

FOURTH SUPPLEMENT TO THE CHECKLIST OF MOSS MITES OF THE NETHERLANDS (ACARI: ORIBATIDA)

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Eleven new species are added to the list of Oribatida (351 Oribatida plus another 303 Astigmatina) making the total now 664 species. These species mainly come from samples of special biotopes: aquatic, old forest floors or old hedgerows and epiphytes. In addition, new species are emerging from large nature restoration experiments or research into the decomposition of dead wood.

INTRODUCTION

Moss mites (Oribatida) form a major group of mites predominantly living in soil and vegetation. They are the largest group of mites in the order Sarcopiformes. This is even more so since the Astigmatina are placed as a cohort within the Oribatida, closely related to the large cohort Brachyphylina. Siepel et al. (2009) presented 318 species of moss mites for the Netherlands, later supplemented with nine (Siepel & Dimmers 2010), another nine (Siepel et al. 2012), two (Doğan et al. 2015) and 13 (Siepel 2018) new species for the Netherlands, which leads to a total of 351 species. The cohort Astigmatina has currently 262 (Siepel et al. 2016) plus 42 minus 2 (Siepel et al. 2023), which leads to a total of 302 species.

The total for the suborder Oribatida was 653 species, where in this publication 11 new Oribatida are added to the total, making it now 664 species of Oribatida in the Netherlands, quite some more than the estimated number in the Dutch biodiversity book (543 species, including 8 Endeostigmata) (Noordijk et al. 2010). The increase in numbers is especially due to an adapted sampling technique of peculiar biotopes, next to new species popping up from samples in extensive studies on nature restoration (Guo & Siepel 2020) or decomposition of wood (Cornelissen et al. 2012). Although most moss mites are living in the litter layer of forests, grasslands and arable land (in decreasing order of abundance), some live in other habitats. Some families are entirely

aquatic (Limnozetestidae) or aquatic and semi-aquatic (Hydrozetidae and Ameronothridae). Sampling these aquatic habitats revealed some new species. As most oribatid mites have a very limited dispersal capacity (Siepel 1994), the species richness is mostly determined by the period since the last disturbance (Van Eekeren et al. 2022) This means that the highest species richness can be found in undisturbed soils. Old undisturbed forest soils (quite rare in the Netherlands) and old hedgerow soils are good examples of rich oribatid communities. Old hedgerows are a remnant of cutting and cultivating the forest from both sides, leaving the hedgerow as a kind of old borderline between estates. These hedgerows can be found by comparing the oldest topographic maps (from 1812-1832) with the current ones. Another poorly explored area for oribatid mites is the arboreal vegetation (mosses and lichens higher up in the trees). The only paper on mites in trees is from Noordijk & Berg (2001), where they sampled the bark of platans (*Platanus* spec.) all over the country, mostly inside cities.

Family Brachychthoniidae

One species is found new to the Netherlands in this family: *Sellnickochthonius furcatus* (fig. 1) and one species of *Eobrachychthonius* needs to be updated. Currently, two species of *Eobrachychthonius* are known from the Netherlands: *E. mooseri* and *E. oudemansi*. The name of *E. mooseri* should be

Figure 1-10. Photos of the new species of oribatid mites. Photos Henk Siepel.
Figuur 1-10. Foto's van de nieuwe mosmijten. Foto's Henk Siepel.



1. *Sellnickochthonius furcatus*



2. *Berniniella hauseri*



3. *Oppiella propinqua*



4. *Oxyoppioides decipiens*



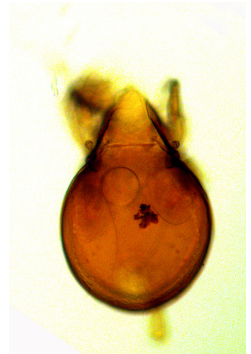
5. *Suctobelbella moritzi*



6. *Limnozetes lustrum*



7. *Achipteria sellnicki*



8. *Dometorina saxicola*



9. *Liebstadia humerata*



10. *Schelorbates ascendens*

changed in the checklist to *E. latior* as it appears to be a synonym according to a re-examination of the holotype by Manfred Moritz in 1975 (label at the backside of the slide RMNH.ACA.P 923). *Eobrachyichthonius oudemansi*, known from two localities in the Netherlands (Breda and Arnhem), is recently found on the isle of Terschelling (Hoorn, Groene Strand, 2.x.2022, in soil under *Glaux maritima*). *Sellnickochthonius furcatus* is a very small white species (145-155 µm), known from forest floors in Europe (Weigmann 2006). It has been obtained from a forest floor patch at Hackfort near Vorden (Guo & Siepel 2020). This holarctic species is also known from the tundra at the Kola peninsula in Russia (Leonov 2020) and from farmland in Alberta (Canada) in the north (Osler et al. 2008, Behan-Pelletier & Lindo 2019) to Spain (Subías & Shtanchaeva 2012) in the south.

Family Quadropiidae

Quadropia bellula (Siepel et al. 2009) has to be renamed to *Coronoquadropia galaica* as it appears to be a synonym (Monson & Luxton 2020). The species is recently found in the Hackfort woodlot near Vorden on 30.x.2019 (Guo & Siepel 2020). It is known from moist humus layers (Weigmann

2006), probably in the more mineral rich forests (not acidic), as Starý (2008) also found it in a beech forest, the most eastern record of this predominantly West-European species.

Family Oppiidae

Of this family three species are new to the Netherlands: *Berniniella hauseri* (fig. 2), *Oppiella propinqua* (fig. 3) and *Oxyoppioides decipiens* (fig. 4). *Berniniella hauseri* was found in grassland soils near Anlo and Rheden. Weigmann (2006) mentions pine litter as biotope, Keszivnik & Mahunka (2000) found it also in forests, while Bernini & Magari (1996) found the species in humus in a ruderal environment on the isle of Molaria (east of Sardinia). Starý & Matějka (2010) found it typically in meadows with a longterm, stable management. The second new species, *Oppiella propinqua*, resembles *O. nova* (Oudemans, 1902), but the costulae have small knobs and the humeral tubercle is more pronounced. Both species have a very wide range of biotopes and it is possible that *O. propinqua* is just a morphospecies of *O. nova* (Lehmitz 2014). Considering that both species have an apomictic thelytokous reproduction, forming female clones (Woodring & Cook 1962, sub *O. neerlandica*,



Figure 11. Habitat of *Scheloriobates ascendens*, lichens on a dead oak at Beekbergen. Foto Henk Siepel.
 Figuur 11. Biotoop van *Scheloriobates ascendens*, korstmossen op een dode eik in Beekbergen.
 Foto Henk Siepel.

Siepel 1995), should give some restraint in describing very similar types. Due to the small differences, it is possible that *O. propinqua* has been overlooked and is much more common than expected. The Dutch specimens were found in the litter of an old hedgerow near Westerbroek, together with the next species: *Oxyoppioides decipiens*, which occurs in parks and dry forest floors, like the location in Westerbroek. Bernini & Magari (1996) found it in soil under stones in a clearing under chestnut trees on Molar. Mangová & Krumpál (2017) mention the species from bare soil under ash *Fraxinus excelsior* in the city of West-Bratislava. The species is primarily found in Southern Europe, our record is the most northern yet.

Family Suctobelbidae

The new species in this family is *Suctobelbella moritzi* (fig. 5), a species of wet meadows and riverine forests (Weigmann 2006). Our record comes from logs of *Betula pendula* in the Loglife experiment in Hollandse Hout near Lelystad (Flevoland) (Cornelissen et al. 2012). The logs are laid on a forest floor in a stand of *Populus* spec. with an understory of high forbs. Schatz (2015) calls the species hygrophilic from a transitional bog, a mountain pine moor forest, a spruce moor forest and the bank of a brook in Vorarlberg.

Family Hydrozetidae

Hydrozetes thienemanni has been found at an unexpected location for the species: the nest of an European mole *Talpa europaea* in Hollandseveld. Usually, the species can be found submerged, but as the only *Hydrozetes*, it is also semiterrestrial and may occur in flood meadows (Weigmann 2006). The species occurs also in more neutral water, whereas some others in the genus can be found in acidic waters (Seniczak 2011). Żbikowska-Zdun et al. (2006) found this species in sand and gravel from a pond bank, also a semiterrestrial biotope.

Family Limnozetestidae

The new species in this family, *Limnozetes lustrum* (fig. 6) is not included in the key of Weigmann (2006), as it was thought to occur in the Nearctic only at the time. However, Seniczak & Seniczak (2010) found it for the first time in Poland. Behan-Pelletier (1989) described the species from wet *Sphagnum* bogs and Seniczak & Seniczak (2010) found it at the edge of lakes in submerged *Sphagnum*. The Dutch records are in line with these habitats: Kootwijkerveen, in moss at the base of reed *Phragmites australis* and Nijeberkoop, in submerged *Sphagnum*. The species is easily recognisable from the other known three species in the genus as the notogaster has small swellings, whereas *L. foveolatus* Willmann, 1939 and *L. ciliatus* (Schrank, 1803) have small pits. *Limnozetes rugosus* (Sellnick, 1923) is larger and has pteromorphae which are almost as broad as long, while the others have more elongated pteromorphae. Siepel et al. (2009) mention already the possible confusion in older material between *L. ciliatus* and *L. foveolatus*, which is described by Willmann (1939) as *L. ciliatus* subsp. *foveolatus*. The publication is an old German book, printed in gothic font and therefore probably overlooked. A junior synonym is *L. palmerae* Behan-Pelletier, 1989. This means that old material has to be checked for *L. lustrum*. Based on my observations, *L. foveolatus* is the most common species found in *Sphagnum* in small acidic fens in the Netherlands, *L. ciliatus* is found more in *Sphagnum* in quagmires, whereas *L. rugosus* seems to occur less and is found only in peat bogs. *Limnozetes lustrum*, finally, occurs in submerged *Sphagnum* at the edge of small lakes. It cannot be ruled out that even more species described from the Nearctic can be found in Europe.

Family Achipteridae

Achipteria sellnicki (fig. 7) was renamed by Van der Hammen (1952) for German specimens erroneously identified by Sellnick (1928) and

Willmann (1931) as *Achipteria nitens* (Nicolet, 1855). These specimens clearly differed from the original *A. nitens*. At that time the species was not recorded for the Netherlands. In a re-examination of old slides of the former Instituut voor Toegepast Biologisch Onderzoek in de Natuur (ITBON), I found *A. sellnicki* from Doorwerth, labelled as *Achipteria*. Fischer & Schatz (2013) found the species in abundance in the Alps in a pine forest floor at 2050 m. altitude. Fischer et al. (2014) found the species at about the same altitude in the Tyrolean Alps. Nae & Nae (2014) found it in Romania also at lower altitudes (1300–1500). Biogeographically the species is restricted to North and Middle Europe (Schatz 2006).

Family Scheloribatidae

From this family three species are new to the Netherlands: *Dometorina saxicola* (fig. 8), *Liebstadia humerata* (fig. 9) and *Schelorbates ascendens* (fig. 10). *Dometorina saxicola* is, like *D. plantivaga*, an arboreal species feeding on lichens. The specimen was found in a *Betula pendula* log at Schovenhorst near Putten in the Loglife experiment (Cornelissen et al. 2012). The species, not included in the key of Weigmann (2006), differs from *D. plantivaga* in the more shiny notogaster and by the prolamel not reaching the rostral seta (Grandjean 1951). Miko (2013) lists the species from Bílé Lábe, in the north of Czechia. It cannot be ruled out that the species has been introduced in the Netherlands, as on the Schovenhorst estate various trees have been planted over time from all regions in Europe.

Liebstadia humerata is also a species from the bark of trees. It might be a vector of Chestnut blight *Cryphonectria parasitica* (Sordariomycetes, Cryphonectriaceae) (Nanelli et al. 1998). The Dutch specimens were found in in decaying *Fomes fometarium* (Agaricomycetes, Polyporaceae) near Uddel and in the litter in a seepage area near Milsbeek. Wasíńska-Graczyk et al. (2009) found the species also in lowland meadows in Poland.

The third new species in this family, *Schelorbates ascendens*, is also arboreal. The Dutch specimens were collected from lichens on a dead oak stem at Beekbergen (fig. 11). In Austria the species has been found exclusively on tree bark (Fischer et al. 2010), Germany (Weigmann 2006), Spain (Subías 2015) and Sweden (Fröberg et al. 2003). Fröberg et al. (2003) found moss mites quite specifically feeding on some foliose lichens. The preferences of *S. ascendens* were *Collema polycarpon* (Peltigerales, Collemales) and *Physcia adscendens* (Caliciales, Physciaceae), whereas the in the Netherlands equally common *Phaulloppia lucorum* (Koch, 1841) (Oribatida, Oribatulidae) preferred *Lecanora muralis* and *Xanthoria parietina* (Teloschistales, Teloschistaceae).

CHECKLIST ADDITIONS AND CORRECTIONS

Eobrachychthonius Jacot, 1936

7 **latior** (Berlese, 1910)

Brachychthonius latior

Brachychthonius brevis var. *glabra* Thor, 1930

Brachychthonius grandis Sellnick, 1944

Eobrachychthonius sexnotatus Jacot, 1936

Eobrachychthonius mooseri Van der Hammen, 1952

Sellnickochthonius Krivolutsky, 1964

27a **furcatus** (Weis-Fogh, 1948)

Brachyochthonius furcatus

Gelderland Hackfort near Vorden, woodlot

corner Koekoekstraat and Beckenstraat,

52°06'09.7"N, 6°15'56.0"E, 30.X.2019, soil 0–5 cm, col. HS.

Coronoquadroppia Ohkubo, 1995

164 **galaica** Minguez, Ruiz & Subias, 1985

Quadroppia bellula Luxton, 1987

Berniniella Balogh, 1983

170b **hauseri** (Mahunka, 1974)

Oppia hauseri

Oppiella rafalski Oplotna & Rajska, 1983

Drenthe Anloo, Anloerdiepje, 53°02'34.4"N,

6°41'14.9"E, 7.IV.1992, field C-1, soil sample

0–5 cm. **Gelderland** Rheden, 10.XII.2019, grass-

encroached heathland soil, col. HS.

Oppiella Jacot, 1937

187a propinqua Mahunka and Mahunka-Papp,
2000

Groningen Westerbroek, old hedgerow with
Quercus robur and *Polygonatum multiflorum*,
53°11'01.1"N, 6°40'44.5"E, 18.v.2018, soil 0-5 cm,
col. HS.

Oxyoppioides Subias & Minguez, 1985

192b decipiens (Paoli, 1908)

Damaeosoma decipiens

Groningen Westerbroek, old hedgerow with
Quercus robur and *Polygonatum multiflorum*,
53°11'01.1"N, 6°40'44.5"E, 18.v.2018, soil 0-5 cm,
col. HS.

Suctobelbella Jacot, 1937

205a moritzi Mahunka, 1987

Flevoland Lelystad, Hollandse Hout,
52°27'55.9"N, 5°25'22.6"E, 22.IV.2020, Loglife
experiment, *Betula pendula* log, col. HS.

Hydrozetes Berlese, 1902

225a thienemanni Strenzke, 1943

Drenthe Hollandseveld, 52°68'N, 6°51'E,
22.II.2021, in nest of *Talpa europaea*, col. HS.

Limnozetes Hull, 1916

227a lustrum Behan-Pelletier, 1989

Friesland Nijeberkoop, Catspoele, 52°57'47.8"N,
6°09'11.3"E, 12.VI.2022, in submerged *Sphagnum*.

Gelderland Kootwijkerveen, 52°12'28.7"N,
5°47'50.4"E, 4.IV.2019, in moss between reed,
Phragmites australis, col. HS.

Achipteria Berlese, 1885

253a sellnicki Van der Hammen, 1952

Notaspis nitens sensu Sellnick 1928 non
Nicolet 1855

Gelderland Doorwerth, oak forest, litter Fo,
51°9'N, 5°8'E, VIII.1953, M. Witkamp, col. HS.

Domotorina Grandjean, 1951

304a saxicola Grandjean, 1951

Gelderland Putten, Schovenhorst, 52°15'11.0"N,
5°38'11.1"E, 20.IV.2020, Loglife experiment, in
Betula pendula log, col. HS.

Liebstadia Oudemans, 1906

305a humerata Sellnick, 1928

Limburg Milsbeek, St. Jansberg, 51°44'26.2"N,
5°56'36.5"E, 14.I.2018, in litter at seepage area.

Gelderland Kroondomein, Doorngat,
52°14'00.6"N, 5°48'56.0"E, 28.I.2018, in decaying
Fomes fometarium, col. HS.

Scheloribates Berlese, 1908

307a ascendens Weigmann & Wunderle, 1990

Gelderland Beekbergen, Nieuw Dennenlust,
52°08'52.0"N, 5°57'42.9"E, 29.III.2020, in lichens
on dead oak, 1.5 m above ground, col. HS.

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SAMENVATTING

Vierde supplement op de checklist van Nederlandse mosmijten (Acari: Oribatida)

Aan het totaal van 653 soorten Oribatida (351 Oribatida s.s. met daarin ook nog 302 Astigmatina) worden nu 11 nieuwe soorten toegevoegd, waardoor het totaal nu 664 bedraagt. Deze soorten komen vooral uit monsters van speciale biotopen: aquatisch, oude bosbodems of oude houtwallen en epifyten. Daarnaast duiken ook nog nieuwe soorten op uit grote experimenten voor natuurherstel of onderzoek naar de afbraak van dood hout.

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