 7 lv.; A 116, 30 ad., 7 n., 4 lv.

Localities from literature. Langweer, De Steeg, Brummen, Zutphen, Lochem, Ruurloo, Delden, Haarlem, The Hague, Bergen op Zoom, Valkenburg (Oudemans); Hooge Veluwe (Noordam and De Vlieger, Van der Drift); Griend (Geijskes).

Nicolet figured the adult of the species; in the explanation of his pl. 7 fig. 7 he named it *Nothrus bistriatus*, but in the text he gave no description. On p. 397 he cited *Nothrus bistriatus* Koch as a synonym of *Nothrus palustris*, the former being the "larve" (represented on pl. 2 fig. 10) of the latter. The figure, however, certainly does not resemble the nymph of *N. palustris*; it may be the nymph of *P. peltifer*, but in that case the drawing is very bad. The question becomes still more complicated as Nicolet on p. 397 gave an explanation of pl. 2 fig. 10 as "larve du *Nothrus sylvestris*" (*sylvestris* written this time with an y!); here he cited *Nothrus palliatus* Koch as a synonym.

*Platynothrus peltifer* is a common species; I collected it in various surroundings: forest soils, sphagnum, meadows, and hayfield; in an alder swamp near the source of a brook the species was extraordinarily numerous.

In literature this species is regarded as requiring a great deal of moisture (Haarløv, 1942, p. 36; Hammer, 1946, p. 11; Weiss-Fogh, 1948, p. 215). According to Cooreman (1947, p. 12) "il exige, en tous cas, un degré



d'humidité voisin de la saturation". On the other hand, Noordam and De Vlieger (1943, p. 15) concluded that *P. peltifer* is one of the species that are proof against dryness. According to Van der Drift (1950, p. 85) the adult as well as the juvenile animals have a pronounced preference for the upper layers of the litter. "This species, adapted to the climatic most extreme litter layer, is less sensible to desiccation and frost and in contrast to most Oribatei it is still present in  $F_0$  and  $F_1$  in great drought and frost".

These statements taken together lead to the conclusion that *P. peltifer* is rather indifferent to humidity.

### **Heminothrus targionii** (Berlese, 1885) (fig. 4 e, f)

*Nothrus Targionii* Berlese, 1885, vol. 17 (8); Michael, 1888, p. 488, pl. 47 a fig. 11.  
*Heminothrus targionii*, Sellnick, 1928 a, p. 21, fig. 44; Willmann, 1931, p. 113, fig. 74; Van der Hammen, 1949, p. 119.

Own material. Sint Pietersberg, A 102, 14 ad., 14 n., 1 lv.; A 105, 20 ad., 3 n.

The nymph of this species is covered with secretion and dirt. The propodosoma resembles that of the adult. In the anterior part only the rather coarse punctate structure that is characteristic of the adult is distinctly visible.

The hysterosoma of the nymph is more or less rectangular; the central part of the dorsum is concave. The hairs  $C_1$ ,  $C_2$ ,  $D_1$ ,  $D_2$ , and  $E_1$  are very small (fig. 4 f), whilst the hairs  $C_3$ ,  $D_3$ ,  $E_2$ ,  $F_2$ ,  $OP_1$ ,  $PN_3$ ,  $K_1$ , and  $PN_2$  (fig. 4 e, f) are rather strong and beset with small hairs;  $D_3$  and  $E_2$  are situated on low elevations. The shape of the posterior border of the hysterosoma resembles that of the adult.

I collected my specimens in two forests (Querceto-Carpinetum) on the Sint Pietersberg; the species at that time appeared to be new to our fauna (Van der Hammen, 1949). It seems to occur rather locally, as both Michael and Willmann mention one locality only.

## HERMANNIIDAE

### **Hermannia gibba** (C. L. Koch, 1839)

*Nothrus gibbus* C. L. Koch, 1839, vol. 29 (4).  
*Hermannia crassipes*, Nicolet, 1855, p. 469, pl. 9 fig. 4.  
*Nothrus piceus*, Berlese, 1886, vol. 33 (6).  
*Hermannia picea*, Michael, 1888, p. 448, pl. 41 figs. 1-9.  
*Hermannia gibba*, Oudemans, 1896, p. 55; Sellnick, 1923 a, p. 5; 1928 a, p. 18, fig. 35; Willmann, 1931, p. 114, fig. 77; Noordam and De Vlieger, 1943, p. 10.  
*Hermannia convexa*, *Hermannia reticulata*, Oudemans, 1900 d, p. 156.  
*Hermannia gibbus*, Buitendijk, 1945, p. 375.

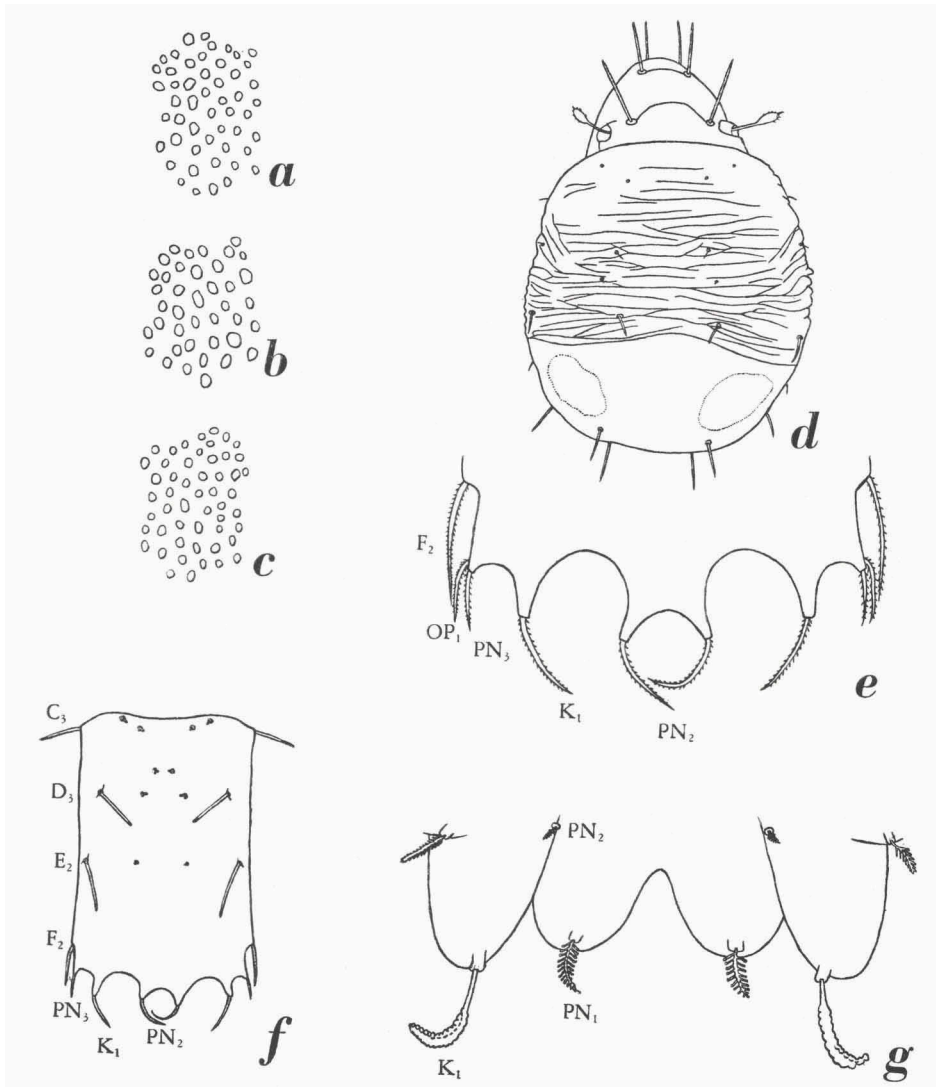


Fig. 4. a-c, structure of the notogaster of: a, *Nanhermannia comitalis* Berlese; b, *Nanhermannia elegantula* Berlese; c, *Nanhermannia nana* (Nicolet). d, *Trhypochthonius cladonicola* Willmann, dorsal view of nymph II. e, f, *Heminothrus targionii* (Berlese), nymph III: e, dorsal view of the posterior part of the notogaster; f, dorsal view of the notogaster. g, *Camisia biverrucata* (C. L. Koch), nymph III, dorsal view of the posterior part of the notogaster. a-d, g,  $\times 175$ ; e,  $\times 165$ ; f,  $\times 65$ .

Oudemans Collection. Arnhem, Ruurloo, Delden.

Own material. Mantinge, A 9, 49 ad., 33 n., 20 lv.; A 10, numerous specimens. Brecklenkamp, A 17, 3 n. Hooge Veluwe, A 40, 3 ad., 1 lv.; A 41, 12 ad., 4 n., 1 lv.; A 42, 3 ad., 1 n., 2 lv.; A 43, 2 ad., 3 n. Wilp, A 46, 3 ad., 3 n. Winterswijk, A 47, 4 ad., 1 n.; A 49, 1 ad. Sint Pietersberg, A 102, 4 ad.; A 104, 2 ad., 1 n.; A 117, 5 ad., 1 n.

Localities from literature. Warnsveld, Ruurloo, Delden (Oudemans); Hooge Veluwe (Noordam and De Vlieger).

I collected this species in forests (belonging to the Querceto-Carpinetum and the Querceto-Betuletum) only, where I found my specimens in moss and in litter. The species occurred very abundantly in moss at the foot of oak and birch trees in the forest near Mantinge (A 9, A 10).

According to Willmann (1931) the species occurs "im Moos und Humus der Wälder"; Noordam and De Vlieger (1943) found it in greater numbers on the northern slope of the hill investigated by them than on the southern.

### **Hermannia scabra** (L. Koch, 1879)

*Nothrus scaber* L. Koch, 1879, p. 113, pl. 3 fig. 24.

*Hermannia nodosa* Michael, 1888, p. 452, pl. 41 figs. 10, 11.

*Hermannia scabra*, Sellnick, 1923 a, p. 6; 1928 a, p. 18; Willmann, 1931, p. 114, figs. 79, 80; Geijskes, 1950, p. 240.

*Hermannia* spec. (p. p.), Buitendijk, 1945, p. 375.

Oudemans Collection. Putten, Zeeburg.

Locality from literature. Griend (Geijskes).

This species occurs in the northern part of Europe (Sellnick, 1949, p. 126). According to the data in literature it is found in dry as well as in moist localities. The specimens in the Oudemans Collection were collected on the shore of the former Zuyderzee, and in Putten in a beer jug. Halbert's (1915, p. 104) specimens were "abundant under stones on the sea shore just above high-water mark".

## CYMBAEREMAEIDAE

### **Micreremus brevipes** (Michael, 1888)

*Eremaeus brevipes* Michael, 1888, p. 475, pl. 44 figs. 12-19.

*Eremaeus minimus* Berlese, 1890, vol. 58 (9).

*Micreremus brevipes* Sellnick, 1928 a, p. 25, fig. 55; Willmann, 1931, p. 117, figs. 86, 90; Buitendijk, 1945, p. 376.

Oudemans Collection. Wolfheze, Burgst near Breda.

Own material. Neercanne, A 91, 1 ad.; A 92, 9 ad., 1 n.

In our country this species seems to occur only locally, I found my specimens in moss on oaks; Willmann also recorded it from moss and lichens, especially on oaks; according to Michael (l.c., p. 478) the species

is sometimes found "in considerable numbers on the foliage of trees, particularly oaks, about May".

### **Cymbaeremaeus cymba** (Nicolet, 1855)

*Eremoeus cymba* Nicolet, 1855, p. 452, pl. 10 fig. 3.

*Eremaeus cymba*, Berlese, 1886, vol. 33 (10); Michael, 1888, p. 470, pl. 44 figs. 1-11; Oudemans, 1896, p. 56.

*Cymbaeremaeus cymba*, Oudemans, 1900 d, pp. 151, 156; Sellnick, 1928 a, p. 25, fig. 56; Willmann, 1931, p. 118, figs. 87, 91; Grandjean, 1932, p. 293; Buitendijk, 1945, p. 376.

*Cymbaeremaeus pulvillifer* Willmann, 1931 b, p. 335.

Oudemans Collection. Brummen, Haarlem.

Own material. Mantinge, A 9, 1 n. Hooge Veluwe, A 41, 1 ad. Winterswijk, A 47, 1 ad. Neercanne, A 92, 1 n. Sint Pietersberg, A 97, 1 n.; A 106, 1 n.; A 116, 1 ad. Localities from literature. Zutphen, Brummen, Haarlem (Oudemans).

Willmann (1931 b) described the nymph of this species as *C. pulvillifer*, regarded by him as a new species, as it seemed to be different from the nymph of *C. cymba* as described and figured by Michael. Grandjean (1932), however, pointed out that Michael's description is inexact, and that *C. pulvillifer* Willmann in reality is the nymph of *C. cymba*.

I found my specimens in the soil of forests and in moss on trees (at the foot as well as higher on the trunk and on the branches). In literature the species is recorded from forests, from the soil as well as from the trees.

### **Scapheremaeus palustris** Sellnick, 1924

*Cymbaeremaeus (Scapheremaeus) palustris* Sellnick, 1924, p. 68, figs. 6-9.

*Scapheremaeus palustris*, Sellnick, 1928 a, p. 25, fig. 57; Willmann, 1931, p. 118, figs. 88-89; Buitendijk, 1945, p. 376.

Oudemans Collection. Arnhem.

Up till now the species was found in our country only once; this specimen, collected from a pond, is in the Oudemans Collection. Sellnick found the species in moss in a marsh in Eastern Prussia. In literature there are only few records of *S. palustris*.

## BELBIDAE

### **Amerus troisi** (Berlese, 1883)

*Belba Troisii* Berlese, 1883, vol. 3 (5).

*Amerus troisii*, Sellnick, 1928 a, p. 31, fig. 72; Willmann, 1931, p. 119, figs. 82, 93; Buitendijk, 1945, p. 376.

Oudemans Collection. The Hague.

As Berlese noted that the species was dedicated to Mr. E. Trois, I have

corrected the trivial name *Troisii* to *troisi* according to the decision of the International Commission on Zoological Nomenclature (Bull. Zool. Nomencl., vol. 4, p. 68).

*A. troisi* appears to be a rare species of which only few records exist. The only specimen known from the Netherlands is in the Oudemans Collection; it was obtained from compost.

### **Belba corynopus** (Hermann, 1804)

*Notaspis corynopus* Hermann, 1804, p. 89, pl. 4 fig. 2.

*Damaeus sufflexus* Michael, 1888, p. 415, pl. 34 figs. 9, 10.

*Oribata sufflexus*, Sellnick, 1928 a, p. 32.

*Belba corynopus*, Willmann, 1931, p. 122, figs. 108, 109; Grandjean, 1936, p. 56, figs. 4-7.

Own material. Denekamp, A 28, 5 ad., 1 n. Winterswijk, A 48, 3 ad.; A 51, 6 ad., 3 n., 2 lv.

Grandjean gave an excellent description of the species based on material from the type locality. In his opinion *Damaeus sufflexus* Michael is a quite different species, but Dr. Evans kindly wrote to me that this supposition is erroneous as Michael's material appears to be conspecific with *Belba corynopus*.

The species is new to our fauna. I collected it in the litter of forests (Querceto-Carpinetum) along brooks in the eastern part of our country. According to Grandjean it is a species of very local distribution that prefers damp surroundings and does not fear to be submerged.

### **Metabelba**

The genus *Metabelba* contains a number of species that in my opinion have often been confounded by earlier authors; a revision of these species is badly needed. In the first place a reinvestigation is necessary of the species that has generally been recorded as *Belba* or *Metabelba pulverulenta* (I have been able to study this species thanks to Dr. K. Strenzke, who kindly sent me specimens from Holstein). According to Grandjean (1936, p. 56) *Belba pulverulenta* auct. is different from *Nothrus pulverulentus* C. L. Koch, as Koch's figure of the notogastral bristles shows a close resemblance to those of *Porobelba spinosa* (Sellnick). In Grandjean's opinion *M. pulverulenta* auct. is identical with *Damaeus papillipes* Nicolet; a reinvestigation of the two species is, however, necessary<sup>1)</sup>.

1) An example of a recent indistinct record is that of Turk and Turk (1952, p. 503); these authors mention a species new to Britain that they name *Porobelba pulverulenta* (Koch), whilst they refer to Koch as well as to Willmann and Sellnick. It is evident that they confounded Grandjean's opinion that *Nothrus pulverulentus* C. L. Koch is a

Michael's *Damaeus verticillipes* (non *D. verticillipes* Nicolet) has generally been regarded as a synonym of *M. pulverulenta* auct.; from Michael's description can be derived, however, that his material consisted of more than one species that he could not sufficiently distinguish from each other. As Michael's *D. verticillipes* is not identical with Nicolet's *D. verticillipes*, Oudemans (1900 d, pp. 156, 169) proposed the name *Oribata michaeli*, a name that generally also occurs in the list of synonyms of *M. pulverulenta*. I studied the specimens identified by Oudemans as *Belba michaeli*, originating from Haarlem, and recorded by him in the above mentioned paper (1900 d); the material appeared to be completely damaged, so that the identity remains doubtful, but, at any rate, the specimens distinctly show chitinous knobs on the propodosoma just in front of projections under the anterior border of the notogaster, a character that is absent in *M. pulverulenta* auct.; it is probable that Oudemans' material is closely related to the species that I describe below as *Metabelba cremersi* nov. spec.

A specimen in the Oudemans Collection from Nuland near Den Bosch, identified by Oudemans as *Belba pulverulenta*, is closely related to, or identical with *Metabelba sphagni* Strenzke; the specimen is, however, too much damaged to be identified with certainty.

I obtained a specimen of an allied *Metabelba* species from a damp heath; it is also closely related to *Metabelba sphagni*, but Dr. Strenzke, who studied my specimen, stated that it is not identical; the specimen is however, too much damaged to be described, so that I shall try to collect new specimens at the same locality.

Two forms of the genus have to be described as new species.

### ***Metabelba cremersi* nov. spec. (fig. 5 a-e) <sup>1)</sup>**

Own material. Hooze Veluwe, A 42, 1 ad. Meyendel, A 65, 1 ad.; A 66, 16 ad.; A 68, 12 ad. Sint Pietersberg, A 114, 1 ad.; A 116, 3 ad. (holotype in sample A 66).

Length 0.415-0.470 mm; width 0.260-0.315 mm. Colour reddish brown, legs and hairs slightly lighter. The specimens are strongly covered with cerotegument.

Rostrum blunt (fig. 5 c). Propodosoma between the first and the second legs with a projection that is generally pointed, but that in older specimens may be slightly blunt. Posterior part of the propodosoma with a pair of

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*Porobelba* with the general opinion that the species is a *Metabelba*, whilst they appear to have overlooked Michael's record of *Damaeus verticillipes*, a species that might prove to be partly synonymous with *M. pulverulenta* sensu Kulczynski.

1) Dedicated to the late Rector Jos. Cremers, who has done such valuable work in promoting the biological investigation of the province of Limburg.

chitinous knobs (fig. 5 a, c) opposite to a pair of teeth under the anterior border of the notogaster.

Notogaster with rather long hairs that are not strongly curved; length of

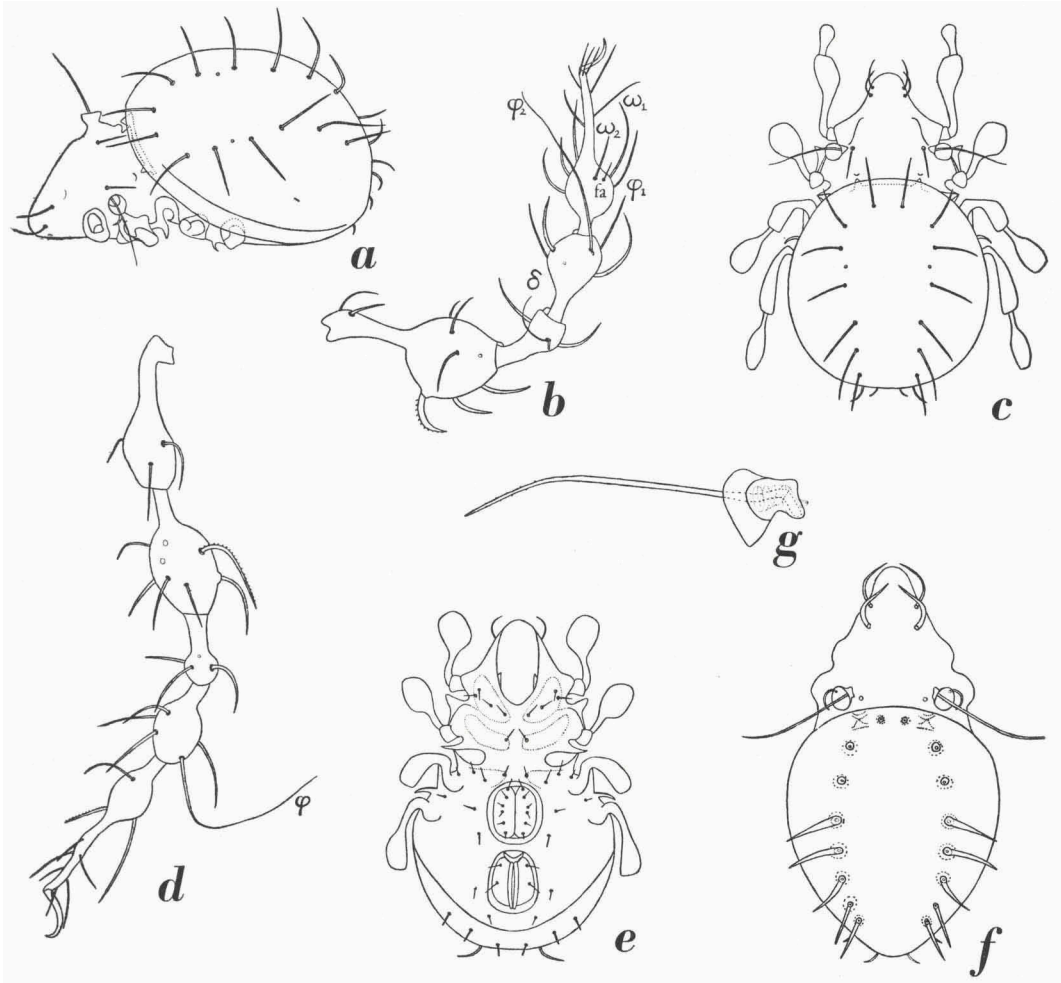


Fig. 5. a-c, *Metabelba cremersi* nov. spec.: a, lateral view; b, first leg seen from the outside (the indication  $\delta$  has to be corrected into  $\sigma$ ); c, dorsal view; d, fourth leg seen from the outside; e, ventral view. f, g, *Metabelba lanceolata* nov. spec.: f, dorsal view; g, pseudostigmatic organ. a, c, e, f,  $\times 100$ ; b, d,  $\times 200$ ; g,  $\times 280$ .

the hairs greater than the distance between two successive hairs of a row. There are no spinae adnatae.

The hairs of the ventral surface (fig. 5 e) are rather long and distinct. Genital and anal openings are situated close to each other.

The femora of the first and the fourth legs (fig. 5 b, d) each show a strong, serrate hair. The solenidion of genu I is rather long and curved, and coupled with a short, thick and blunt protective hair. Tibia IV has a long, curved solenidion.

The species shows a superficial resemblance with *M. pulverulenta* auct., but this species has no knobs in the posterior part of the propodosoma and no corresponding teeth under the anterior border of the notogaster; further, in the specimens of *M. pulverulenta* that I studied the notogastral hairs are shorter and more strongly curved, whilst the second pair of these hairs are inserted more to the front; finally, the hairs of the legs of *M. pulverulenta* are also more strongly curved.

*M. cremersi* is related to *Oribata propexus* Kulczynski (1902, p. 33, pl. 3 fig. 15, pl. 4 figs. 58, 59), but this species is larger, has two pairs of knobs in the posterior part of the propodosoma, and the notogastral hairs are shorter, whilst both rows stand closer to each other.

I repeatedly collected *M. cremersi* in birch woods in the sand dunes and in thickets of *Prunus spinosa* and *Crataegus*; further once in an oak wood (Querceto-Betuletum). In Meyendel the species was found to occur in the lower litter layers.

***Metabelba lanceolata* nov. spec. (fig. 5 f, g)**

Own material. Lattrop, A 19, 1 ad. (holotype).

I obtained a single specimen of this species, but tibiae and tarsi of the legs, and a number of notogastral spines are lacking; moreover the specimen is cracked in various parts of the body. Nevertheless the species is so characteristic that it cannot be confounded with any of the known Belbidae.

On account of the absence of the tibiae it is not possible to determine with certainty to what genus the species belongs. For the present I contribute it to *Metabelba* as it shows a good deal of accordance with this genus.

Length 0.510 mm. Colour clear brown. Pseudostigmatic organ (fig. 5 g) 0.165 mm long, rather strong, pointed, distal part rough and slightly curved. Notogaster (fig. 5 f) with very characteristic, strong, broad, yellowish spines, that in dorsal view appear as lanceolate; the spines are inserted on distinct elevations. Under the anterior border of the notogaster, at each side, two projections are visible that stand opposite to each other. Genital and anal openings are at some distance of each other.

I collected the species in very damp sphagnum at the border of a pool.



**Damaeus auritus** C. L. Koch, 1836

- Damaeus auritus* C. L. Koch, 1836, vol. 2 (11); Grandjean, 1943 a, p. 415.  
*Oribata gracilipes* Kulczynski, 1902, p. 22, pl. 3 fig. 7, pl. 4 figs. 40, 41; Sellnick, 1928 a, p. 32.  
*Belba gracilipes*, Willmann, 1931, p. 120, figs. 101, 102; Buitendijk, 1945, pp. 377.  
 Oudemans Collection. Denekamp.  
 Own material. Sint Pietersberg, A 116, 1 ad., 1 n., 1 lv.; A 117, 4 ad.

Grandjean pointed out that *Oribata gracilipes* Kulczynski is conspecific with *Damaeus auritus* Koch. In the Oudemans Collection the species was identified as *Belba gracilipes*; a slide containing a *Damaeus* species from the same locality (Denekamp) and date, identified by Oudemans as *Belba clavipes*, is in a bad state of preservation and undeterminable; it is, however, not impossible that it also contains *D. auritus*.

*D. auritus* appears to be rare in our country just as in Germany (Willmann). I collected a few specimens in the litter of a forest (*Querceto-Carpinetum*), and in that of a thicket of *Prunus spinosa*.

**Damaeus riparius** Nicolet, 1855

- Damaeus riparius* Nicolet, 1855, p. 461, pl. 8 fig. 5.  
*Oppia aurita*, Oudemans, 1900 d, p. 156.  
*Oribata riparius*, Kulczynski, 1902, p. 26, pl. 3 fig. 10, pl. 4 figs. 44, 45; Sellnick, 1928 a, p. 33.  
*Belba riparia*, Willmann, 1931, p. 120, fig. 98.  
*Belba aurita*, Buitendijk, 1945, p. 6.  
 Oudemans Collection. Haarlem.  
 Locality from literature. Haarlem (Oudemans).

Oudemans identified his specimens of the species as *Belba aurita*; they appeared, however, to belong to *D. riparius*. Nicolet's description of the species is not very distinct, but according to Grandjean (1943 a, p. 416), who studied the Oribatei of the environments of Paris, Kulczynski's excellent description of *Oribata riparius* indeed refers to the species.

Oudemans (1920, p. 260) recorded a damaged specimen of *Oribata riparius* from Oosterbeek; as it is no more in the collection I am not certain whether this identification is correct.

According to Strenzke (1950 b, p. 65) the species occurs in "feuchten Waldwiesen und Laubwäldern"; the specimens in the Oudemans Collection were obtained from decaying leaves.

**Damaeus verticillipes** Nicolet, 1855

- Damaeus verticillipes* Nicolet, 1855, p. 462, pl. 8 fig. 2.  
*Belba* sp., Oudemans, 1896, p. 55.  
*Belba torva*, Oudemans, 1897, p. 184, pl. 10 figs. 20-23.

*Oribata verticillipes*, Oudemans, 1900 d, pp. 151, 156, 169; Kulczynski, 1902, p. 28, pl. 3 fig. 16, pl. 4 figs. 48, 49; Sellnick, 1928 a, p. 33.

*Belba verticillipes*, Willmann, 1931, p. 121, figs. 102-105; Noordam and De Vlieger, 1943, p. 10; (p.p.) Buitendijk, 1945, p. 377.

*Belba* cf. *verticillipes*, Van der Drift, 1950, p. 85.

Oudemans Collection. De Steeg, Delden, Lochem, Loosduinen, Breda, Burgst near Breda.

Own material. Hooge Veluwe, A 32, 2 ad.; A 35, 3 ad., 2 n.; A 35 a, 7 ad., 1 n.; A 40, 1 lv.; A 41, 3 ad.; A 42, 3 ad., 1 n., 1 lv. Wilp (Gld.), A 44, 2 ad., 1 n., 2 lv. Meyendel, A 65, 2 ad.; A 68, 34 ad., 6 n. Breda, A 86, 1 n. Neercanne, A 89, 3 ad.

Localities from literature. De Steeg, Delden, Lochem, Loosduinen (Oudemans); Hooge Veluwe (Noordam and De Vlieger, Van der Drift).

I collected the species in the litter of forests (Querceto-Carpinetum, Querceto-Betuletum, beech forest, birch wood in the sand dunes) and in moss in a fir wood. According to Van der Drift the species has its optimum in F<sub>0</sub> and F<sub>1</sub>. My data on the habitat accord with those of Nicolet and Kulczynski; in Holstein Strenzke (1950 b, p. 65) obtained the species from "Röhrichten und hygrophilen Süssgraswiesen" only.

### **Damaeus glabriseta** (Willmann, 1930)

*Belba glabriseta* Willmann, 1930 a, p. 3, figs. 3, 4.

*Belba verticillipes* (p.p.), Buitendijk, 1945, p. 377.

Oudemans Collection. Bergen (Noord Holland), Nederweert.

Localities from literature. Bergen, Nederweert (Willmann).

Willmann described the species after specimens in the Oudemans Collection that Oudemans had identified as *Belba verticillipes*; the slide in the Oudemans Collection still bears this name, so that it was recorded as *B. verticillipes* in the preliminary catalogue (Buitendijk, 1945). The type material are the only specimens known from our country; they were collected in moss, and in moss in the sand dunes. Strenzke (1950 b, p. 65) recorded the species from moss on roofs.

### **Damaeus onustus** C. L. Koch, 1841

*Damaeus onustus* C. L. Koch, 1841, vol. 38 (7); Grandjean, 1943 a, p. 411.

*Damaeus geniculatus*, Michael, 1888, p. 428, pl. 39 figs. 1-9.

*Oribata geniculata*, Oudemans, 1900 d, p. 156; 1902 e, p. 2.

*Oribata geniculatus*, Kulczynski, 1902, p. 19, pl. 3 figs. 2-4, pl. 4 figs. 36, 37; Sellnick, 1928 a, p. 33, fig. 74.

*Belba geniculosa* Oudemans, 1929, p. 452; Willmann, 1931, p. 122, fig. 106; Buitendijk, 1945, p. 377.

Oudemans Collection. Denekamp, The Hague, Breda, Meerssen, Houthem (Limburg), Valkenburg (Limburg).

Own material. Mantinge, A 7, 1 ad., 5 lv. Wilp (Gld.), 16.VIII.1951, leg. Jhr. W.

C. van Heurn, 11 ad., 4 juv. Sint Pietersberg, A 107, 1 ad.; A 114, 1 ad., 1 n. Vijlen (Limburg), 25.V.1949, 9 ad. Gronsveld, 13.IX.1951, 4 ad.

Localities from literature. Nijkerk, Valkenburg (Limburg).

Grandjean pointed out that the species has to bear the name *D. onustus* Koch. Koch described the species as "die grösste Art dieser Gattung"; it is strange that Oudemans (1937, p. 2594) concluded from the description that it should be one of the smaller species of the genus.

The greater part of our specimens originate from southern Limburg. In the remaining parts of our country the species appears to occur only locally. I collected *D. onustus* in the litter of forests (Querceto-Betuletum, Querceto-Carpinetum); once I received specimens found on a dead branch covered with fungi.

### **Damaeus clavipes** (Hermann, 1804)

*Notaspis clavipes* Hermann, 1804, p. 88, pl. 4 figs. 7, D, E, pl. 9 figs. U, V.

*Damaeus nodipes* C. L. Koch, 1839, vol. 30 (6).

*Damaeus auritus*, Nicolet, 1855, p. 462, pl. 8 fig. 3.

*Damaeus clavipes* Michael, 1888, p. 423, pl. 38 figs. 1-8; Grandjean, 1936, p. 69.

*Belba geniculata*, Oudemans, 1896, p. 55; 1897, p. 181, pl. 10 figs. 16-19.

*Oribata clavipes*, Oudemans, 1900d, pp. 151, 156; Kulczynski, 1902, p. 15 (21), pl. 3 figs. 5, 6, pl. 4 figs. 38, 39; Sellnick, 1928a, p. 33.

*Belba clavipes*, Willmann, 1931, p. 122, fig. 107; Buitendijk, 1945, p. 376.

Oudemans Collection. Sneek, Arnhem, Lochem, Zeeburg near Amsterdam, Haarlem, Rotterdam, Burgst near Breda.

Own material. Mantinge, A 9, 1 ad. Denekamp, A 26, 1 ad., 2 n., 2 lv. Winterswijk, A 48, 2 ad.; A 51, 1 ad. Meyendel, A 66, 1 ad., 2 n.; A 67, 1 lv. Sint Pietersberg, A 102, 2 ad.; A 113, 1 lv.; A 114, 2 ad., 2 n., 1 lv.; A 116, 6 ad., 5 n., 2 lv.; A 117, 1 ad., 2 n., 4 lv.

Localities from literature. Sneek, Lochem, Maarsbergen, Haarlem, The Hague (Oudemans).

According to Grandjean the main habitat of the species is the bark of trees or old stumps (covered with moss or not). I collected the species in litter, and in moss at the foot of trees in forests (Querceto-Carpinetum, Querceto-Betuletum, birch wood in the sand dunes), in litter of thickets of *Prunus spinosa*, and in moss in a birch and alder marsh.

### **Dameobelba minutissima** (Sellnick, 1920)

*Oribata* (?) *minutissimus* Sellnick, 1920, p. 40.

*Oribata* (*Dameobelba*) *minutissimus*, Sellnick, 1928a, p. 33.

*Belba* (*Dameobelba*) *minutissima*, Willmann, 1931, p. 124, figs. 118, 119.

*Belba minutissima*, Van der Drift, 1950, p. 85.

Own material. Mantinge, A 7, 1 ad.

Locality from literature. Hooge Veluwe (Van der Drift).

I collected a single specimen of *D. minutissima* in the litter of a forest (Querceto-Betuletum). Van der Drift recorded the species from "De Hooge Veluwe"; according to him it has a preference for the F<sub>x</sub> layer.

#### LICNEREMAEIDAE

##### **Licnodamaeus pulcherrimus** (Paoli, 1908)

*Licneremaeus pulcherrimus* Paoli, 1908, p. 84, pl. 5 figs. 36, 53.

*Licnodamaeus pulcherrimus*, Grandjean, 1931 a, p. 230.

Own material. Meyendel, A 65, 2 ad.; A 70, 3 ad.; A 74, 1 ad.

Dr. Grandjean had the kindness to send me specimens of *L. pulcherrimus* from southern Europe, among which there are some from the gardens of Boboli at Florence, the type locality. A comparison of my specimens with those received from southern Europe showed that they undoubtedly belong to the same species.

According to Grandjean the species is common in southern Europe where it lives in "débris végétaux à terre ou dans les mousses". There are only a few records of more northern localities; Grandjean wrote to me that he found the species also near Strassburg and near Paris; Willmann (1949, p. 130) recorded it from Ciechocinek (Poland). I collected the species, that appears to be new to our fauna, in dry litter of *Salix repens*, of *Populus*, and of an oak tree at the border of a birch wood in the sand dunes.

#### EREMAEIDAE

##### **Suctobelba trigona** (Michael) f. **granulata** nova forma

*Suctobelba trigona*, Paoli, 1908, p. 74, pl. 4 fig. 31, pl. 5 fig. 50; Sellnick, 1928 a, p. 34, fig. 78; Willmann, 1931, p. 128, fig. 130; Strenzke, 1951 c, p. 148, fig. 1.

Own material. Ootmarsum, A 23, 1 ad. (holotype). Lekkerkerk, A 85, 1 ad. Neercanne, A 91, 1 ad. Sint Pietersberg, A 106, 1 ad.

Forsslund (1941, p. 385) and Strenzke (l.c.) drew attention to the fact that there exists a difference between the descriptions by Paoli, Sellnick, and Willmann on the one hand, and the original description by Michael (1888, p. 396, pl. 28 fig. 16) on the other; Michael described the median part of the propodosoma as smooth, which corresponds with Forsslund's specimens, whilst Paoli, Sellnick, and Willmann figure specimens of which this part is granulate. In the greater part of Strenzke's specimens (Strenzke, l.c.) the median part is also granulate, but in one locality he collected smooth specimens; the last mentioned as well as Forsslund's specimens were collected in humus. My specimens have a granulate propodosoma and together

with the corresponding specimens of Paoli, Sellnick, Willmann, and Strenzke I regard them as belonging to a special form, that I propose to name *Suctobelba trigona* f. *granulata*.

The species is new to our fauna; I collected it in moss at the foot of trees, and in moss on the steep bank of a brook.

#### **Suctobelba acutidens** Forsslund, 1941

*Suctobelba acutidens* Forsslund, 1941, p. 391, fig. 6; Strenzke, 1951 c, p. 151, fig. 6.  
Own material. Hooge Veluwe, A 35, 2 ad.

The species is new to our fauna; I collected two specimens in the soil of a beech forest. According to Forsslund it occurs in the F- and H-layers.

#### **Suctobelba sarekensis** Forsslund, 1941

*Suctobelba cornigera*, Trägårdh, 1910, p. 512, figs. 278-281.  
*Suctobelba sarekensis* Forsslund, 1941, p. 392, fig. 8; Strenzke, 1951 c, p. 154, fig. 10.  
Own material. Meyendel, A 70, 1 ad.

I collected a single specimen of the species (that is new to our fauna) in the sand dunes in litter of *Salix repens*.

#### **Suctobelba subcornigera** Forsslund, 1941

*Suctobelba subcornigera* Forsslund, 1941, p. 394, fig. 9; Strenzke, 1951 c, p. 155, fig. 12.

Own material. Mantinge, A 7, 2 ad. Ootmarsum, A 24, 1 ad. Denekamp, A 26, 3 ad. Hooge Veluwe, A 38, 5 ad.; A 41, 1 ad. Meyendel, A 68, 1 ad. Baarle Nassau, A 87, 1 ad. Sint Pietersberg, A 98, 1 ad.; A 106, 1 ad.

This form, that is new to our fauna, appears to be the *Suctobelba* species of which I obtained the greatest number of specimens. Corresponding with Forsslund's and Strenzke's data, the species was found to occur in various surroundings; I collected my specimens in the litter of forests (Querceto-Betuletum, Querceto-Carpinetum, birch wood in the sand dunes), in moss at the foot of an oak tree, in moss and sphagnum near the source of a brook, in moss in the heath, and in a meadow.

#### **Suctobelba falcata** Forsslund, 1941

*Suctobelba falcata* Forsslund, 1941, p. 391, fig. 7; Strenzke, 1951 c, p. 155, fig. 13.  
Own material. Winterswijk, A 49, 1 ad.

According to Strenzke the species occurs in "feuchten und nassen Böden von Mooren und azidophilen Wäldern". I collected a single specimen (the

species is a new record for the Netherlands) in the litter of a forest belonging to the Querceto-Carpinetum; at the place where sample A 49 was taken the vegetation consisted of *Vaccinium*, which points to a rather acid soil.

### **Suctobelba palustris** Forsslund, 1951

*Suctobelba palustris* Forsslund in: Strenzke, 1951 c, p. 159, fig. 16.

Own material. Spier, A 5, 1 ad. Hooge Veluwe, A 39, 3 ad.

Dr. Strenzke kindly compared my specimens with his material. According to him the species occurs in very damp surroundings, which corresponds with my data, as I collected *S. palustris* in damp sphagnum. *S. palustris* is a new record for the Netherlands.

### **Suctobelba subtrigona** (Oudemans, 1900)

gen. ? sp. ? Oudemans, 1896, p. 57 (no. 66).

*Eremaeus subtrigonus* Oudemans, 1900 d, pp. 152, 155, 166, pl. 9 fig. 7.

*Xenillus subtrigonus*, Oudemans, 1917 a, p. 34, figs. 65, 66.

*Suctobelba intermedia* Willmann, 1939, p. 449, fig. 177; Forsslund, 1941, p. 394, fig. 10; Strenzke, 1951 c, p. 161, fig. 18.

*Suctobelba subtrigonus*, Buitendijk, 1945, p. 377.

Oudemans Collection. Zutphen.

Own material. Hooge Veluwe, A 35, 1 ad.; A 35 a, 1 ad.

Locality from literature. Zutphen (Oudemans).

Forsslund identified his specimens of the species as *S. intermedia*; according to him it is probable, but not certain, that *S. intermedia* is conspecific with *S. subtrigona*, a species insufficiently described by Oudemans. I have studied the type specimen of *S. subtrigona* and it proved to be conspecific with *S. intermedia* indeed; of the two names *subtrigona* has priority.

Noordam and De Vlieger (1943, p. 6) mentioned *S. subtrigona* from "De Franse Berg" at "De Hooge Veluwe"; as long as this record is not checked it is better to regard it as doubtful.

My specimens were collected in the litter of a beech forest.

### **Oppia quadricarinata** (Michael, 1885)

*Notaspis quadricarinata* Michael, 1885, p. 393, pl. 7 fig. 7; 1888, p. 385, pl. 31 figs. 13-15.

*Dameosoma quadricarinatum*, Paoli, 1908, p. 70, pl. 4 fig. 30, pl. 5 fig. 49.

*Oppia quadricarinata*, Sellnick, 1928 a, p. 35; Willmann, 1931, p. 128, fig. 131; Van der Hammen, 1949, p. 119.

Own material. Mantinge, A 7, 2 ad. Denekamp, A 26, 1 ad. Hooge Veluwe, A 43, 3 ad. Noordwijk aan Zee, A 56, 1 ad. Meyndel, A 70, 1 ad.; A 72, 1 ad. Sint Pietersberg, A 104, 1 ad.; A 106, 1 ad.; A 116, 1 ad.

Recently (Van der Hammen, 1949) I recorded *O. quadricarinata* as new to our fauna; I collected small numbers of specimens in the litter of forests (Querceto-Betuletum, Querceto-Carpinetum, thicket of *Prunus spinosa*), in moss in a birch and alder swamp, in moss at the foot of trees (oak, birch), and in litter of *Salix repens* in the sand dunes.

***Oppia nova*** (Oudemans, 1902) (= *neerlandica* auct.) (fig. 6 a)

*Eremaeus novus* Oudemans, 1902 c, p. 36; 1903 b, p. 6, pl. 2 fig. 22.

*Dameosoma corrugatum* Berlese, 1904 a, p. 273; Paoli, 1908, p. 62, pl. 4 fig. 23.

*Dameosoma uliginosum* Willmann, 1919, p. 554, fig. 5.

*Dameosoma neerlandicum*, Sellnick, 1928 a, p. 35.

*Oppia neerlandica*, Willmann, 1931, p. 128, fig. 132; Noordam and De Vlieger, 1943, p. 6; Van der Drift, 1950, p. 85.

*Oppiella corrugata*, Jacot, 1937 a, p. 356, pl. 26 fig. 1.

*Oppia corrugata*, Forsslund, 1942, p. 10, fig. 14.

*Oppia neerlandicus*, Buitendijk, 1945, p. 378.

Oudemans Collection. Rotterdam.

Own material. Dwingelo, A 1, 2 ad. "Staatsbossen" between Lhee and Spier, A 4, 1 ad. Mantinge, A 7, 1 ad. Oosterhesselen, A 13, 1 ad. Markelo, A 16, 4 ad. Lattrop, A 19, 2 ad. Ootmarsum, A 24, 2 ad. Denekamp, A 26, 222 ad. Hooge Veluwe, A 32, 2 ad.; A 35 a, 1 ad.; A 38, 3 ad. Wilp (Gld.), A 44, 1 ad. Noordwijk aan Zee, A 56, 1 ad. Meyendel, A 68, 1 ad.; A 70, 4 ad.; A 73, 1 ad. Baarle Nassau, A 87, 1 ad. Neercanne, A 90, 1 ad. Sint Pietersberg, A 106, 1 ad.

Localities from literature. Rotterdam (Oudemans), Hooge Veluwe (Noordam and De Vlieger, Van der Drift).

Many authors have identified the species as *Oppia neerlandica* (Oudemans), the original description of which, however, is completely different. It is a strange fact that the slides in the Oudemans Collection labelled as *O. neerlandica* indeed correspond with the *neerlandica* of modern authors, and not with the original description. Among the slides in the Oudemans Collection there is, however, a slide labelled *O. novus* that exactly corresponds with the original description of *Eremaeus longilamellatus* var. *neerlandicus*; moreover the specimen originates from the type locality of the last mentioned form (Delden, 9.IV.1896, decaying leaves). On the other hand the specimen of the slide labelled *O. neerlandicus* (Rotterdam, IV.1901) exactly corresponds with the original description of *Eremaeus novus*, and originates from the type locality of that species. It is distinctly visible that the original labels with the names of the slides have been replaced by others (apparently at the same time, as they are written in the same handwriting) and certainly they have been interchanged, whilst the labels with the localities (written in an earlier handwriting) remained in the original, right place. This explains why later authors (Oudemans included) misinterpreted the species whilst studying the supposed type specimen. Nobody appears to have

studied the original description of *E. novus* that is easily recognizable. The above mentioned data prove that the species has to bear the name *Oppia nova* (Oudemans). Of the real *Oppia neerlandica* I shall give a new description below.

*O. nova* appears to be a variable species; Jacot described two "subspecies", whilst the descriptions of *D. corrugatum* Berlese and *D. uliginosum* Willmann are based on slightly different forms too. Perhaps *D. krygeri* Trägårdh (1931, p. 35, fig. 67) is also one of these different forms. I collected one specimen (in sample A 20) that may be a variety as it presents a form of which the interpseudostigmatal ridges run in one line with the lamellae, whilst the lamellae surpass the lamellar hairs.

The type specimen accords best with the descriptions given by Willmann (1931) and Forsslund (1942). It is therefore not necessary to give a new description, but as the species is rather variable I give a figure (fig. 6 a) of the posterior part of the propodosoma and the adjacent portion of the notogaster, drawn after the type specimen.

The species was recorded from a large part of the world (Europe, America, Sunda Islands). In our country it is common; I collected it in litter and in moss in forests (Querceto-Betuletum, Querceto-Carpinetum, coniferous woods, beech forests, birch wood in the sand dunes), in moss at the foot of trees, in dry litter of *Salix repens*, in moss in a birch and alder swamp, in sphagnum, in moss in the heath, and in a meadow. In the beech forest investigated by Van der Drift the species had its greatest density in the F<sub>x</sub> layer.

***Oppia neerlandica*** (Oudemans, 1900) (non auct.) (fig. 6 d, f)

*Eremaeus longilamellatus* var. *neerlandica* Oudemans, 1900 d, pp. 155, 168, pl. 9 fig. 4.  
*Oppia novus*, Buitendijk, 1945, p. 378.

Oudemans Collection, Delden.

Own material. Denekamp, A 25, 9 ad.; A 26, 1 ad. De Lutte, A 29, 3 ad.

Locality from literature, Delden (Oudemans).

As I noted above (cf. *Oppia nova*) the real *O. neerlandica* is completely different from *O. neerlandica* as it was described by modern authors; the last mentioned species has to bear the name *Oppia nova*, whilst the real *O. neerlandica* up till now has never been recognized, because the original description is insufficient. I give a new description after the type specimen, supplied with characters from my own material.

Length 0.275-0.300 mm. Colour yellowish or light brown.

Rostrum (fig. 6 f) blunt, not incised. Rostral hairs rather long; place of insertion removed from the front. Pseudostigmatic organ long, with slightly



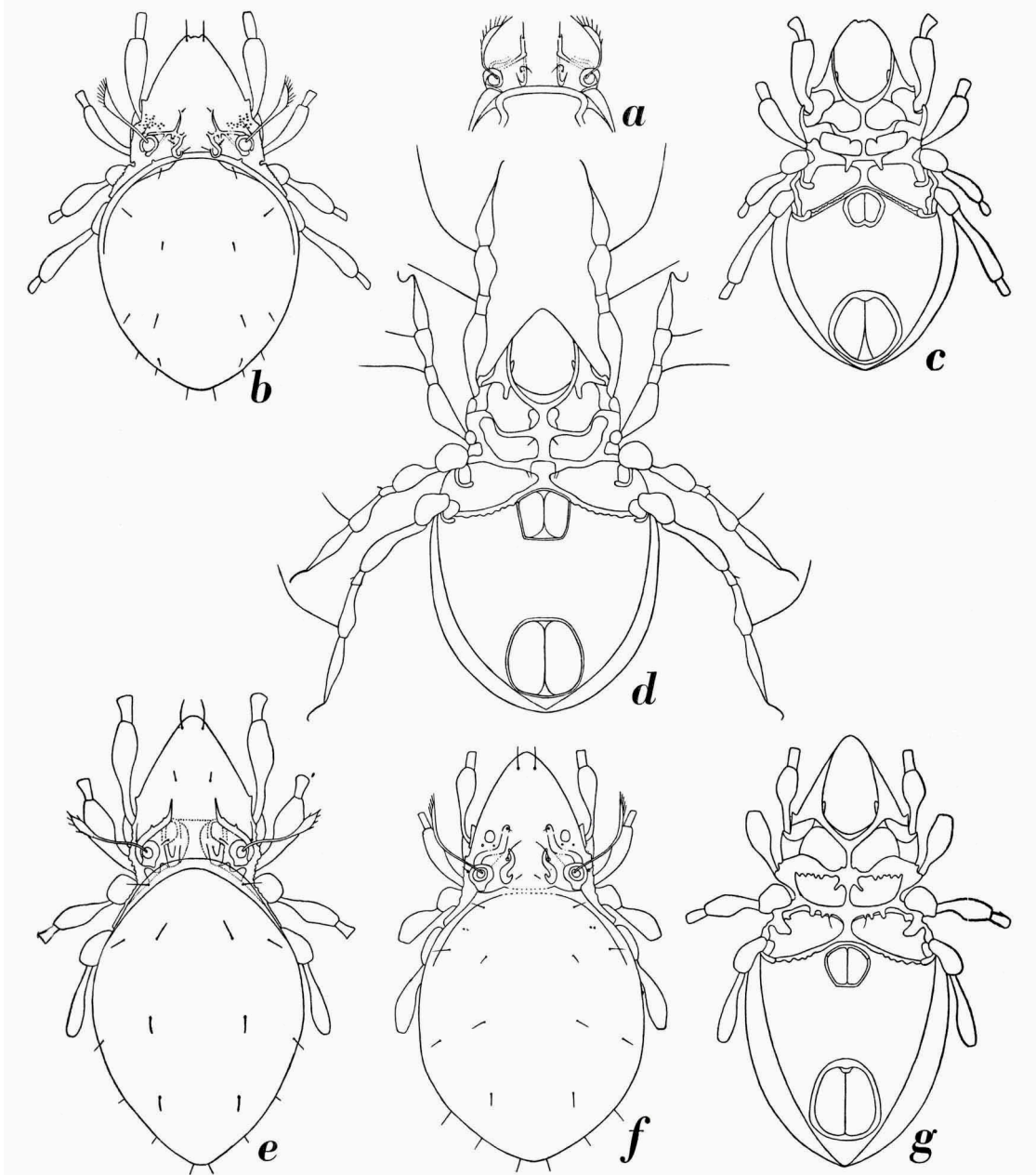


Fig. 6. a, *Oppia nova* (Oudemans), posterior part of the propodosoma, and adjacent portion of the notogaster. b, c, *Oppia falcata* (Paoli): b, dorsal view; c, ventral view. d, f, *Oppia neerlandica* (Oudemans): d, ventral view; f, dorsal view. e, g, *Oppia unicarinata*: e, dorsal view; g, ventral view. a-g,  $\times 200$ .

thickened head, ending in a sharp point, near the end at one side beset with a row of rather long hairs. The lamellae extend to the pseudostigmata; generally they are less distinct at two places (nearly halfway, and near the top), consequently the short lamellar hairs often stand more or less isolated within the rounded tops. Interlamellar ridges auricular; interlamellar hairs long, inserted at the outside of the ridges. Pseudostigma with a large posterior lobe opposite to a projection of the anterior margin of the notogaster. The last mentioned margin, which is less distinct in the median part, has also a small projection opposite to the interlamellar ridges. The posterior border of epimere IV is crenulate (fig. 6 d). Among the tactylous hairs (solenidions) of genu ( $\sigma$ ) and tibia ( $\varphi$ ) some are extremely long: especially  $\varphi$  I, further  $\varphi$  IV, and  $\sigma$  I; some are of medium size:  $\sigma$  II,  $\varphi$  III,  $\varphi$  II; whilst  $\sigma$  III is short (in this order the hairs are arranged according to decreasing length).

*O. neerlandica* is related to *Oppia unicarinata* (Paoli, 1908, p. 56, pl. 4 fig. 19, pl. 5 fig. 46) on the one hand, and to *Oppia falcata* (Paoli, 1908, p. 61, pl. 4 fig. 22) on the other. It is especially recognizable by the measurements, and by the shape of the pseudostigmatic organs, the lamellae, the interlamellar ridges, and the anterior margin of the notogaster.

I collected the species in birch and alder marshes (in moss and in sphagnum).

### **Oppia falcata** (Paoli, 1908) (fig. 6 b, c)

*Dameosoma falcatum* Paoli, 1908, p. 61, pl. 4 fig. 22.

Own material. Mantinge, A 9, 4 ad.; A 10, 5 ad. Hooge Veluwe, A 38, 5 ad.

I identify my specimens as *O. falcata* (Paoli), though there are slight differences. Measurements, general shape, pseudostigmatic organ, and lamellae correspond with Paoli's description, but the lamellar and the interlamellar hairs are shorter, whilst the interlamellar ridges as figured by Paoli appear to be rather different; the last mentioned difference is, however, not of great importance, as different focussing often changes the appearance of the ridges, so that it is difficult to draw an exact figure. I give the following characters supplementary to Paoli's description.

Length 0.235-0.250 mm; width 0.125-0.145 mm. The anterior part of the lamellae (fig. 6 b) is curved to the outside, whilst the short lamellar hairs are inserted at the inner side of the tops; the lamellae have more or less distinct connections with the pseudostigmata and the interlamellar ridges; these ridges are auricular. The part of the propodosoma between pseudostigmata and lamellae is granulate; the exopseudostigmatic hairs are long.

The posterior border of epimere IV (fig. 6 c) is crenulate, but the crenulations are much smaller and occur with a greater density than in *O. neerlandica*. The solenidions of the legs correspond with those of *O. neerlandica*.

I am not certain whether Willmann's (1931) description of *O. falcata* indeed refers to the species, as it appears to be rather different. Strenzke (1951, p. 719, fig. 1) described a rather strongly different form as *O. falcata* subsp. *marginedentata*.

I collected my specimens in moss at the foot of birch and oak trees in a forest belonging to the Querceto-Betuletum, and in moss (*Leucobryum*) in a heath.

### ***Oppia sigma* Strenzke, 1951**

*Oppia sigma* Strenzke, 1951 b, p. 722, fig. 4.

Own material. Winterswijk, A 47, 1 ad.

Dr. Strenzke kindly compared my specimen with his type material; it appeared to belong to the typical form of the species.

*O. sigma* was described after a few specimens from Holstein (Germany), collected in very dry humus under beeches. Evans (1952, p. 36) recorded four specimens from the F layer under beech and oak at Woburn (England). I collected a single specimen in the litter of a forest belonging to the Querceto-Carpinetum.

### ***Oppia unicarinata* (Paoli, 1908) (fig. 6 e, g)**

*Dameosoma unicarinatum* Paoli, 1908, p. 56, pl. 4 fig. 19, pl. 5 fig. 46.

Own material. Mantinge, A 9, 9 ad.

My specimens accord rather well with Paoli's original description; I give the following supplementary details. The lamellae (fig. 6 e) have two small projections at the outside; the interlamellar ridges start under the anterior margin of the notogaster, whilst laterally of these there are two teeth opposite to the pseudostigmata. The hairs on the pseudostigmatic organ are slightly longer and less in number than figured by Paoli. The ventral surface (fig. 6 g) shows striking characters as, apart from the crenulate posterior border of epimere IV, the posterior borders of the epimeres I and II also show distinct projections; the posterior border of the epimeres I are crenulate or dentate, whilst the epimeres II have three rather large posterior projections. The solenidions of the legs resemble those of *O. neerlandica*, but  $\sigma$  III is longer. The length of my specimens varies from 0.300 to 0.325 mm; the width is 0.150 mm.

Willmann's description of *O. unicarinata* appears to be based on rather different specimens as the lamellar hairs are inserted close to the lamellae, and as the pseudostigmatic organ has a more or less globular head.

I collected the species in moss at the foot of an oak in a forest belonging to the Querceto-Betuletum.

### **Oppia splendens** (C. L. Koch, 1841)

Oudemans (1900 d, p. 156) recorded *Eremaeus splendens* from Delden. In the Oudemans Collection there is indeed a slide from Delden (collected in 1896) that bears this name (Buitendijk, 1945, p. 378); it appears, however, to contain a larva, the identity of which is doubtful.

Noordam and De Vlieger (1943, p. 6) recorded the species from "De Hooge Veluwe". As I made fairly large collections at the same locality and did not obtain the species I have no definite data concerning its occurrence here.

### **Oppia ornata** (Oudemans, 1900)

*Dameosoma splendens*, Berlese, 1895, vol. 77 (10).

*Eremaeus ornatus* Oudemans, 1900 d, pp. 153, 167, pl. 9 fig. 6.

*Dameosoma tricarinata* Paoli, 1908, p. 54, pl. 4 figs. 16-18, pl. 5 fig. 46.

*Dameosoma ornatum*, Sellnick, 1928, p. 34.

*Oppia ornata*, Willmann, 1931, p. 130, fig. 138; Noordam and De Vlieger, 1943, p. 6.

*Oppia ornatus*, Buitendijk, 1945, p. 378.

Oudemans Collection. Bergen op Zoom.

Own material. Dwingelo, A 2, 1 ad. Mantinge, A 7, 12 ad.; A 10, 1 ad. Brecklenkamp, A 17, 6 ad. Lattrop, A 21, 1 ad. Ootmarsum, A 23, 1 ad. Denekamp, A 26, 55 ad.; A 28, 8 ad. Hooge Veluwe, A 32, 1 ad.; A 36, 2 ad. Wilp (Gld.), A 44, 13 ad.; A 46, 1 ad. Winterswijk, A 47, 16 ad.; A 48, 1 ad.; A 49, 2 ad. Noordwijk aan Zee, A 58, 1 ad. Meyendel, A 65, 1 ad.; A 66, 23 ad.; A 67, 7 ad.; A 68, 12 ad.; A 69, 1 ad.; A 70, 8 ad.; A 72, 3 ad., A 74, 2 ad. Maasland, A 75, 17 ad. Ossendrecht, A 88, 8 ad. Sint Pietersberg, A 103, 1 ad.

Localities from literature. Warnsveld (Oudemans), De Hooge Veluwe (Noordam and De Vlieger).

According to Paoli *Dameosoma splendens* Berlese (1895, non Koch) is identical with *Dameosoma tricarinata* (a synonym of *Oppia ornata*). Berlese's description appears, however, to be rather different from *O. tricarinata* as it represents a species that is 0.350 mm long, of which the pseudostigmatic organs have a distinctly thickened head, and of which the rostral hairs are inserted laterally. Certainly Paoli studied Berlese's type specimen (as he wrote his monograph in the same institute), so that the differences must be regarded as due to inaccuracies.

The species appears to be rather common. I collected it in various surroundings: in litter and in moss in forests (Querceto-Betuletum, Querceto-

Carpinetum, birch wood in the sand dunes), in moss at the foot of trees, in moss in a fir wood and in birch and alder swamps, in moss on a wall and on the bank of a brook, in dry litter of *Salix repens* and of *Populus* in the sand dunes.

***Oppia nitens* C. L. Koch, 1836**

*Oppia nitens*, C. L. Koch, 1836, vol. 3 (10).

*Damaeus nitens*, Michael, 1888, p. 409, pl. 34 figs. 1-8.

*Dameosoma nitens*, Sellnick, 1928 a, p. 35.

*Oppia nitens*, Willmann, 1931, p. 132, fig. 147; Van der Hammen, 1949, p. 119.

Own material. Sint Pietersberg, A 96, 1 ad.

According to Willmann (1931) the species mentioned by him as *Oppia concolor* (C. L. Koch), occurring in southern Germany, is closely related to *O. nitens*. *Damaeus concolor* C. L. Koch, however, belongs, as demonstrated by Oudemans (1937, p. 2587), to the Belbidae, so that *Oppia concolor* Willmann cannot bear this name; Oudemans renamed it as *Oppia willmanni*, a name that is preoccupied by *Oppia willmanni* Dyradowska, 1929. It is, however, not necessary to rename this species as Canestrini and Canestrini (1882) described the species *Belba denticulata* that appears to be identical with Willmann's *O. concolor* (and not identical with *O. nitens* as Willmann supposed). In the Oudemans Collection *O. denticulata* is present as a slide originating from Berlese's *Acarotheca Italica*; it indeed appears to be closely related to my specimen of *nitens*, but it represents a considerably larger species. In my opinion it is problematic after which of the two species Koch described his *O. nitens*. I have based the identification of my specimen on the descriptions by Michael and Willmann.

Recently (Van der Hammen, 1949) I recorded the species as new to our fauna; my single specimen was collected in the litter of a cultivated wood.

***Oppia subpectinata* (Oudemans, 1900)**

*Belba pectinata*, Berlese, 1892, vol. 61 (8).

gen. ? sp. ?, Oudemans, 1896, p. 57 (no. 68).

*Eremaeus subpectinatus* Oudemans, 1900 d, pp. 152, 155, 166, pl. 9 fig. 5.

*Dameosoma clavipectinatum*, Paoli, 1908, p. 51, pl. 3 fig. 4, pl. 5 fig. 44.

*Dameosoma subpectinatum*, Sellnick, 1928 a, p. 35.

*Oppia subpectinata*, Willmann, 1931, p. 132, fig. 150.

*Oppia subpectinatus*, Buitendijk, 1945, p. 378.

Oudemans Collection. Warnsveld.

Own material. Mantinge, A 7, 22 ad. Ambt Vollenhove, A 14, 1 ad. Brecklenkamp, A 17, 1 ad. Denekamp, A 26, 45 ad.; A 28, 11 ad. Hooge Veluwe, A 40, 1 ad. Winterswijk, A 47, 1 ad.; A 48, 1 ad.; A 51, 2 ad. Maasland, A 75, 1 ad. Breda, A 86, 1 ad. Sint Pietersberg, A 102, 1 ad.; A 104, 1 ad.

Localities from literature. Warnsveld, Ruurloo, Delden (Oudemans).

Berlese and Paoli erroneously identified the species as *B. pectinata* (Michael) and *D. clavipectinatum* (Michael) respectively; the descriptions prove that their specimens belonged to *Oppia subpectinata*.

I collected the species in the litter of forests (Querceto-Betuletum, Querceto-Carpinetum), and in moss in birch and alder swamps.

### ***Oppia clavipectinata*** (Michael, 1885)

*Notaspis clavipectinata* Michael, 1885, p. 392, pl. 7 fig. 6; 1888, p. 387, pl. 32 figs. 7-11.

*Xenillus clavipectinatus*, Oudemans, 1913 a, p. 282.

*Dameosoma clavipectinatum*, Sellnick, 1928 a, p. 35.

*Oppia clavipectinata*, Willmann, 1931, p. 133, fig. 151.

*Oppia clavipectinatus*, Buitendijk, 1945, p. 378.

Oudemans Collection. Sittard.

Own material. Maasland, A 77, 3 ad.; A 78, 1 ad. Sint Pietersberg, A 111, 9 ad.; A 113, 8 ad.; A 115, 2 ad.

Locality from literature. Sittard (Oudemans).

The species is easily recognizable from the above mentioned descriptions. I collected it in meadows and in the litter of small woods (Querceto-Carpinetum, thicket of *Crataegus*).

### ***Autogneta longilamellata*** (Michael, 1885)

*Notaspis longilamellata* (Michael, 1885, p. 391, pl. 7 fig. 4; 1888, p. 392, pl. 28 figs. 13-15.

*Dameosoma longilamellatum*, Paoli, 1908, p. 58, pl. 4 fig. 20.

*Oppia longilamellata*, Willmann, 1931, p. 130, fig. 141.

*Autogneta longilamellata*, Forsslund, 1947, p. 113, fig. 1.

Own material. Meyendel, A 66, 7 ad.; A 67, 12 ad.

Forsslund showed that it is justified to separate the genus *Autogneta* Hull (1916, p. 400) from *Oppia*, although in a sense different from the original. He described a number of new species belonging to the genus, partly resembling *A. longilamellata* and probably confounded with it by earlier authors. My specimens exactly correspond with Forsslund's description and figure.

I collected several specimens of the species (that is new to our fauna) in a birch wood in the sand dunes (in litter, and in moss on a tree stump). Forsslund obtained his specimens mainly from dead parts of trees. In the countries from which the species was recorded it appeared to be rare.

### ***Autogneta trögårdhi*** Forsslund, 1947

*Autogneta trögårdhi* Forsslund, 1947, p. 114, fig. 3.

Own material. Winterswijk, A 49, 1 ad.

My specimen corresponds with the original description; the distal part of the pseudostigmatic organ is slightly thickened, and beset with a few very small hairs; the interlamellar hairs are straight and a little longer than those figured by Forsslund.

I collected the species, that is new to our fauna, in the litter of a forest (Querceto-Carpinetum) along a brook.

#### **Autogneta dalecarlica** Forsslund, 1947

*Autogneta dalecarlica* Forsslund, 1947, p. 116, fig. 4.

Own material. Denekamp, A 28, 1 ad.

My specimen corresponds with the original description, but the pseudostigmatic organ is slightly longer and more slender than in Forsslund's fig. 4 b; it accords better with his fig. 4 a, but the distal papillae are slightly longer.

I collected a single specimen of the species, that appears to be new to our fauna, in the litter of a forest (Querceto-Carpinetum) along a brook; Forsslund obtained a few specimens from the soil near a farm.

#### **Autogneta willmanni** (Dyrdowska, 1929)

*Dameosoma willmanni* Dyrdowska, 1929, p. 178, fig. 1.

*Oppia willmanni*, Willmann, 1931, p. 131, fig. 142.

Own material. Winterswijk, A 51, 4 ad.

The species belongs to the genus *Autogneta* as Forsslund (1947) noted already; Dyrdowska did not observe that the point of the rostrum is divided by a longitudinal fissure.

The species was described from Poland. I collected four specimens in a forest (Querceto-Carpinetum) along a brook; the present record is new for the Netherlands.

#### **Oribella lanceolata** (Michael, 1885)

*Notaspis lanceolata* Michael, 1885, p. 394, pl. 7 fig. 8; 1888, p. 398, pl. 32 figs. 12-15. gen. ? sp. ?, Oudemans, 1896, p. 57 (no. 67).

*Eremaeus lanceolatus*, Oudemans, 1900 d, pp. 152, 155, 165.

*Xenillus castaneus*, Sellnick, 1928 a, p. 37, fig. 84.

*Oribella castanea*, Willmann, 1931, p. 133, fig. 154.

Oudemans Collection. Delden, Haarlem.

Own material. Mantinge, A 7, 30 ad. Markelo, A 16, 1 ad. Lattrop, A 20, 16 ad.; A 21, 1 ad. Hooge Veluwe, A 36, 2 ad. Winterswijk, A 51, 1 ad. Maasland, A 75, 4 ad. Ossendrecht, A 88, 27 ad.

Localities from literature. Delden, Zutphen, Haarlem (Oudemans).

Grandjean (1936, p. 75) pointed out that *Notaspis lanceolata* Michael is not identical with *Notaspis castaneus* Hermann (1804); nor is it probable that the species is identical with *Zetes dorsatus* C. L. Koch and *Zetes flavipes* C. L. Koch as Oudemans (1937, pp. 2604, 2605) supposed, so that the species has to bear the name *Oribella lanceolata* (Michael).

The species was omitted from the preliminary catalogue (Buitendijk, 1945) although it is present in the Oudemans Collection.

I collected *O. lanceolata* in the litter of forests (Querceto-Betuletum, Querceto-Carpinetum), in moss in an alder marsh, and repeatedly in moss, sphagnum, and *Cladonia* in the heath.

### **Oribella paolii** (Oudemans, 1913)

*Eremaeus pectinatus*, Oudemans, 1900 d, p. 155.

*Xenillus paolii* Oudemans, 1913, p. 375; 1917 a, p. 38, figs. 67-76; Sellnick, 1928 a, p. 37.

*Oribella paolii*, Willmann, 1931, p. 134, fig. 156; Buitendijk, 1945, p. 378.

Oudemans Collection. Haarlem.

Own material. Denekamp, A 28, 2 ad. Winterswijk, A 51, 1 ad. Baarle Nassau, A 87, 5 ad.

Locality from literature. Haarlem.

The type material of the species is still in the Collection and my specimens correspond with it.

In our country the species appears to be not "überall verbreitet" as Willmann characterized it; I collected a few specimens in the litter of forests (Querceto-Carpinetum), and in a meadow.

### **Oribella pectinata** (Michael, 1885)

*Notaspis pectinata* Michael, 1885, p. 392, pl. 7 fig. 5; 1888, p. 389, pl. 32 figs. 1-6.

*Xenillus limburgensis* Oudemans, 1912, p. 249.

*Xenillus pectinatus*, Oudemans, 1913, p. 375; 1917 a, p. 232; Sellnick, 1928 a, p. 37.

*Oribella pectinata*, Willmann, 1931, p. 134, figs. 153, 155; Buitendijk, 1945, p. 378; Van der Hammen, 1950, p. 113.

Oudemans Collection. Sittard.

Own material. Sint Pietersberg, A 118, 20 ad. Houthem (Limburg), cave Ravensbos I, 11.XI.1951, numerous specimens.

Locality from literature. Sittard (Oudemans).

Willmann observed that *O. pectinata* is a rare species. According to Sellnick it occurs in mouse nests, whilst the specimens in the Oudemans Collection as well as Michael's material were obtained from mole nests; I collected my specimens in artificial caves: in old mushroom beds (horse dung and straw) and in straw and garbage.



**Eremaeus oblongus** C. L. Koch, 1836

*Eremaeus oblongus* C. L. Koch, 1836, vol. 3 (24); Nicolet, 1855, p. 451, pl. 10 fig. 1; Sellnick, 1928 a, p. 37; Willmann, 1931, p. 135, figs. 159, 160; Buitendijk, 1945, p. 379. *Notaspis oblonga*, Michael, 1888, p. 374, pl. 30 figs. 6-11.

Oudemans Collection. Renkum, Valkeveen, Bergen (Noord Holland), Nederweert. Own material. Hooge Veluwe, A 34, 14 ad., 8 n.; A 43, 6 ad., 4 n. Lekkerkerk, A 85, 1 ad.

*E. oblongus* was mentioned for the first time as a representative of our fauna in the preliminary catalogue of the Oudemans Collection (Buitendijk, 1945); it is an easily recognizable species. According to Willmann it occurs "im Moos der Wälder, ... gern an Baumstämmen und alten Stümpfen." I collected my specimens in moss at the foot of trees.

**Phauloppia lucorum** (C. L. Koch, 1841)

*Zetes lucorum* C. L. Koch, 1841, vol. 31 (18).

*Notaspis lucorum*, Michael, 1888, p. 371, pl. 30 figs. 1-5.

*Oppia conformis* Berlese, 1895, vol. 77 (7).

*Eremaeus schneideri* Oudemans, 1900, p. 89; 1900 b, p. 136, pl. 8 figs. 41, 42.

*Eremaeus conjunctus* Oudemans, 1902 f, p. 54; 1905 a, p. 205, pl. 8 figs. 12, 13.

*Phauloppia conformis*, Sellnick, 1928 a, p. 38, fig. 86.

*Oribata geniculatus*, Willmann, 1931, p. 136, fig. 161.

*Eremaeus conjunctus*, *Oribata geniculatus*, *Oribata* spec., Buitendijk, 1945, pp. 378, 379.

*Phauloppia lucorum*, Grandjean, 1950 b, p. 344.

Oudemans Collection. Arnhem, Bergen (Noord Holland), Amsterdam, Valkeveen, Bloemendaal, Nederweert.

Own material. Hooge Veluwe, A 33, 31 ad., 34 n.; A 34, 8 ad., 1 n. Meyendel, A 71, 35 ad., 4 juv. Lekkerkerk, A 85, 2 ad. Neercanne, A 91, 34 ad.; A 92, 62 ad.; 15 n.

Locality from literature. Warnsveld (Oudemans).

According to Oudemans (1929 a, p. 775) the species is conspecific with *Acarus geniculatus* Linnaeus, but this supposition is insufficiently founded. There has been a great deal of confusion concerning the nomenclature of the species, but recently Grandjean (1950 b) pointed out that *Phauloppia lucorum* is the correct name; for the argumentation I refer to his paper. Besides *Eremaeus schneideri* Oudemans I have also added *E. conjunctus* Oudemans to the list of synonyms; the description of the last mentioned species is based on an empty, severely damaged, chitinous integument without legs; the supposed lamellae that Oudemans described are lines of the under surface, visible by transparency.

Although Berlese's description of *Phauloppia conformis* refers to the species dealt with here, whilst his description of *Oppia lucorum* refers to *Lucoppia burrowsi* (Michael), a slide in the Oudemans Collection from the Acarothea Italica labelled *Lucoppia lucorum* contains *Phauloppia lucorum*.

It is probable that the following records, mentioned by Oudemans in his card index as *Lucoppia lucorum*, refer to the species, although none of the recorded specimens is present in the collection: *Oppia exilis*, Oudemans, 1896, p. 54; *Eremaeus lucorum*, Oudemans, 1900 d, pp. 150, 155; 1902 e, p. 2; *Eremaeus lichenum*, Oudemans, 1913 a, p. 232. The localities mentioned in these papers are: Sneek, Nijkerk, Utrecht.

According to Grandjean the species occurs in dry lichens on trees, rocks, and walls; it prefers solitary trees, or trees at the border of forests. I collected my specimens in moss and in lichens on trees, and in moss at the foot of trees.

### **Ceratoppia bipilis** (Hermann)

- Notaspis bipilis* Hermann, 1804, p. 95; Michael, 1888, p. 356, pl. 27 figs. 1-9.  
*Oppia bipilis*, Berlese, 1885, vol. 20 (8); Oudemans, 1896, p. 54.  
*Eremaeus bipilis*, Oudemans, 1900 d, pp. 150, 155; 1902 e, p. 2.  
*Ceratoppia bipilis*, Sellnick, 1928 a, p. 36, fig. 82; Willmann, 1931, p. 140, fig. 171; Grandjean, 1936, p. 70; Buitendijk, 1945, p. 379; Van der Drift, 1950, p. 66.  
*Ceratoppia* spec., Noordam and De Vlieger, 1943, p. 10.  
 Oudemans Collection. Huizum, Burgst near Breda, Bergen op Zoom.  
 Own material. Denekamp, A 26, 1 ad. Hooge Veluwe, A 35 a, 1 ad.; A 41, 1 ad.  
 Localities from literature. De Steeg, Hilversum, Bergen op Zoom (Oudemans); Hooge Veluwe (Noordam and De Vlieger, Van der Drift).

According to Grandjean the species is strongly variable, probably in connection with geographical distribution and surroundings. A rich material from different countries is, however, needed to make a subdivision of the species.

*C. bipilis* occurs in various surroundings: branches and trunks of trees, rocks, litter, etc. I collected a few specimens in the litter of forests (*Querceto-Betuletum*, beech forest) and in moss in a birch and alder marsh.

### **Hydrozetes lacustris** (Michael, 1882)

- Notaspis lacustris* Michael, 1882, p. 12, pl. 2 fig. 6; 1888, p. 399, pl. 30 fig. 12, pl. 33 figs. 1-9.  
*Hydrozetes lacustris*, Willmann, 1931, p. 138, figs. 162-165; Grandjean, 1948 a, p. 328, fig. 2 A; 1949, p. 225.  
*Hydrozetes confervae* (p. p.), Buitendijk, 1945, p. 379.  
 Oudemans Collection. Arnhem.  
 Own material. Dwingelo, A 1, 30 ad., 3 n. Lattrop, A 18, 4 ad. Hooge Veluwe, A 39, 29 ad., 10 juv.

The species was not yet recorded from our country, but among the slides in the Oudemans Collection there are four slides labelled *H. confervae*, together containing 60 specimens of *H. lacustris* from Arnhem.

I collected *H. lacustris* in very damp sphagnum.

**Hydrozetes confervae** (Schrank, 1781)

*Cepheus (Carabodes) coriaceus*, Oudemans, 1896, p. 54.

*Oppia confervae*, Oudemans, 1897, p. 175, pl. 10 figs. 1-8.

*Eremaeus confervae*, Oudemans, 1900 d, pp. 151, 155.

*Hydrozetes terrestris* Berlese, 1910 a, p. 266.

*Hydrozetes confervae*, Willmann, 1931, p. 138, figs. 166-168; Grandjean, 1948 a, p. 328, fig. 2 C; 1949, p. 224.

Localities from literature. Sneek, Utrecht (Oudemans).

Oudemans identified the species as *H. confervae* (Schrank), a species of which the original description is insufficient. Modern authors have based their identification on Oudemans' description, so that Grandjean gave the name *H. confervae* Oudemans to the species. This is, however, contrary to the rules of nomenclature; the species either has to bear the name *H. confervae* (Schrank), or, if this name is unavailable, *H. terrestris* Berlese (1910a).

The specimens on which Oudemans based his descriptions of 1897 and 1900 are no more in the Collection. The specimens on the slides labelled *H. confervae* that are still present partly belong to *H. lacustris* and to *H. lemnae*, and partly are completely damaged so that they are undeterminable.

**Hydrozetes lemnae** (Coggi, 1899)

*Notaspis lemnae* Coggi, 1899, p. 916, pl. 95.

*Hydrozetes confervae* (p. p.), Buitendijk, 1945, p. 379.

*Hydrozetes lemnae*, Grandjean, 1948 a, p. 328, figs. 2 B, 2 G, 3 B, 3 D; 1949, p. 224.

Oudemans Collection. Valkeveen.

*H. lemnae* was not yet recorded from our country; I found one slide with seven specimens among the slides labelled *H. confervae* in the Oudemans Collection.

## AMERONOTHRIDAE

**Ameronothrus maculatus** (Michael, 1882)

*Scutovertex maculatus* Michael, 1882, p. 13, pl. 1 figs. 1-5; 1884, p. 302, pl. 18 figs. 9-16; Oudemans, 1900 d, p. 154.

*Ameronothrus lineatus*, *Ameronothrus maculatus*, Buitendijk, 1945, p. 380.

Oudemans Collection. Oude Pekela, Zeeburg near Amsterdam.

Locality from literature. Oude Pekela (Oudemans).

Among the specimens of *Ameronothrus* collected at Zeeburg, there is one nymph that was identified as *A. lineatus* by Oudemans; as, however, the

specimen completely accords with the description of the nymph of *A. maculatus* by Michael, Oudemans obviously made an error. Moreover the species is present in several adult specimens from the same locality.

The specimens in the Oudemans Collection were found at Zeeburg in the drift accumulation along the shore of the former Zuyderzee, and at Oude Pekela in dried chicory roots. The last mentioned locality is rather strange as the species lives near the sea shore.

### **Ameronothrus marinus** (Banks, 1896)

*Nothrus marinus* Banks, 1896, p. 77.

*Hygroribates marinus*, Jacot, 1934 a, p. 331, pl. 20.

*Ameronothrus infusionum*, Buitendijk, 1945, p. 380.

*Ameronothrus marinus*, Grandjean, 1947 a, p. 165, figs. A-G.

Oudemans Collection. Zeeburg near Amsterdam.

Although the single specimen present in the Oudemans Collection is rather damaged, I am convinced that it belongs to *Ameronothrus marinus*; moreover I feel justified to assume that this is the specimen referred to by Jacot (1934 a, p. 336), as he wrote concerning *H. marinus*: "One specimen from Zeeburg seems identical but is badly mashed down and flattened out".

Oudemans labelled the slide of this species with the name *A. infusionum* (Schrank, 1803) (cf. Oudemans, 1929, p. 794); he recorded *A. bilineatus* (Michael) as a synonym. I do not understand why Oudemans interpreted Schrank's description as representing an *Ameronothrus*, for the very short description does not contain any useful character. Moreover the specimen is not identical with *A. bilineatus*, as in this species the legs are monodactylous.

The specimen in the Oudemans Collection was found in the drift accumulation along the shore of the former Zuyderzee.

## HERMANNIELLIDAE

### **Hermanniella granulata** (Nicolet, 1855) (figs. 3 c, 7 b-e)

*Hermannia granulata* Nicolet, 1855, p. 469, pl. 9 fig. 6.

*Hermanniella granulata*, Grandjean, 1931 b, p. 654, fig. 1 A, B; Noordam and De Vlieger, 1943, p. 10.

*Hermanniella picea*, Buitendijk, 1945, p. 381.

Oudemans Collection. Arnhem.

Own material. Hooge Veluwe, A 40, 2 ad.; A 41, 2 ad., 2 n.; A 42, 9 ad.

Locality from literature. Hooge Veluwe (Noordam and De Vlieger).

My identification is based on the description by Grandjean, who collected specimens at the type locality. For the rest there exists such a confusion

concerning the species of the genus *Hermanniella* that I cannot cite more than the few literature records mentioned above. As specific characters of *H. granulata* Grandjean recorded the peculiar structure of the central part of the notogaster, the great length of the notogastral hairs, the shape of the hairs  $F_1$ , and the great total length.

In his fig. 1 B, Grandjean represented the structure of the central part of the notogaster as consisting of rounded and irregularly placed spots, each containing 1, 2, or 3 points; he did not state, however, that these spots are connected by lines. In the central part of the notogaster these lines are vague and sometimes difficult to observe (fig. 7 b). In the lateral parts of the notogaster the lines become much more distinct, whilst the spots are much smaller here, and appear as the angles of polygons (fig. 7 d); each of the lateral spots contains one point only. The number of points in the dorsal spots is connected with the number of meeting lines: when three lines meet, there is one point, when four lines meet there are two points, and when five lines meet there are three points. Towards the ventral region the structure suddenly passes into one of mere polygons (fig. 7 c), in which it is impossible to distinguish any points. I draw attention to the fact that the structural characters regarded as typical of the species are found in the central part of the notogaster only. The polygonal structure of the lateral and ventral regions shows a great resemblance to that of *Hermanniella dolosa* as figured by Grandjean.

The medium length of my adult specimens is 0.765 mm. The colour is clear brown, clearer than in the majority of my specimens of *H. punctulata*.

Among my material I found two nymphs; one of these, a nymph III, is represented in fig. 3 c. The colour of this nymph is pale brown. The rostral hairs are implanted at some distance of the front; the hairs on the propodosoma are strong and rough, with the exception of the rostral hairs and the pseudostigmatic hairs. The rough hairs appear as such on account of numerous very small hairs.

The first row of notogastral hairs consists of the three pairs  $C_1$ ,  $C_2$ , and  $C_3$ . The hairs  $F_2$ ,  $PN_1$  (?), and especially  $F_1$ , are thicker than the remaining hairs; they have blunt extremities.

The hairs at the posterior border are much thinner than those on the dorsal surface. Grandjean designated the pair  $F_1$  as "poils acronotiques". In the nymph of another species, *H. punctulata*, this pair of hairs  $F_1$  has an altogether different shape, as described below.

Seen from aside the notogastral structure consists of small cones, which have the appearance of small circles when seen from above; the circles give the impression of being much smaller than the cones (fig. 7 e).

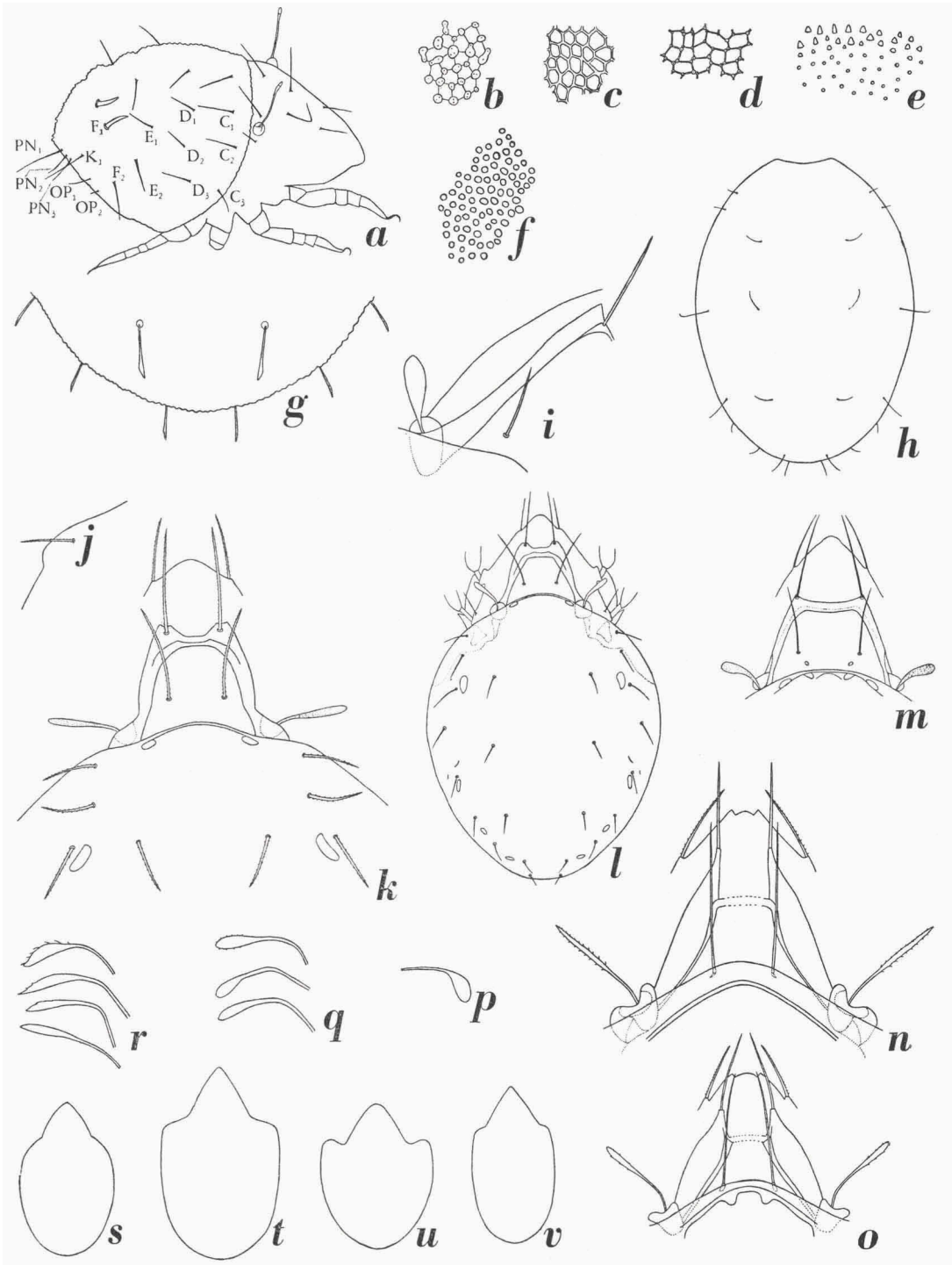


Fig. 7 (explanation on p. 67)

Noordam and De Vlieger were the first to record the species from our country. In the Oudemans Collection there is one slide of this species, identified by Oudemans as *H. picea*. I collected my specimens in the soil of a Querceto-Betuletum in the locality from which Noordam and De Vlieger obtained their material.

**Hermanniella punctulata** Berlese, 1908 (fig. 7 a, f)

*Hermanniella punctulata* Berlese, 1908, p. 12; 1910, p. 224, pl. 20 fig. 58; Grandjean, 1931 b, p. 655, fig. 2 A.

Own material. Mantinge, A 7, 2 ad. Winterswijk, A 47, 3 ad.; A 48, 1 ad.; A 49, 2 ad.; A 51, 1 ad. Sint Pietersberg, A 117, 20 ad., 1 n.

Berlese's original description (1908, p. 12) runs as follows. "Dermate dorsi punctulis minutissimis ornato. Ad. 540  $\mu$  long. 380  $\mu$  lat. (Minor quam *H. granulata* quae est 650  $\times$  450)". At the head of this description, Berlese records *Hermannia granulata* Berlese, 1883, vol. 9 (4) (according to Berlese different from *H. granulata* Nicolet) as a synonym. Berlese's description of 1883 contains little that is characteristic, but the length (700  $\mu$ ) seems to be in contradistinction to his description of 1908. This description of 1908 is altogether insufficient, but in 1910 Berlese gave a figure of the structure of the central part of the notogaster, sufficiently characteristic of the species.

Berlese described some varieties of *H. punctulata*, characterized by small differences in the notogastral structure, but probably these differences are nothing else but the result of individual variation. In the Oudemans Collection there is a slide containing a specimen of *H. punctulata* var. *septen-*

*Explanation of the opposite figure.*

Fig. 7. a, f, *Hermanniella punctulata* Berlese, nymph III: a, seen from the side, and a little above; f, structure of the notogaster. b-e, *Hermanniella granulata* (Nicolet): b-d, structure of the notogaster of the adult: b, central; c, ventrolateral; d, lateral region; e, nymph III, structure of the central part of the notogaster, cones partly seen from above, partly from the side. g, *Carabodes marginatus* (Michael), dorsal view of the posterior part of the hysterosoma. h, i, *Adoristes ovatus* (C. L. Koch): h, dorsal view of the hysterosoma; i, left part of the propodosoma. j-l, *Zygoribatula terricola* nov. spec.: j, pteromorpha; k, central part of the propodosoma, and adjacent portion of the notogaster; l, dorsal view. m, *Zygoribatula frisiae* (Oudemans), propodosoma. n, *Ceratozetes gracilis* (Michael), propodosoma (tectopodia I omitted). o, *Ceratozetes mediocris* Berlese, propodosoma (tectopodia I omitted). p, v, *Schelorbates pallidulus* (C. L. Koch): p, pseudostigmatic organ; v, general outline of the body. q, u, *Schelorbates latipes* (C. L. Koch): q, pseudostigmatic organs of 3 specimens; u, general outline. r, t, *Schelorbates laevigatus* (C. L. Koch): r, pseudostigmatic organs of 4 specimens; t, general outline. s, *Schelorbates confundatus* Sellnick, general outline. a,  $\times$  95; b-e,  $\times$  183; f,  $\times$  190; g, i-k, m-r,  $\times$  200; h,  $\times$  100; l,  $\times$  107; s-v,  $\times$  47.

*trionalis* from Berlese's *Acarothea italiana*, that is only slightly different from my specimens.

Most authors identify *H. punctulata* with *H. picea* (C. L. Koch). Koch's description, however, is not sufficient to determine which species of *Hermannietta* he had in view.

*H. punctulata* is easy to recognize by the structure of the central part of the notogaster as described by Grandjean. Just as in *H. granulata* the structure of the ventro-lateral region consists of polygons. For the rest this species is smaller than *H. granulata*, and the interlamellar hairs are shorter than the pseudostigmatic organs.

Among my material I found one nymph (fig. 7 a), showing characters distinctly different from those of the nymph of *H. granulata*. The hairs are shorter and thinner, with the exception of  $F_1$ , that is very thick, 3 times as thick as the remaining hairs; in my specimen this pair is directed towards the front. The interlamellar hairs are shorter than the pseudostigmatic organ, just as in the adult. The notogastral structure consists of small cones as in *H. granulata*, but these cones are more closely distributed. Seen from above, circular spots only are visible (fig. 7 f). A comparison of fig. 7 f with fig. 7 e shows that the structural differences from *H. granulata* are distinct.

The colour of my single nymph is white.

The species is new to our fauna. I collected my specimens in the soil of forests (Querceto-Betuletum and Querceto-Carpinetum).

## CARABODIDAE

### **Scutovertex bidactylus** Coggi, 1900

*Scutovertex bidactylus* Coggi, 1900, p. 315, fig. 3; Willmann, 1931, p. 143, figs. 181, 182.

*Ameronothrus* spec., Buitendijk, 1945, p. 380.

Oudemans Collection. Valkeveen.

Own material. Meyendel, A 69, 5 ad.

My specimens correspond with the above mentioned descriptions. Both Coggi and Willmann appear not to have observed the presence of interlamellar hairs and of a pair of exopseudostigmatic hairs. The interlamellar hairs, that Willmann considered absent, are difficult to distinguish; they are situated each close to a small round spot. The exopseudostigmatic hairs are rather strong.

Coggi described the species after six specimens from moss at two localities in Sardinia, near the sea shore. Willmann recorded *S. bidactylus* from moss in the sand dunes, while Strenzke (1950) recorded it as an inhabitant of the marine "Litoral".



Willmann noted as the distribution of the species: Italy, Ireland, Holland; possibly the last mentioned record is based on a slide in the Oudemans Collection, which erroneously was identified by Oudemans as "*Ameronothrus spec.*" (as such mentioned by Buitendijk). Oudemans' specimens were collected in decaying leaves.

I found my specimens in moss in the sand dunes, where I took several samples, but *S. bidactylus* was present in one only, collected at a spot where the dense vegetation consisted of low grass (*Festuca ovina*, *Luzula campestris*) and moss (*Pseudoscleropodium purum*, *Hypnum cupressiforme* var. *clatum*); the remaining samples of moss from grass lands in the sand dunes were collected in the Tortuleto-Phleëtum, and these generally contained *Scutovertex minutus*.

### **Scutovertex minutus** (C. L. Koch, 1836)

*Cepheus minutus* C. L. Koch, 1836, vol. 3 (12); Oudemans, 1900 a, p. 119, pl. 6 figs. 24-31.

*Scutovertex ovalis*, Oudemans, 1900 d, p. 154.

*Scutovertex minutus*, Willmann, 1931, p. 142, figs. 179, 180; Strenzke, 1943, p. 66.

*Scutovertex minutus* (p. p.), *Ameronothrus minutus*, Buitendijk, 1945, p. 380.

Oudemans Collection. Arnhem, Bloemendaal.

Own material. Markelo, A 15, 11 ad., 11 n. Noordwijk aan Zee, A 57, 1 n. Meyendel, A 60, 1 ad.; A 63, 3 ad., 3 n.; A 64, 1 n. De Beer, A 79, 12 ad., 4 n. Sint Pietersberg, A 99, 1 ad.; A 100, 1 ad.

Locality from literature. Bloemendaal (Oudemans).

Strenzke (1943) definitely proved that there exists a specific difference between *S. sculptus* Michael and the species generally named *S. minutus*. I believe that the latter is indeed identical with the species described by Koch as *Cepheus minutus*. Koch described and figured the hairs at the posterior border of the hysterosoma as thin; he accurately described the pseudo-stigmatic organ as slightly clavate; nevertheless he erroneously drew it as ending in a point.

Oudemans (1900 a) collected *Cepheus minutus* at Haarlem, in August, in decaying leaves. His paper is accompanied by a plate that indeed represents *S. minutus*. Oudemans (1900 d) recorded *S. ovalis* from Bloemendaal, where he collected the species also in August, in decaying leaves; the slide containing the specimens (proving to belong to *S. minutus* indeed) is in the Oudemans Collection. In my opinion both records (Haarlem and Bloemendaal) refer to the same specimens, as Bloemendaal is situated near Haarlem; moreover date and surroundings are the same.

Judging by the description of *Eremacus ovalis* var. *siculis* Berlese (1887, vol. 35 (8)) it is not impossible that it represents the species dealt with here.

I collected my specimens in moss in dry places, for the greater part dry grass lands.

### **Scutovertex sculptus** Michael, 1879

*Scutovertex sculptus* Michael, 1879, p. 242, pl. 11 figs. 4-9; 1884, p. 299, pl. 18 figs. 1-8, pl. 24 fig. 11; Strenzke, 1943, p. 66.

*Eremaeus ovalis*, Berlese, 1887, vol. 35 (7).

*Scutovertex minutus* (p. p.), Buitendijk, 1945, p. 380.

Oudemans Collection. Putten, Valkeveen, Zeeburg near Amsterdam, Burgst near Breda.

In the Oudemans Collection there is a slide of *Scutovertex ovalis* from Berlese's *Acarotheca Italica*, that contains *S. sculptus* indeed; Berlese's 1887 description of *S. ovalis* indicates already that probably the two are conspecific. A slide labelled by Oudemans as a larva of *S. sculptus*, obtained from Wageningen, and as such recorded by Buitendijk (1945, p. 380) contains an indeterminable *Brachychthonius* species.

The Dutch specimens of *S. sculptus* in the Oudemans Collection (erroneously determined by Oudemans as *S. minutus*) were for the greater part collected in decaying leaves. The specimen from Putten was found in a beer mug.

### **Tectocephus velatus** (Michael, 1880)

*Tegeocranus velatus* Michael, 1880a, p. 190, pl. 6 figs. 6-9; 1884, p. 313, pl. 21 figs. 9-15.

*Tectocephus velatus*, Berlese, 1895, vol. 77 (2); Sellnick, 1928a, p. 28, fig. 64; Willmann, 1931, p. 142, figs. 176, 178; Noordam and De Vlieger, 1943, p. 10; Buitendijk, 1945, p. 380; Van der Drift, 1950, p. 86.

*Cepheus* sp., Oudemans, 1896, p. 55 (no. 25).

*Scutovertex velatus*, Oudemans, 1900d, pp. 151, 154.

Oudemans Collection. Arnhem, Bergen (N.H.), Valkeveen, Burgst near Breda.

Own material. Dwingelo, A 2, 3 ad. "Staatsbossen" between Lhee and Spier, A 4, 36 ad., 2 n. Weeringe, A 6, 1 ad. Mantinge, A 7, 15 ad.; A 8, 2 ad.; A 9, 10 ad., 4 n.; A 11, 1 ad. Oosterhesselen, A 13, 15 ad., 1 lv. Markelo, A 15, 1 ad.; A 16, 10 ad., 1 n. Lattrop, A 19, 3 ad.; A 20, 4 ad.; A 21, 1 ad. Denekamp, A 26, 2 ad. Hooge Veluwe, A 32, 4 ad.; A 34, 15 ad., 32 n.; A 35, 6 ad., 1 n.; A 35a, 1 ad.; A 36, 4 ad.; A 37, 9 ad., 1 n.; A 38, 17 ad., 5 n.; A 41, 4 ad.; A 42, 1 ad.; A 43, 1 n. Winterswijk, A 47, 4 ad.; A 48, 2 ad., 3n.; A49, 2 ad.; A 51, 3 ad., 2 n. Texel, A 53, 1 ad. Noordwijk aan Zee, A 56, 19 ad., 3 n. Meyendel, A 59, 2 ad., 2 juv.; A 65, 1 ad.; A 66, 18 ad., 2 n.; A 67, 14 ad., 4 n.; A 68, 16 ad., 3 n.; A 69, 2 ad., 1 n.; A 70, 6 ad.; A 72, 22 ad., 14 n. Rockanje, A 84, 3 ad., 1 juv.; Lekkerkerk, A 85, 1 ad. Ossendrecht, A 88, 1 ad. Neercanne, A 90, 1 ad.; A 91, 5 ad., 17 n. Sint Pietersberg, A 94, 1 ad., 1 n.; A 95, 1 ad.; A 96, 18 ad., 7 juv.; A 98, 1 ad.; A 99, 1 ad.; A 101, 1 ad.; A 102, 2 ad., 9 n.; A 103, 3 ad., 1 n.; A 104, 4 ad., 30 juv.; A 105, 1 ad.; A 106, 3 ad., 8 n.; A 107, 2 ad., 1 n.; A 108, 18 ad., 1 n.; A 109, 4 ad.; A 110, 1 ad.; A 111, 14 ad., 1 n.; A 112, 2 ad.; A 113, 8 ad., 4 n.; A 114, 4 ad.; A 115, 5 ad., 1 n.; A 116, 8 ad.; A 117, 6 ad., 9 n.

Localities from literature. Sneek, Lochem, Zutphen, Brummen (Oudemans); Hooge Veluwe (Noordam and De Vlieger, Van der Drift).

The species is very common; it occurs nearly everywhere. The shape of the pseudostigmatic organ and of the lamellae is rather variable, which led to the creation of several species and varieties (*T. minor* Berlese with var. *expansus* Berlese, *T. personatus* Berlese, *T. velatus* var. *sarekensis* Trägårdh). Haarløv (1942, p. 37) showed that probably these described species and varieties belong within the range of variation of the single species *T. velatus*. It remains, however, possible that the species is composed of a number of races, each with its preference for distinct ecological conditions. On the wooded hill investigated by Noordam and De Vlieger the species was more abundant on the southern slope than on the northern. Van der Drift found his specimens in greater numbers in the F<sub>1</sub> and F<sub>x</sub> layers than in the other layers.

### **Xenillus clypeator** Robineau-Desvoidy, 1839

*Xenillus clypeator* Robineau-Desvoidy, 1839, p. 455.

*Cepheus latus*, Nicolet, 1855, p. 446, pl. 7 fig. 9; Michael, 1884, p. 295, pl. 17 fig. 12, Berlese, 1888, vol. 49 (5).

(*Cepheus*) *latus*, Oudemans, 1896, p. 55.

*Kochia lata*, Oudemans, 1900 d, pp. 151, 154.

*Cepheus permixtus* André, 1925 a, p. 155.

*Banksia lata*, Sellnick, 1928 a, p. 27.

*Xenillus latus*, Willmann, 1931, p. 145, fig. 189.

*Xenillus* spec., Noordam and De Vlieger, 1943, pp. 7, 10.

*Xenillus lata*, Buitendijk, 1945, p. 381.

*Xenillus clypeator*, Grandjean, 1946 b, p. 324.

Oudemans Collection. Bloemendaal.

Own material. Hooge Veluwe, A 40, 1 n.; A 41, 3 ad.; A 42, 1 ad. Sint Pietersberg, A 117, 1 ad.

Localities from literature. Nijkerk, Haarlem, Bloemendaal, The Hague, Loosduinen (Oudemans); Hooge Veluwe (Noordam and De Vlieger).

Grandjean (1946 b) convincingly showed that *Xenillus clypeator* Robineau-Desvoidy is the species that modern authors have named *X. latus*; according to him it is an arboricolous mite. Noordam and De Vlieger found that the species was absent from the upper layers of the litter during drought; in my opinion this is chiefly caused by the fact that specimens fall down from the trees during rain.

Noordam and De Vlieger recorded the species as *Xenillus* spec.; they believed that their material consisted of the two species *X. latus* (= *clypeator*) and *X. tegeocranus*; at the same locality I collected *X. clypeator* only.

*X. clypeator* appears to be much rarer than *X. tegeocranus*; the rare occurrence of the former in my material may be due to the fact that I did not collect mites from trees.

**Xenillus tegeocranus** (Hermann, 1804)

- Notaspis tegeocranus* Hermann, 1804, p. 93, pl. 4 figs. 3, 4.  
*Cepheus vulgaris* Nicolet, 1855, p. 445, pl. 7 fig. 8.  
*Cepheus tegeocranus*, Michael, 1884, p. 292, pl. 16 fig. 9, pl. 17 figs. 1-11; Berlese, 1887, vol. 36 (2).  
 (*Cepheus*) *tegeocranus*, (*Cepheus*) sp., Oudemans, 1896, p. 55.  
*Kochia tegeocrana*, Oudemans, 1900 d, pp. 151, 154.  
*Banksia tegeocrana*, Sellnick, 1928 a, p. 27, fig. 62.  
*Xenillus tegeocranus*, Willmann, 1931, p. 145, figs. 187, 188; Grandjean, 1936, p. 73; Buitendijk, 1945, p. 380.

Oudemans Collection. Sneek, De Steeg, Haarlem.

Own material. Breckelenkamp, A 17, 4 ad., 1 n. Denekamp, A 28, 6 ad. Wilp (Gld.), A 44, 7 ad. Winterswijk, A 48, 1 ad.; A 51, 2 ad. Noordwijk aan Zee, A 56, 1 ad. Meyendel, A 59, 2 ad.; A 66, 1 ad., 1 n. Maasland, A 75, 1 ad. Lekkerkerk, A 85, 4 ad. Neercanne, A 89, 4 ad.; A 91, 2 ad., 1 n.; A 93, 2 ad. Sint Pietersberg, A 94, 1 ad.; A 95, 1 n.; A 101, 2 ad.; A 102, 3 ad.; A 103, 1 ad.; A 104, 1 ad.; A 105, 3 ad.; A 107, 1 ad., 1 n.; A 113, 1 ad.; A 114, 1 ad.; A 116, 3 ad.; A 117, 27 ad.

Localities from literature. Warnsveld, De Steeg, Haarlem, Bloemendaal, Overveen, The Hague, Bergen op Zoom (Oudemans).

This species is rather common; it mainly occurs in the litter of forests and in moss in the neighbourhood of trees. I did not find it, however, in every type of forests; it appears that the species is absent from forests on poor soils (the Querceto-Betuletum), while it is common in the area of the Querceto-Carpinetum.

**Tritegeus bifidatus** (Nicolet, 1855)

*Cepheus bifidatus* Nicolet, 1855, p. 446, pl. 7 fig. 10; Michael, 1884, p. 290, pl. 16 fig. 8.

*Kochia bifidata*, Oudemans, 1900 d, p. 154.

*Tritegeus bifidatus*, Berlese, 1913, p. 92; Sellnick, 1928 a, p. 28, fig. 63; Willmann, 1931, p. 145, figs. 190, 191; Buitendijk, 1945, p. 381.

Oudemans Collection. Delden.

Own material. De Lutte, A 29, 3 ad.

Locality from literature. Delden (Oudemans).

The species appears to be rare; previous authors (Nicolet, Michael, Willmann) collected few specimens only. It seems to prefer moist surroundings; I obtained my specimens from damp moss in an alder marsh near the source of a brook.

**Odontocephus elongatus** (Michael, 1879)

*Tegeocranus elongatus* Michael, 1879, p. 250, pl. 10 figs. 7-10; 1884, pl. 22 figs. 4-10.

*Carabodes elongatus*, Berlese, 1888, vol. 50 (1).

*Odontocephus elongatus*, Sellnick, 1928 a, p. 27, fig. 60; Willmann, 1931, p. 146, fig. 192.

Own material. Bennekom, 18.X.1948, leg. J. van der Drift, 2 ad.<sup>1)</sup>.

This very characteristic species up till now was never recorded from our country. I obtained only two specimens, collected in a fir wood. According to Michael it occurs in decaying wood; Willmann recorded it from moss, trees, and old stumps.

### **Cepheus cepheiformis** (Nicolet, 1855)

*Tegeocranus cepheiformis* Nicolet, 1855, p. 465, pl. 9 fig. 1; Michael, 1888, p. 340, pl. 25 figs. 1-7.

*Cepheus latus*, Oudemans, 1896, p. 54.

*Cepheus spec.*, Oudemans, 1896, p. 55 (no. 27); 1897, p. 180, pl. 10 figs. 9-13, 15; Noordam and De Vlieger, 1943, pp. 6, 10.

*Cepheus cepheiformis*, Oudemans 1900 d, pp. 151, 154; Sellnick, 1928 a, p. 28, fig. 65, Willmann, 1931, p. 147, figs. 193, 198; Buitendijk, 1945, p. 381.

*Cepheus michaeli* Jacot, 1928, p. 263.

Oudemans Collection. Huis ter Heide (Friesland), Lochem.

Own material. Brecklenkamp, A 17, 3 ad. Denekamp, A 25, 2 ad.; A 26, 17 ad.; A 28, 1 ad. Hooge Veluwe, A 35 a, 3 ad.; A 41, 2 ad.; A 42, 2 ad.

Localities from literature. Langweer, Zutphen, Lochem, Warnsveld (Oudemans); Hooge Veluwe (Noordam and De Vlieger).

Jacot's (1928) summary of the original descriptions of the European species of the genus *Cepheus* is rather confounding as it appears that he did not see European specimens. He concluded that *Tegeocranus cepheiformis* Nicolet is different from *Tegeocranus cepheiformis* Michael on account of characters that certainly belong to the well known inaccuracies in Nicolet's work. In my opinion the two species are identical.

On the other hand it is not impossible that *T. cepheiformis* Nicolet is a synonym of *Cepheus latus* C. L. Koch, 1836, vol. 3 (11). Koch described the lamellae of *C. latus* as broad, covering the upper surface and the anterior part of the propodosoma. This points to *T. cepheiformis* Nic. and certainly not to *T. latus* Michael, in which the rostrum is visible from above between the lamellae.

Noordam and De Vlieger recorded the species as *Cepheus spec.* I collected specimens at the same locality and these proved to be *C. cepheiformis*.

The species occurred abundantly in moss in a marsh with birch and alder; further I collected it in the litter of various forests (Querceto-Betuletum, Querceto-Carpinetum, beech forest).

### **Carabodes coriaceus** C. L. Koch, 1836

*Carabodes coriaceus* C. L. Koch, 1836, vol. 3 (15); Sellnick, 1928 a, p. 29, fig. 66;

1) Recently the species was also discovered in moss in a fir wood in the southern part of "De Hooge Veluwe" near Schaarsbergen.

Willmann, 1931, p. 148, fig. 201; Noordam and De Vlieger, 1943, p. 10; Buitendijk, 1945, p. 381.

*Tegeocranus coriaceus*, Michael, 1884, p. 316, pl. 20 figs. 1-8, pl. 22 fig. 11.

Oudemans Collection. The Hague.

Own material. Hooge Veluwe, A 42, 2 ad. Sint Pietersberg, A 117, 1 ad.

Locality from literature, Hooge Veluwe (Noordam and De Vlieger).

Koch's original description probably refers to the *C. coriaceus* of modern authors. Berlese (1886, vol. 33 (8)) appears to have confounded *C. coriaceus* with *C. marginatus*; his description and figure refer partly to the first species, partly to the second.

Noordam and De Vlieger were the first to record the species from our country; it appears to be rare. I collected it twice, in the soil of a Querceto-Betuletum and of a Querceto-Carpinetum respectively.

### ***Carabodes labyrinthicus* (Michael, 1879) (fig. 8 c)**

*Tegeocranus labyrinthicus* Michael, 1879, p. 249, pl. 11 figs. 2-3; 1884, p. 319, (? pl. 21 figs. 1-4, 6-8, pl. 22 fig. 3).

*Cepheus* spec., Oudemans, 1896, p. 55 (no. 26).

*Carabodes labyrinthicus*, Oudemans, 1900 d, pp. 151, 154; 1902 e, p. 2; Sellnick, 1928, p. 29; Willmann, 1928 a, pp. 162, 163; 1931, p. 149, fig. 202.

*Cepheus heimi* Oudemans, 1903 a, p. 83; Oudemans and Heim, 1904, p. 312, figs. 1-3.

Oudemans Collection. Arnhem, Warnsborn near Arnhem, De Steeg, The Hague.

Own material. Lhee, A 3, 60 ad., 8 n. Mantinge, A 7, 1 ad.; A 9, 4 ad. Oosterhesselen, A 13, 3 ad., 1 n.; Denekamp, A 28, 2 ad. Hooge Veluwe, A 32, 9 ad.; A 35 a, 5 ad.; A 43, 7 ad. Wilp (Gld.), A 44, 2 ad.; A 45, 3 ad., 1 n. Winterswijk, A 47, 2 ad.; A 50, 7 ad., 3 n.; A 51, 1 ad. Meyendel, A 68, 1 ad.

Locality from literature: De Steeg (Oudemans).

Willmann (1928 a) pointed out that there exists a great difference between Michael's original figure of the species (1879) and the figure given by him in 1884; the 1884 description corresponds with that of 1879. The specimen figured in 1884 is possibly identical with *Carabodes minusculus* Berlese.

A *Carabodes* spec. was recorded from "De Hooge Veluwe" by Noordam and De Vlieger (1943, p. 10), and by Van der Drift (1950, p. 66). In the forest investigated by Noordam and De Vlieger I collected three *Carabodes* species: *C. coriaceus* (also recorded by them), *C. marginatus*, and *C. labyrinthicus*; in the forest investigated by Van der Drift I found *Carabodes labyrinthicus*, but also *Cepheus cepheiformis*, a Carabodid species not recorded by him.

My material contains some nymphs; I have represented one of these (a nymph III) in fig. 8 c. The colour is greyish. The posterior part of the notogaster shows a vaguely granulated structure, that possibly is present on the whole dorsal surface. The hairs on the propodosoma are situated as in

the adult; the pseudostigmatic organ, however, is not clavate, but it has the shape of a long and strong hair. The notogastral hairs are not short and stiff as in the adult, but rather long; the hairs dp are a little stronger than the remaining hairs.

I collected the species in forests in the litter and in moss, further sometimes at the foot of a tree, and three times in lichens on oaks (once in numerous specimens). The forests belonged to very different types: *Querceto-Betuletum*, *Querceto-Carpinetum*, birch wood in the sand dunes, and cultivated woods of *Pinus*, *Picea*, and *Fagus* respectively.

***Carabodes marginatus*** (Michael, 1884) (fig. 8 g)

*Tegeocranus marginatus* Michael, 1884, p. 322, pl. 21 fig. 5, pl. 22 figs. 1-2.

*Cepheus minutus*, Oudemans, 1896, p. 54.

*Carabodes marginatus*, Oudemans, 1900 d, pp. 151, 154, 162; Sellnick, 1928, p. 29; Willmann, 1931, p. 149, fig. 203; Buitendijk, 1945, p. 381.

Oudemans Collection. Huis ter Heide (Friesland), Valkeveen, The Hague.

Own material. Markelo, A 16, 2 ad. Denekamp, A 26, 1 ad. Hooge Veluwe, A 36, 4 ad.; A 38, 1 ad.; A 43, 3 ad. Meyendel, A 69, 8 ad.; A 72, 1 ad.

Localities from literature. Langweer, Lochem, Zutphen, Brummen (Oudemans).

Michael described the hairs on the notogaster as follows: "Four rows of short, thick hairs on notogaster, and a few radiating fine hairs round the hind margin." I have figured the posterior part of the hysterosoma (fig. 8 g), which shows that the radiating hairs are indeed thinner than the dorsal hairs; nevertheless they are slightly thickened towards the end and they are rough at the outside.

Willmann wrote: "Interlh. dick, an der Spitze rauhaarig ..... Borsten des Hyst. scharf und spitz." The notogastral hairs, however, resemble the interlamellar hairs.

I collected the species in litter and moss in forests (sometimes at the foot of trees), in moss in the sand dunes, in moss in a birch and alder marsh, and several times in moss in the heath.

***Carabodes minusculus*** Berlese, 1923

*Carabodes minusculus* Berlese, 1923, p. 257; Willmann, 1928 a, p. 162; 1931, p. 149, figs. 204, 205.

Own material. Dwingelo, A 2, 24 ad. "Staatsbossen" between Lhee and Spier, A 4, 1 ad. Markelo, A 16, 37 ad. Lattrop A 18, 1 ad.; A 20, 1 ad.; A 21, 11 ad. Hooge Veluwe, A 36, 31 ad.; A 39, 1 ad. Texel, A 53, 7 ad. Ossendrecht, A 88, 2 ad.

Berlese's original description, a short Latin diagnosis, seems to be applicable to the specimens dealt with here. As I noted above, Willmann (1928 a) drew attention to the fact that in Michael's 1884 description of *Carabodes*

*labyrinthicus* the plate (not the text) probably represents *C. minusculus*; this plate is different from the original 1879 plate.

*C. minusculus*, a species new to our fauna, occurs sometimes abundantly in moss and lichen in the heath; I further collected a few specimens in sphagnum and in the litter in a cultivated forest of *Picea* and *Larix*.

## LIACARIDAE

### **Adoristes ovatus** (C. L. Koch, 1839) (fig. 7 h, i)

*Oribates ovatus* C. L. Koch, 1839, vol. 30 (24).

*Leiosoma ovata*, Nicolet, 1855, p. 443, pl. 6 fig. 5; Michael, 1884, p. 278, pl. 13 figs. 8-14.

*Leiosoma pyrigerum* Berlese, 1888, vol. 50 (2).

(*Leiosoma flavipes*, (*Leiosoma*) *ovatus*, (*Leiosoma*) sp., Oudemans, 1896, p. 54 (nos. 15, 17, 20, 21).

*Liacarus ovatus*, Oudemans, 1900 d, pp. 151, 155.

*Adoristes ovatus*, Sellnick, 1928 a, p. 30, fig. 67; Willmann, 1931, p. 150, fig. 207.

*Adoristes ovatus*, *Leiosoma ovatus*, Buitendijk, 1945, pp. 381, 382.

Oudemans Collection. Putten, Zutphen, Haarlem, Burgst near Breda.

Own material. Mantinge, A 7, 9 ad. Brecklenkamp, A 17, 13 ad. Denekamp, A 26, 6 ad.; A 28, 2 ad. Hooge Veluwe, A 35, 9 ad. Winterswijk, A 49, 1 ad. Neercanne, A 91, 1 ad. Sint Pietersberg, A 114, 3 ad.; A 115, 20 ad.; A 117, 1 ad.

Localities from literature. Delden, Zutphen, Brummen, Lochem, Haarlem (Oudemans).

Koch's original description (1839) of *Oribates ovatus* is probably based upon the *Adoristes ovatus* of modern authors. Nicolet (1855) drew the interlamellar hairs  $1\frac{1}{2}$  times as long as the lamellae, that is at least 3 times as large as in my specimens. Further he drew too many notogastral hairs, and the hairs themselves too long. Michael (1884) drew no interlamellar hairs, but he described them as "short and setiform"; his drawing of the notogastral hairs is incorrect, as he figured 5 pairs of median hairs of medium size, and 5 pairs of very small hairs along the posterior border; consequently it was desirable to give a new figure (fig. 7 h). Berlese (1888) in his figure omitted the interlamellar hairs, and drew only two very small notogastral hairs (situated at the posterior border).

Oudemans (1906 b, p. 121, and in: Oudemans and Poppe, 1906, p. 52, pl. 2 figs. 1-3), described and figured *Liacarus poppei* as a related species. He gave a rather elaborate description, but he did not point out the differences from *A. ovatus*. Differences between the two species were given by Sellnick (1928 a, p. 30), and by Willmann (1931, p. 150; 1932, p. 430). They recorded the following distinguishing characters of *A. poppei*: the interlamellar hairs are only half as long as the lamellae (nearly as long as the lamellae in *A. ovatus*); the pseudostigmatic organ is clavate or spindle-



shaped, its stem inside the pseudostigma (clavate and short; stem partly extending in *A. ovatus*); the notogastral hairs are rather long and slightly curved (short in *A. ovatus*); the species is smaller and relatively broader than *A. ovatus*.

I have examined the type specimen of *A. poppei* and have compared it with my specimens of *A. ovatus*. In contradistinction to the characters given by Sellnick and Willmann, I found the following peculiarities in my specimens of *A. ovatus*. The interlamellar hairs are only  $\frac{1}{3}$ - $\frac{1}{4}$  as long as the lamellae (fig. 7 i), and not nearly as long as these; the notogastral hairs are of medium length and slightly curved (fig. 7 h); the total length and the general shape are variable.

The type specimen of *A. poppei* (this is the only available specimen) has the following peculiarities. The interlamellar hairs are about  $\frac{1}{4}$  as long as the lamellae; the pseudostigmatic organ is spindle-shaped, and ends in a long, sharp point (Sellnick states that among his material there are also specimens with clavate pseudostigmatic organs); the notogastral hairs resemble those of *A. ovatus*; the general shape is short and relatively broad, but this shape is not essentially different from that of some of my specimens of *A. ovatus*.

Consequently the main difference between the two species is that of the pseudostigmatic organs, these being spindle-shaped in *A. poppei* (although Sellnick states that he has found specimens with clavate pseudostigmatic organs). Compared with the pseudostigmatic organ of *A. ovatus*, this organ in *A. poppei* has indeed a strange shape, as it ends in a sharp point. The head, however, gives the impression of being damaged, as it is rather wrinkled. With the single specimen at my disposal I cannot decide whether the only remaining distinguishing character holds good, and if owing to this *A. poppei* is a good species or not.

I collected *A. ovatus* only in forests belonging to the following types: Querceto-Betuletum, Querceto-Carpinetum, thickets of *Prunus spinosa* and *Crataegus*, birch and alder marsh, beech forest. The samples consisted of litter and moss. According to Forsslund (1939) the species has a preference for the upper layer of the litter.

### **Hafenrefferia gilvipes** (C. L. Koch, 1839)

*Oribates gilvipes* C. L. Koch, 1839, vol. 30 (14).

*Liacarus auritus* Nordenskiöld, 1901, p. 20, fig. 2.

*Liacarus pterotus* Coggi, 1900, p. 322, fig. 5.

*Hafenrefferia gilvipes*, Oudemans, 1917 a, p. 29, figs. 53-57; Sellnick, 1928 a, p. 30, fig. 68; Willmann, 1931, p. 150, fig. 209; Buitendijk, 1945, p. 382.

Oudemans Collection. Oosterbeek, Arnhem.

Locality from literature. Oosterbeek (Oudemans).

Koch's original description corresponds with my specimens. He exactly described the pteromorphae, lamellae, pseudostigmatic organs, the colour, and the shape of the hysterosoma.

I did not collect the species, but there are specimens from our country in the Oudemans Collection. *H. gilvipes* appears to occur only locally; according to Willmann it is sometimes found in large numbers.

### **Liacarus coracinus** (C. L. Koch, 1841)

*Oribates coracinus* C. L. Koch, 1841, vol. 31 (1).

*Leiosoma similis* Nicolet, 1855, p. 442, pl. 6 fig. 2.

*Leiosoma simile*, Michael, 1884, p. 276, pl. 13 figs. 1-7.

*Leiosoma coracinum*, Berlese, 1885, vol. 20 (3).

*Liacarus coracinus*, Sellnick, 1928 a, p. 31; Willmann, 1931, p. 152, fig. 214; Noordam and De Vlieger, 1943, p. 10.

*Liacarus coracinus*, *Liacarus xylariae*, Buitendijk, 1945, p. 382.

Oudemans Collection. De Steeg, Zeeburg near Amsterdam, Burgst near Breda.

Own material. Hooze Veluwe, A 35 a, 2 ad.; A 41, 1 ad. Meyendel, A 68, 6 ad.

Locality from literature. Hooze Veluwe (Noordam and De Vlieger).

Koch's original description accords with my specimens. Nicolet's description and figure of *Leiosoma similis* are not very distinct, but I am inclined to regard the name as a synonym of *L. coracinus*.

Nicolet made an error when drawing the lamellae as provided with two long points and the hysterosoma as provided with 4 pairs of rather long hairs at the posterior border.

Oudemans' records of species of *Liacarus* give rise to some confusion. In 1896 (p. 54) he recorded (*Leiosoma*) *fuscus* from De Steeg, Brummen, and Langweer; in a later paper (1900 d, p. 151) he identified these specimens as *Liacarus coracinus*. His specimens from De Steeg are still in the collection, they really belong to *L. coracinus*; there is also a slide containing a *Liacarus* species from Brummen, collected in 1895, that, however, is identical with *Liacarus subterraneus*; the specimens from Langweer are no more in the collection. One specimen from Zeeburg, identified by Oudemans as *Leiosoma xylariae* (as such recorded by Buitendijk), was identified by me as *L. coracinus*.

I collected my specimens in the soil of forests only (beech forest, *Querceto-Betuletum*, birch wood). Oudemans obtained also specimens from the drift accumulation along the shore of the former Zuyderzee. Noordam and De Vlieger found the species in greater numbers on the southern slope of the hill investigated by them than on the northern. As I found my specimens in three samples only, the species is certainly not "ueberall verbreitet", as according to Willmann it is in Germany.

**Liacarus subterraneus** (C. L. Koch, 1841) (= *tremellae*, *globosus* auct.)

*Oribates subterraneus* C. L. Koch, 1841, vol. 38 (11).

*Leiosoma lativentris* Nicolet, 1855, p. 444, pl. 6 fig. 6.

*Leiosoma globosum*, Berlese, 1885, vol. 20 (4).

*Liacarus globosus*, Sellnick, 1928 a, p. 31.

*Liacarus tremellae*, Willmann, 1931, p. 152, fig. 216; Buitendijk, 1945, p. 382.

Oudemans Collection. Brummen, The Hague, Oisterwijk, Burgst near Breda.

Own material. Oosterhesselen, A 12, 2 ad. Winterswijk, A 47, 1 ad.; A 49, 1 ad. Sint Pietersberg, A 102, 1 ad.

Oudemans (1929 a, p. 791) identified the species as *Acarus tremellae* Linnaeus (1761). Linnaeus' concise diagnosis runs as follows: "Acarus subglobosus atro-coerulescens nitidus. Habitat in Tremella juniperina." Oudemans derived from the recorded blue-black colour that *Oribates globosus* C. L. Koch is the only (!) Oribatid mite that accords with Linnaeus' diagnosis, in my opinion an altogether insufficiently founded conclusion.

Grandjean (1936 a, p. 253) pointed out that *Oribates globosus* C. L. Koch probably is a *Conoppia*, and certainly not a *Liacarus*. On the other hand, the description of *Oribates subterraneus* C. L. Koch agrees with my specimens, and because it is the oldest description, the species has to bear this name. Berlese was one of the few authors who recorded the name on his list of synonyms, although with a question mark. Berlese was also one of the few authors who cited *Leiosoma lativentris* Nicolet as one of the synonyms of the species; Nicolet's description indeed accords with the species.

Oudemans (1896, p. 54) recorded *Liacarus subterraneus* from The Hague. Later (1900 d, pp. 151, 155, 162) he identified this specimen as *Liacarus lativentris*. In the Oudemans Collection there are specimens of *Liacarus subterraneus* from The Hague (identified as *L. tremellae*), but they were collected in 1910 and 1919. There is, however, a specimen with the label *Leiosoma* spec., collected at The Hague in 1896, which is probably the specimen referred to; the slide is in a bad condition, for the specimen is severely damaged; it appears to be rather large, and it may belong to *L. subterraneus*, though the state of preservation does not allow of a definite identification.

I collected the species at three localities only, where I found it in the soil of forests (Querceto-Betuletum, Querceto-Carpinetum).

## GUSTAVIIDAE

**Gustavia microcephala** (Nicolet, 1855)

*Leiosoma microcephala* Nicolet, 1855, p. 443, pl. 6 fig. 4.

*Serrarius microcephalus*, Michael, 1884, p. 272, pl. 14 figs. 7-13; Sellnick, 1928a, p. 23, fig. 50.

*Gustavia microcephala*, Willmann, 1931, p. 157, fig. 233.

*Gustavia fusifer*, Buitendijk, 1945, p. 384.

Oudemans Collection. Leeuwen (Gelderland).

The Oudemans Collection contains one Dutch specimen of a *Gustavia* species that, however, is severely damaged. Oudemans identified it as *G. fusifer* (C. L. Koch); I believe, on the contrary, that it belongs to *G. microcephala*, for as far as the characters are distinct, it accords with Michael's description of this species.

The cuspidata of my specimen are truncate, but not very long, and the pseudostigmatic organ has a rather thick head just as in Michael's figures.

Nicolet's original description is insufficient; the figured specimen bears some resemblance to *G. fusifer*.

Of *Serrarius bicornis* Berlese (1885, vol. 20 (7)), regarded by most authors as a synonym of *G. microcephala*, there is a specimen in the Oudemans Collection originating from Berlese's *Acarotheca Italica*. I have examined this specimen, and can state that the cuspidata are long, much longer than in my specimen of *G. microcephala* whilst the pseudostigmatic organ is narrower; the specimen probably belongs to a different species indeed.

Oudemans obtained his specimen from decaying leaves.

## ORIBATULIDAE

### ***Oribatula tibialis*** (Nicolet, 1855)

*Notaspis tibialis* Nicolet, 1855, p. 449, pl. 3 fig. 8.

*Oribatula tibialis*, Sellnick, 1928 a, p. 17; Willmann, 1931, p. 155, fig. 225; Noordam and De Vlieger, 1943, p. 10; Van der Drift, 1950, p. 86.

*Zygoribatula exilis* (p.p.), *Z. venustus*, Buitendijk, 1945, p. 383.

Oudemans Collection. Putten, Zeeburg near Amsterdam, Breda, Burgst near Breda, Bergen op Zoom.

Own material. Dwingelo, A 2, 1 ad. "Staatsbossen" between Lhee and Spier, A 4, 1 ad. Mantinge, A 7, 8 ad., 3 n.; A 8, 11 ad., 2 n.; A 9, 1 ad. Oosterhesselen, A 13, 1 ad. Denekamp, A 26, 58 ad. Hooge Veluwe, A 32, 12 ad.; A 35, 1 ad.; A 35a, 6 ad.; A 38, 1 ad.; A 40, 2 ad.; A 41, 3 ad., 1 n.; A 42, 8 ad.; A 43, 1 ad. Wilp (Gld.), A 44, 15 ad., 1 n. Sint Pietersberg, A 94, 1 ad.; A 115, 2 ad.

Locality from literature. Hooge Veluwe (Noordam and De Vlieger, Van der Drift).

Nicolet's original description and figure are not very distinct, but his species appears to be sufficiently characterized by his description of the lamellae as "tronquées au sommet se prolongeant un peu au dessous de la troncature", which corresponds with my specimens. Michael's description of *Notaspis tibialis* (1888, p. 362, pl. 28 figs. 6-8) does not accord with my specimens, as in his specimens the lamellae are "narrower at the distal than

the proximal ends"; moreover he described a translamella, although it is "a mere line not conspicuous". Nor can I identify *Oribatula tibialis* Berlese (1895, vol. 77 (5)) with *O. tibialis* (Nic.); Berlese's species is too long (600  $\mu$ ), and, moreover, it possesses a translamella. In 1892 (vol. 64 (1)) Berlese described an *Oppia tibialis* that he regarded in 1895 as a new species (*Oribatula plantivaga*).

Oudemans confounded *Oribatula tibialis* with *Zygoribatula exilis*; the greater part of his material that was identified as *Z. exilis* in reality belongs to *O. tibialis*; one specimen only, from Arnhem, indeed belongs to *Z. exilis*. Further the Oudemans Collection contains slides that were identified as *Z. venustus* Berlese, but these also belong to *O. tibialis*. On the other hand two slides, with the name *O. tibialis*, appeared to belong to *Scheloribates confundatus*; the remaining two slides labelled as *O. tibialis* are unrecognizable, but they certainly do not belong to *O. tibialis*. Accordingly, Oudemans' records of *Eremaeus exilis* (1900 d, pp. 155, 162) refer for the greater part to *O. tibialis*, whilst his records of *Eremaeus tibialis* (1900 d, pp. 155, 162) at any rate partly refer to *Scheloribates confundatus*. In the preliminary catalogue of the Oudemans Collection (Buitendijk, 1945, p. 383) the records of *O. tibialis*, *Z. exilis*, and *Z. venustus* have to be corrected in the above mentioned sense.

I collected the species in the heath (in moss and *Cladonia*), in a birch swamp (in moss), in a fir wood (in moss), and in the litter of forests (*Querceto-Betuletum*, *Querceto-Carpinetum*, beech forest, forest of *Picea* and *Larix*, thicket of *Crataegus*). According to Van der Drift, and Noordam and De Vlieger, the species is not very sensitive to drought. It appears to have its optimum in F<sub>0</sub> and F<sub>1</sub>. Noordam and De Vlieger observed that the species was more abundant on the northern slope of the wooded hill investigated by them than on the southern; they regarded the preference for moss as the cause of this distribution.

### ***Zygoribatula exilis* (Nicolet, 1855)**

*Notaspis exilis* Nicolet, 1855, p. 448, pl. 3 fig. 7; Michael, 1888, p. 359, pl. 28 figs. 1-5. *Zygoribatula exilis*, Sellnick, 1928 a, p. 17; Willmann, 1931, p. 155, fig. 226; (p.p.), Buitendijk, 1945, p. 383.

Oudemans Collection. Arnhem.

Own material. Hooge Veluwe, A 34, 26 ad.; A 43, 14 ad. Meyendel, A 60, 2 ad. Lekkerkerk, A 85, 27 ad. Neercanne, A 92, 2 ad. Sint Pietersberg, A 103, 2 ad.

Nicolet's figure of the propodosoma of *Notaspis exilis* makes it easy to recognize the species, though the drawing of the notogastral hairs is completely wrong. I am not certain about the identity of *Oribatula exilis* Berlese

(1895, vol. 77 (6)); this may represent *Z. exilis*, but Berlese draws no trans-lamella.

The species appears to be less common than *O. tibialis*. I collected my specimens mainly in moss at the foot of trees, and once in dry moss in the sand dunes.

**Zygoribatula frisiae** (Oudemans, 1900) (fig. 7 m)

*Eremaeus frisiae* Oudemans, 1900 d, pp. 155, 163.

*Oribatula frisiae*, Oudemans, 1917 a, p. 43, figs. 80-84.

*Oribatula (Zygoribatula) frisiae*, Sellnick, 1928 a, p. 17; Willmann, 1931, p. 156, fig. 229.

*Eremaeus frisiae*, *Zygoribatula frisiae*, Buitendijk, 1945, pp. 379, 383.

Oudemans Collection. Sneek, Huizum, Baarn.

Own material. Texel, A 54, 1 ad.

Locality from literature. Sneek (Oudemans).

Oudemans (1917 a) gave an extensive description of the species, which, together with the accompanying figure, might cause some misunderstanding, as Oudemans described and figured the propodosomatal hairs as very coarse ("deutlich behaarte Borsten"), while in reality they are smooth (fig. 7 m, drawn after the type specimen); I determined this in the type specimen as well as in the other specimens studied by me. On the other hand the pseudo-stigmatic organ is indeed beset with numerous very small hairs.

*Z. frisiae* seems to be a rare species. It was recorded from the northern part of Germany (Willmann, 1931) and from England (Evans, 1952, p. 40). My single specimen was collected in the sand dunes in moss; the specimens in the Oudemans Collection were obtained from moss, and from moss on roofs.

**Zygoribatula terricola** nov. spec. (fig. 7 j-1)

Oudemans Collection. Zeeburg, Valkeveen (2 paratypes).

Own material. Maasland, A 78, 1 ad. (holotype). Lekkerkerk, A 85, 1 ad. (paratype).

This new species is identical with the form described by Sellnick (1928 a, p. 17, fig. 33) as *Z. cognata*; in the Oudemans Collection the species was erroneously identified in the same way (as such recorded by Buitendijk (1945, p. 383)). *Z. cognata* was originally described by Oudemans after specimens from San Remo, Italy (Oudemans, 1902 f, p. 54; 1904, p. 27, pl. 3 figs. 75-77), and the type specimens are still in the collection; these show that *Z. terricola* is related to *Z. cognata*, but that nevertheless the differences are evident, as results from the following description (fig. 7 j-1).

Colour brown.

Measurements: medium length 0.515 mm (extremes 0.510-0.525, while Sellnick records 0.539), width 0.335 mm.

Lamellae with short, but distinct cuspidata that have a concave anterior border; the lamellar hairs are inserted behind this anterior border (I am not certain whether this insertion is at the upper surface or at the lower). Rostral hairs, lamellar hairs, and interlamellar hairs strong, and rough by numerous small hairs. Pseudostigmatic organ with rather narrow head, that is also beset with a great number of small hairs. Exopseudostigmatic hairs long.

Hysterosoma with small pteromorphae that project only slightly beyond the general outline; sometimes they are rather distinct and rounded (fig. 7 j), and then they resemble the pteromorphae of *Z. cognata*. Notogastral hairs strong and rough, especially in the anterior part. The notogaster further shows the usual four pairs of areae porosae of which the adalares are rather large; moreover, in the holotype, I could distinguish one pair of large, boot-shaped areae porosae under the pteromorphae (fig. 7 l).

This new species is related to *Z. cognata* (Oudemans), of which it is distinctly different by the presence of cuspidata, and by the greater measurements ( $0.450 \times 0.270$  mm in *Z. cognata*); further in *Z. terricola* the head of the pseudostigmatic organ appears to be a little narrower, and the notogastral hairs (with the exception of the hairs on the pteromorphae) are a little stronger.

I remark that two of my specimens have, instead of one, two hairs on one of their pteromorphae; I found this abnormality also in the type specimen of *Zygoribatula hessei* (Oudemans, 1902) from the Belgian Congo.

My specimens were collected in a meadow, and in moss at the foot of a pollard willow; the specimens in the Oudemans Collection were obtained from the drift accumulation along the shore of the former Zuyderzee, and from decaying leaves.

## SCHELOBIBATIDAE

### **Schelorbates**

The species of the genus *Schelorbates* are to be distinguished only after a thorough comparison of the various forms, and the earlier authors (and sometimes even the modern) often confounded them. In our country I collected four species; three of these belong to forms that have been generally identified as species described by Koch. I am completely certain about these identifications as far as concerns *S. laevigatus* only; for the remaining

species I am in doubt. Nevertheless I stick to the old names to prevent confusion. My identifications correspond with those by Willmann, although his key does not hold good in every respect. After a thorough comparison, the species are best to be distinguished by the general outline of the body, and by the shape of the pseudostigmatic organ.

**Scheloribates confundatus** Sellnick, 1928 (figs. 7 s, 8 b)

*Scheloribates confundatus* Sellnick, 1928 a, p. 16; Willmann, 1931, p. 159, fig. 234; Noordam and De Vlieger, 1943, p. 10; Buitendijk, 1945, p. 384.

Oudemans Collection. Valkeveen, Bloemendaal.

Own material. Hooge Veluwe, A 32, 14 ad.; A 42, 2 ad. Winterswijk, A 48, 2 ad., 2 n.; A 51, 1 ad. Meyendel, A 65, 11 ad., 4 n.; A 66, 27 ad.; A 68, 35 ad., 14 n.; A 70, 10 ad., 2 n. Maasland, A 75, 5 ad. Rockanje, A 82, 2 ad.; A 84, 1 ad. Sint Pietersberg, A 116, 1 ad., 1 n.

Locality from literature. Hooge Veluwe (Noordam and De Vlieger).

According to Oudemans (1937, p. 2661) it is not impossible that the species is identical with *Zetes gilvulus* C. L. Koch (1841, vol. 31 (17)). As I pointed out above, part of Oudemans' records of *Eremaeus tibialis* (1900 d, pp. 150, 152, 155, 162, earlier recorded as *Oppia* sp., *Oribates* sp., 1896, p. 54 (no. 14), p. 57 (no. 61)), refer to *Scheloribates confundatus*, just as part of Buitendijk's record of *Oribatula tibialis* (1945, p. 383).

The species is easily recognizable by the pteromorphae that do not extend beyond the general outline (fig. 7 s). The length of my specimens varies between 0.465 and 0.565 mm.

I collected a number of nymphs of the species (fig. 8 b). They resemble those of *S. laevigatus*, but they have rather short, rough interlamellar hairs, rather long notogastral hairs (though the hair C<sub>3</sub> is less strong than in *S. laevigatus*), and larger areae porosae mesonoticae.

The species occurs only locally in our country, but it sometimes occurs abundantly. According to Willmann (1931) it prefers "sehr feuchte Plätze, besonders quellige Stellen"; Frenzel (1936) recorded it as an inhabitant of "Quell- und Moormoosen". I collected the species in the litter of forests (Querceto-Betuletum, Querceto-Carpinetum, birch wood in the sand dunes, thicket of *Prunus spinosa*), in litter of *Salix repens* in the sand dunes, in moss in a fir wood and in an alder marsh, and in moss in a grass land with solitary *Hippophaë*; all these places were not very dry, but certainly also not extraordinarily wet. According to Forsslund (1939) the species has a preference for the upper layer of the litter. Noordam and De Vlieger collected the species in larger numbers on the northern slope of the wooded hill investigated by them than on the southern.



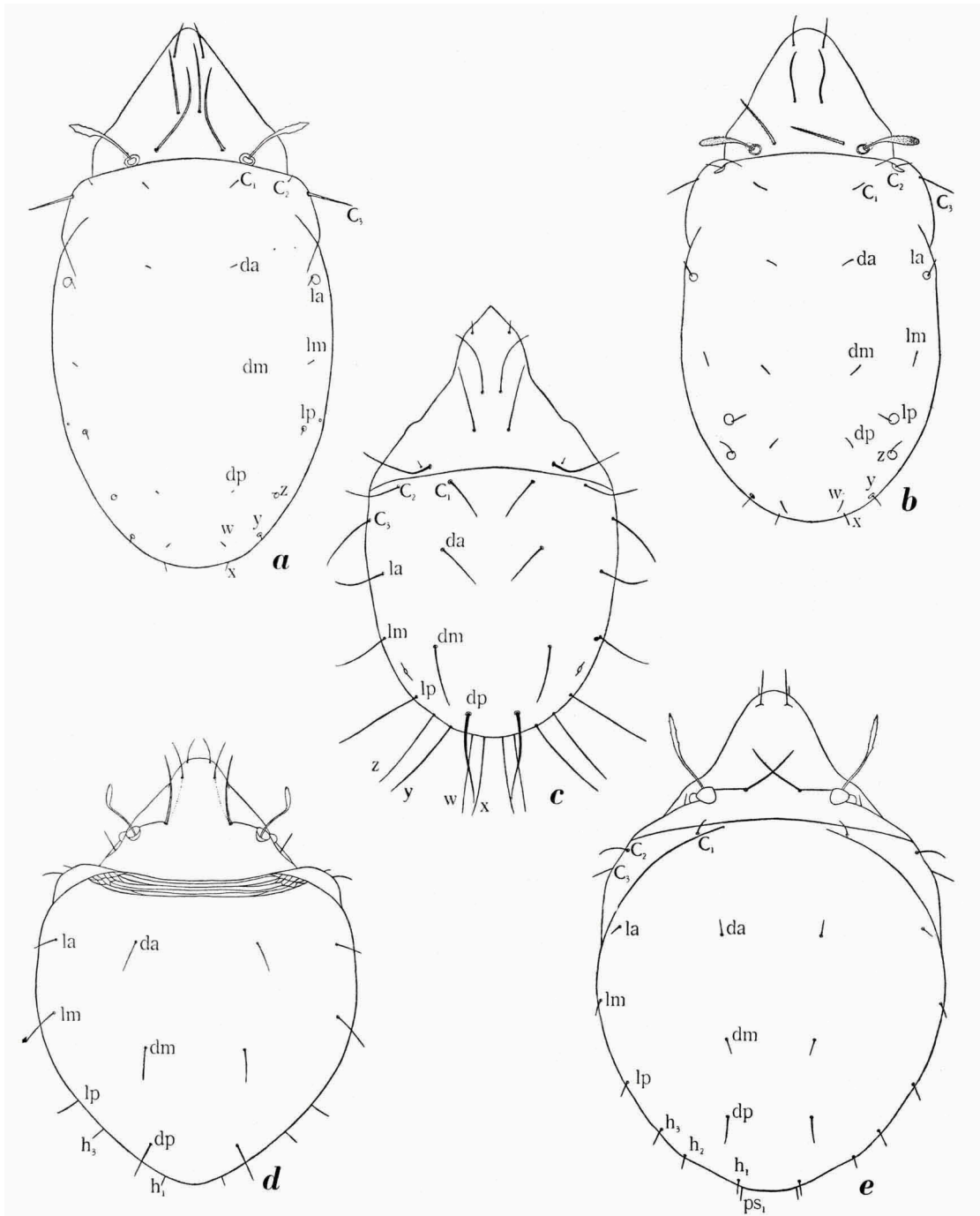


Fig. 8. Dorsal views of nymphs. a, *Scheloribates laevigatus* (C. L. Koch), nympha III. b, *Scheloribates confundatus* Sellnick, nympha III. c, *Carabodes labyrinthicus* (Michael), nympha III. d, *Melanozetes mollicomus* (C. L. Koch), nympha III. e, *Fuscozetes fuscipes* (C. L. Koch), nympha II. a-e,  $\times 150$ .

**Scheloribates latipes** (C. L. Koch, 1841) (fig. 7 q, u)

*Zetes latipes* C. L. Koch, 1841, vol. 38 (14).

*Scheloribates latipes*, Sellnick, 1928 a, p. 16, fig. 30; Willmann, 1931, p. 159, fig. 235; Buitendijk, 1945, p. 384.

Oudemans Collection. Arnhem.

Own material. Dwingelo, A 2, 3 ad. Markelo, A 16, 1 ad. Lattrop, A 19, 1 ad. Dene-kamp, A 26, 1 ad. Hooge Veluwe, A 32, 2 ad.; A 42, 1 ad. Meyendel, A 66, 6 ad.; A 67, 3 ad.

I am not certain whether my specimens and those described by modern authors as *S. latipes* are identical with Koch's original description of this species. Koch's figure shows a rather slender animal, with small pteromorphae, the shape of which does not correspond with that of my specimens; on the other hand the shape of the pseudostigmatic organ accords completely.

The length of my specimens varies between 0.415 and 0.520 mm; they are 1.4 or 1.5 times as long as wide. Apart from these measurements the species is recognizable by the outline of the body, as the pteromorphae have a concave anterior border when seen from above (fig. 7 u); further the pseudostigmatic organ has a thickened head (sometimes beset with a few very small hairs) that does not end in a point (it is somewhat variable as fig. 7 q shows).

In the Oudemans Collection there is a specimen from Utrecht, labelled *Scheloribates depauperatus* Berlese; it was recorded by Oudemans as *Oribates ehippiatus* in 1896 (p. 57), and later as *Notaspis depauperatus* (1900 d, pp. 152, 153, 157); further it was recorded as *Scheloribates depauperatus* by Buitendijk (1945, p. 384). *Zetes ehippiatus* Koch is an undeterminable species, that may be identical with *S. latipes* (as Koch described the outline of the hysterosoma as "etwas herzförmig") if he had not drawn cuspidata at the end of the lamellae; *Oribates depauperatus* Berlese is a *Chamobates*. Oudemans' specimen, however, is a *Scheloribates*, probably *S. latipes*, but I am not completely certain of this identification as the specimen is severely damaged.

The species appears to be rare in our country. I collected specimens in sphagnum, in the heath (in moss and *Cladonia*), in a birch swamp (in moss), in a birch wood in the sand dunes (in litter and in moss), in a fir wood (in moss), and in the litter of an oak wood (*Querceto-Betuletum*).

**Scheloribates pallidulus** (C. L. Koch, 1841) (fig. 7 p, v)

*Zetes pallidulus* C. L. Koch, 1841, vol. 31 (9).

*Zetes fuscomaculatus* C. L. Koch, 1841, vol. 31 (11).

*Oribates latipes*, Berlese, 1886, vol. 30 (3).

*Scheloribates pallidulus*, Sellnick, 1928 a, p. 16; Willmann, 1931, p. 159, fig. 236; Buitendijk, 1945, p. 384.

Oudemans Collection. The Hague.

Own material. Maasland, A 76, 5 ad.

Although I am not absolutely convinced of the identity of my specimens as *Zetes pallidulus* Koch, I place them here, especially as they closely correspond with the description and the figure of *Z. fuscomaculatus* Koch, a form regarded by Oudemans (1937, p. 2664) as conspecific with *pallidulus*.

Berlese did not distinguish *S. latipes*, *pallidulus*, and *laevigatus*. The species described and figured by him in 1886 as *S. latipes* (he recorded *S. laevigatus*, *pallidulus*, and *fuscomaculatus* as synonyms) accords with my *S. pallidulus*. In the Oudemans Collection there is, however, a specimen, originating from Berlese's *Acarotheca Italica*, and identified by Berlese as *S. latipes*, which proved to be *S. laevigatus*.

The species is easily recognizably by its relatively small width (cf. fig. 7 v); my specimens are 1.78-1.95 times as long as wide. The pseudostigmatic organ is clavate, with a rather strongly thickened head (fig. 7 p).

The length of my specimens varies between 0.485 and 0.535 mm. Sellnick records 0.350 mm (width 0.210), and Willmann 0.430 (width 0.240). In comparison with my specimens especially those of Sellnick present rather small measurements, so that these may belong to a different species.

*S. pallidulus* appears to be rare, as I collected it only once (in a wet hay-field, in moss).

### ***Scheloribates laevigatus*** (C. L. Koch, 1836) (figs. 7 r, t, 8 a)

*Zetes laevigatus* C. L. Koch, 1836, vol. 3 (8).

*Oribata lucasi* Nicolet, 1855, p. 432, pl. 4 fig. 2; Michael, 1884 p. 262, pl. 11 figs. 1-5.

*Oribates fuscomaculata*, Oudemans, 1896, p. 57.

*Notaspis lucasi*, Oudemans, 1900 d, pp. 152, 154.

*Murcia lucasi*, Oudemans, 1913 a, p. 282.

*Scheloribates laevigatus*, Sellnick, 1928, p. 16; Willmann, 1931, p. 45, fig. 237.

*Scheloribates laevigatus*, *S. lucasi*, Buitendijk, 1945, p. 384.

Oudemans Collection. Arnhem, Valkeveen, Sittard (the last mentioned locality is probably erroneous, see below).

Own material. Denekamp, A 28, 8 ad.; A 26, 3 ad.; A 27, 1 ad. Texel, A 52, 1 ad., 2 n.; A 55, 2 ad. Meyendel, A 66, 11 ad.; A 67, 1 ad.; A 68, 6 ad., 1 n.; A 69, 2 ad., 1 n. Maasland, A 75, 1 ad., 1 n.; A 76, 11 ad.; A 77, 4 ad., 2 n.; A 78, 4 ad., 2 n. Rockanje, A 82, 2 ad.; A 84, 14 ad., 2 n. Lekkerkerk, A 85, 4 ad. Baarle Nassau, A 87, 7 ad. Sint Pietersberg, A 96, 3 ad., 1 n.; A 98, 1 ad., 1 n.; A 108, 2 ad., 6 n.; A 116, 1 ad.

Localities from literature. Sneek, Valkenburg (Oudemans).

The above mentioned descriptions by Koch, Nicolet, and Michael accord with my specimens. Nicolet (1855) described two other species that might belong to the genus *Scheloribates*, if he had not drawn the lamellae as

broadening towards the end; apart from this character, *Oribata femoralis* resembles *S. laevigatus*, whilst *Oribata agilis* resembles *S. latipes*.

*S. laevigatus* is rather variable. The length of my specimens varies between 0.450 and 0.700 mm; the greater part of my specimens, however, is longer than 0.580 mm. The pseudostigmatic organ is lanceolate and ends in a rather sharp point; the width of the thickened part is variable; the head is smooth or beset with small hairs (fig. 7 r). In contradistinction to *S. latipes* the anterior border of the pteromorphae is nearly straight when seen from above (fig. 7 t).

The nymph (fig. 8 a) resembles that of *S. confundatus*, but the propodosomatal hairs are longer, the notogastral hairs are shorter (with the exception of the hair C<sub>3</sub>), and the areae porosae mesonoticae are smaller.

It is probable that the slide in the Oudemans Collection with specimens from a mole's nest in southern Limburg, was wrongly labelled "Sittard", as according to Oudemans (1913 a) the species was not found at Sittard, but at Valkenburg.

I collected the species repeatedly in wet or rather dry grass lands (among which were meadows and a hayfield), further in alder and birch marshes, in birch woods in the sand dunes, and in a thicket of *Prunus spinosa*. Frenzel (1936, p. 94) regards the species as a characteristic form of the meadow.

### **Liebstadia similis** (Michael, 1888)

*Notaspis similis* Michael, 1888, p. 363, pl. 31 figs. 9-12.

*Oribates pallidula*, Oudemans, 1896, p. 57.

*Eremaeus similis*, Oudemans, 1900 d, pp. 152, 155.

*Liebstadia similis*, Oudemans, 1913 a, p. 232; Sellnick, 1928 a, p. 16; Willmann, 1931, p. 153, fig. 219; Buitendijk, 1945, p. 382.

*Protoribates silesius* Sellnick, 1925, p. 163, fig. J.

Oudemans Collection. Lochem, Valkeveen, The Hague, Breda, Sittard.

Own material. Ootmarsum, A 23, 4 ad., 1 n.; A 24, 7 ad. Denekamp, A 25, 5 ad. Texel, A 55, 2 ad. Maasland, A 78, 1 ad. Lekkerkerk, A 85, 6 ad.

My specimens were collected in moss in grass lands, in birch and alder marshes, and at the foot of pollard willows. In our country the species is certainly not "überall verbreitet", as Willmann characterizes it.

### **Liebstadia leontonycha** (Berlese, 1910)

*Oribella leontonycha* Berlese, 1910 b, p. 383.

*Liebstadia leontonycha*, Vitzthum, 1926, p. 492, figs. 42-44; Sellnick, 1928 a, p. 16; Willmann, 1931, p. 153, figs. 220, 221; Buitendijk, 1945, p. 382.

Oudemans Collection. Oisterwijk.

Berlese's original description contains little that is characteristic, but he described the remarkable claws of the species, by which it is easily recognizable.

There appears to be a difference in size between ♂ and ♀. Oudemans' material contains 1 ♂ that is 0.375 mm long and 0.218 mm broad, and 2 ♀♀ that are 0.450-0.480 mm long and 0.285-0.300 mm broad. Vitzthum recorded 0.461 × 0.238 mm for the male and 500 × 301 and 470 × 275 mm for the female. Sellnick recorded as measurements of the species 0.396 × 0.220 mm, and therefore his specimen was apparently a male; on the other hand Willmann recorded 0.500 × 0.300 mm, which proves that his specimen was a female. Berlese recorded as length 450 μ and as width 1500 μ; the latter measurement certainly is erroneous.

According to Willmann the species is rare and occurs in moss and humus. The label of the single slide in the Oudemans Collection contains no notes on the peculiarities of the locality.

### **Eporibatula plantivaga** (Berlese, 1895)

*Oppia tibialis*, Berlese, 1892, vol. 64 (1) (non *Oribatula tibialis*, Berlese, 1895).

*Oribatula plantivaga* Berlese, 1895, vol. 77 (5).

*Eporibatula plantivaga*, Willmann, 1931, p. 154, fig. 223; Buitendijk, 1945, p. 382.

Oudemans Collection. Arnhem.

Own material. Neercanne, A 91, 2 ad.; A 92, 37 ad.

The species appears to occur only locally. I collected it in moss on trees, just as Willmann. In southern Europe the species appears to be a common inhabitant of orange trees, according to the record by Berlese (1892) and to the label on a slide from the Acarotheca Italica; moreover Oudemans repeatedly collected the species on imported oranges.

## HAPLOZETIDAE

### **Protoribates capucinus** Berlese, 1908

*Protoribates capucinus* Berlese, 1908, p. 2; Willmann, 1931, p. 160, fig. 240.

Own material. Sint Pietersberg, A 103, 1 ad.

I obtained one specimen of a *Protoribates* species that I identify with some reserve as *P. capucinus*. Berlese's description of the species is very short, but the measurements and the description of the pseudostigmatic organ are in accordance with the description later given by Willmann. Dr. Strenzke kindly sent me two specimens from Austria that are identical with *P. capucinus* sensu Willmann. My specimen differs from these by its very short interlamellar hairs, whilst the hairs on the pseudostigmatic organ are

difficult to distinguish. More material from the same locality is required to decide if the differences are constant.

I collected the single specimen in moss at the foot of a *Robinia* tree in a forest (Querceto-Carpinetum). Up till now *P. capucinus* was not yet recorded as a representative of our fauna.

## CERATOZETIDAE

### **Edwardzetes edwardsi** (Nicolet, 1853)

*Oribata edwardsii* Nicolet, 1855, p. 438, pl. 5 fig. 5; Michael, 1884, p. 229, pl. 4 figs. 10-17, pl. 23 fig. 5; 1888, p. 575, pl. 53 fig. 1.

*Oribates edwardsii*, Berlese, 1887, vol. 43 (5).

*Edwardzetes erwardsii*, Sellnick, 1928 a, p. 14, fig. 24; Willmann, 1931, p. 161, fig. 244; Van der Hammen, 1949, p. 119.

Own material. Sint Pietersberg, A 104, 8 ad.

I have corrected the trivial name *edwardsii* of the species to *edwardsi* according to the decision of the International Commission on Zoological Nomenclature (Bull. Zool. Nomencl., vol. 4, p. 68).

The earlier descriptions give no difficulties for the identification of the easily recognizable species. *E. edwardsi* appears to be rare, although according to Nicolet it was very common in the forest of Satory near Paris. In 1949 I recorded the species for the first time as an element of our fauna; I collected my specimens in the litter of a forest belonging to the Querceto-Carpinetum.

### **Chamobates subglobulus** (Oudemans, 1900)

*Notaspis subglobulus* Oudemans, 1900 d, pp. 153, 158, pl. 9 figs. 1-3.

*Chamobates lapidarius*, Sellnick, 1928 a, p. 14; Willmann, 1931, p. 162, fig. 248.

*Chamobates lapidarius*, *Sphaerozetes subglobulus*, Buitendijk, 1945, p. 385.

Oudemans Collection. Warnsveld, The Hague, Breda, Burgst near Breda.

Own material. Winterswijk, A 51, 2 ad.

Locality from literature. Warnsveld (Oudemans).

My specimens are identical with Oudemans' type material of *C. subglobulus*.

According to Sellnick and to Willmann this species is conspecific with *Oribates lapidarius* Lucas (1846), a form originally described from Algiers; Grandjean (1936, p. 83), however, found the last mentioned species again in Algiers and it proved to be a *Euzetes*.

I collected *C. subglobulus* in the litter of a forest (Querceto-Carpinetum); according to Willmann the species occurs "im Moos der Walder, durch ganz Deutschland, aber immer nur einzeln".

**Chamobates cuspidatus** (Michael, 1884)

*Oribates cuspidatus* Michael, 1884, p. 260, pl. 10 figs. 6-11.

*Chamobates cuspidatus*, Sellnick, 1928 a, p. 14; 1929, p. 343, fig. 3; Willmann, 1931, p. 163, fig. 250; Buitendijk, 1945, p. 385.

Oudemans Collection. Lochem, Arnhem, Burgst near Breda.

Own material. Weerdinge, A 6, 3 ad. Mantinge, A 7, 15 ad.; A 8, 25 ad.; A 9, 1 ad. Oosterhesselen, A 12, 4 ad. Brecklenkamp, A 17, 3 ad. Wilp (Gld.), A 44, 4 ad. Winterswijk, A 47, 1 ad.; A 49, 4 ad.

Oudemans' records of *Notaspis cuspidatus* (1900 d, pp. 152, 154) give rise to some confusion; on p. 152 he mentions *Oribates punctum*, *O. rubens*, *O. semirufa*, and *O. spec.* (Oudemans, 1896, p. 57 nos. 54, 57, 60, 62) as synonyms of *N. cuspidatus*, but later, in his card index, he regarded two of these as belonging to different species (*Punctoribates punctum*, *Minunthozetes semirufus*). As none of the slides referred to is still in existence, it is impossible to check the records.

I collected the species in litter and in moss in forests belonging to the Querceto-Carpinetum and the Querceto-Betuletum. With the exception of samples from Mantinge, the species was never found together with *C. incisus*, a species that, for instance, is common in "De Hooge Veluwe", where *C. cuspidatus* appears to be absent.

**Chamobates incisus** nov. spec. (= *schützi* auct.)

*Chamobates schützi*, Sellnick, 1929, p. 343, fig. 2; Willmann, 1931, p. 162, fig. 249 a (non fig. 249); Van der Drift, 1950, p. 87.

*Chamobates spec.*, Noordam and De Vlieger, 1943, p. 10.

Own material. Mantinge, A 7, 1 ad.; A 9, 4 ad. Hooge Veluwe, A 32, 10 ad.; A 35, 3 ad.; A 35 a, 9 ad.; A 41, 1 ad.; A 42, 5 ad.; A 43, 1 ad. Noordwijk aan Zee, A 56, 6 ad. Meyendel, A 70, 4 ad. Maasland, A 75, 1 ad. (holotype in A 35, the other specimens are paratypes).

Locality from literature. Hooge Veluwe (Noordam and De Vlieger, Van der Drift).

This species is identical with the species described by Sellnick and by Willmann as *Chamobates schützi*. The real *C. schützi* (Oudemans), however, appears to be an entirely different species, as resulted from an examination of the type material. I have chosen therefore the name *Chamobates incisus* for the small, clear brown species with incised rostrum, erroneously identified as *schützi*. It appears that Willmann's fig. 249 has been drawn after the real *C. schützi* (probably the type specimen).

The species was recorded by Van der Drift as *C. schützi*; according to him the species has its optimum in F<sub>0</sub> and F<sub>1</sub>, and is not very sensitive to desiccation. The specimens mentioned by Noordam and De Vlieger as *Chamobates spec.* appeared also to belong to the species; they collected greater numbers on the southern slope of the wooded hill investigated by them than on the northern.

I collected the species in litter and in moss in forests (Querceto-Betuletum, fir wood, beech forest, alder marsh) and in the sand dunes.

**Chamobates schützi** (Oudemans, 1902) (non auct.) (fig. 9 a, c)

*Notaspis schützi* Oudemans, 1902 a, p. 10; 1902 e, pp. 1, 2, pl. 1 fig. 1.

*Schelorbates schützi*, *Chamobates schützi*, Buitendijk, 1945, pp. 384, 385.

Oudemans Collection. Rotterdam (in a terrarium).

Own material. Dwingelo, A 2, 1 ad. "Staatsbossen" between Lhee and Spier, A 4, 1 ad. Hooge Veluwe, A 37, 9 ad., 4 n. Texel, A 53, 3 ad.

Locality from literature. Rotterdam (Oudemans).

As I remarked above *C. schützi* has generally been misinterpreted. The species with which it was confounded (*C. incisus*) indeed shows a superficial resemblance, as it possesses exactly the same clear brown colour, and nearly the same measurements, although *C. schützi* sometimes is slightly larger; nevertheless the differences are striking.

Willmann's description of his *C. schützi* completely accords with the species that I have named *C. incisus*, but it is accompanied by two figures, one of which is identical with the real *C. schützi*; apparently this was drawn after the type specimen.

Apart from the original description the real *C. schützi* was never recorded in literature. It is not identical with *C. pusillus* (Berlese, 1895, vol. 77 (3)); the pseudostigmatic organ of the latter has a narrow head beset with rather long hairs, the lamellar hairs are beset with rather long hairs, and the length of the animal is 0.450 mm; nor is it identical with the *C. pusillus* of Sellnick and of Willmann, as this species (that appears to be different from *C. pusillus* (Berlese)) is longer and has differently shaped pseudostigmatic organs and rostral teeth.

Oudemans' original description of the species (written in Dutch) is very short, and accompanied by a small, indistinct figure; the only valuable character that can be derived from it is the shape of the pseudostigmatic organ that is clavate with thin stem and thick head. I have made a new description after the type specimen, supplied with characters from my own material (fig. 9 a).

Colour clear brown. Measurements: length 0.345-0.390, width 0.240-0.270 mm.

Rostrum not incised, with two rather widely separated teeth, that are directed straight to the front when seen from above. Rostral hairs at the outside beset with small hairs; lamellar hairs long and rather thin; interlamellar hairs rather thin, sometimes a little shorter than shown in the figure; pseudostigmatic organ clavate, with thin stem and thick head. Lamellae rather high, at the anterior side ending in a sharp point.



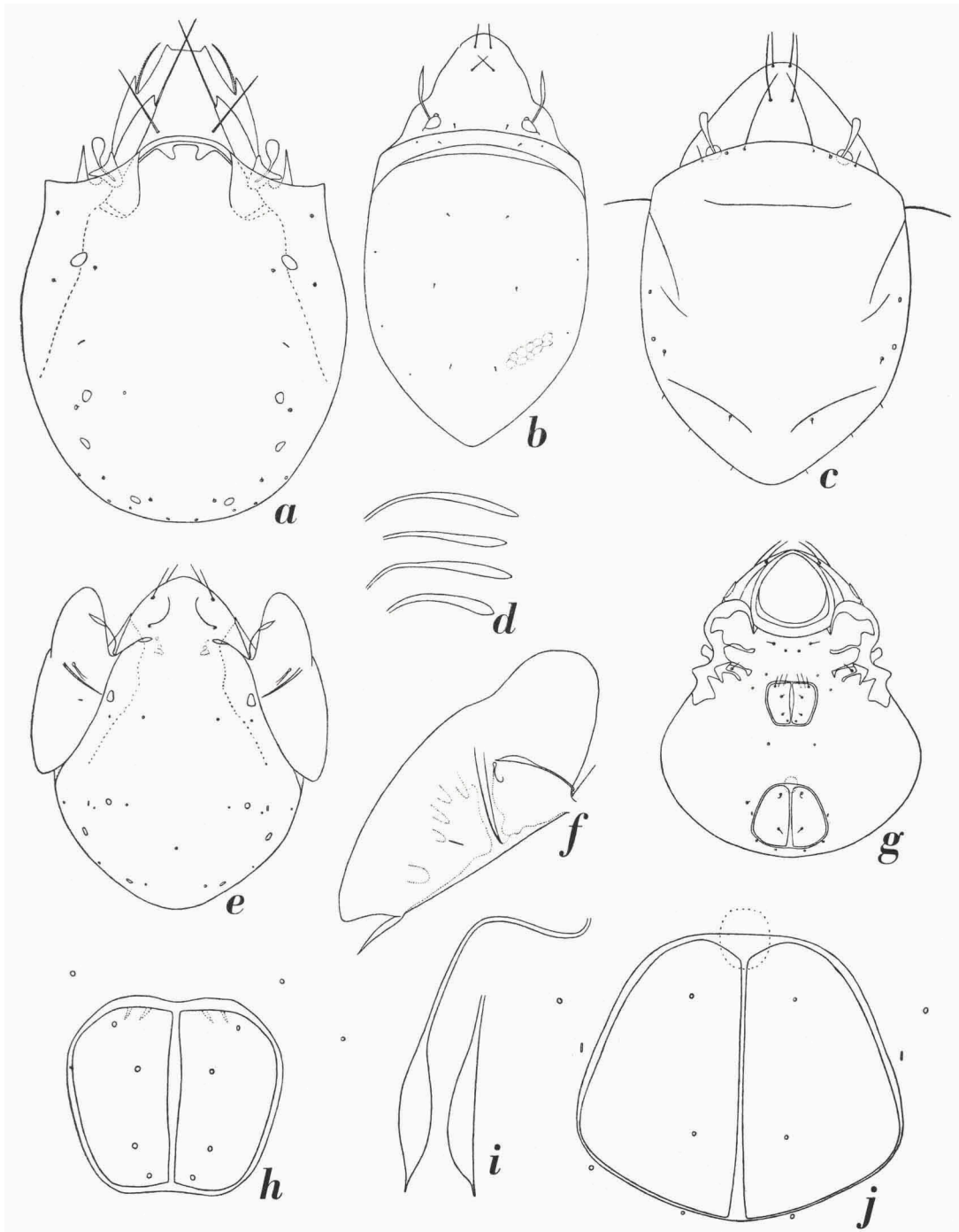


Fig. 9. a, c, *Chamobates schützi* (Oudemans), dorsal view of: a, adult; c, nymph III. b, *Minunthozetes semirufus*, nymph III, dorsal view. d, *Oribatella quadricornuta* (Michael), pseudostigmatic organs of 4 specimens (hairs omitted). e-j, *Allogalumna neerlandica* nov. spec.: e, dorsal view; f, pteromorpha and pseudostigmatic organ; g, ventral view (notogaster omitted); h, genital plates; i, dorsal and lateral view of the pseudostigmatic organ; j, anal plates. a-d, f,  $\times 200$ ; e, g,  $\times 110$ ; h, j,  $\times 495$ ; i,  $\times 735$ .

The hysterosoma often has two pigment spots in the anterior part; the notogastral hairs are very small and difficult to distinguish, so that sometimes the place of insertion only is visible. The areae porosae are large, especially the adalares.

I have collected some nymphs of the species (fig. 7 c); these are yellowish. The rostral hairs are almost smooth and the pseudostigmatic organs are clavate, though less thickened than in the adult. The hysterosoma is locally covered with some adhering dirt, and it is slightly wrinkled. The anterior lateral notogastral hair that I identify as  $C_3$  is long and strong; the remaining notogastral hairs are very small and very difficult to distinguish, so that I could find only some of them.

From the other species of *Chamobates* the species is easily recognizable by the shape of the pseudostigmatic organ.

The type specimens of *C. schützi* were collected at Rotterdam, in a terrarium, so that they certainly originated from another locality. I found my specimens in moss and in *Cladonia* in the heath, in moss in a valley with *Calluna* and *Cladonia* in the sand dunes, in the litter of solitary firs, and in the litter of a wood of *Picea* and *Larix*.

### ***Ceratozetes gracilis*** (Michael, 1884) (fig. 7 n)

*Oribata gracilis* Michael, 1884, p. 225, pl. 3 figs. 9, 10.

*Oribates gracilis*, Berlese, 1894, vol. 74 (6).

*Notaspis gracilis*, Oudemans, 1900 d, p. 153.

*Murcia gracilis*, Oudemans, 1913 a, p. 282.

*Ceratozetes gracilis*, Sellnick, 1928 a, p. 13, fig. 20; Willmann, 1931, p. 164, figs. 256, 257.

Oudemans Collection. Haarlem, Burgst near Breda.

Own material. Brecklenkamp, A 17, 3 ad. Denekamp, A 28, 3 ad. Wilp (Gld.), A 46, 1 ad. Winterswijk, A 47, 2 ad.; A 48, 3 ad. Baarle Nassau, A 87, 4 ad.

Localities from literature. Haarlem, Valkenburg (Oudemans).

Dr. Evans compared one of my slides with Michael's type specimens of *C. gracilis*; it proved to be identical. Michael's figure is misleading (cf. my fig. 7 n); it represents the rostrum as pointed without rostral teeth, instead of blunt with one pair of these, and the pseudostigmatic organ as smooth instead of beset with hairs; further in my opinion Michael drew the rostral hairs as lamellar hairs and omitted the latter, which explains the strange shape of the cuspidata (curved to the outside).

Berlese omitted in his figure the rostral teeth and the rostral hairs, and drew the pseudostigmatic organ erroneously as smooth (in the Oudemans Collection there is a slide from the *Acarotheca Italica* determined by Berlese as *Ceratozetes gracilis*, which proved to be no *Ceratozetes* at all). Willmann also drew the pseudostigmatic organ as smooth.

Grandjean (1951 b, p. 263, figs. 1, 2) described the immature stages of a related species (*C. peritus*); according to him the adults (to be described in a future paper) have a close resemblance to *C. gracilis*.

In the preliminary catalogue of the Oudemans Collection (Buitendijk, 1945) the species was omitted.

I collected my specimens in litter and in moss in forests belonging to the Querceto-Carpinetum; once I obtained specimens from a meadow.

### **Ceratozetes mediocris** Berlese, 1908 (fig. 7 o)

*Ceratozetes mediocris* Berlese, 1908, p. 4; Sellnick, 1928 a, p. 13; Willmann, 1931, p. 164, figs. 254, 255; Caroli and Maffia, 1934, p. 2, figs. 1-4.

Own material. Maasland, A 78, 2 ad. Baarle Nassau, A 87, 6 ad. Sint Pietersberg, A 111, 1 ad.

My identification is based on the descriptions by Sellnick, Willmann, and Caroli and Maffia. Berlese's original description is very short; he described the species as pale brown, with long clavate pseudostigmatic organs that are beset with hairs. These characters accord with several species of *Ceratozetes*; the recorded length ( $410 \times 270 \mu$ ) makes it, however, probable that modern authors correctly identified the species.

My specimens are 0.400-0.420 mm long. The rostrum (fig. 7 o) is provided with one pair of teeth; the rostral hairs are slightly coarse at the outside; the pseudostigmatic organs are beset with a few hairs only.

The species is new to our fauna. I obtained my specimens from meadows, in accordance with Frenzel's (1936) data, who characterized *C. mediocris* as one of the "Leitformen des Wiesenbodens".

### **Heterozetes palustris** Willmann, 1917

*Ceratozetes (Heterozetes) palustris* Willmann, 1917, p. 10, figs. 1-10; Sellnick, 1928 a, p. 13.

*Heterozetes palustris*, Willmann, 1931, p. 165, figs. 259, 260; Buitendijk, 1945, p. 385. Oudemans Collection. Doetinchem.

The species is easily recognizable from the original description. According to Willmann it occurs "in Moorgewässern an untergetauchten Wasserpflanzen". The specimen in the Oudemans Collection was obtained from a pool.

### **Euzetes globulus** (Nicolet, 1855)

*Oribata globula* Nicolet, 1855, p. 439, pl. 5 fig. 1; Michael, 1884, p. 234, pl. 5 figs. 6-12, pl. 23 fig. 7.

*Oribates globulus*, Berlese, 1887, vol. 43 (6).

*Oribates seminulum*, Oudemans, 1896, p. 57.

*Notaspis globulus*, Oudemans, 1900 d, pp. 152, 153, 159.

*Murcia seminulum*, Oudemans, 1905 b, p. 10; Oudemans, 1913 a, p. 233.

*Euzetes aterrimus*, Sellnick, 1928 a, p. 13, fig. 21.

*Euzetes seminulum*, Willmann, 1931, p. 166, fig. 261; Buitendijk, 1945, p. 385.

Oudemans Collection. Ruurlo, Haarlem, Burgst near Breda, Houthem.

Own material. Weerdinge, A 6, 2 ad., 2 n. Mantinge, A 7, 3 ad., 1 n; A 8, 2 ad.; A 9, 1 ad. Ambt Vollenhove, A 14, 1 n. Denekamp, A 28, 1 ad. Winterswijk, A 47, 1 ad.; A 48, 1 ad.; A 51, 2 ad. Neercanne, A 90, 1 ad. Sint Pietersberg, A 102, 2 ad.; A 116, 8 ad.; A 117, 1 ad.

Localities from literature. Ruurlo, Haarlem, The Hague, Loosduinen, Sittard, Meerssen (Oudemans).

According to Oudemans *E. globulus* is conspecific with *Acarus seminulum* O. F. Müller (1776). Müller's description contains but three words: "sub-sphaericus, nitidissimus, fuscus"; the first and the second mentioned characters are not very specific and the third does not accord with *E. globulus*, as this animal is completely black, so that Oudemans had to assume that in *Acarus seminulum* the colouration was not fully developed. In my opinion the supposed identification is insufficiently founded. Nor is *E. globulus* conspecific with *Oribates aterrimus* C. L. Koch (1841). The species is, on the contrary, easily recognizable from the descriptions by Nicolet, Michael, and Berlese.

I collected *E. globulus* in litter and in moss in forests (Querceto-Carpinetum, Querceto-Betuletum), and in litter of a thicket of *Prunus spinosa*.

### Sphaerozetes

Oudemans (1900 d, p. 153) recorded *Notaspis orbicularis* from Overveen; the slides containing these specimens (one with adults, and one with nymphs) are still in the collection, but the adults are severely damaged, so that they are undeterminable, whilst I cannot identify the nymphs because there exists no description of the immature stages of this species.

Oudemans (1902 e, p. 1) recorded *Notaspis orbicularis* from Nijkerk; the slide referred to is still in the collection; it contains nymphs that are different from those collected at Overveen. A slide with damaged nymphs from Voorst is also undeterminable.

Oudemans (1913 a, p. 280, and 1914, A 10, p. 25) recorded a nymph of *Sphaerozetes piriformis* from Valkenburg; this specimen is no longer in the collection and I cannot decide whether the identification is right. A slide labelled *Sphaerozetes piriformis*, containing a nymph from Wageningen, is empty. The immature specimens from Arnhem and Burgst near Breda identified by Oudemans as "*Fuscozetes piriformis*?" for the present remain also problematic. Consequently there are no certain records of species of the genus *Sphaerozetes* from the Netherlands.

**Humeroabates rostralamellatus** Grandjean, 1936

*Oribates humeralis*, Berlese, 1883, vol. 3 (4).

*Oribata lapidaria*, Michael, 1884, p. 230, pl. 5 figs. 1, 2, pl. 23 fig. 6.

*Oribates humeralis*, *Oribates facula*, *Oribates* spec., Oudemans, 1896, p. 56 (nos. 48, 52, 63)

*Notaspis lapidarius*, Oudemans, 1900 d, pp. 152, 153.

*Notaspis humeralis*, Oudemans, 1902 e, p. 1.

*Murcia humeralis*, Oudemans, 1905 b, p. 10; 1913 a, p. 233; 1917 a, p. 84.

*Humeroabates humeralis*, Sellnick, 1928 a, p. 11, fig. 13.

*Humeroabates fungorum*, Willmann, 1931, p. 167, fig. 264; Oudemans, 1932, p. 361; Buitendijk, 1945, p. 386.

*Humeroabates rostralamellatus* Grandjean, 1936, p. 77.

Oudemans Collection. Warnsveld, Wageningen Arnhem, Utrecht, Amsterdam, The Hague, Sittard.

Own material. Hooge Veluwe, 11. VIII. 1944, 7 ad., 2 n.; A 33, 3 ad.; A 36, 7 ad., 1 n. Wilp (Gld.), 11. V. 1948, leg. Jhr. W.C. van Heurn, thousands of specimens, mainly nymphs. Bakkum (N. H.), VII. 1950, numerous specimens. Leiden, 7. VII. 1950, leg. K. van der Heiden, numerous specimens. Meydel, A 62, 1 ad.; A 66, 2 ad.; A 68, 1 n. Neercanne, A 92, 1 ad.

Localities from literature. Warnsveld, Zutphen, Oosterbeek, Arnhem, De Steeg, Nijkerk, Haarlem, Overveen, Bloemendaal, Leiden, The Hague, Bergen op Zoom, Sittard, Meerssen (Oudemans).

Grandjean pointed out that the species is not identical with *Notaspis humeralis* Hermann and *Oribates lapidarius* Lucas; moreover, Oudemans' interpretation of *Acarus fungorum* Linnaeus is insufficiently founded, so that the species had to be renamed; Grandjean called it *H. rostralamellatus*; for a critical survey of the earlier descriptions I refer to Grandjean (1936) and to Jacot (1931).

My specimens were found in moss on trees, and on the bark of trees, in moss in the sand dunes, in the heath, and in wood; remarkable is the finding of specimens in nests of the spider *Cheiracanthium erraticum* (Wlk.) in the heath.

**Melanozetes mollicomus** (C. L. Koch, 1839) (fig. 8 d)

*Oribates mollicomus* C. L. Koch, 1839, vol. 30 (20).

*Oribata mollicomus*, Michael, 1884, p. 227, pl. 4 figs. 1-9.

*Melanozetes mollicomus*, Sellnick, 1928, p. 12, fig. 17; Willmann, 1931, p. 167, figs. 266-267.

Own material. Lattrop, A 19, 1 ad., 2 n.; A 20, 11 ad., 2 n. Denekamp, A 26, 5 ad. Hooge Veluwe, A 38, 2 ad., 8 juv.

The species is sufficiently recognizable from Koch's original description.

Michael gave a description of the immature stages; the nymphs that I collected correspond with these; I give some supplementary details (fig. 8 d).

The pseudostigmatic organs of the nymph have a narrow stem, but the head is different from that of the adult, as it is spindle-shaped. The pseudo-

stigmata are connected with the interlamellar hairs by a ridge; there is an indistinct ridge running from the interlamellar hairs towards the lamellar hairs.

The hysterosoma is shield-shaped; when seen from above only a part of the notogastral hairs are visible; the hairs are arranged in a way different from that of the adult, so that it is not easy to homologize them. The part of the notogaster adjoining the propodosoma is wrinkled.

The species is new to our fauna. I collected it in sphagnum, in moss in a birch and alder marsh, and in moss in the heath.

**Fuscozetes fuscipes** (C. L. Koch, 1841) (fig. 8 e)

*Oribates fuscipes* C. L. Koch, 1841, vol. 38 (9).

*Oribata fuscipes*, Michael, 1884, p. 241, pl. 7 figs. 1, 2.

*Fuscozetes fuscipes*, Sellnick, 1928 a, p. 12, fig. 16; Willmann, 1931, p. 168, figs. 269, 270; Jacot, 1935 b, p. 315, pl. 26 figs. 1, 2, 6; Buitendijk, 1945, p. 386.

Oudemans Collection. Sneek.

Own material. Ootmarsum, A 23, 4 ad.; A 24, 3 ad., 1 n. Denekamp, A 26, 7 ad., 13 juv. De Lutte, A 29, 2 ad. Maasland, A 76, 3 ad.

Koch's original, fairly good description accords with my specimens. Michael gave a description of the nymph of the species; below I give some supplementary details.

The slide in the Oudemans Collection labelled as "*Fuscozetes ? fuscipes*" contains some nymphs that indeed belong to the species; as a matter of fact Buitendijk's lapsus "Italië: Sneek" must be corrected to "Nederland: Sneek".

The nymph of the species is light brown. The rostral hairs are short; the lamellar hairs are rather short and are situated on low elevations; the interlamellar hairs are of medium size; the pseudostigmatic organ has a narrow, lanceolate head, beset with a few hairs. The notogastral hairs are of medium size; 26 are visible from above, arranged as in fig. 8 e.

I collected my specimens in very damp surroundings: birch and alder marshes, and a moist meadow.

**Fuscozetes rotundatus** Willmann, 1930

*Fuscozetes rotundatus* Willmann, 1930 a, p. 5, figs. 5-6.

*Fuscozetes* spec., Buitendijk, 1945, p. 386.

Oudemans Collection. Sittard.

Locality from literature. Sittard (Willmann).

*F. rotundatus* was described by Willmann after a specimen in the Oudemans Collection, that apparently is still present; it is, however, labelled *Fuscozetes* spec. (as such mentioned by Buitendijk).

According to Willmann the species is characterized by the relatively large

width, by the pseudostigmatic organs that are only slightly thickened, by the curved posterior lateral hairs, and by small differences in the shape of anal plates and apodemata.

The type specimen is in a rather bad condition; it is strongly flattened, and the greater part of the notogastral hairs are absent; apparently it was in the same condition when Willmann studied it. I have compared it with my specimens of *F. fuscipes*; it appears that the pseudostigmatic organ and the position of the posterior lateral hairs are not really different from those found in my specimens of *F. fuscipes*. The characters recorded for the ventral side are not very convincing, so that the shape of the body remains as the only distinguishing character; it is, however, difficult to conclude from the flattened specimen what has been the original shape, so that it is better to regard *F. rotundatus* as a doubtful species.

**Trichoribates trimaculatus** (C. L. Koch, 1836) (fig. 3 d)

*Murcia trimaculata* C. L. Koch, 1836, vol. 3 (21); Oudemans, 1905 b, p. 10; 1920, p. 260; Sellnick, 1928 a, p. 11, figs. 1-5.

*Oribates setosus*, Berlese, 1887, vol. 43 (4); Oudemans, 1896, p. 57.

*Notaspis trimaculatus*, Oudemans, 1900 d, pp. 152, 153, 157; 1902 e, p. 1.

*Trichoribates berlesei*, Jacot, 1929 c, p. 422.

*Trichoribates trimaculatus*, *Trichoribates* spec. (p. p.), Buitendijk, 1945, pp. 386, 387.

Oudemans Collection. Sneek, Huizum, Oosterbeek, Arnhem, Utrecht, Baarn, Zeeburg, Valkeveen, Katwijk, Burgst near Breda.

Own material. Hooge Veluwe, A 37, 2 ad. Texel, A 54, 5 ad. Noordwijk aan Zee, A 58, 7 ad., 2 n., 2 lv. Sint Pietersberg, A 114, 1 ad.

Localities from literature. Sneek, Utrecht, Nijkerk, The Hague, Arnhem (Oudemans).

It is difficult to determine the correct name of the species that I call *T. trimaculatus*. Koch described as *Murcia trimaculata* a nymph that certainly belongs to the genus *Trichoribates*; he drew, perhaps erroneously, only two pairs of notogastral hairs (the pair  $C_3$ , and a posterior pair, the latter rather short), but he described the head of the pseudostigmatic organ as globular, which indeed corresponds with my specimens. Some authors have identified the species dealt with here as *Oribates setosus* C. L. Koch (1839, vol. 30 (19)), but there is no ground for this identification; according to Willmann *O. setosus* is a *Fuscozetes*, but this is not probable either.

The nymph of the species (fig. 3 d) is a greyish, oviform animal. It has long, thin rostral hairs, and long, strong lamellar and interlamellar hairs. The pseudostigmatic organs have a thin stem and a strongly thickened head. The exopseudostigmatic hairs are rather long.

The notogastral hairs are long and strong, especially the lateral and posterior hairs. Besides the hairs  $h_1$ ,  $h_2$ ,  $h_3$ , and  $ps_1$ , also  $ps_2$  and  $ps_3$  are visible from above, as they are very long.

The nymph resembles that of *T. novus*, described by Michael, but it differs by the shape of the pseudostigmatic organ (thin stem and strongly thickened head), and by the hairs, all of which are smooth.

I collected *T. trimaculatus* in the litter of solitary firs, in the litter of a thicket of *Prunus spinosa*, in moss on a wall, and in moss in the sand dunes.

### **Trichoribates incisellus** (Kramer, 1897)

*Oribata incisella* Kramer, 1897, p. 535, figs. 1, 2.

*Murcia incisella*, Sellnick, 1928 a, p. 11.

*Trichoribates incisellus*, Willmann, 1931, p. 169, fig. 273.

*Trichoribates incisella* (p.p.), Buitendijk, 1945, p. 386.

Oudemans Collection. Putten, Valkeveen, Zeeburg, Lisse, Weert.

Own material. Markelo, A 16, 3 ad. Meyendel, A 70, 1 ad. Lekkerkerk, A 85, 1 ad. Sint Pietersberg, A 112, 2 ad.

The species is easily recognizable from the above mentioned descriptions. The length appears to be rather variable; Kramer recorded 0.550 mm, Sellnick 0.530, Willmann 0.450, whilst the length of my specimens varies between 0.450 and 0.500 mm.

Buitendijk (1945) mentioned two slides (from Zuidwolde and Doetinchem) as *T. incisellus* of which Oudemans had cancelled the determination; they are indeterminable, but they indeed do not belong to the species; as far as concerns the specimen from Doetinchem it is clear that it is no *Trichoribates* at all.

I collected *T. incisellus* in the heath, in the sand dunes in litter of *Salix repens*, in moss at the foot of a pollard willow, and in a grass land.

### **Trichoribates novus** (Sellnick, 1928)

*Oribata setosa*, Michael (non Koch), 1884, p. 243, pl. 7 figs. 3-12, pl. 23 fig. 9.

*Murcia nova* Sellnick, 1928 a, p. 11.

*Trichoribates novus*, Willmann, 1931, p. 170, fig. 275.

*Trichoribates nova* (p. p.), *Trichoribates numerosa* (p. p.), Buitendijk, 1945, p. 386.

Oudemans Collection. Putten, Valkeveen, Hilversum, Oisterwijk.

Own material. Baarle Nassau, A 87, 1 ad.

Michael's description and figure of *Oribata setosa* refer to *Trichoribates novus*, an opinion that recently was confirmed by Evans (1952, p. 40) who checked the material in the Michael Collection. It is possible that *T. novus* is identical with *Sphaerozetes (Trichoribates) oxypterus* Berlese, 1910, p. 386, a species of which the cuspidata have also a long exterior tooth and no interior; the description of *S. oxypterus* is, however, very short.

The specimens in the Oudemans Collection from Burgst near Breda, that Oudemans regarded as representatives of the species, are in a bad con-



dition; they probably belong to *Diapterobates*. A slide labelled *Murcia numerosa*, from Oisterwijk, contains, besides a specimen of *Diapterobates humeralis*, one specimen of *T. novus*.

The length of the specimen from my own material is 0.565 mm; it has cuspidata that are very long and sharp, longer than those of the specimens in the Oudemans Collection.

My single specimen was collected in a moist meadow; the species is known as an inhabitant of grass lands. Grandjean (1946 a, p. 341) observed that it feeds exclusively on pollen grains.

### **Diapterobates humeralis** (Hermann, 1804)

- Notaspis humeralis* Hermann, 1804, p. 92, pl. 4 figs. 5, B.  
*Sphaerozetes (Trichoribates) numerosus* Sellnick, 1924, p. 67 figs. 2-5.  
*Sphaerozetes numerosus*, Oudemans in: Corporaal, 1926, p. C.  
*Murcia numerosa*, Sellnick, 1928 a, p. 11.  
*Trichoribates numerosus*, Willmann, 1931, p. 16, fig. 274.  
*Diapterobates humeralis*, Grandjean, 1936, p. 77, fig. 8 A.  
*Trichoribates numerosa* (p. p.), Buitendijk, 1945, p. 386.  
 Oudemans Collection. Leeuwen (Gelderland), Hilversum, Oisterwijk.  
 Own material. Meyendel, A 66, 25 ad.  
 Locality from literature. Naardermeer (Oudemans).

Grandjean pointed out that *Notaspis humeralis* Hermann is identical with *Trichoribates numerosus* Sellnick. According to him it is an arboricolous mite. I collected the species only once, in the litter at the foot of a birch.

### **Mycobates parmeliae** (Michael, 1884)

- Oribata parmeliae* Michael, 1884, p. 265, pl. 12 figs. 1-5.  
*Notaspis parmeliae*, Oudemans, 1900 d, p. 154.  
*Mycobates parmeliae*, Sellnick, 1928 a, p. 12, fig. 18; Willmann, 1931, p. 171, fig. 281; Buitendijk, 1945, p. 387.  
 Oudemans Collection. Nijkerk.  
 Locality from literature. Nijkerk.

The species is easily recognizable from the above cited descriptions.

The single specimen in the Oudemans Collection is the only one known from our country. The label of the slide contains no peculiarities of the locality. Michael collected the species in lichens on the granite rocks of sea cliffs; Willmann found it "in Moos am Nordufer des Boden-sees".

### **Punctoribates punctum** (C. L. Koch, 1839)

- Oribates punctum* C. L. Koch, 1839, vol. 30 (22); Berlese, 1886, vol. 30 (2).  
*Punctoribates punctum*, Sellnick, 1928 a, p. 15, fig. 25; Willmann, 1931, p. 173, fig. 285; Buitendijk, 1945, p. 387.

Oudemans Collection. Valkeveen, Leeuwen (Gelderland), Burgst near Breda.

Own material. Denekamp, A 28, 3 ad. Winterswijk, A 48, 9 ad.; A 51, 4 ad. Lekkerkerk, A 85, 1 ad. Sint Pietersberg, A 96, 30 ad., A 97, 8 ad.; A 100, 1 ad.; A 113, 1 ad.; A 115, 3 ad.; A 116, 8 ad.

Probably Berlese was right in his interpretation of Koch's original description of *Oribates punctum*. As I remarked above (cf. *Chamobates cuspidatus*) I am not certain about Oudemans' record of *Oribates punctum* (1896, p. 57), as in a later publication (1900 d, p. 152) he mentioned this name as a synonym of *Notaspis cuspidatus*; the material referred to is no longer in the Oudemans Collection.

I collected *P. punctum* in the litter of forests belonging to the Querceto-Carpinetum, in thickets of *Prunus spinosa* and *Crataegus*, in moss at the foot of trees, and in grass land. Frenzel (1936) characterized the species as one of the "Leitformen des Wiesenbodens"; in our country it is, however, certainly not characteristic of this biotope.

### **Punctoribates sellnicki** Willmann, 1928

*Punctoribates bicornis*, Sellnick, 1928 a, p. 15.

*Punctoribates sellnicki* Willmann, 1928 a, p. 157, fig. 8; 1931, p. 173, fig. 286; Buitendijk, 1945, p. 387.

Oudemans Collection. Zuidwolde (Drente), Assel (Gelderland).

Own material. Dwingelo, A 1, 7 ad. Lattrop, A 18, 1 ad.; A 19, 2 ad. Ootmarsum, A 23, 1 ad. Hooge Veluwe, A 38, 1 ad.; A 39, 83 ad.

Sellnick identified the species as *P. bicornis* Berlese, but Willmann pointed out that his specimens belonged to a different species, described by him as *P. sellnicki*.

According to Willmann *P. sellnicki* occurs in "Moos nasser Wiesen und Moore", which corresponds more or less with my data as I collected my specimens in sphagnum (once in a large number), in moss in the heath, and in moss on the steep border of a brook.

### **Minunthozetes semirufus** (C. L. Koch, 1841) (fig. 9 b)

*Zetes semirufus* C. L. Koch, 1841, vol. 31 (7).

*Oribata fusigera* Michael, 1884, p. 268, pl. 12 figs. 6-11.

*Punctoribates (Minunthozetes) semirufus*, Sellnick, 1928, p. 15, fig. 26; Willmann, 1931, p. 174, fig. 288.

*Minunthozetes semirufus*, Buitendijk, 1945, p. 387.

Oudemans Collection. Sittard.

Own material. Denekamp, A 25, 5 ad.; A 26, 11 ad.; A 28, 1 ad. De Lutte, A 29, 1 ad. Winterswijk, A 47, 1 ad. Sint Pietersberg, A 106, 6 ad., 4 n.; A 111, 8 ad., 2 n.; A 113, 28 ad., 3 n.; A 115, 5 ad.; A 116, 4 ad.

Koch gave a fairly good description of the species; he observed that the

anterior part of the hysterosoma is brown, while the posterior part is much darker, a striking character that later on was never recorded. Michael's description is easily recognizable by the figure of the pseudostigmatic organ. I am not certain about Oudemans' record of *Oribates semirufa* (1896, p. 57), as in a later paper (1900 d, p. 152) he mentioned this name as a synonym of *Notaspis cuspidatus*, together with *Punctoribates punctum*.

Michael described the nymph of the species; I give some details supplementary to his description (fig. 9 b). Colour yellowish brown. Rostral hairs rather long; the lamellar hairs, and especially the interlamellar hairs, are very short; pseudostigmatic organ with a shorter point than in the adult. Notogaster with a vague honey-comb structure, best visible in the posterior part. Notogastral hairs very small and difficult to distinguish, so that I could draw only a part of them.

The species is sometimes found together with *Punctoribates punctum*, but it occurs also in more damp surroundings. I collected it in sphagnum and in moss in birch and alder marshes, in the litter of forests (*Querceto-Carpinetum*) and of thickets of *Prunus spinosa* and *Crataegus*, and in a meadow.

#### ***Limnozetes sphagni* (Michael, 1884)**

*Oribata sphagni* Michael, 1884, p. 223, pl. 3 figs. 1-8.

*Limnozetes sphagni*, Sellnick, 1928 a, p. 12, fig. 19.

*Limnozetes ciliatus*, Willmann, 1931, p. 170, figs. 276, 277; Oudemans, 1932, p. 361; Buitendijk, 1945, p. 387.

Oudemans Collection. Zuidwolde, Doetinchem, Boxtel.

Own material. Dwingelo, A 1, 50 ad. Lattrop, A 18, 218 ad.; A 19, 32 ad. Hooge Veluwe, A 39, 8 ad.

Localities from literature. Noord Brabant, Gelderland, Drente (Oudemans).

According to Oudemans (1929 a, p. 803) *L. sphagni* is identical with *Acarus ciliatus* Schrank, being the nymph (identification based on the description by Michael). Apart from the fact that Schrank's description is insufficient, his definition of the habitat "im Bodensaze stehender Wässer, worin langarmige Polypen wohnen" does not accord with the occurrence of the species in sphagnum. Further I am not completely certain of the identity of the nymph described by Michael, as the nymphs that I collected together with my specimens of *Limnozetes* have a completely different habitus; they are strongly wrinkled, lack the strong posterior hairs, and resemble the nymph described by Oudemans as *L. rugosus*. When they are *L. rugosus* indeed, it is strange that I collected no nymphs of *L. sphagni*, a species that I found in much larger numbers.

I collected numerous specimens of the species in very moist sphagnum; in all cases they were found together with *L. rugosus*.

**Limnozetes rugosus** (Sellnick, 1923)

*Ceratozetes rugosus* Sellnick, 1923, p. 2; 1925, p. 161, fig. G; 1928 a, p. 13.  
*Limnozetes rugosus*, Willmann, 1931, p. 170, figs. 278-280; Oudemans, 1932, p. 363;  
 Buitendijk, 1945, p. 387.

Oudemans Collection. Wijster, Arnhem, Boxtel, De Hamert (Limburg).  
 Own material. Dwingelo, A 1, 3 ad. Lattrop, A 18, 18 ad.; A 19, 3 ad. Hooge Veluwe,  
 A 39, 2 ad.

Localities from literature. Limburg, Noord Brabant, Gelderland, Drente (Oudemans).

The species is easily recognizable from the original description. I collected it in very moist sphagnum; it always occurred together with *L. sphagni*; the latter species, however, was much more numerous.

## ORIBATELLIDAE

**Oribatella quadricornuta** (Michael, 1884) (fig. 9 d)

*Oribata quadricornuta* Michael, 1884, p. 247, pl. 8 figs. 1-10.

*Oribates flammula*, Oudemans, 1896, p. 56.

*Notaspis quadricornutus*, Oudemans 1900 d, pp. 152, 153.

*Notaspis quadricornuta*, Oudemans, 1902, p. 1.

*Oribatella quadricornuta*, Oudemans, 1913 a, p. 233.

*Oribatella calcarata*, Willmann, 1931, p. 180, fig. 310; Buitendijk, 1945, p. 388.

Oudemans Collection. Huizum, Arnhem, Doetinchem, The Hague, Burgst near Breda.

Own material. Ambt Vollenhove, A 14, 1 ad. Denekamp, A 28, 4 ad., 1 n. Winterswijk,  
 A 47, 6 ad.; A 49, 1 ad. Noordwijk aan Zee, A 58, 1 ad. Sint Pietersberg, A 96, 17 ad.,  
 2 n.; A 97, 5 ad.

Localities from literature. Sneek, Nijkerk, De Steeg, Delden, Haarlem, Bloemendaal, Bergen op Zoom, Sittard (Oudemans).

According to Willmann (1931) *Oribatella calcarata* consists of two related forms or species; one of these, the larger form (600  $\mu$ ), of which the pseudostigmatic organ is "pfriemenförmig zugespitzt", is supposed to be identical with *Oribatella calcarata* (Koch), while the smaller form (500  $\mu$ ), of which the pseudostigmatic organ is "keulig verdickt mit stumpfem Ende", is supposed to be identical with *Oribatella quadricornuta* (Mich.); the smaller form is stated to occur in northern Germany, the larger form in the southern part. It must be premised that Michael recorded 0.580 mm as the length of *O. quadricornuta* and not 0.500 mm, while the length of my specimens varies between 0.465 and 0.570 mm, and shows no division into two classes, so that the total length cannot be used to separate the forms. The pseudostigmatic organ also appears to be variable (fig. 9 d); in my specimens it is sometimes a little pointed and sometimes a little clavate, but there is no distinct separation into two shapes. In our country it is therefore impossible to separate the two forms or species on ground of the characters given by Willmann. Nevertheless I have identified my specimens as *O. quadricornuta*,

as they accord with Michael's original description; I did not use the name *O. calcarata*, as Koch's description of this species is insufficient.

I collected my specimens in the litter of forests (Querceto-Carpinetum), and in moss on a wall.

### **Tectoribates borussicus** (Sellnick, 1909)

*Notaspis borussicus* Sellnick, 1909, p. 343, fig. 4.

*Tectoribates connexus* var. *borussicus*, Sellnick, 1928 a, p. 10 fig. 11.

*Joelia connexa* var. *borussica*, Willmann, 1931, p. 179, fig. 306.

Own material. Mantinge, A 7, 1 ad. Winterswijk, A 47, 1 ad.

I identify my specimens as *T. borussicus*, as the pseudostigmatic organ corresponds with Sellnick's description. Berlese (1905, p. 28, pl. 2 fig. 49) described a closely related species (*Oribates connexus*), differing from *T. borussicus* by slightly clavate pseudostigmatic organs; Berlese drew only one pair of notogastral hairs, but this is certainly an error. Sellnick, in a later paper (1928 a), regarded his species as a variety of *T. connexus*; as long as the type of Berlese's species is not reinvestigated, it is, however, better to regard *T. connexus* and *borussicus* as different species. I have followed Grandjean (1932, p. 304) in placing the species in the genus *Tectoribates*.

*T. borussicus*, an apparently rare species, is new to our fauna; I twice collected a single specimen in the litter of forests (Querceto-Betuletum, Querceto-Carpinetum).

## ACHIPTERIIDAE

Up till now there has been a great deal of confusion concerning the species generally contributed to the genus *Achipteria* Berlese (1885), or erroneously to the genus *Notaspis* Hermann (1804); as Grandjean (1936) pointed out it is impossible to use the latter name in the sense of *Achipteria* for reasons that are unnecessary to repeat.

Oudemans (1900 c, p. 143) selected as the type of the genus *A. nicoletii*, a species of which the name was proposed by Berlese to replace the name *Oribata ovalis* Nicolet, the latter being preoccupied by *Oribates ovalis* Koch (1836, vol. 3 (5)) of which the identity is uncertain. It is, however, not easy to decide whether Berlese's description of *A. nicoletii* indeed refers to Nicolet's *ovalis* (the latter being identical with *A. coleoptrata* auct. as I shall demonstrate below). It appears that Berlese himself did not distinctly distinguish the species of the genus; a slide labelled *A. nicoletii* originating from Berlese's Acarotheca Italiana contains *A. punctata*, whilst according to Oudemans a tube with specimens determined by Berlese as *A. nicoletii* con-

tained besides 1 specimen of *A. punctata* 3 specimens of *A. patavina* (Oudemans). Berlese's description and figure, however, contain a few characters that point to *ovalis* Nicolet, viz., the smooth notogaster with only a few small hairs, and the rounded, outer (lower) anterior angle of the pteromorphae. Therefore I regard *A. coleoptrata* auct. (synonyms *ovalis* Nicolet, *nicoletii* Berlese, *intermedia* Michael) as the type of the genus.

A great deal of the confusion concerning the species of the genus *Achipteria* has been caused by the doubtful identity of the species described by Nicolet (*Oribata punctata*, *nitens*, *ovalis*). After having examined material from forests near Paris (Nicolet collected his material in the environments of Paris), kindly sent to me by Dr. Grandjean, I have been able to redescribe these species. It appears that *punctata* and *nitens* have generally been misinterpreted. *A. punctata* (Nicolet) is conspecific with *Notaspis italica* Willmann, non Oudemans, whilst *N. punctata* Willmann appears to be a new species that I propose to name *Parachipteria willmanni* nov. spec. (the genus *Parachipteria* is defined below). *A. nitens* (Nicolet) appears to be not identical with *Notaspis nitens* sensu Sellnick, but with *Notaspis mixtus* Sellnick (1943), whilst Sellnick's *nitens* is a new species that I propose to name *A. sellnicki* nov. spec. As I noted above, *O. ovalis* Nicolet is identical with *A. coleoptrata* auct.; Michael proposed the name *O. intermedia* for *O. ovalis* Nicolet, but the species described by Oudemans (1927) as *Notaspis intermedia* appears to be a new species that I name *A. oudemansi* nov. spec.

Oudemans (1914) proposed the name *Notaspis anglicus* for *Oribata punctata* Michael, as in his opinion this species is different from *O. punctata* Nicolet; Michael's description shows that he regarded *nitens* and *punctata* (and perhaps some other species) as belonging to one species, so that it is impossible to give a name to this combination of forms.

I am not certain about Oudemans' earlier records of *Oribates nitens*, *Oribates ovalis*, and *Oribates* sp. (no. 64) (1896, p. 57), that later on (1900 d, pp. 152, 153) he regarded as belonging to one species (*Notaspis coleoptratus*). According to his 1927 record *O. ovalis* is *coleoptrata*, but in his card index he refers the records of *ovalis* to *punctata* (a species of which no specimens from the Netherlands are present in the Oudemans Collection). Some slides of 1896, that are still in existence, appear to be erroneously identified as *coleoptrata* as they contain immature specimens of *nitens*.

As the species of the genus *Achipteria* can be divided into two groups I have erected a new genus, *Parachipteria*, for certain species differing in important characters from the type of the genus. The genus *Achipteria* then is restricted to species with "Schlitzporen" instead of areae porosae; besides the type *A. coleoptrata* (synonyms *ovalis* Nicolet, *nicoletii* Berlese, *inter-*

*media* Michael) belong to the genus *Achipteria* s. str.: *A. nitens* (Nicolet), *sellnicki* nov. spec. (= *nitens* Sellnick), *italicus* Oudemans, *quadridentatus* Willmann, and *oudemansi* nov. spec. (= *intermedia* Oudemans).

### **Parachipteria** nov. gen.

Achipteriidae resembling *Achipteria*, but of which the notogaster possesses arcae porosae. Type: *Oribata punctata* (Nicolet). Further representatives: *P. willmanni* nov. spec. (= *punctata* Willmann), *perproxima* (Sellnick), *bella* (Sellnick), *patavina* (Oudemans), and probably *magna* (Sellnick).

#### **Parachipteria punctata** (Nicolet, 1855) (figs. 10 a, d-f, 11 a, e)

*Oribata punctata* Nicolet, 1855, p. 434, pl. 4 fig. 7.

*Notaspis punctata*, Oudemans, 1914, p. 40; 1927, p. 126, figs. 1-6.

*Notaspis italicus*, Willmann, 1931, p. 183, fig. 319.

Own material. Mantinge, A 9, 87 ad., 32 n., 14 lv. Hooge Veluwe, A 43, 3 n.

I have been able to identify the species after a comparison with specimens from a forest between Paris and Versailles, kindly sent to me by Dr. Grandjean; it is without doubt that the Paris material represents *punctata*, as the specimens are very distinctly punctate, whilst their general shape shows a close resemblance to Nicolet's figure.

It appears that the species has generally been misinterpreted. The form described by Willmann (1931) as *Notaspis punctatus*, and subsequently recorded by many authors, represents a distinctly different species that I describe below as *Parachipteria willmanni* nov. spec.; I am not certain about Sellnick's (1928 a) description of *Notaspis punctatus*, as this may refer to *punctata* as well as to *willmanni*.

Probably Oudemans' description of *Notaspis punctatus* refers indeed to the species of this name; it was, however, based on a severely damaged specimen from Padua that is still in existence, but that is not determinable with certainty; in the description some important characters are not noted, whilst the state of preservation of the specimen does not allow of an altogether definite identification.

It is not impossible that the specimens recorded by Noordam and De Vlieger (1943, p. 10) as *Notaspis* cf. *coleoptratus* from "De Hooge Veluwe" belong to *P. punctata*, as this was the only species of the Achipteriidae collected by me at the same locality.

In *P. punctata* the tectopodia I (fig. 10 f) show a close resemblance to those of *P. willmanni*; the free points are rather long so that they meet or nearly meet each other. The tooth on the tectopodia II (fig. 10 e) is rather small and faintly curved. The outer (lower), anterior angle of the ptero-

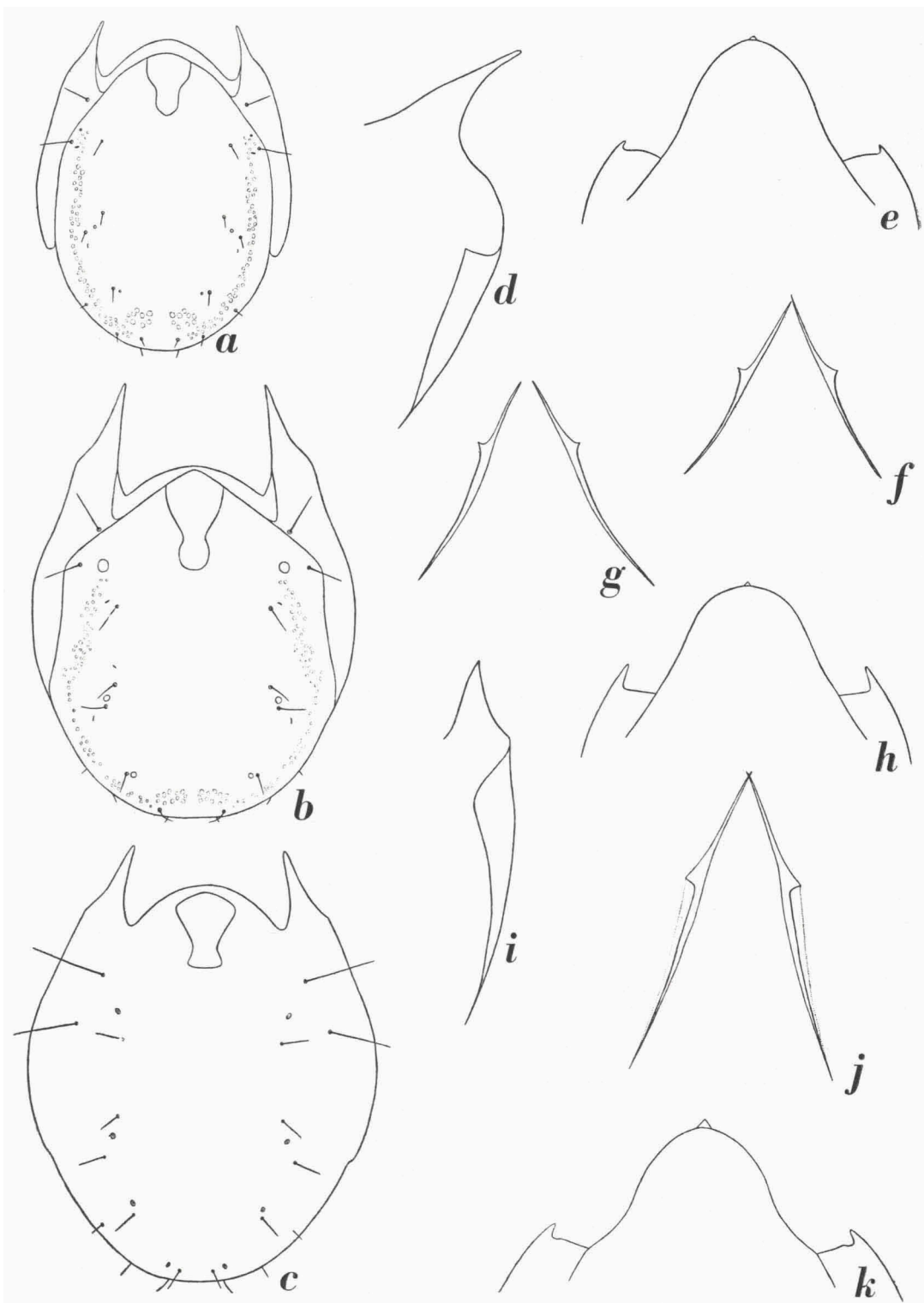


Fig. 10. a, d-f, *Parachipteria punctata* (Nicolet): a, dorsal view of the notogaster; d, left pteromorpha, seen from below; e, tectopedia II, seen from below; f, tectopedia I. b, g, h, *Parachipteria willmanni* nov. spec.; b, dorsal view of the notogaster; g, tectopedia I; h, tectopedia II, seen from below. c, i-k, *Achipteria nitens* (Nicolet): c, dorsal view of the notogaster; i, left pteromorpha, seen from below; j, tectopedia I; k, tectopedia II, seen from below. a-c, i,  $\times 100$ ; d-h, j, k,  $\times 200$ .



morphae (fig. 10 d) is not rounded, but more or less rectangular, sometimes slightly pointed. The structure of the dorsal surface is closely punctate. The notogastral areae porosae (fig. 10 a) are present as small, rounded, clear spots; the areae porosae adalares are very small and difficult to distinguish. Seen from above the lateral border of the hysterosoma presents a row of small, rounded spots; at the posterior border there are two groups of slightly larger clear spots (areae porosae and clear spots are best visible in dissected animals). The length of my specimens varies from 0.545 to 0.580 mm.

The immature specimens of *P. punctata* (fig. 11 a, e) show a slight resemblance to those of *A. nitens*, but all notogastral hairs are thin, whilst the notogastral wrinkles are less strong and for the greater part much less crenulate; finally the posterior part of the notogaster is not provided with numerous small curved lines.

I collected the species, that up till now was not yet recorded as a representative of our fauna, only two times (once in large numbers); the specimens were found in moss at the foot of oak trees in forests (*Querceto-Betuletum*).

***Parachipteria willmanni* nov. spec. (= *punctata* auct.)**

(figs. 10 b, g, h, 11 b, f)

*Notaspis punctatus*, Willmann, 1931, p. 183, figs. 315-318.

Own material. Ootmarsum, A 24, 25 ad., 29 juv. Denekamp, A 25, 37 ad., 26 juv.; A 26, 57 ad., 64 juv. (holotype in sample A 25).

The first distinctly recognizable description of the species was given by Willmann, who identified it, however, as *punctata*; as I stated above *P. punctata* is a different species, so that the present species is new. I propose the name *P. willmanni* in honour of the first describer of the species. I am not certain whether Sellnick's (1928 a) description of *N. punctata* refers to the real *punctata* or to *willmanni*, as the short diagnosis accords with both species.

*P. willmanni* is larger than *P. punctata*. In my specimens the length varies from 0.600 to 0.700 mm, and the width from 0.400 to 0.470 mm. The punctate structure is slightly less distinct and more dense in comparison to that in *P. punctata*. Generally the free points of the tectopodia I (fig. 10 g) are slightly different by being relatively shorter; the teeth on the tectopodia II are considerably longer (fig. 10 h); the anterior points of the pteromorphae reach farther to the front than in *P. punctata*; the areae porosae are larger, especially the areae porosae adalares (fig. 10 b).

The nymph of the species (fig. 11 b, f) has thickened hairs. The notogaster is strongly wrinkled, but only a few wrinkles are slightly crenulate

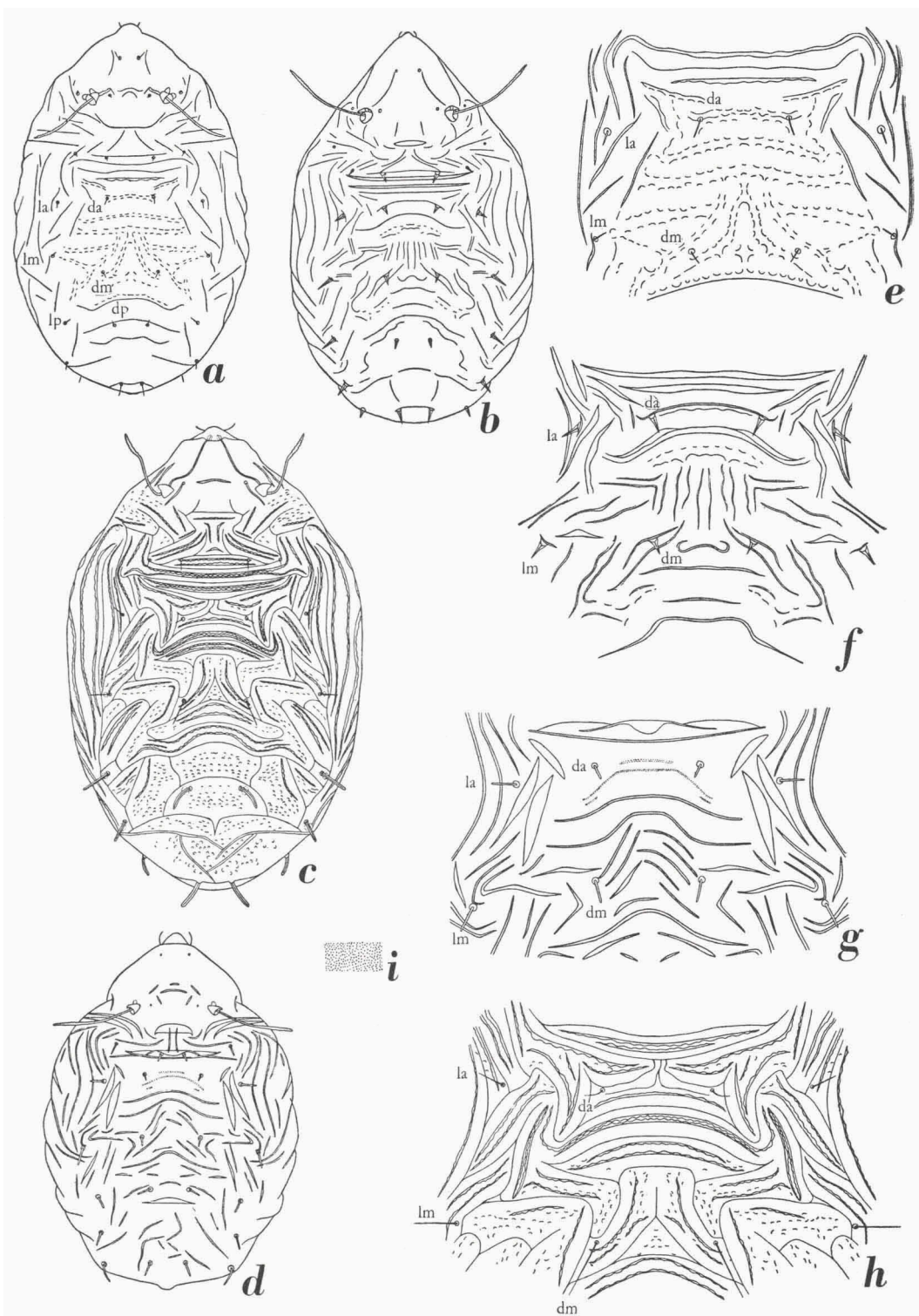


Fig. 11. a, c-i, nymphae III; b, nympha II. a-d, dorsal habitus views; e-h, central part of the notogaster. a, e, *Parachipteria punctata* (Nicolet). b, f, *Parachipteria willmanni* nov. spec. c, h, *Achipteria nitens* (Nicolet). d, g, i, *Achipteria coleoptrata* (L.): i, structure of the dorsal surface. a-d,  $\times 100$ ; e-i,  $\times 200$ .

(some at the lateral surface and a few in the centre), so that the structure is distinctly different from that of *P. punctata*.

I collected the species in moss and in sphagnum in or near birch and alder marshes.

**Achipteria nitens** (Nicolet, 1855) (figs. 10 c, i-k, 11 c, h)

*Oribata nitens* Nicolet, 1855, p. 433, pl. 4 fig. 6, pl. 5 fig. 8.

*Notaspis nitens*, Oudemans, 1914, A 10, p. 40; 1927, p. 130, figs. 7-13.

*Notaspis nitens*, *Notaspis coleopratus* (p. p.), Buitendijk, 1945, p. 389.

*Notaspis mixtus* Sellnick, 1943, p. 23.

Oudemans Collection. Langweer, Lochem, Arnhem, Valkeveen, Overveen, Burgst near Breda.

Own material. Denekamp, A 28, 4 ad., 2 n. Wilp (Gld.), A 46, 1 ad., 3 n. Winterswijk, A 48, 4 ad., 5 n.; A 51, 16 ad., 3 juv. Noordwijk aan Zee, A 56, 5 ad. Baarle Nassau, A 87, 1 ad. Neercanne, A 90, 1 ad. Sint Pietersberg, A 113, 1 ad., 3 juv.; A 114, 11 ad., 3 n.; A 115, 7 ad., 11 juv.

My specimens correspond with those originating from the "bois de Meudon" near Paris, sent to me by Dr. Grandjean. The identity of the large, shining black species with long, distinct notogastral hairs is certain.

In Germany there occurs a species of similar habitus that Sellnick and Willmann erroneously identified as *Notaspis nitens* (Nic.); this species is distinctly different by the tectopodia I that have no free points, and by the tectopodia II that have a tooth that is strongly curved to the inner side; above I have named this species *A. sellnicki* nov. spec. Sellnick's description of *Notaspis mixtus*, on the other hand, closely accords with the real *nitens*.

Oudemans correctly identified the species, but his description, although rather extensive, gives no decisive answer as to some important characters.

*A. nitens* has tectopodia I (fig. 10 j) with long free points that generally cross each other near the end. Seen from above the lamellae have a truncate anterior border, but in reality they are pointed. The pseudostigmatic organs are rather short and have a very slightly thickened head. The tectopodia II (fig. 10 k) have a tooth directed to the front, whilst their anterior border just inside the tooth shows a faint excavation. The anterior, outer (lower) angle of the pteromorphae (fig. 10 i) is rounded. The notogaster (fig. 10 c) has 4 pairs of "Schlitzporen"; the notogastral hairs are long, especially the two pairs near the pteromorphae. The length of my specimens varies from 0.700 to 0.780 mm, the width from 0.540 to 0.560.

The nymph of the species is strongly wrinkled in a characteristic way, as one side of each wrinkle is generally crenulate (fig. 11 c, h). The posterior part of the notogaster is provided with small curved lines (small arcs of circles). The notogastral hairs as a rule are partly thickened.

I collected the species in litter and in moss in forests (Querceto-Carpinetum), in litter of thickets of *Prunus spinosa* and *Crataegus*, and in a meadow.

**Achipteria coleoptrata** (Linnaeus, 1758) (fig. 11 d, g, i)

*Oribata ovalis* Nicolet, 1855, p. 438, pl. 4 fig. 5.

*Oribates Nicoletii* Berlese, 1883, vol. 3 (3).

*Oribata intermedia* Michael, 1898, p. 21.

*Notaspis coleoptratus*, Oudemans, 1914, A 10, p. 37, pl. 17 figs. 11-15; 1927, p. 124; Sellnick, 1928 a, p. 7, fig. 7; 1931, p. 699, figs. 4, 5; Willmann, 1931, p. 183, figs. 322-324.

*Notaspis coleoptratus* (p. p.), *Notaspis intermedia* (p. p.), Buitendijk, 1945, p. 389.

Oudemans Collection, Sneek, De Steeg, Ruurlo, Valkeveen, Haarlem, Bloemendaal, The Hague, Burgst near Breda, Sittard.

Own material. Oosterhesselen, A 12, 1 ad.; A 13, 3 ad. Ambt Vollenhove, A 14, 1 ad. Denekamp, A 28, 2 ad., 1 juv. Wilp (Gld.), A 44, 1 ad. Winterswijk, A 48, 4 ad., 1 n.; A 49, 1 ad., 1 n.; A 51, 8 ad., 3 n. Meyendel, A 59, 4 ad., 3 n.; A 65, 11 ad., 3 n.; A 66, 84 ad., 8 n.; A 68, 94 ad., 63 n.; A 69, 1 ad.; A 70, 1 ad.; A 73, 1 ad. Maasland, A 77, 4 ad., 2 n., 2 lv.; A 78, 6 ad., 1 n. Rockanje, A 82, 12 ad., 3 n. Breda, A 86, 1 ad. Sint Pietersberg, A 101, 17 ad., 8 juv.; A 107, 2 ad., 5 n.; A 113, 1 n.; A 115, 8 ad., 4 juv.; A 116, 2 ad., 1 n.

In my opinion for the present it is better to keep the name *coleoptrata* L., although Linnaeus' original description of *Acarus coleoptratus* even is insufficient to characterize the genus *Achipteria*; it appears, however, that *coleoptrata* is one of the few trivial names in the genus that most authors have used for the same species.

Specimens from the "Bois de Fausses-Reposes" between Paris and Versailles, that I regard as identical with *O. ovalis* Nicolet, as they are reddish brown and present the same general shape as figured by Nicolet, are conspecific with my *coleoptrata*.

The specimens from Burgst near Breda that Oudemans identified as *N. intermedia* are not conspecific with his specimens of *intermedia* (= *oudemansi* nov. spec.) from San Remo, described by him in 1927; they are on the contrary identical with *coleoptrata*.

It is not necessary to give a new description, as Sellnick (1931) sufficiently characterized the species. The length of my specimens varies from 0.545 to 0.625, the width from 0.410 to 0.470 mm.

The nymph of the species (fig. 11 d, g) is wrinkled, but the wrinkles are not crenulate; the notogastral hairs are slightly thickened; especially characteristic is the punctate structure (fig. 11 i) of the body.

I collected the species in moss and in litter in forests (Querceto-Betuletum, Querceto-Carpinetum), in litter of thickets of *Prunus spinosa* and *Crataegus*, in the sand dunes in litter and moss in birch woods and in litter of *Salix repens*, and in grass lands. The species was especially abundant in the birch woods in the sand dunes.

## GALUMNIDAE

**Galumna alata** (Hermann, 1804)

*Notaspis alatus* Hermann, 1804, p. 92, pl. 4 fig. 6.

*Galumna lanceatum octopunctatum*, Jacot, 1934, p. 91, pl. 10 figs. 5-10.

*Galumna alatus*, Grandjean, 1936, p. 94, figs. 12-14.

Own material. Rockanje, A 84, 5 ad.

Earlier authors generally misinterpreted *G. alata*, but Grandjean found the species again in Strassburg and gave a new description; it appears that *G. alata* is not rare in France.

Oudemans' earlier records of *G. alata* refer to *G. lanceata*; his 1913 record (1913 a, p. 233) is doubtful, as this specimen appears to be lost. (Oudemans' 1919 description of *Galumna alatus*, based on specimens from Italy, refers to an *Allogalumna* species).

I collected *Galumna alata* (that appears to be new to our fauna) in moss in a grass land near the sea shore; as I obtained the species from one locality only it certainly is a rare species in our country.

**Galumna lanceata** (Oudemans, 1900)

*Oribates coleoprata*, Oudemans, 1896, p. 56.

*Notaspis lanceatus* Oudemans, 1900 d, pp. 152, 154, 159.

*Notaspis aiatus*, Oudemans, 1901, p. 81.

*Notaspis alata, lanceata*, Oudemans, 1902 e, p. 1.

*Galumna lanceatus*, Oudemans, 1914, A 10, p. 33; Sellnick, 1928 a, p. 9; Willmann, 1931, p. 176, fig. 297; Buitendijk, 1945, p. 387.

*Galumna* cf. *dorsalis*, Van der Drift, 1950, p. 87.

Oudemans Collection. Oldenzaal, Arnhem, De Steeg, Haarlem, Breda, Burgst near Breda.

Own material. Weerdinge, A 6, 1 ad. Mantinge, A 7, 12 ad. Hooge Veluwe, A 35 a, 9 ad. Winterswijk, A 47, 1 ad. Meyendel, A 68, 3 ad.

Localities from literature. Apeldoorn, De Steeg, Zutphen, Haarlem (Oudemans); Hooge Veluwe (Van der Drift).

My specimens correspond with the type material that is still present in the Oudemans Collection. The specimens recorded by Van der Drift as *Galumna* cf. *dorsalis* appeared to belong to *G. lanceata*. I obtained the species from litter and humus in forests only (Querceto-Betuletum, Querceto-Carpinetum, beech forest, birch wood in the sand dunes).

**Galumna dorsalis** (C. L. Koch, 1836)

Wasmann (1899, p. 161) recorded *Oribata alata* from a nest of *Formica rufa* near Exaeten (province of Limburg); Oudemans (1914 a, p. 102, and 1919, p. 26) investigated the specimens and concluded that they belonged to

*Galumna dorsalis*. As I could not find the specimens referred to, I regard the record as doubtful. Oudemans' description of *Galumna dorsalis*, based on specimens from Italy, at any rate refers to a species different from the real *dorsalis*; it concerns the species that later was mentioned as *G. dorsalis* by Willmann (1931), a form which I intend to deal with in a future paper. The real *Galumna dorsalis* is a species that belongs to the subgenus *Centroribates* (cf. Grandjean, 1935 b, p. 244), and that possibly is identical with *Galumna* (*Centroribates*) *mucronatus* Canestrini. The name *Centroribates*, however, becomes a synonym of *Zetes* C. L. Koch (1836), of which the type is *Zetes dorsalis* (*Zetes* is a monotypical genus that was described in 1836 with *Z. dorsalis* as the only representative; notwithstanding this Koch designated in 1841 *Z. elimatus* as the type of the genus).

Noordam and De Vlieger (1943, p. 10) recorded *G. dorsalis* from "De Hooge Veluwe". I did not obtain any *Galumna* species at the same locality, but in a forest in the neighbourhood I collected *G. lanceata* only, so that it is possible that this is the species referred to.

***Galumna elimata*** (C. L. Koch, 1841) (= *obvius* auct.)

*Zetes elimatus* C. L. Koch, 1841, vol. 31 (5); Jacot, 1935, p. 52.

*Galumna elimata*, Oudemans, 1914, A 10, p. 26, pl. 17 figs. 1-10.

*Oribates obvius* Berlese, 1915, p. 119, pl. 1 fig. 1.

*Galumna elimatus*, Oudemans, 1915 a, p. XII.

*Galumna obvius*, Oudemans, 1919, p. 42, figs. 3-5; Sellnick, 1928 a, p. 9; Willmann, 1931, p. 178, fig. 302; Buitendijk, 1945, p. 388.

Oudemans Collection. Arnhem, Naardermeer, Hoensbroek, Sittard, Valkenburg, Houtthem (Limburg).

Own material. Winterswijk, A 51, 5 ad. Maasland, A 76, 4 ad., 2 n. Rockanje, A 82, 6 ad.; A 83, 1 ad.; A 84, 1 ad. Baarle Nassau, A87, 4 ad.

Locality from literature. Limburg (Oudemans).

Jacot (1935) collected numerous specimens of a *Galumna* species at Regensburg, the type locality of *Zetes elimatus*; in all probability his specimens indeed accord with Koch's original description of this species; it appears that Berlese's *Oribates obvius* is a synonym of *Zetes elimatus*.

Oudemans (1914) described as *G. elimatus* the nymph of the species; in later papers (1915 a, 1919) he doubted the identity of this nymph, as it possesses long interlamellar hairs. In my opinion, however, the nymph indeed belongs to the species, for the immature stages that I collected together with *G. elimata* also possess long interlamellar hairs.

I collected *G. elimata* in litter and in moss in forests (*Querceto-Carpinetum*, damp birch wood in the sand dunes), and in moss in grass lands and in a hayfield.

**Galumna (Pergalumna) nervosa** (Berlese, 1915)

*Oribates nervosus* Berlese, 1915, p. 127, pl. 1 fig. 15.

*Galumna retalata* Oudemans, 1915 a, p. XIV; 1919, p. 32, figs. 41-52.

*Galumna nervosus*, Sellnick, 1928 a, p. 9; Willmann, 1931, p. 176, figs. 295, 296.

*Zetes nervosus*, Jacot, 1935, p. 83, pl. 10 figs. 35, 36.

*Galumna nervosus*, *Galumna retalata*, Buitendijk, 1945, p. 388.

Oudemans Collection. Apeldoorn, Arnhem.

Own material. Mantinge, A 10, 3 ad. Markelo. A 16, 5 ad. Lattrop, A 21, 2 ad. Hooge Veluwe, A 32, 4 ad., 2 juv.; A 38, 3 ad., 6 juv.

Locality from literature. Apeldoorn (Oudemans).

I collected the species three times in moss and *Cladonia* in the heath, once in moss at the foot of a birch in a forest (*Querceto-Betuletum*), and once in moss in a fir wood. According to Willmann *G. nervosus* has a preference for very damp surroundings.

**Allogalumna neerlandica** nov. spec. (fig. 9 e-j)

Own material. Texel, A 55, 11 ad. (1 holotype, 10 paratypes).

Length 0.420-0.455 mm. Colour rather clear brown. General shape strongly resembling that of *Galumna alata* (Hermann).

Propodosomatal hairs (fig. 9 e) of medium length, slightly rough; interlamellar hairs at first converging, afterwards diverging. Pseudostigmatic organ (fig. 9 i) ending in a point; seen from above the head is spindle-shaped, whilst in lateral view it appears to be asymmetrical; the hairs on the head are very small and difficult to distinguish. Anterior areae porosae oval. Lamellae absent. The lateral surface of the propodosoma presents a ridge (indicated with S by Grandjean) that slightly projects when seen from above. There is no distinct demarcation between propodosoma and notogaster.

The pteromorphae (fig. 9 f) show the usual characters. Adalar areae porosae rather large, generally triangular; areae porosae mesonoticae more or less rounded, smaller. The posterior median part of the notogaster presents a small, round, clear spot, mentioned as pseudoforamen by Jacot.

Genital plates (fig. 9 g, h) each with six hairs, of which two stand at the anterior border, whilst the remaining four pairs are inserted in the following way. The first pair widely separate, situated laterally and slightly posteriorly of the anterior two hairs; the second pair more approximate, nearly just as widely separate as the third; the fourth pair still more approximate. The hairs of the epimeres are arranged as in fig. 9 g; two hairs stand near the anterior angle of the genital plates, one anteriorly and one posteriorly of the frontal border. Anal plates (fig. 9 j) each with two hairs; the anal opening is surrounded by 3 pairs of hairs, the lateral of which stand anteriorly of the "pseudofissura".

*A. neerlandica* is related to *A. alamellae* (Jacot, 1935 a); the latter is,

however, characterized by clavate pseudostigmatic organs beset with papillae, small areae porosae anteriores, and a different arrangement of the hairs of the genital plates (the first pair stands posteriorly of the anterior two hairs and more approximate than the outer anterior hair, whilst the second pair is much more approximate than the third), of the hairs of the epimeres (especially those near the anterior angle of the genital plates), and of the hairs near the anal plates (the lateral one stands near the pseudofissura).

Unfortunately, Jacot regarded as *G. alamellae italicum* the species that Oudemans erroneously had described as *Galumna alata*; the distinguishing characters derived by Jacot from Oudemans' description, however, hold no good as Oudemans' description was not correct in essential details. Nevertheless the form is distinctly separate from *A. alamellae*, so that I regard it as a different species (*Allogalumna italica* (Jacot)) that is closely related to *A. neerlandica*. I mention as its characters: pseudostigmatic organ clavate, but with small head beset with distinct papillae, areae porosae rather small, genital hairs arranged as in *A. neerlandica*, hair at the lateral border of the anal plate just near the pseudofissura.

Jacot regarded *A. alamellae* as identical with the species that was erroneously identified as *Galumna alata* by Willmann (1931). Willmann described the form as characterized by small, rounded areae porosae adalares, which does not correspond with *A. alamellae*; it is therefore probable that Willmann's description is founded on a different species closely related to (or identical with) *A. italica*.

*A. neerlandica* was collected in the grass slope of a dike.

#### **Allogalumna tenuiclavus** (Berlese, 1908)

*Oribates tenuiclavus* Berlese, 1908, p. 7; 1915, p. 120, pl. 1 fig. 2.

*Galumna tenuiclavus*, Oudemans, 1919, p. 71; Sellnick, 1928 a, p. 8; Willmann, 1931, p. 177, fig. 301.

*Galumna areolata* Willmann, 1923 a, p. 471, figs. 1, 2.

Own material. Denekamp, A 25, 1 ad. Hooge Veluwe, A 39, 4 ad. Sint Pietersberg, A 98, 1 ad.; A 101, 1 ad.

According to Willmann *A. tenuiclavus* has a preference for very damp surroundings. I collected the species (that appears to be new to our fauna) in sphagnum, but also in litter of a thicket of *Prunus spinosa* and in litter of a cultivated forest, that both did not represent especially damp surroundings.

#### **Allogalumna longiplumus** (Berlese, 1904)

*Oribates elimatus*, Oudemans, 1896, p. 57.

*Notaspis elimatus*, Oudemans, 1900 d, pp. 152, 154; 1902 e, p. 1.



*Oribatus elimatus* var. *longiplumus* Berlese, 1905, p. 30, pl. 1 fig. 22 a.

*Galumna filata* Oudemans, 1913 a, p. 282; Oudemans, 1914, A 10, p. 33, pl. 14 figs. 9-18, pl. 17 fig. 16; 1915 a, p. XIII.

*Oribates longiplumus*, Berlese, 1915, p. 122, pl. 1 fig. 9.

*Galumna longiplumus*, Oudemans, 1919, p. 62, figs. 1, 2; Sellnick, 1928 a, p. 8, fig. 8; Willmann, 1931, p. 174, fig. 289; Buitendijk, 1945, p. 388.

Oudemans Collection. Arnhem, Haarlem.

Localities from literature. Sneek, Nijkerk, De Steeg, Zutphen, Haarlem, Overveen.

Oudemans (1919) stated that the nymph described by him in 1914 as *G. elimata* belongs to *G. longiplumus*. As I noted above it represents, however, *G. elimata*.

I did not collect the species, so that I have no data concerning its habitat; according to Willmann *A. longiplumus* occurs in moss and in ants' nests.

## PELOPIDAE

### ***Pelops bilobus*** Sellnick, 1928

*Pelops bilobus* Sellnick, 1928 a, p. 5; 1929, p. 342, fig. 1; Willmann, 1931, p. 185, fig. 328.

Own material. Hooge Veluwe, A 36, 2 ad.; Ossendrecht, A 88, 1 ad.

The species is easily recognizable from the above mentioned descriptions. The width of the pseudostigmatic organ appears to be slightly variable.

*P. bilobus* is new to our fauna. I collected my specimens in the heath (in moss, and in *Cladonia*). According to Sellnick and to Willmann the species occurs rarely in "Moormoosen".

### ***Pelops oudemansi*** nov. spec. (fig. 12 d)

Oudemans Collection. Valkeveen, 7. V. 1916, 2 ad. (1 holotype, 1 paratype).

The specimens of this species in the Oudemans Collection were identified as *Pelops* spec., and as such recorded by Buitendijk (1945, p. 390). The specimens are severely damaged, but they are still well recognizable.

Colour reddish brown. The length of the severely damaged specimens is 0.575 mm; the original length apparently was about 0.515 mm.

The blunt rostrum (fig. 12 d) has a median longitudinal groove. Lamellae with long, pointed cuspidata, which are situated rather close to each other. Tectopodia I pointed; tectopodia II with a tooth that is directed towards the front. Pseudostigmatic organ long and slender, with a slightly thickened head that is beset with numerous very small hairs. The blunt interlamellar hairs are enlarged towards the end.

The anterior part of the notogaster forms a large tectum (named by Berlese the squama notogastri), that covers a part of the propodosoma; the anterior border of this tectum is completely straight, without lobes. Noto-

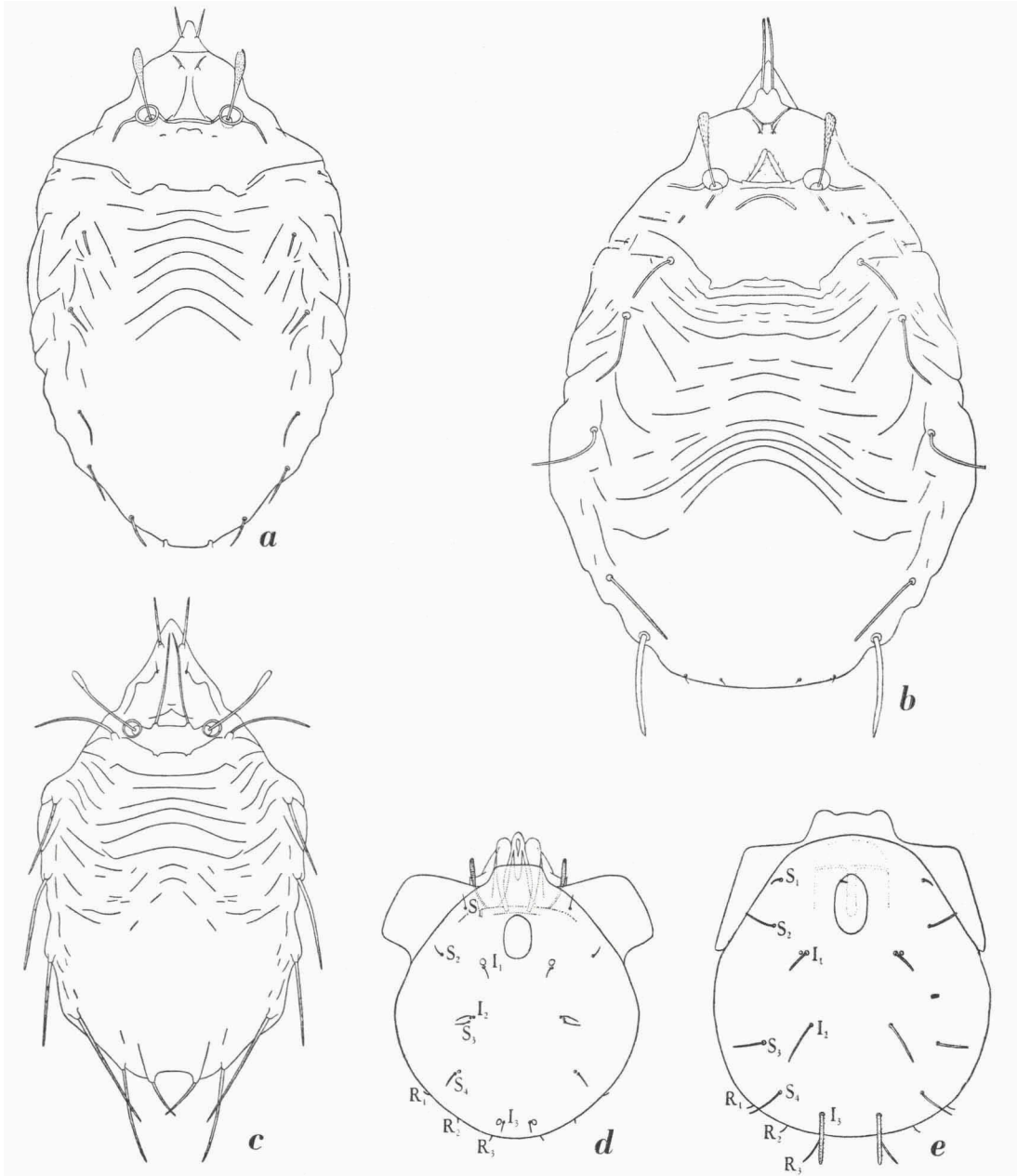


Fig. 12. a, *Pelops occultus* C. L. Koch, nymph III, dorsal view. b, e, *Pelops plicatus* (C. L. Koch): b, nymph III, dorsal view, e, adult, notogaster, c, *Peloptulus phaeonotus* (C. L. Koch), nymph III, dorsal view. d, *Pelops oudemansi* nov. spec., adult, dorsal view. a-c,  $\times 150$ ; d, e,  $\times 75$ .

gastral hairs rather thin:  $S_4$  and  $I_3$  are a little stronger;  $R_1$ ,  $R_2$ , and  $R_3$  are slightly thickened and blunt, but short.  $S_3$  and  $I_2$  are situated close to each other, separated by an area porosa only. The areae porosae near  $I_1$  and  $I_3$  are rather large.

As the hairs  $I_2$  and  $S_3$  are situated close to each other, the species belongs to the group of *P. occultus*, in which group *P. geminus* Berlese (1917) is the only species that has a squama notogastris with a straight anterior border. *Pelops oudemansi* differs from this species by the long and slender pseudostigmatic organ (very short, with flat, rounded head in *P. geminus*) and by the large area porosa near  $I_1$  (according to Sellnick (1928 a, p. 5) very small in *P. geminus*).

The specimens in the Oudemans Collection were obtained from decaying leaves.

#### ***Pelops occultus* C. L. Koch, 1836 (fig. 12 a)**

*Pelops occultus* C. L. Koch, 1836, vol. 2 (15); Oudemans, 1913 a, p. 233; 1914, A 10, p. 41, pl. 17 figs. 17, 18; Sellnick, 1928 a, p. 5; Willmann, 1931, p. 186, fig. 332; Buitendijk, 1945, p. 389.

Own material. Texel, A 55, 1 ad. Meyendel, A 59, 3 ad. Maasland, A 78, 1 ad. Lekkerkerk, A 85, 2 ad., 1 n. Sint Pietersberg, A 101, 2 ad.; A 108, 4 ad., 6 n.; A 109, 1 ad.; A 111, 6 ad., 2 n.; A 113, 2 ad., 2 n.; A 116, 13 ad., 4 n.

Locality from literature. Sittard (Oudemans).

It is probable that modern authors have correctly interpreted Koch's original description. I am not certain about the *P. occultus* of Nicolet (1855, p. 427, pl. 3 fig. 5) and of Berlese (1887, vol. 35 (4)), as they described the species as only 0.430 mm long, and as provided with a longitudinal groove in the centre of the notogaster. On account of the presence of this groove Oudemans (1914, A 10, p. 43) concluded that it certainly was a new species, which he named *P. sulcatus*. I am not completely certain about this conclusion, as in *P. occultus* the centre of the dorsum is indeed slightly deepened; moreover, Sellnick remarked that the thick layer of secretion which sometimes covers the notogaster, is never present in this central part.

The nymph (fig. 12 a) of the species is easy to recognize. The rostral hairs are of medium length; the lamellar and interlamellar hairs are small; the first pair of lateral hairs and the pair of posterior notogastral hairs are small; the remaining lateral notogastral hairs are of medium size.

In the Oudemans Collection the species is represented by a plate only.

I collected the species in grass lands, in the litter of small thickets in grass lands (Querceto-Carpinetum and thickets of *Prunus spinosa*), and in moss at the foot of pollard willows in grass land. According to Frenzel (1936) the species is common in meadows.

**Pelops acromios** (Hermann, 1804)

*Notaspis acromios* Hermann, 1804, p. 91, pl. 4 fig. 1, pl. 9 fig. Z.

*Pelops acromios*, Michael, 1884, p. 208, pl. 1 figs. 1-12; Oudemans, 1896, p. 56; 1900 d, pp. 152, 153; Sellnick, 1928 a, p. 5, fig. 6; 1931, p. 697, fig. 2 a; Grandjean, 1936, p. 83, figs. 9-11.

*Pelops planicornis*, Willmann, 1931, p. 186, fig. 333; Buitendijk, 1945, p. 389.

Oudemans Collection. Sneek, Nijkerk, Oosterbeek, Valkeveen, Burgst near Breda.

Own material. Hooge Veluwe, A 35 a, 1 ad. Sint Pietersberg, A 116, 1 ad.

Localities from literature. Sneek, Nijkerk, De Steeg, Zutphen, Ruurloo (Oudemans).

Oudemans (1929, p. 809) placed *P. acromios* in the synonymy of *Acarus planicornis* Schrank (1803), a species that in my opinion is an undeterminable *Pelops*.

It is not easy to draw a conclusion from the old descriptions by Koch, Nicolet, and Berlese (*Celaeno spinosa*, *Pelops acromios*, *Pelops phytophilus*). The difficulties have increased since Sellnick (1931, p. 697) stated that *P. acromios* and *P. phytophilus* are two different species, although very closely related. The distinguishing characters given by him are not very striking, and the differences in measurements anyway do not hold good; the relation of the two species certainly needs checking.

According to Grandjean (1936) the species is arboricolous, and is easily collected by beating the foliated branches of trees and shrubs. I collected the species twice in litter; these specimens probably had fallen down from trees.

**Pelops plicatus** (C. L. Koch, 1836) (= *auritus* auct.) (fig. 12 b, c)

*Celaeno plicata* C. L. Koch, 1836, vol. 3 (18).

*Pelops auritus* C. L. Koch, 1839, vol. 30 (11); Sellnick, 1928 a, p. 5; Willmann, 1931, p. 187, fig. 334; Noordam and De Vlieger, 1943, p. 10.

*Pelops laevigatus* Nicolet, 1855, p. 426, pl. 3 fig. 3; Michael, 1884, p. 213, pl. 2 figs. 1-7.

*Pelops fuliginus*, Oudemans, 1896, p. 56.

*Pelops plicatus*, Oudemans, 1900 d, pp. 152, 153.

*Pelops auritus*, *Pelops plicatus*, Buitendijk, 1945, pp. 389, 390; Willmann, 1931, p. 187, figs. 334, 337.

*Pelops aurita*, Van der Drift, 1950, p. 70.

Oudemans Collection. Warnsveld, Delden, Ruurloo, Bloemendaal.

Own material. Ambt Vollenhove, A 14, 4 ad. Brecklenkamp, A 17, 6 ad., 11 n. Ootmarsum, A 24, 3 ad., 1 n. Denekamp, A 28, 1 ad., 1 juv. Hooge Veluwe, A 35, 1 ad., 6 n.; A 40, 1 ad.; A 42, 2 ad. Wilp (Gld.), A 44, 8 ad., 1 n., 7 lv. Winterswijk, A 47, 3 ad.; A 48, 12 ad., 4 lv.; A 49, 2 ad., 2 lv.; A 51, 14 ad., 5 lv. Meyendel, A 68, 1 n.; A 69, 1 ad.; A 70, 5 ad., 5 n.; A 74, 5 ad., 3 n. Sint Pietersberg, A 116, 9 ad., 2 n., 4 lv.

Localities from literature. Sneek, Delden, Ruurloo, Warnsveld, Zutphen, De Steeg, Overveen, Bloemendaal, Bergen op Zoom (Oudemans); Hooge Veluwe (Noordam and De Vlieger, Van der Drift).

In this species and in related forms the shape of the notogastral hairs varies with age and with quantity of adhering secretion. This variability has

been the cause that the earlier authors described more species than exist in reality. Unfortunately Oudemans (1937) has taken much trouble to interpret the old descriptions, and to give these old names to specimens at his disposal; Willmann (1931) too made use of these names. As shown below, at least some of these conclusions are insufficiently founded.

I identify my specimens as *Celaeno plicata* C. L. Koch, the nymph of the species, that is easily recognizable by the long, thick hairs at the posterior border of the hysterosoma. The species is further identical with *Pelops auritus* C. L. Koch, described on a specimen which was strongly covered with secretion. It is not impossible that *Pelops fuliginus* C. L. Koch (1839, vol. 30 (10)) also belongs to the species, representing a specimen with thin hairs and not covered with secretion. Nicolet's description of *P. laevigatus* is probably also identical. Michael drew the notogastral hairs as thin; in the text, however, he wrote that among the hairs one or two pairs near the hind margin are thicker. *Pelops auritus* Berlese (1884, vol. 15 (8)) is a different species, that Berlese later on (1917, p. 55) renamed *P. curtipilus*. Willmann's description and figure of *P. plicatus* (1930 a, 1931) was apparently made after a specimen in the Oudemans Collection, and therefore I am certain that it is *P. plicatus* indeed.

I have represented a dorsal view of the notogaster of the adult in fig. 12 e. The hairs S<sub>2</sub>, S<sub>3</sub>, S<sub>4</sub>, I<sub>1</sub>, I<sub>2</sub>, and R<sub>3</sub> are rather long and rather thin; I<sub>3</sub> is long and thicker than the remaining hairs, the shape is, however, variable, and sometimes the hair is narrower than in the figured specimen; the hairs R<sub>1</sub> and R<sub>2</sub> are rather small.

The nymph of the species (fig. 12 b) is easily recognizable. The rostral hairs are long, and the lamellar hairs are short (the latter sometimes thickened by secretion); the interlamellar hairs are broadened and rough. The anterior lateral notogastral hair is short, the following four pairs of lateral hairs are rather long and blunt, the pair of posterior lateral hairs is long, thick, and coarse.

I collected my specimens in the litter of forests (Querceto-Carpinetum, Querceto-Betuletum, beech forest, birch wood in the sand dunes, thicket of *Prunus spinosa*), in the litter of *Salix repens* and *Populus*, and in a grass land in the sand dunes, and once in moss near the source of a brook. Noor-dam and De Vlieger collected the species in greater numbers on the southern slope of the wooded hill investigated by them than on the northern.

### ***Peloptulus phaeonotus* (C. L. Koch, 1841) (fig. 12 c)**

*Pelops phaeonotus* C. L. Koch, 1841, vol. 39 (23); Michael, 1884, p. 216, pl. 2 figs. 8-12, pl. 23 fig. 2; 1888, p. 574, pl. 52 fig. 1; Oudemans, 1914, A 10, p. 43.

*Peloptulus phaenotus*, Sellnick, 1928 a, p. 5; Buitendijk, 1945, p. 390; Geijskes, 1950, p. 241.

*Peloptulus phaenotus*, Willmann, 1931, p. 188, fig. 339.

Oudemans Collection. Arnhem, Zeeburg, Valkeveen.

Own material. Texel, A 53, 2 ad. Meyendel, A 69, 6 ad., 3 n. Sint Pietersberg, A 110, 1 ad.

Localities from literature. Sittard (Oudemans); Griend (Geijskes).

Koch's original description in general accords with my specimens. In Michael's description the text is better than the accompanying figures. Berlese's description of *Pelops phaenotus* (1887, vol. 35 (3)) appears to refer to a quite different species, that Oudemans (1929, p. 452) renamed *Peloptulus berleseii*; judging by Berlese's figure the species is, however, not a *Peloptulus*, but a *Pelops*.

The nymph of the species (fig. 12 c) is easily recognizable. The rostral hairs are rather long, the lamellar hairs short, the interlamellar hairs long, and the pseudostigmatic organ long and clavate. At the sides of the hysterosoma there are six pairs of long, strong hairs, and at the posterior border there is one pair of hairs of medium size.

My specimens were obtained from grass lands. Frenzel (1936) characterized the species as one of the "Leitformen der Wiesenbodens".

#### PHTHIRACARIDAE

##### ***Steganacarus magnus* (Nicolet, 1855)**

*Hoplophora magna* Nicolet, 1855, p. 472, pl. 10 fig. 4; Michael, 1888, p. 556, pl. 50 figs. 1-7; Berlese, 1892, vol. 67 (9).

(*Hoplophora*)*magna*, Oudemans, 1896, p. 53.

*Hoploderma magnum*, Oudemans, 1900 d, pp. 150, 157; Willmann, 1931, p. 191, figs. 347, 348.

*Phthiracarus magna*, Oudemans, 1915 c, p. 218.

*Hoploderma magna*, Sellnick, 1928 a, p. 40; Buitendijk, 1945, p. 390.

Oudemans Collection. Delden, Haarlem, Burgst near Breda.

Own material. Weerdinge, A 6, 1 ad. Mantinge, A 7, 24 ad.; A 8, 1 ad.; A 11, 1 ad. Ambt Vollenhove, A 14, 4 ad. Brecklenkamp, A 17, 3 ad. Ootmarsum, A 24, 4 ad. Denekamp, A 28, 5 ad. Hooge Veluwe, A 40, 4 ad.; A 41, 6 ad.; A 42, 3 ad., 1 n. Wilp (Gld.), A 44, 1 ad.; A 46, 2 ad. Winterswijk, A 47, 3 ad.; A 48, 3 ad.; A 49, 5 ad.; A 51, 2 ad. Breda, A 86, 1 ad. Sint Pietersberg, A 102, 6 ad.; A 117, 9 ad.

Localities from literature. Delden, Ruurlo, Zutphen, De Steeg, Haarlem, The Hague (Oudemans).

Noordam and De Vlieger (1943, p. 6) recorded a *Hoploderma* (= *Steganacarus*) species from "De Hooge Veluwe", that in their opinion was closely related to *Hoploderma spinosa*; at the same locality, however, I repeatedly collected *S. magnus* as only representative of the genus, so that probably their record relates to this species.

I collected *S. magnus* in litter and in moss in forests belonging to the Querceto-Carpinetum and to the Querceto-Betuletum, and once in moss near the source of a brook.

**Steganacarus striculus** (C. L. Koch, 1836)

*Hoplophora stricula* C. L. Koch, 1836, vol. 2 (10); Michael, 1888, p. 563, pl. 51 fig. 7.

*Phthiracarus stricula*, Oudemans, 1915 d, p. 231.

*Hoploderma stricula*, Sellnick, 1928 a, p. 40, fig. 91.

*Hoploderma striculum*, Willmann, 1931, p. 192, fig. 346.

*Steganacarus striculum*, Grandjean, 1933 b, p. 314, fig. 4.

Own material. Mantinge, A 11, 3 ad. Ootmarsum, A 24, 2 ad. Denekamp, A 26, 27 ad. De Lutte, A 29, 2 ad. Hooge Veluwe, A 32, 2 ad.; A 35a, 6 ad.; A 38, 5 ad. Maasland, A 75, 2 ad. Rockanje, A 82, 12 ad.; A 83, 9 ad.

The species is sufficiently recognizable from Koch's original description. Nicolet's (1855, p. 472, pl. 10 fig. 5) description of *Hoplophora stricula*, however, certainly refers to a different, much larger species (recorded length 0.82 mm, whilst the length of my specimens varies from 0.365 to 0.655 mm). Michael figured the notogastral hairs as pointed, but he correctly described them as "blunt ended".

*S. striculus* appears to be new to our fauna. I collected the species in moss in the heath, in moss in birch and alder marshes, in moss in a fir wood, in litter and moss in a damp birch wood in the sand dunes, and in the litter of forests (Querceto-Betuletum, beech forest).

**Steganacarus spinosus** (Sellnick, 1920)

*Phthiracarus spinosus* Sellnick, 1920, p. 37.

*Hoploderma spinosa*, Sellnick, 1928 a, p. 40; Willmann, 1931, p. 190.

Own material. Denekamp, A 28, 10 ad. Winterswijk, A 51, 2 ad.

My specimens correspond with the above mentioned descriptions; the diagonal length of the hysterosoma varies from 0.400 to 0.500 mm. The species is new to our fauna, the specimens were obtained from the litter of forests (Querceto-Carpinetum).

**Phthiracarus piger** (Scopoli, 1763)

*Phthiracarus piger*, Willmann, 1931, p. 192, fig. 351 a; Noordam and De Vlieger, 1943, p. 10; (p. p.), Buitendijk, 1945, p. 391.

Oudemans Collection. Delden, Lochem.

Own material. Hooge Veluwe, A 32, 3 ad.; A 35 a, 7 ad. Wilp (Gld.), A 44, 1 ad. Noordwijk aan Zee, A 56, 2 ad. Meyendel, A 65, 4 ad.; A 66, 1 ad.; A 68, 5 ad. Breda, A 86, 1 ad. Neercanne, A 89, 2 ad.; A 91, 3 ad. Sint Pietersberg, A 94, 1 ad.; A 95, 1 ad.; A 102, 13 ad.; A 104, 1 ad.; A 107, 5 ad.; A 114, 6 ad.; A 117, 12 ad.

Locality from literature. Hooge Veluwe (Noordam and De Vlieger).

It is impossible to find useful characters in Scopoli's original description of *Acarus piger*, but my specimens are identical with those originating from Dr. Strenzke's collection identified by him and by Forsslund as *P. piger*;

they correspond, moreover, with Willmann's (1931) description of the species, although the pseudostigmatic organ is more slender.

In the Oudemans Collection there are several slides, identified by Oudemans as *P. piger*, that are undeterminable or belong to other *Phthiracarus* species. As Oudemans apparently did not sufficiently distinguish the species of the genus it is impossible to attach any importance to the following records: (*Hoplophora*) *globosa*, *ferruginea*, *lucida*, *laevigata*, *nitens*, sp., Oudemans, 1896, p. 53 (nos. 1-5, 7-10); *Hoploderma dasyopus*, Oudemans, 1900 d, pp. 150, 157; 1902 e, p. 2.

*P. piger* is a rather common species that I collected in the litter of forests (Querceto-Carpinetum, Querceto-Betuletum, birch wood in the sand dunes, beech forest), in the litter of a thicket of *Prunus spinosa*, in moss in fir woods and at the foot of an oak tree.

#### **Phthiracarus testudineus** (C. L. Koch, 1841)

*Hoplophora testudinea* C. L. Koch, 1841, vol. 32 (11).

*Phthiracarus testudineus*, Jacot, 1936, p. 170, figs. 7-12.

*Phthiracarus piger* (p. p.), Buitendijk, 1945, p. 391.

Oudemans Collection. Sneek.

Own material. Denekamp, A 26, 2 ad. De Lutte, A 29, 1 ad.

In the Oudemans Collection the species is represented by a slide containing numerous specimens from Sneek; Oudemans erroneously identified these as *P. piger*; specimens from Haarlem, identified as *P. piger*, are closely related to *P. testudineus*, but show slight differences: the colour is darker, the pseudostigmatic organ is slightly thicker, the hairs are longer and the hysterosoma is slightly more elongate.

*P. testudineus* is closely related to *Hoplophora dasyopus*, Berlese, 1883, vol. 6 (4) (non Dugès), for which Oudemans (1900 d, p. 170) proposed the name *Hoploderma italicum*. Afterwards Oudemans recorded *H. italicum* from Bremen (in: Poppe, 1906, p. 38), and from Geule (province of Limburg, Netherlands) (Oudemans, 1920, p. 260). The last mentioned specimen is still in the collection, although damaged, in which state it was already when Oudemans studied it; in my opinion it is impossible to identify it with certainty. Oudemans himself later on changed the determination of the specimen into *P. piger*, and as such it was recorded in the preliminary catalogue (Buitendijk, 1945). The specimen from Bremen shows accordance with *testudineus* but is much darker. Oudemans indentified also a specimen from Switzerland as *italicus*, that, however, is too severely damaged to be recognized with certainty; it is light coloured, has short hairs, and shows a close resemblance to the specimens that I identified as *P. piger*.



*P. ligneus* Willmann is a species with much longer notogastral hairs, whilst the species described by Willmann (1931, p. 193) as *P. italicus* is possibly identical with *P. testudineus*.

I collected *P. testudineus*, a species new to our fauna, in moss in birch and alder marshes. According to Jacot it occurs in damp meadows and in marshes.

### **Phthiracarus globosus** (C. L. Koch, 1841)

*Hoplophora globosa* C. L. Koch, 1841, vol. 32 (12).

*Phthiracarus globosus*, Willmann, 1931, p. 193, figs. 354, 355.

Own material. Denekamp, A 26, 6 ad.; A 28, 1 ad. De Lutte, A 29, 3 ad.

Jacot (1936) could not find Koch's *Hoplophora globosa* near Regensburg, so that its identity remains uncertain. The identification of my specimens is based on the description by Willmann (1931); the animals show indeed a close similarity to Koch's original description as they have a nearly globular hysterosoma and two clear areas on the aspis.

I collected the species, that is new to our fauna, in moss in birch and alder marshes, and in the litter of a forest (Querceto-Carpinetum) along a small river. In literature it is known to occur in "Moormoosen" and in forests.

### **Phthiracarus ferrugineus** (C. L. Koch, 1841)

*Hoplophora ferruginea* C. L. Koch, 1841, vol. 32 (10).

*Phthiracarus ferrugineus*, Jacot, 1936, p. 179, figs. 26-33.

*Phthiracarus borealis*, Noordam and De Vlieger, 1943, p. 10; Van der Drift, 1950, p. 87.

Own material. Mantinge, A 7, 4 ad.; A 8, 1 ad. Brecklenkamp, A 17, 1 ad. Denekamp, A 26, 2 ad. Hooge Veluwe, A 32, 2 ad.; A 35, 1 ad.; A 35a, 21 ad.; A 40, 2 ad.; A 41, 3 ad.; A 42, 1 ad. Winterswijk, A 48, 2 ad.; A 49, 1 ad. Sint Pietersberg, A 102, 2 ad. Locality from literature. Hooge Veluwe (Noordam and De Vlieger, Van der Drift).

The species was previously recorded by Noordam and De Vlieger, and by Van der Drift, as *P. borealis*.

I am not completely certain about the identity of my material. In the greater part the pseudostigmatic organ is broader than in Jacot's description of *P. ferrugineus*, resembling that of *P. stramineus*, but my specimens lack the characteristic shape of the rostrum of *P. stramineus* (in Koch's original description of *P. ferrugineus* the pseudostigmatic organ is also broader than in Jacot's redescription). My material is further not very homogeneous; the specimens from "De Hooge Veluwe" distinctly represent one form to which the greater part of my material is closely related, but the specimens from Mantinge form a separate group on account of the presence of shorter hairs.

I collected my material for the greater part in the litter of forests.

## EUPHTHRACARIDAE

**Pseudotritia ardua** (C. L. Koch, 1841)

*Hoplophora ardua* C. L. Koch, 1841, vol. 32 (15).

*Phthiracarus* sp., Oudemans, 1896, p. 54 (no. 11).

*Phthiracarus arduus*, Oudemans, 1900 d, pp. 150, 157.

*Tritia ardua*, Sellnick, 1923 b, p. 12, figs. 1, 12, 23, 24.

*Oribotritia ardua*, Sellnick, 1928 a, p. 39; Buitendijk, 1945, p. 391.

*Pseudotritia ardua*, Jacot, 1930, p. 243, pl. 38 figs. 44-51; Grandjean, 1933 b, p. 310, fig. 2.

*Oribotritia loricata*, Willmann, 1931, p. 194, fig. 358; Van der Drift, 1950, p. 88.

Oudemans Collection. Langweer, Lochem, Haarlem, Overveen.

Own material. "Staatsbossen" between Lhee and Spier, A 4, 2 ad. Mantinge, A 7, 2 ad. Ambt Vollenhove, A 14, 2 ad. Lattrop, A 21, 1 ad. Hooge Veluwe, A 35, 4 ad.; A 35a, 17 ad.; A 36, 1 ad.; A 38, 1 ad.; A 40, 1 ad.; A 41, 3 ad. Meyendel, A 70, 1 ad.; A 74, 1 ad. Rockanje, A 83, 6 ad. Sint Pietersberg, A 95, 1 ad.; A 102, 4 ad.; A 107, 4 ad.; A 117, 4 ad.

Localities from literature. De Steeg, Zutphen, Lochem, Langweer, Haarlem, Overveen, Bloemendaal (Oudeschans); Hooge Veluwe (Van der Drift).

According to Willmann's description there is only one pair of long hairs on the anal plate, but in reality the anal region shows 3 pairs of anal hairs and 3 pairs of adanal hairs.

Jacot characterized *P. ardua* as the most ubiquitous species of the family; I collected it in moss and in *Cladonia* in the heath, in dry litter of *Salix repens* and of *Populus* in the sand dunes, in litter and moss in a damp birch wood in the sand dunes, and in the litter of various forests (Querceto-Betuletum, Querceto-Carpinetum, beech forest, cultivated forest of *Picea* and *Larix*).

**Pseudotritia minima** (Berlese, 1904)

*Phthiracarus minimus* Berlese, 1904, p. 22.

*Tritia (Pseudotritia) minuta* Willmann, 1919, p. 552, fig. 2.

*Tritia (Pseudotritia) minima*, Sellnick, 1923 b, p. 21, figs. 11, 22, 33.

*Pseudotritia minima*, Sellnick, 1928 a, p. 39; Willmann, 1931, p. 195, fig. 364; Van der Drift, 1949, p. 13; 1950, p. 88.

Own material. Hooge Veluwe, A 35 a, 13 ad.

Locality from literature. Hooge Veluwe (Van der Drift).

With the exception of the measurements Berlese's original, very short description contains nothing that is characteristic. Sellnick, however, received specimens of the species from Berlese himself, and by Sellnick's description *P. minima* is sufficiently characterized.

My specimens were obtained from the humus layer of a beech forest; according to Van der Drift the species has a pronounced preference for this layer.

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