Spiders new to Norway (Arachnida, Araneae) with ecological, taxonomical and faunistic comments

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A total of 46 species of spiders (Araneae) are reported as new to Norway, as follows; *Aculepeira lapponica* (Holm, 1945), *Araneus triguttatus* (Fabricus, 1793) (Araneidae), *Brommella falcigera* (Balogh, 1935), *Emblyna mitis* (Thorell, 1875), *Lathys humilis* (Blackwall, 1855), *Mastigusa macrophthalma* (Kulczynski, 1897) (Dictynidae), *Phaeocedus braccatus* (L. Koch, 1866), *Trachyzelotes pedestris* (C.L. Koch, 1837) (Gnaphosidae), *Acartauchenius scurrilis* (O.-P. Cambridge, 1872), *Aphileta misera* (O. P.-Cambridge, 1882), *Bolyphantes punctulatus* (Holm, 1939), *Centromerus semiater* (L. Koch, 1879), *Diastanillus pecuarius* (Simon, 1884), *Drepanotylus borealis* Holm, 1945, *Entelecara errata* O. P.-Cambridge, 1913, *Erigone svenssoni* Holm, 1975, *E. whymperi* O. P.-Cambridge, 1877, *Estrandia grandaeva* (Keyserling, 1886), *Flagelliphantes bergstroemi* (Schenkel, 1931), *Mughiphantes cornutus* (Schenkel, 1927), *Oreoneta sinuosa* (Tullgren, 1955), *Scotinotylus alpigena* (L. Koch, 1869), *Semljicola barbiger* (L. Koch, 1879), *S. caliginosus* (Falconer, 1910), *Syedra* cf. *apetlonensis* Wunderlich, 1992, *Tibioplus diversus* (L. Koch, 1879), *Trichoncus affinis* (Kulczynski, 1894), *Trichopterna cito* (O. P.-Cambridge, 1872), *Troxochrus cirrifrons* (O. P.-Cambridge, 1871), *Walckenaeria alticeps* (Denis, 1952) (Linyphiidae), *Aulonia albimana* (Walckenaer, 1805), *Pardosa saltans* Töpfer-Hofmann, 2000 (Lycosidae), *Ero cambridgei* Kulczynski, 1911 (Mimetidae), *Neon levis* (Simon, 1871), *N. robustus* Lohmmander, 1945, *Sitticus ranieri* (Peckham & peckham, 1909) (Salticidae), *Achaeridion conigerum* (Simon, 1914), *Dipoena braccata* (C. L. Koch, 1841), *Enoplognatha latimana* Hippa & Oksala, 1982, *E. serratosignata* (L. Koch, 1879), *Lasaeola prona* (Menge, 1868), *Steatoda triangulosa* (Walckenaer, 1802) (Theridiidae), *Theridiosoma gemmosum* (L. Koch, 1877) (Theridiosomatidae), *Xysticus luctator* L. Koch, 1870 (Thomisidae), *Zora armillata* Simon, 1878 and *Z. silvestris* Kulczynski, 1897 (Miturgidae). The species have been collected between 2007 and 2012, with the majority having been discovered in the last couple of years. Data on their ecology, distribution and taxonomy are given. The significance of this large number of new species discovered in a relatively short time span is briefly discussed. The last checklist from 2003 reported 562 species of spiders from Norway, this paper adds significantly to that number.

Key words: Araneae, new species to Norway, ecology, faunistics, taxonomy.

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Introduction

During the last few years, there have been a marked increase in the number of people actively collecting spiders in Norway and several spider-collecting expeditions have been carried out during these years by some of the authors. This intensified collecting activity has resulted in the discovery of a large number of species new to the Norwegian fauna. These species and data on their ecology, habitat preferences and identification features will be presented collectively in this paper.

Material and methods

The families and the new species are both presented in alphabetical order. The collector's abbreviations are as follows: AA = Annie Antonsen, AF = Arne Fjellberg, AIO = Atle Ivar Olsen, AT = Arild Tangerud, BAA = Bjarte Aadland, EFT = Emilie Farlund Tinholt, EH = Erling Hauge, GHM = Glenn Halvor Morka, HL = Harald Løvbrekke, KAA = Kjetil Aakra, KB = Kai Bergren, KMO = Kjell Magne Olsen, MF = Magne Farlund, ML = Martin Lemke, PF = Per Furuseth, REW = Roy E. Wrånes, RF = Roar Frølandshagen, SA = Steinn Andersen, SÖ = Sandra Öberg, TH = Tomas Husdal, WP = Walter P. Pfliegler. Other abbreviations; NHMO = Natural History Museum Oslo.

The revised Strand-system (Økland 1981) is followed in listing the localities in addition to UTM-codes or geographical coordinates and EIS-square numbers. Please note that each county is listed alphabetically. Nomenclature follows Platnick (2016).

All material is in the collections of their respective collectors.

Results

ARANEIDAE

***Aculepeira lapponica* (Holm, 1945)**

Material: **FØ**, Sør-Varanger: Pasvik, near Nyåsen (EIS 160, 69.8942°N, 28.585800°E), 1 juv. ♀, 28.VII.2011, leg. SA; Pasvik Naturreservat, Nilamyra (EIS 160, 69.74398°N, 29.124878E°), 1♀, 29.VII.2011, leg. KAA.

Remarks: This rather elusive species has only been found six times in Finland (Palmgren 1974) and three times in Sweden (Holm 1945, Artportalen för småkryp 2011) as well as western Siberia (Mikhailov 1996), and its occurrence in Norway was thus expected.

The species has a rather complicated taxonomic history, despite the few known records (Blick & Nentwig 2003), at one time being synonymised with the Holarctic species *A. packardi* (Thorell, 1875). The genitals of the species in this genus are very similar, but currently *A. lapponica* is recognized as a separate species, even if Holm (1945) indicated that it might just be a form of *A. packardi.* Compared to the Figures of Levi (1977) both the epigyne and vulva of *A. lapponica* shows distinct differences. The adult Norwegian specimen is shown shortly after capture in Figure 1.

FIGURE 1. *Aculepeira lapponica* (Holm, 1945). Habitus of female. Photo: Walter P. Pfligler.

***Araneus triguttatus* (Fabricus, 1793)**

Material. **AAY**, Gjerstad: Mo (EIS 11, 58.8606°N 09.0747°E), 2♂♂, 10.VI.2010 (leg. GHM). **VAY**, Kristiansand: Nordre Timenes (EIS 2, 58.11562°N 08 6380°E), 1♀, April/May 2007, leg. KB.

Remarks. The specimen was found in a collection of spider probably collected by malaise tent or light traps in a heath area. The appearance of this species in Norway was expected as it is known from southern parts of Sweden and most parts of Europe and Russia. It is mainly a species associated with bushes and deciduous trees (Almquist 2006, Nentwig *et al.* 2016).

The species is very similar to *A. sturmi* (Hahn 1831) which is widespread and common in the southern half of Norway, but the female is often paler, almost yellowish in colour and the epigyne differs markedly when viewed from behind. The orientation of the S-shaped scapus has often been used to distinguish the species (e.g. Roberts 1995), but both forms occur within at least *A. sturmi* (Aakra 2000). Differences in the male palps are small and require careful examination (e.g. Almquist 2005).

DICTYNIDAE

***Brommella falcigera* (Balogh, 1935)**

Material: **Ø**, Hvaler: Storesand, Kirkøy (EIS 12. 59.02590°N, 11.01720°E), 1♂, 14.X.2010, leg. AF.

Remarks. A single male of this generally rare spider was found on dry sandy ground between *Calluna* stands and grass. It is a species that is rare throughout its known range (Szymkowiak 1997, Jonsson 2008), which stretches from Italy though central continental Europe (France and the Benelux countries excluded) to Southern Fennocandia (Szymkowiak 1997, Nentwig *et al*. 2016). Although it is often associated with dry and sunny open areas, it has been shown that

it may occur in both wet and shaded habitats, included marshes, bogs and dense coniferous and deciduous forests (see Szymkowiak (1997) for a review of localities and habitat requirements known up to that date). It thus appears to have rather wide ecological amplitude and whether it really is rare remains in some doubt (Szymkowiak 1997, Kronestedt 2001a). It may even be a species that is slowly expanding its range. Its occurrence in Norway was expected, but it is probably confined to the Oslofjord area.

The species is very small (1,5–2,0 mm) and has no obvious external distinguishing characteristics except for its genitals that on the other hand are very distinctive, especially the male palp. This (Figure 2A) is characterized by the slightly curved and forward-directed tibial apophysis that is virtually as long as the cymbium. There is also a brush consisting of four stiff setae at the basis of the tibial apophysis (Figure 2B). The shape of the internal ducts and spermatecha in the female are also distinctive and easily recognizable (see Almquist 2006).

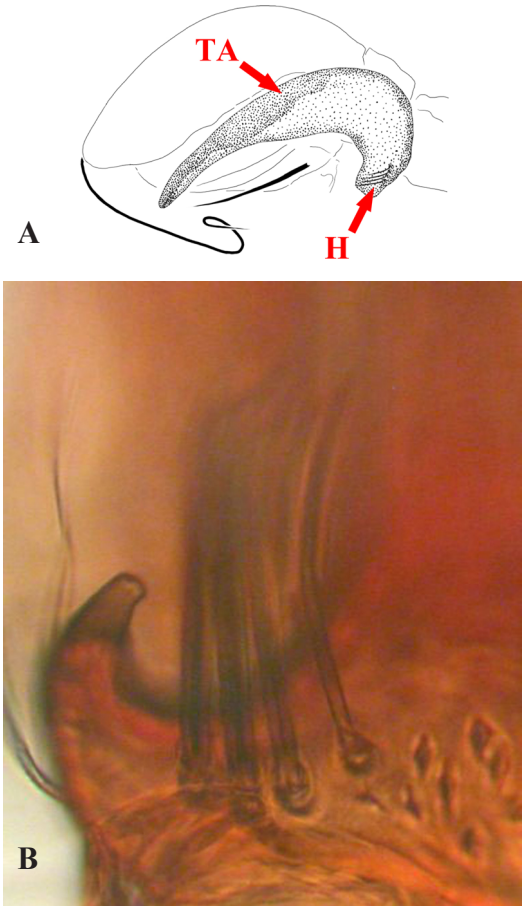

FIGURE 2. *Brommella falcigera* (Balogh, 1935). **A**. Male palp, showing the long tibial apophysis (TA) and position of a row of stiff hairs (H). **B**. Details of the row of stiff hairs or setae at the basis of the tibial apophysis. Drawing: Kjetil Aakra. Photo: Arne Fjellberg.

***Emblyna mitis* (Thorell, 1875)**

Material: **AK**, Eidsvoll: Minnesund railway bridge (EIS 37, 60.23.842°N 11.14035°E), 1♀, 12.V.11, leg. AF, handpicked from bridge structure. **ON**, Sel: Sel (EIS 71, 61.50611°N 9.27.851°E), 1♂1♀, 27.IV.2012, hand-picked from compost consisting of dried grass, leg. AF. **TRY**, Balsfjord: Storsteinnes (EIS 154, 69.14790°N 19.13341°E), 1♂, 18.IV.2010, from first author´s computer desk!, leg. KAA.

Remarks. This is a northern species known from both Sweden and Finland (Palmgren 1977, Almquist 2006). It is usually associated with either fens with *Carex* and *Salix* or branches of coniferous trees (Almquist 2006). European records are from Sweden, Finland, Russia, Ukraine, Slovakia and the Czech Republic (Nentwig *et al.* 2016).

There seems to be a taxonomical problem regarding the correct identity of this species. Holm (1945) redescribed the species then known as *Dictyna mitis* (Thorell, 1875) (now *E. mitis*) and reported it from Abisko in Northern Sweden. However, both the Internet version of the Swedish national checklist (Kronestedt 2001b) and Almquist (2006) only lists *E. annulipes* from Sweden, the latter author even listing Holm's record as *E. annulipes;* thus either practically synonymizing the species or at the very least revising Holm's original identification.

Details of the synonymies of *E. annulipes* may be found in Chamberlin & Gertsch (1958: 123–124), these authors treated *D. mitis* as a synonym of *D. annulipes*. Wunderlich (1973) also noted the uncertain status of the two species, but he later (Wunderlich 1975) removed *E. mitis*

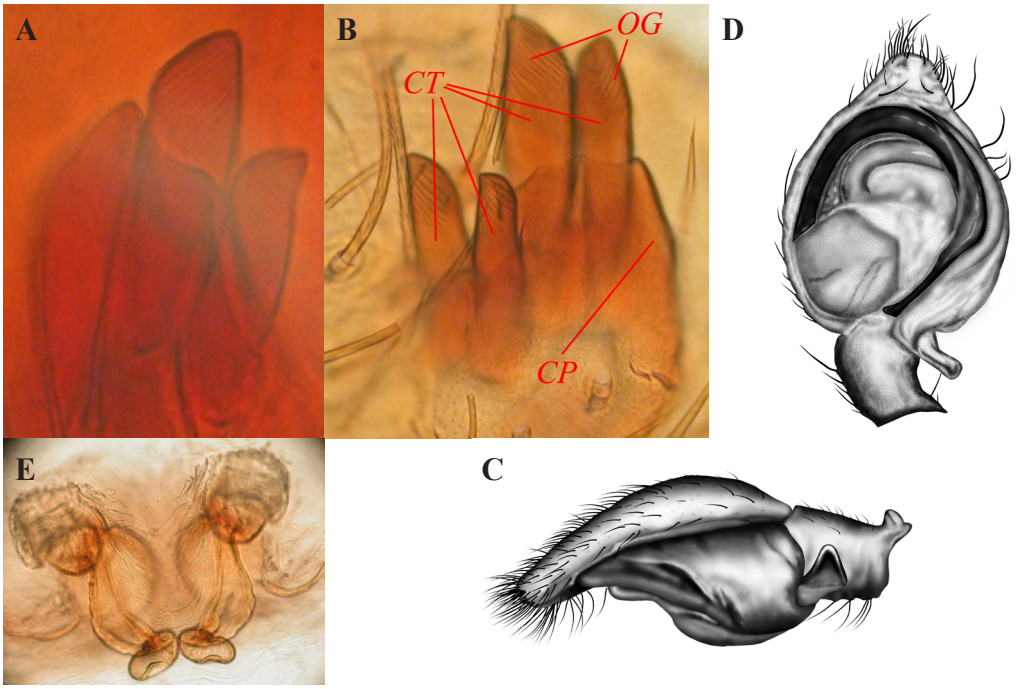

FIGURE 3. *Emblyna mitis* (Thorell, 1875). **A**. Ctenidium with two teeth. **B**. Ctenidium with four teeth (same specimen as previous illustration), CP = ctenidial plate, CT = ctenidial teeth, OG = oblique grooves. **C**. Male palp, laterial view. **D**. Male palp, ventral view. **E**. Vulva. Photos: Arne Fjellberg. Drawings: Kjetil Aakra.

from the synonymy of *E. annulipes*. Nentwig *et al.* (2016) also accepts the Swedish specimen as *E. annulipes* on their distribution maps, although Holm's drawings are provided under *E. mitis*, which is not listed as a Swedish species on their website. On the other hand, Platnick (2016) still lists Holm's record as *E. mitis* and both species are valid according to him.

This leaves some doubt and confusion as to the correct identification of the current record. One distinguishing feature between *E. mitis* and *E. annulipes* has been reported to be that the former species has two processes on the dorsal tibial apophysis or ctenidium («*...hat obeninnen eine kurze und breit, am Ende gabelige Apophyse*», Holm 1945: 75) whereas *E. annulipes* has three («*Ctenidium without process, with 3 joined teeth*», Almquist 2006: 317). The new material presented above demonstrates that the number of ctenidial processes or teeth cannot be used as a distinguishing feature between the two species as the male from Sel has two such teeth on one palpal tibia (Figure 3A) and four on the other (Figure 3B), whereas the specimen from Storsteinnes has two on each palpal tibia! The palpal organs are otherwise virtually identical, judging by the drawings in Holm (1945) and Almquist (2006) (representing Nearctic specimens) as compared to illustrations in e.g. Kaston (1945) (as *E. muraria*) and Chamberlin & Gertsch (1958). This means that the two species may be indistinguishable and we find it highly likely that they either are synonyms, or alternatively, that the Nearctic records refer to *E. annulipes* (originally described from Canada) whereas the Palearctic specimens refer to *E. mitis* (originally described from southern Russia). Comparison of material from both regions is necessary to solve this problem. Pending such an investigation, the specimens from Norway are provisionally listed as *E. mitis*.

The structure of the ctenidium is also quite interesting. It consists of a ctendial plate and the teeth are actually extremely stout and thick hairs (as evidenced by their circular sockets)

with oblique grooves on their ends (Figure 3B). The palp of the specimen from Storsteinnes is illustrated in Figure 3C & D. The vulvae (Figure 3E) is fully in accordance with illustrations in e.g. Almquist (2006).

***Lathys humilis* (Blackwall, 1855)**

Material: **AAY**, Gjerstad: Mo (EIS 11, 58.86064°N 09.07474°E), 1♂, 18.V.2010, leg. GHM; Risør: Nistevåg, nær Gjernes (EIS 11, 58.45391°N 09.18748°E), 1♀, 24.VI.2010, leg. GHM.

Remarks: This species has actually been reported from Norway recently, but then as stowaway in imported horticultural plants (Sæthre *et al.* 2010). The authors of that report speculated that it may be able to establish itself in South and South-East Norway, but even if one of the records reported here originated from dry woody plant material close to a forest (Gjerstad, Mo) the other record from a pine forest habitat next to the sea shore, clearly indicates that this is a species naturally occurring in Southern Norway. Its presence was also expected by the first author (unpublished manuscript).

Lathys humilis is associated with dry pine forests where it may be found on branches, trunks and also in litter, but it may also turn up on *Calluna*-heaths and in oak woods and limestone areas (Almquist 2006, Marusik *et al.* 2009). The Norwegian records are in accordance with these habitat descriptions.

L. humilis may be confused with its sibling species, *L. nielseni*, but are distinguished by palpal and epigynal details as well as the lack of white guanine spots on the abdomen of the latter species (Marusik *et al.* 2009). The habitus of the species may be seen in Figure 4.

***Mastigusa macrophthalma* (Kulczynski, 1897)**

Material: **AAY**, Gjerstad: Mo (EIS 11, 58.8606°N 9.0747°E), 2♀♀, 12.IX.2010, 1♂, 09.X.2010, leg. GHM. **BV**, Flå: Heielva 20.IX.2011 (EIS 35, 60.45240°N 9.45600 °E). Hol: Hovet (EIS 43. 60.3714.9°N 8.11474°E), 16♂♂4♀♀, 24.IX.2011, sieved from *Formica*-nests, leg. PF. **ON**, Vestre Slidre: Robølstøl 7.IX.2011 (EIS 52, 61.11740 °N 08.78280 °E).

FIGURE 4. *Lathys humilis* (Blackwall, 1855). Habitus of female. Note the white guanine spots on the abdomen. Photo: Glenn Halvor Morka.

TEY, Bø: Folkestadmogane (EIS 18, 59.27267°N 09.2589°E), 1♂1♀, 7.X.2010, leg. MF. **VE**, Tjøme: Sandø 2.IX.2010 (EIS 19. 59.08460°N 10.46650°E); Larvik: Holtesetra 13.X.2011 (EIS 19, 59.29690°N, 09.96960°E).

Remarks. This myrmecophile species represents another taxonomic problem in that there are currently two very closely related species, *M. arietina* (Thorell, 1871) and *M. macropthalma*, that are only distinguished by the size of their eyes, specifically the distance between the eyes in the posterior eye row; the eyes being separated by at least twice the diameter of each eye in *M. arietina* whereas the distance is more or less equal to one eye diameter in *M. macropthalma* (Roberts 1995).

Previously, only *M. arietina* has been reported from Norway (Hauge 1989) and then only from the Western parts of the country. These new records thus considerably increase the range of the genus in Norway. However, the current specimens have an eye pattern (Figure 5A–B) that is more in accordance with the description of *M. macropthalma* than that of *M. arietina* and given that this is the only currently known distinguishing characteristic we are forced to report this species from Norway. The affinities of the Western populations have not been examined yet, but we are hesitant to accept a species where only eye size is used to distinguish two species. According to Roberts (1995) there may be different hosts of ants used by the two species, *M. arietina* only occurring in *Lasius* sp. nests,

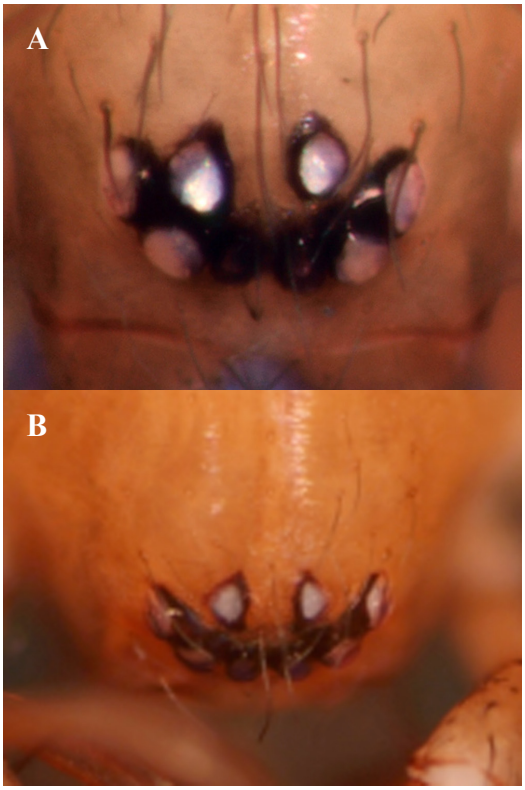

FIGURE 5. *Mastigusa macropthalma* (Kulczynski, 1887). **A**. Eye size of specimens from Gjerstad and **B**. Bø. Photos: Glenn Halvor Morka (A) and Magne Farlund (B).

but as host specificity has not been investigated over the entire range of the species complex, the usefulness of this behavioural character is unknown.

Fortunately, a revision of the genus is currently under way (Aagaard Jensen 2009) and a final decision regarding the status of these two species will have to await the arrival of that paper. For now, both species are listed in the Norwegian checklist as it is in accordance with current taxonomic practice.

GNAPHOSIDAE

***Phaeocedus braccatus* (L. Koch, 1866)**

Material: **AAY**, Gjerstad: Solhomfjell Nature Reserve (EIS 11, 58.56993°N 08.47026° E) 1 subadult ♂, 30.V.2011, leg. GHM. Hansemyra, near Øysang (EIS 11, 58.45075°N 09.16600°E), 1♀, 05.VII.2011, leg. GHM. **HOY**, Stord: Dalskardvatnet, Litlabøfjellet (EIS 22, 59.8529°N, 05.4041°E), 1 juv., 18.V.2012, leg. BAA. **TEI**, Bø: Folkestadmogane (EIS 17, approx. 59.264978°N 09.41615°E), 1♀, 15.VIII.2009, leg. MF & EFT. **VE**, Tjøme: Øvre Barkevik Lykt, Dirhue (EIS 19, 59.10890°N 10.38320°E), 1 subadult ♂, 1.VI.2011, leg. AF.

FIGURE 6. *Phaeocedus braccatus* (L. Koch, 1866). Habitus of female. Drawing: Kjetil Aakra.

Remarks: These specimens were handpicked from under rocks on area of exposed bedrock in open pine forest mostly dominated by Calluna-heath or broadly similar situations.

The occurrence of this species in Norway was expected as it is rather widely distributed in the Southern part of Sweden where it found in broadly similar habitats as those reported above (Almquist 2006). The somewhat surprising discovery of this species in Western Norway, one of the most intensively investigated areas of Norway, is somewhat surprising, but is a good indication that the species may well have a rather wide distribution in Southern Norway. It is otherwise known from most parts of Europe

and has a Palearctic distribution (Nentwig *et al.* 2016). It is probably to be found around the Oslofjordregion and as far west along the coastline as Kristiansand, if not even further west.

The habitus (Figure 6) as well as the genitaliae of this species (see Almquist 2006) are fairly distinctive.

***Trachyzelotes pedestris* (C.L. Koch, 1837)**

Material: **AAY**, Risør: Barmen island (EIS 11, 58.727255°N 09.184521°E), 1 subad. ♂, 23.IV.2012, sieved from oak leave detritus; Rundsaga (EIS 11, 58.749903°N 09.115664°E), 1 subad. ♀, 6.V.2012, leg. GHM.

Remarks: Fennoscandian records of this highly characteristic gnaphosid have so far been restricted to Skåne, Öland and Gotland in Sweden (Almquist 2006, Nentwig *et al.* 2016). The new records reported here are thus the northernmost in Europe.

The species may be recognized by its black body and the legs that have similarily black-coloured coxae, trochanters and femora, and reddish-brown segments beyond the femora. The genitaliae are also highly characteristic.

T. pedestris is a xerothphilic species usually found in dry, exposed habitats with lot of sun exposure (Harvey *et al.* 2000b, Almquist 2006) which is in accordance with the Norwegian localities. The discovery of this species in Norway suggests it may be more widespread in Sweden than current records suggest and the distribution range of the species in Fennoscandia may be continous.

LINYPHIIDAE

***Acartauchenius scurrilis* (O.P. Cambridge, 1872)**

Material: **VE**, Tjøme: Mågerø, Ødegården (EIS 12, 59.14750°N 10.42330°E), 3♀♀2♂♂, 20.III.2012, in nest of *Tetramorium caespitum* L under rock in in xerothermic gravel slope, leg. AF. Lilleskagen (EIS 19, 59.09408°N 10.44759°E.), 1♀, 8.XI.2011, under rock in nest of *T. caespitum* in xerothermic gravel slope, leg. AF.

Remarks: The dedicated search for myrmecophile linyphiids in Norway has resulted in several new and both expected and unexpected linyphiids for Norway, no doubt overlooked because these habitats have not been specifically investigated in this country before. An expected occurrence was that of *A. scurrilis*. This species is apparently very rare in our neigbouring countries, with only records from Gotland in Sweden (Jonsson pers. comm.) and from Tvärrminne in southern Finland (Palmgren 1976) as well as the southwestern archipelago (Koponen 2000), but this may be because ant nests have not been thoroughly investigated in these countries either. It is also considered rare in Great Britain (Harvey *et al.* 2002a), but is rather widespread in Germany (Staudt 2011). *A. scurrilis* is a social parasite of the ant species *Tetramorium caespitum* L. and probably follows the distribution of this species rather closely. The locality where the Norwegian specimen was found is in accordance with previous records abroad, i.e. in ant nests in dry, sandy or gravelly grassland and heatland sites.

***Aphileta misera* (O.P. Cambridge, 1882)**

Material: **AAY**, Risør: Risør, Øysang, Hansemyra (EIS 11, 58.45075°N 09.16600°E), 1♂, 5.VII.2011, leg. GHM. **RY**, Eigersund: Æsan (EIS 7, UTM 58.28174°N 05.533985°E), 1♀, 29.IV.2009. Hå: Holmavatnet (EIS 7, 58.321054°N 05.50001°E), 1♂, 23.III.2010, 3♀, 3.IV.2010. Bjelland, 1♀, 3.IV.2010 (EIS 7, 58.333028°N 05.462401°E), all leg. HL.

Remarks: That this rather common linyphiid has escaped detection in Norway is rather surprising. The records cited above shows it to be quite widespread and rather common in appropriate habitats, at least along the southern coastline; there are also a few other records of this species from the souther eastern coast which are not listed above. The species is very common in the rest of Europe, including Sweden and Finland and has a Holarctic distribution pattern (Nentwig *et al.* 2016). the species is mainly associated with wet habitats, including *Sphagnum* in bogs (Roberts 1987, Nentwig *et al.* 2016), but the current records stems from coastal *Calluna*-heaths and grassland by the coast (records from Rogaland) and grass-dominated areas on bogs (records from Telemark), indicating a

quite wide ecological amplitude in this species. Moisture of some kind seems to be the primary prerequisite and apparently it shuns shaded and dark localities. *A. misera* is easily recognised by its genitals (e.g. Roberts 1987).

***Bolyphantes punctulatus* (Holm, 1939)**

Material: **FN**, Gamvik: Gamvik (EIS 188, 70.553544°N 28.41505°E), 1♀, 1.IX.2009, leg. REW.

Remarks. This comparatively rare species is so far only known from Sweden, Finland and Russia (Platnick 2016) and is a distinctly northeastern species, so the discovery of it in Northern Norway is not surprising. It seems to be living mainly in rocky areas, such as screes and avalanche debris fields.

B. punctulatus is distinguished by its genitalia, although Holm (1939) mentions that the markings on the sternum, consisting of small dark spots, are also a good aid to identification. For illustrations of genitals see Holm (1939, 1945).

***Centromerus semiater* (L. Koch, 1879)**

Material: **AAY**, Gjerstad: Gjerstadvannet, Nesbrua (EIS 11, 58.51762°N 09.2973°E), 1♀, 15.X.2011, sieving from river detritus deposits, leg. GHM. **BØ**, Øvre Eiker: Fiskumvatnet (EIS 27, 59.71530°N, 09.83220°E), 1♀, 19.V.2010, leg. AF.

Remarks: The specimen from Fiskumvatnet was sieved from reed and detritus under a *Salix*-bush at the lakeshore, in what constitutes a very humid habitat, the locality from Gjerstadvatnet was very similar. This is to be expected as this comparatively rare species is most often reported from such damp situations, including very wet moss (Nentwig *et al.* 2016). In Britain, where the species is known from only three fens in mid-eastern parts of the country and is considered Nationally Vulnerable, it occurs in litter and moss in sedge beds, the litter layer of *Calamagrostis canescens* and *Thelypteris palustris* along fen water ways, in heaps of cut saw sedge *Cladium mariscus*, as well as open can wood land and fen litter (Harvey *et al.* 2002a). Its distribution in Sweden is quite extensive, ranging from Småland to Lycksele lappmark (Jonsson unpub. manuscript). In Finland it has apparently been found only once, according to Palmgen (1975), who speculated that it would occur in the south and middle parts of Finland,

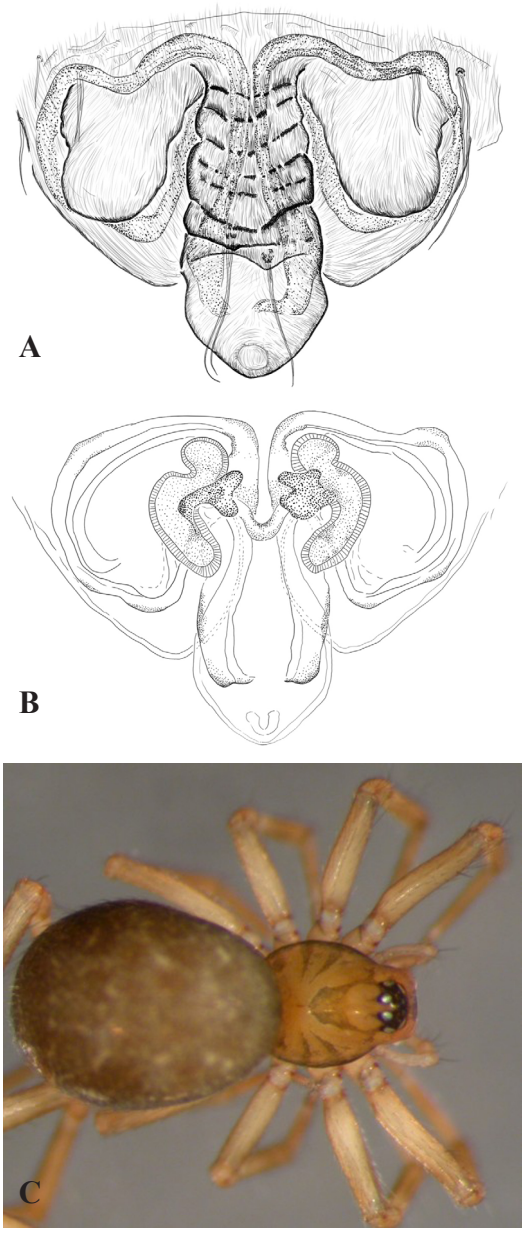

FIGURE 7. *Centromerus semiater* (L. Koch, 1879). **A**. Epigyne and **B**. Vulval structures. **C**. Habitus of female. Drawings: Kjetil Aakra. Photo: Arne Fjellberg.

but only locally. World distribution is Palearctic, ranging from England in the west to Russia in the east, although it has not yet been found in many continental European countries, including France, Italy, Lithuania and Denmark.

The vulval structures and epigyne of the Norwegian specimens fits descriptions and Figures in e.g. Miller (1958) and Wiehle (1960a) very well and are illustrated in Figure 7A–B. The habitus is shown in Figure 7C.

***Diastanillus pecuarius* (Simon, 1884)**

Material: **BV**, Nore & Uvdal (EIS 43, 60.27371°N 08.38266°E), 2♀♀, hand picked from ants nest under rocks in sun-exposed forest margin, leg. PF. **NNV**, Moskenes: Stuvdalsvatnet by Sørvågen (EIS 133, 67.53484°N 12.59535°E), 3♀♀, 22.VII.2011, hand picked from ant nest, leg. TH. **NSY**, Bodø: Løp (EIS 131, 67.19544°N 14.29448°E), 20+ females and subadults, including 2 subadult males, 13.X.2011, from large *Lasius*-nest, leg. TH. **ON**, Dovre: Hjellåa (EIS 71, 62.05350°N 09.15120°E), 2♀♀, 3.VI.2010, handpicking, leg. AF. Lom: Bøvertun 22.VI.2011 (EIS 61, 61.64120°N 08.04700°E), leg AF. Vågå: Åabakke 22.VI.2011 (EIS 70, 61.86780°N, 08.98670°E), leg AF. **SFI**, Lærdal: Eggjestøl (EIS 51, 61.04760°N, 7.98890°E),

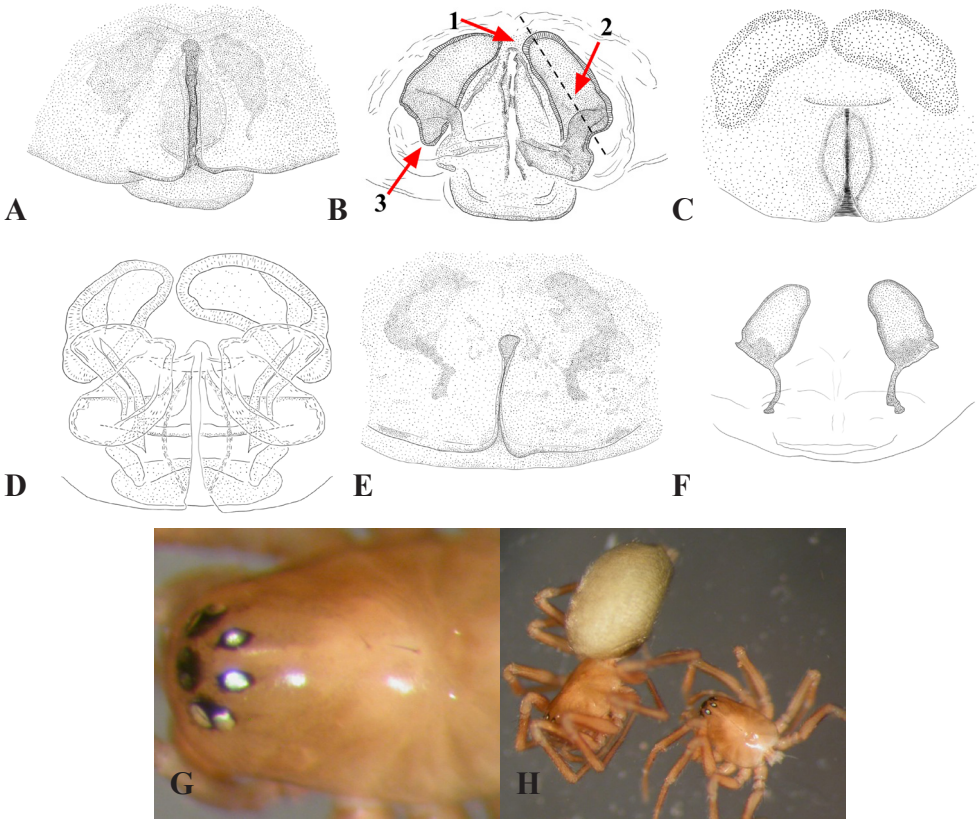

FIGURE 8. *Diastanillus pecuarius* (Simon, 1884). **A**. Epigyne (Dovre specimen). **B**. Vulva (Dovre specimens), arrow 1 points to the distance between the upper parts of the spermatechae, arrow 2 points to the angle of the spermatechae relative to the longitudinal axis of the abdomen, arrow 3 points to the more narrow shape of the apical end of the spermatchae. **C**. Epigyne (Austrian specimen, redrawn from Thaler (1969, Figure 32)). **D**. Vulva (Austrian specimen, redrawn from Thaler (1969, Figure 32)). **E**. Epigyne (Nore & Uvdal specimen). **F**. Vulva (Nore & Uvdal specimen). **G**. Eyes (Dovre specimen). **H**. Habitus females (Dovre specimens). Drawings: Kjetil Aakra. Photos: Arne Fjellberg.

several females, 21.IX.2011, leg. AF.

Remarks: The affinity of the females reported here is not entirely clear yet (see below), but they seem to belong to the myrmecophile species *Diastanillus pecuarius* (Simon 1884), a species which has previously only been reported from the French Pyrenêes and two localities in Austria (Thaler 1969). All of these continental European localities are from high altitudes, between 1800–2550 metres in the Pyrenêes and between 2000–2300 metres in the Austrian Alps. The Norwegian females have been found at much lower elevations, from about 700–800 metres in central Norway to almost sea level in Northern Norway.

D. pecuarius is a social parasite of ant species in the *Formica fusca* complex; the Norwegian specimens from Dovre were found under a rock on a very dry slope amongst *F. fusca* L. ants whereas the Nore & Uvdal-specimens where found with *F. lehmanni* Bondroit. In the Austrian Alps it has also been reported from *F. lehmanni* nests (Thaler 1969).

The epigyne and vulva resembles the drawing depicted by Thaler (1969: 209, Fig. 32), but there are some noticeable differences. The shape of the lower part of the epigynal fissure (Figure 8A) apparently is rather variable (Figure 8C). As for the vulva, the spermatechae (Figure 8B) are situated further apart in Norwegian specimens than on the Austrian specimen depicted by Thaler (1969) (Figure 8D), there being quite a considerable distance between them. They are also orientated differently, having a more acute angle compared to the longitudinal axis of the abdomen (compare Figure 8B and 8D). Their shape is also slightly different, the apical part being more narrowed and pointy than in the Austrian specimens (Figure 8D). On the other hand, all these characters do seem to be quite variable in this species as the epigyne (Figure 8E) and vulvae (Figure 8F) of a specimen from Nore & Uvdal shows (compare to specimen from Dovre, Figures 8A & 8B).

Whether these characteristics represent useful taxonomic differences on a subspecies or species level or are just the result of natural variation or plasticity remains to be determined. Any conclusion must await further studies and the availability of more material, especially of males, and the specimens are therefore for the time being assigned to *Diastanillus pecuarius* (Simon 1884).

In any case the generic affinity of the specimens seems clear and it is quite surprising and interesting that what has long been considered a rare and local south European species suddenly appears in central parts of Fennoscandia. It clearly demonstrates that there are still lots to be discovered on the Fennoscandian peninsula regarding spiders and that the spider component of social parasites of ants should be investigated more thoroughly in both Norway and other countries. *D. pecuarius* obviously could be occurring in Sweden and probably Finland as well, and maybe even in appropriate localities in Russia. Habitus of the female and details of the eyes are illustrated in Figures 8G and 8H.

***Drepanotylus borealis* Holm, 1945**

Material: **FØ**, Sør-Varanger: near Bjørnstad by Grense Jakobselv (EIS 169, 69.43175°N 30.52531°E), 1♂, 27.VII.2011, sieving in moist forest, leg. GHM.

Remarks: Although described some time ago and having been recorded from the northernmost county in Sweden (Jonsson pers. comm) and at least four rather scattered localities in northern Finland (Palmgren 1975), this species has not been found in Norway until now. It appears to be rather rare and as far as can be ascertained the current record is the northernmost of the species (see map in Marusik *et al.* 2000). It was not reported from the tundra zone of the Kola

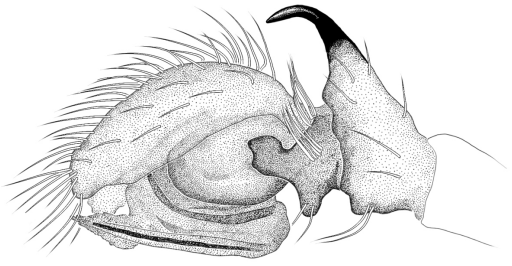

FIGURE 9. *Drepanotylus borealis* Holm, 1945. Male palpus. Drawing: Kjetil Aakra.

Peninsula by Tanasevitch and Rybalov (2010), but is known as far east as the Kurile Islands (Marusik *et al.* 2000).

D. borealis is, like its other congener in Fennoscandia, *D. uncatus* (O.P. Cambridge, 1873), dependent upon high levels of moisture and is mostly known from sites with *Sphagnum*-mosses (Palmgren 1975), mainly bogs. As the current records shows, it may also be found in very moist bogs, the site was very close to the Grense Jakobselv River.

The species can be easily distinguished from *D. uncatus* by the genitalia; the male palpus is shown in Figure 9. See Deltshev (1992) for illustrations of female genitaliae in the genus.

***Entelecara errata* O.P. Cambridge, 1913**

Material: **BV**, Hol: Strandvatnet, Tyvleshaugen (EIS 42, 60.4332°N 07.47012°E), 1♀, 25.VI.2011, handpicked from beneath rock at 1250 m a.s.l., leg. PF.

Remarks. Members of this genus are notoriously difficult to determine from the epigyne or palps alone (e.g. Tanasevitch 2007), but the epigyne and vulva of the specimen reported here (Figure 10 A & 10B) is consistent with that of *E. errata* (see for instance epigyne depicted by Tazoe 1993).

The species appear to be quite rare and is usually found beneath rocks in high elevations (Nentwig *et al.* 2016). It is somewhat surprising that the species has not been found in such places in souther Norway as the high-alpine spider fauna of the region is rarther well investigated. Known records come from Great Britain, France, Denmark, Russia, Ukraine, Finland and Slovakia (Nentwig *et al.* 2016).

***Erigone svenssoni* Holm, 1975**

Material: **TRI**, Lavangen: Gratangsfjellet, Bukkemyra (EIS 146, 68.395787 °N 17.505979 °E), 1♀, 3.VIII.2010, sieving in moss, leg. GHM. Sølvfjellet (EIS 146, 68.392115°N 17.505098°E), 1♀, 4.VIII.2011, handpicking/sieving in very wet muddy bog, leg. AA.

Remarks: This species was originally described from Swedish Lapland (Holm 1975) and has subsequently been found in Russia

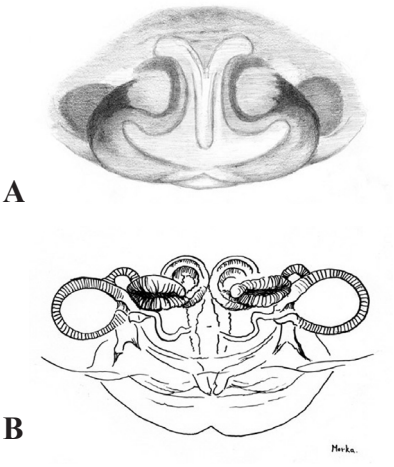

FIGURE 10. *Entelecara errata* O.P. Cambridge, 1913. **A**. Epigyne. **B**. Vulva. Drawings: Glenn Halvor Morka.

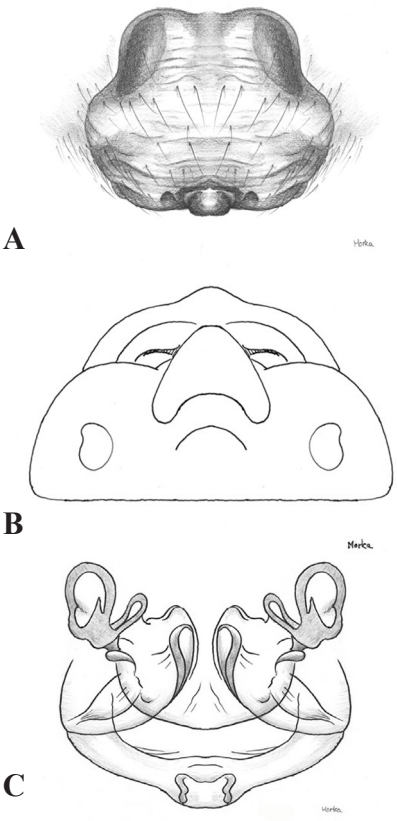

FIGURE 11. *Erigone svenssoni* Holm, 1975. **A**. Epigyne, **B**. Epigyne from behind, **C**. Vulva. Drawings: Glenn Halvor Morka.

(Esyunin *et al.* 1995). Its occurrence in Norway was thus expected and the new localities are only some 60 km from the type locality.

The species is associated with the very wet bogs where it seems to occur in the wettest parts, sometimes climbing thigh grasses (Holm 1975). In this regards it differs from other Norwegian species of the genus that are primarily pioneer species occurring in vegetation-free or recently disturbed localities. The species probably occurs in most parts of Northern Norway, but may be rather local and scattered as far as its distribution is concerned.

The epigyne and vulva (Figure 11A–C) is in good accordance with illustrations in Holm (1975).

***Erigone whymperi* O.P.-Cambridge, 1877**

Material: **RY**, Forsand, Langavatnet (EIS 8, 58.57648°N 06.23800°E), 1100 m.a.s.l., 1♀, 23.VIII.2011, hand picked from under rocks near bog, leg. HL.

Remarks: This species was until recently only known from Greenland, Alaska and Canada, but Tanasevitch & Koponen (2007) reported the species from the Palearctic, specifically the southern tundra of the Russian plains. The discovery of this species in high altitudes in southern Norway thus fills an important gap in the distribution of this species, forming a bridge between the Greenland and Russian records. It has not been recorded from Sweden or Finland, but the largely similar *E. welchi* Jackson was reported from Sweden by Holm (1951) and from Finland by Kleemola (1962). It is possible that *E. whymperi* has previously been confused with the broadly similar and widespread *E. tirolensis* L. Koch in high-altitude areas of Norway.

It is safest to distinguish these and other members of the *psychrophila*-group by considering the male palps (Tanasevitch pers. comm., Tanasevitch 2011). However, given the known range of the most closely related congener, *E. cristatopalpus* Simon, 1884 which is known from the Alps only in Europe (Muster & Hänggi 2009), as well as mountains of Southern Siberia, East Siberia and the Russian Far East (Tanasevitch 2011), the specimens reported here is most likely, in our view, to represent *E. whymperi*. This is also substantiated by consideration of the vulva. Based on published drawings in the abovementioned papers, the spermatechae of *E. cristatopalpus* seem to have a distinct constriction roughly at midpoint (see e.g. Figure 4a in Muster & Hänggi 2009 and Figures 48–52 in Tanasevitch 2011), despite some variation. This constriction is either lacking or very weak in *E. whymperi* (see Figures 15–20 in Tanasevitch & Koponen 2007). The Norwegian specimen lack any sign of constriction in the spermatechae whatsoever.

The species seem to be associated mostly with various moist habitats, but apparently exhibits a rather diverse spectrum of possible habitats (see e.g. Tanasevitch & Koponen 2007). In Norway it is likely to be predominantly a high-altitude species in the southern half of the country, but may probably be found all the way down to the seashore in Northern Norway; a pattern observed with many other arcto-alpine species.

***Estrandia grandaeva* (Keyserling, 1886)**

Material: **BV**, Ål: Hovdene nord (EIS 43. 60.37111°N 08.36061°E), 1♀, 7.VIII.2011, from spruce, leg. PF. Dokki (EIS 43. 60.36579°N 08.3644°E), 1♀, 7.VIII.2011(?), from spruce, leg. PF. **FØ**, Sør-Varanger: near Melkefoss, 1♀, 25.VII.2011, sweep-netted in pine forest undergrowth, leg. KAA. Pasvik Nature Reserve, 4♀♀, 4 subadult ♂♂, 29.VII.2011, sweep-netted from undergrowth on pine bog, leg. AA. **ON**, Vestre Slidre: Robøstøl (EIS 52, 61.11740°N 08.78280°E), 3♀♀, 2.VIII.2010, leg. AF. Østre Slidre: Røyne (EIS 61, 61.17470°N 08.92390°E) 2 subadult ♀♀, 1.VIII.2010, leg. AF.

Remarks: This is yet another species which for some time has been expected to occur in Norway. In Sweden it has only been found in some of the northermost counties (Jonsson unpub. manuscript) and the same is the case in Finland (Palmgren 1975). The current Norwegian records constitute the so far southernmost, westernmost and northernmost records from Fennoscandia. The species is otherwise holarctically distributed with European records from only the Fennoscandian countries and Russia (Nentwig *et*

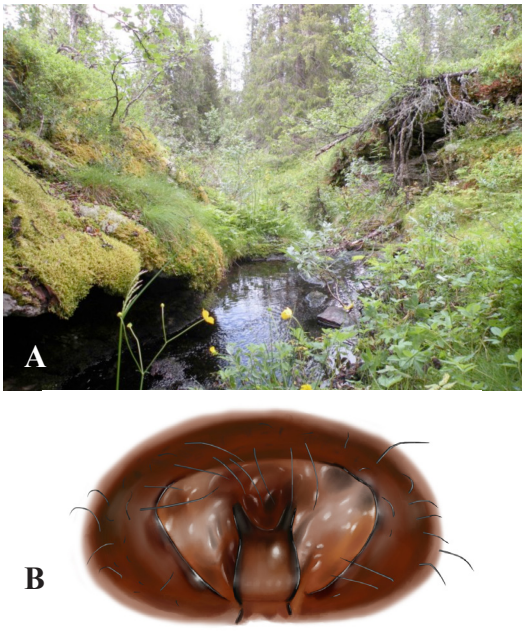

FIGURE 12. *Estrandia grandaeva* (Keyserling, 1886). **A**. Typical habitat from Valdres. **B**. Epigyne. Photo: Arne Fjellberg. Drawing: Kjetil Aakra.

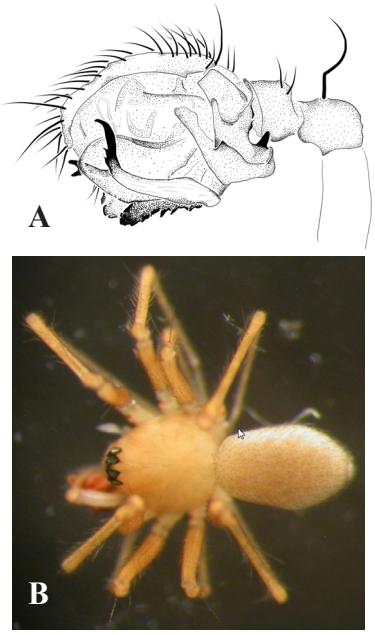

FIGURE 13. *Flagelliphantes bergstroemi* (Schenkel, 1931). **A**. Male palp. **B**. Habitus of male. Drawing: Kjetil Aakra. Photo: Arne Fjellberg.

al. 2016).

According to Palmgren (1975) it is typical of the northern moist coniferous forests, Palmgren even described it as a «Taiga-Art». Even so he commented on the comparatively few records of the species in Finland. It must also be rather uncommon in both Sweden and Norway given the paucity of records, despite the apparent area of presumably suitable habitats. One explanation for this paucity could be that it is a species dependent on or at least preferring old-growth forests. The South Norwegian specimens were all taken in what can be described as such; in Robøstøl they were sweep netted in an old-growth mountain forest consisting mainly of spruce and birch (Figure 12A); in Røyne they were sweep netted in an old-growth spruce forest. In Eastern Finnmark the species appears to be rather locally common, it was sweep-netted from the undergrowth in pine forests, including a very boggy site (Pasvik Nature Reserve).

The females of this species could easily be mistaken for certain *Neriene*-species so the possibility exists that it may have been misidentified or overlooked in the past. The epigyne (Figure 12B) is markedly different from those of *Neriene* spp., however, and should allow for easy identification. The males are also distinctive; both in regard to habitus and the palpal organs (see Paquin & Duperre 2003).

***Flagelliphantes bergstroemi* (Schenkel, 1931)**

Material: **ON**, Lom: Bøverdalen, between Bøvertun og Krossbu (EIS 61, 61.61300°N 08.05160°E), 1♂, 12.VIII.2011, sieving in *Salix*-bushes, leg AF.

Remarks: This highly characteristic species is only known from Sweden, Finland and Russia in Europe (Nentwig *et al.* 2016) and the current record is the westernmost in Europe thus far.

The species is a rather rare and local inhabitant of *Salix*-stands and other low vegetation in the subalpine zone in Fennoscandia. It is easily recognized by the characteristic sickle-shaped spine on the male palpal patella (Figure 13A). The epigyne is also characteristic (e.g. Holm 1945). The habitus of the male is shown in Figure 13B.

***Mughiphantes cornutus* (Schenkel, 1927)**

Material: **FI**, Sør-Varanger: Grense Jakobselv, sand dunes by river delta (EIS 169, 69.47187°N 30.48743°E), 1♀, 27.VII.2011, leg. ML. **ON**, Skjåk: Gjøingsli, along the road to Aursjøen, about 950 m a.s.l. (EIS 61, 61.91591°N 08.22529°E), 1♂1♀, 20.VI.2011, leg. AF.

Remarks: This species is known from northern Fennoscandia and Russia and the mountaineous regions of central parts of Europe (Thaler 1973, Kronested 1993, Nentwig *et al.* 2016) and was described as a boremontane species by Thaler (1983). Its distribution seems to be disjunct with two separate populations in Northern Europe and central Europe (Kronestedt 1973).

Its habitat has been variously described as litter layer of high subalpine coniferous forests (Thaler 1973, Maurer & Hänggi 1990), but also from hay barns and other farm buildings in Fennoscandia (Palmgren 1975, Kronestedt 1993). The Norwegian specimens were found in a mountain pine forest with birch and aspen and bracken, ling, *Juniperus* and various herbaceous vegetation on the ground level.

The epigyne (Figure 14A) may resemble the much more common *Agnyphantes expunctus* (O. P.-Cambridge, 1875) at first sight, especially to the untrained eye, but the vulvae (Figure 14B) is distinctive. The male palp (Figure 14C) is best distinguished by the *lamella characteristica* (see Thaler 1973; Figure 25). The male carapace also has a quite distinct shape and the stout dorsal hair is highly characteristic of this species (Figure 14D). See Thaler (1973) for further detailed illustrations of both the epigyne and male palp.

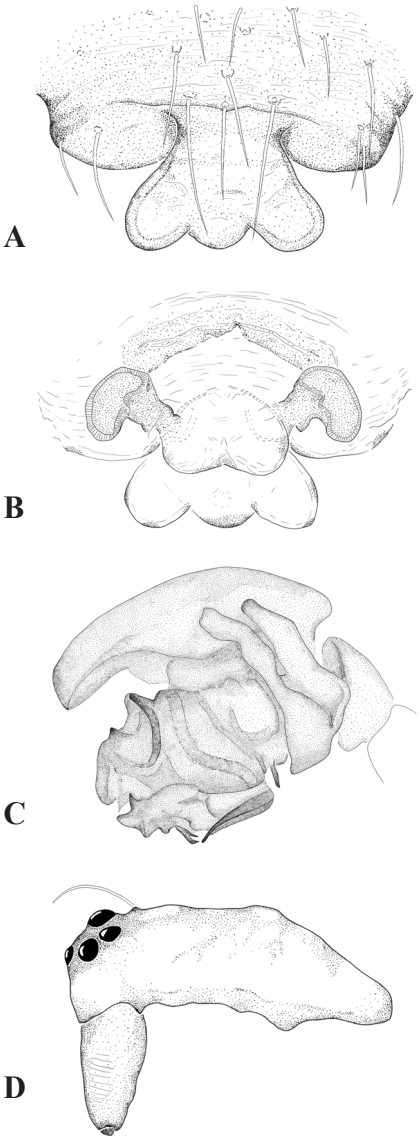

FIGURE 14. *Mughiphantes cornutus* (Schenkel 1927). **A**. Epigyne. **B**. Vulva. **C**. Male palp, slightly expanded. Hairs omitted for clarity. **D**. Male carapace. Drawings: Kjetil Aakra.

***Oreoneta sinuosa* (Tullgren, 1955)**

Material: **FØ**, Gamvik: Trollhetta (EIS 183, 71.0245°N 28.0658°E), 3♀♀, 25.VIII.2010, leg. REW. **NNØ**, Narvik: Sirkelvatn (Sierggaljávri), along E10 towards Bjørnefjell (EIS 140, 68.295560°N 17.464711°E), 1♀, 7.VIII.2010, leg. GHM & AA. **TRI**, Lavangen: Sølvfjellet (EIS 146, 68.39452°N 17.52204°E), 1♀, 4.VIII.2011, handpicking/sieving in very wet muddy bog, leg. AA.

Remarks. The genus *Oreoneta* was resurrected and revised by Saaristo and Marusik (2004) and amongst other changes the species *O. sinuosa* (Tullgren) (previously in *Hilaira*) was removed from the synonymy of *O.* (*H.*) *frigida*. The latter species is seemingly very common and widespread in Norway and given that another species known from Sweden (*O. punctata* Tullgren), also previously synonymized

with a species then in *Hilaira* (*O. tatrica*), were resurrected, it has become necessary to always carefully examine specimens that would otherwise easily have been ascribed to *O. frigida.* This picture is complicated by the fact that there may still be an undescribed species of *Oreoneta* hidden in what is still regarded as *O. frigida* (Saaristo & Marusik 2004: 223–225, Saaristo & Marusik pers. comm.). Studies are currently in progress to determine the exact nature and affinity of populations of *Oreoneta frigida s. lat.* in Norway.

Here, we present some individuals of *Oreoneta* that seem to be corresponding to the description of *O. sinuosa* in Saaristo & Marusik (2004), a species which has previously not been reported from Norway. This occurrence was predicted by Saaristo and Marusik (2004: 229). The differences between *O. sinuosa* and *O. frigida* are relatively small, but constant. In particular, the shape of the border of the curved epigynal margin viewed from above (Figure 15A) seem to offer a reliable distinguishing characteristic between the species (compare Figures 85 and 89 in Saaristo & Marusik 2004: 223). Also, the entrance ducts in the epigynal atrium (pits), visible when the epigyne is viewed from behind, are further apart in *O. sinuosa* and this seems to be the case in our specimens as well (Figure 15B). The habitus of the female from Narvik is shown in Figure 15C.

The habitat of this species seems to be rather open areas in the alpine-arctic zone with low growth vegetation, including both bogs and swampy areas and areas with bedrock and lichens, but given the relatively new status of the species and the previous inclusion of it within the «*Oreoneta frigida*» complex, there is little published material on its habitat preference.

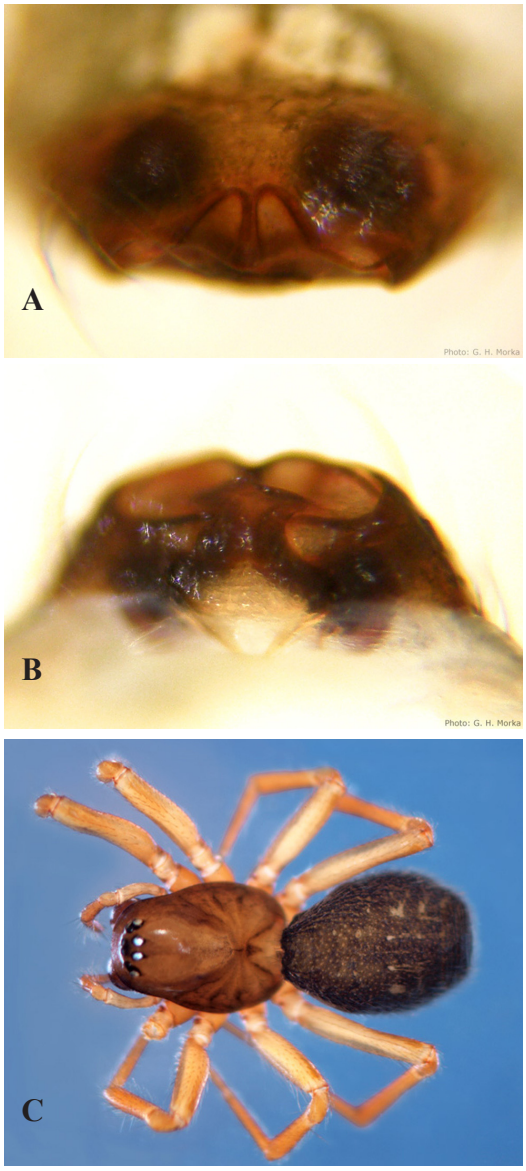

FIGURE 15. *Oreoneta sinuosa* (Tullgren, 1955). **A**. Epigyne, specimen from Narvik-area. **B**. Epigyne, viewed from behind. **C**. Habitus of female. Photos: Glenn Halvor Morka.

***Scotinotylus alpigena* (L. Koch, 1869)**

Material: **FØ**, Sør-Varanger: Grense Jakobselv, sand dunes by river delta (EIS 169, (EIS 169, 69.47187°N 30.48743°E), 1♂, 27.VII.2011, handpicking, leg. ML.

Remarks: This species has a fairly widespread distribution in Sweden, records originating from Upland to Torne Lappmark (Jonsson pers. comm.) and its discovery in Norway is therefore not surprising. It is the third *Scotinotylus*-species known from Norway (the others being *S. clavatus* (Schenkel) and *S. evansi* (O.P.-Cambridge)) and the males are easily distinguished from the other species by the carapace shape (Figure 16A) and the palpal organ, in particular the tibial apohysis

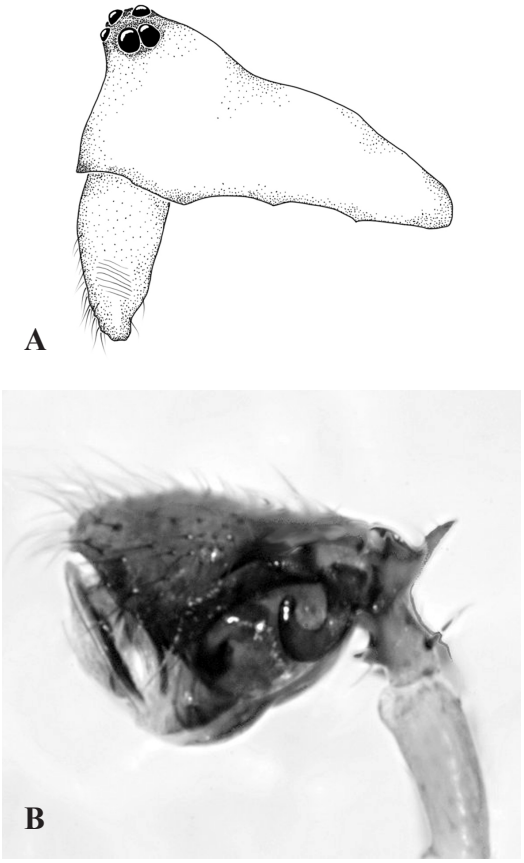

FIGURE 16. *Scotinotylus alpigena* (L. Koch, 1869). **A**. Carapace of male. **B**. Male palpus. Photo: Martin Lemke. Drawing: Kjetil Aakra

(Figure 16B). The females require a little more care; see Thaler (1970) for details.

The species is associated with ground litter and vegetation in high subalpine coniferous forests and heatland in the Alps, often at very high elevations (Thaler 1970), but in northern Norway the species seem to be occurring at all elevations in various types of habitats, certainly not restricted to pine forests or heaths. In Russia the species has been found in a variety of habitats, manily in moss and litter in various types of forests (Tanasevitch & Koponen 2006).

***Semljicola barbiger* (L. Koch, 1879)**

Material: **FØ**, Sør-Varanger: by Urdfjellhalsen (EIS 169, 69.61257°N 30.71630°E), 1♀, 27.VII.2011, sieving in wet *Sphagnum* in bog, leg. GHM.

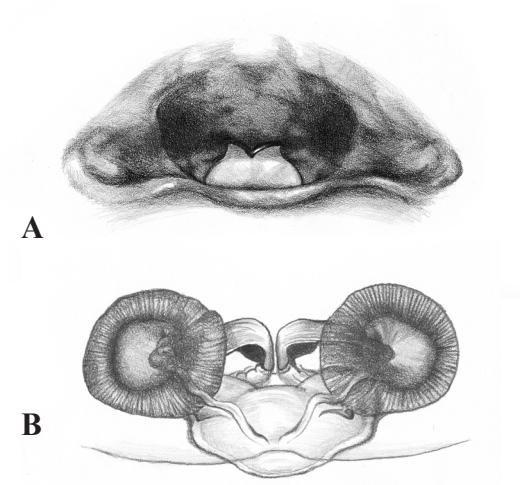

FIGURE 17. *Semljicola barbiger* (L. Koch, 1879). **A**. Epigyne. **B**. Vulva. Drawing: Glenn Halvor Morka.

Remarks: The genus *Semljicola* consists of small, dark-coloured erigoninaes with broadly similar secondary genitalia that makes identification difficult, especially in females (Saaristo & Eskov 1996). The female reported here belong to the species *S. barbiger*, making it the fitfh representative of the genus in Norway.

S. barbiger females are distinguished from its congeners by the trapeziform shape of the epigynal cavity according to Saaristoa & Eskov (1996), examination of the current specimen also reveal that the apical posteriomedian plate (sensu Saaristo & Eskov 1996) has a distinct V-shape (Figure 17A), which may aid in identification. The vulva is illustrated Figure 17B. This shape is also visible in Holm (1945: Figure 3b, sub *Rhaebothorax assimilis*).

S. barbiger is rather widely distributed in northern Fennoscandia and ranges eastwards to central Asia (Saaristo & Eskov 1996). The species is mainly found in very wet sites, such as bogs, wet meadows and heathlands (Holm 1963, Saaristoa & Eskov 1996).

***Semljicola caliginosus* (Falconer, 1910)**

Material: **BV**, Hemsedal: Storeskardvatnet (EIS 52, 60.89534°N, 08.31791°E), 1♀,

21.IX.2011, sieving in moist detritus in *Salix*-shrubs by water, leg. AF. **RY**, Gjesdal: shore of Ålgard lake (EIS 7, 58.45688°N 05.52354°E), 4♂♂, 14.IV.2012, 4♂♂4♀♀, 5.V.2012, sieving in leaf-litter beneath birch and *Salix*-shrubs, leg. HL.

Remarks: This species was for almost a century only known from the northern half of Great Britain, but was finally reported from Russia by Tanasevitch & Koponen (2007). This left a gap in the species distribution encompassing the Fennoscandian peninsula. The occurrence of *S. caliginosus* in this region was therefore not unexpected. The two records reported here are however, separated by 275 km and while the first record was from approximately 900 m a.s.l., the records from Rogaland are from an elevation of only about 115 m. *S. caliginosus* thus seems to have quite a large habitat spectrum in Norway and its occurrence should be expected throughout at least Southern Norway.

Even so, it is apparently a rather rare and locally occuring species with relatively few records even in Britain (Harvey *et al.* 2002a). It is associated with moist to very moist habitats, including sites dominated by *Sphagnum* and other mosses but also Juncus and in sedge fens (Harvey *et al.* 2002a, Tanasevitch & Koponen 2007).

The genitaliae of the Norwegian specimens from Rogaland (Figure 18A–C) are in good accordance with e.g. Roberts (1987).

***Syedra cf. apetlonensis* Wunderlich, 1992**

Material: **VE**, Tjøme: Tjømekollen, 1♀, 31.V.2011 (EIS 19, 59.15320°N 10.42770°E). Ødegården, 2♀♀, 09.VI.2011 (EIS19, 59.14750° N, 10.42358°E), all handpicked from *Formica*

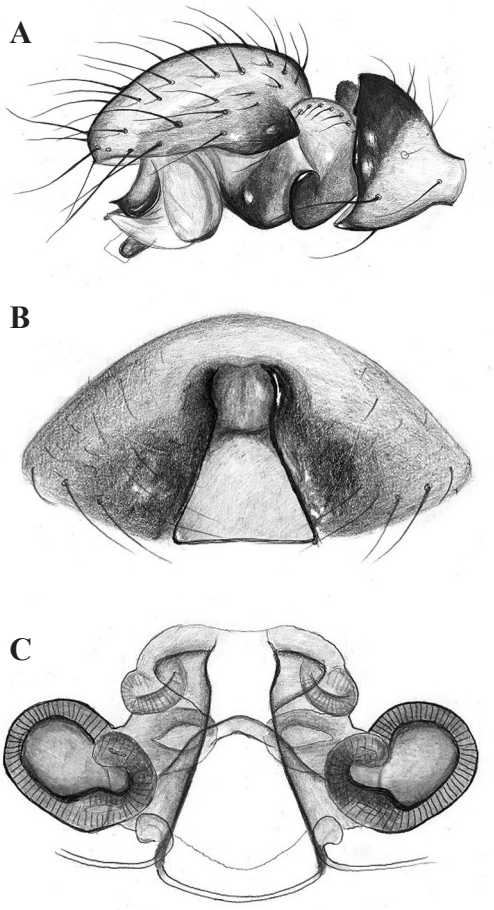

FIGURE 18. *Semljicola caliginosus* (Falconer, 1910). **A**. Palp. **B**. Epigyne. **C**. Vulva. Drawings: Harald Løvbrekke.

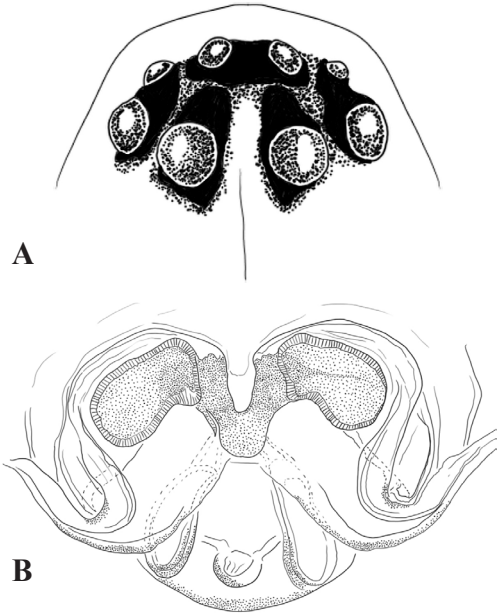

FIGURE 19. *Syedra apetlonensis* Wunderlich, 1992. **A**. Procurved eye row. **B**. Vulva. Drawings: Kjetil Aakra.

fusca nests.

Remarks: The correct identity of these three females is not entirely clear yet. They were initially believed to be *S. myrmicarum* (Kulczynski, 1882) due to their myrmecophilous lifestyle, but the epigynes and vulvae as well as somatic characters are more in accordance with the rare species *S. apetlonensis*, previously only recorded from Austria and Slovakia (Nentwig *et al.* 2016, Platnick 2016). This species is distinguished from *S. myrmicarum* by details of its genitalia but also by the procurved eye row (Wunderlich 1992). The eyes of the Norwegian specimens (Figure 19A) are clearly procurved. Concerning the epigyne the main distinguishing feature is the shape of the anterior margin of the epigynal plate (Nentwig *et al.* 2016); this is straight in *S. myrmicarum* and indented laterally in *S. apetlonensis*. The shape of this margin in the Norwegian specimens corresponds to the latter species. The vulva (Figure 19B) is very similar to the corresponding illustration in Wunderlich (1992).

Further differences between *S. myrmicarum* and *S. apetlonensis* are a lack of fovea in *S. myrmicarum* which is also consistent with the Norwegian specimens. The TmI value of the Norwegian specimens is 0.28, which falls within the ranges recorded for *S. apetlonensis* (0.20–0.29 and 0.30–0.39), but also *S. myrmicarum* (0.20–0.29) (data from the interactive Linyphidae-key by Anna Stäubli available on Nentwig *et al.* 2016). Spine formula is 2-2-2-2 and the length is 1,5 mm, again corresponding to data for *S. apetlonensis*.

According to Wunderlich (1992) *S. apetlonensis* is known from dry non-pastured meadows and has been considered to be a central-European endemic (Komposch 2008). Others have reported *S. apetlonensis* both from steppe meadows in the Seewinkel-area (Zulka & Milazowsky 1998), but also bird nests (Kristofik *et al.* 1994). There is no mention of the species being myrmecophilous and this could mean the Norwegian specimens are *S. myrmicarum*. On the other hand, the biology of *Syedra*-species is poorly known and more species than *S. myrmicarum* could potentially be myrmecophilous. It may be fitting to mention that the rare linyphiid *Caviphantes saxetorum*, previously recorded only once from sand banks along a major river in Norway (Aakra 2000b) is often considered a microcavernicolous species (e.g. Nentwig *et al.* 2016), but new records from a dry river bank in Borkhus, Folldal demonstrate that this species is at home in ant nests (AF unpub. obs.). It was found in a *Formica lehmanni* colony and seemed to thrive there. It has also recently been found away from ant colonies (T. Husdal pers. comm.), but its similarity in habitus to other known myrmecophile linyphiids (i.e. pale brownish overall colour, unmodified carapace, etc.) suggest that also this species exhibits this life style, even if this has not been recorded in the literature before. It should thus not be entirely surprising if *S. apetlonensis* is also a myrmecophile.

***Tibioplus diversus* (L. Koch, 1879)**

Material: **FØ**, Sør-Varanger: near Melkefoss (EIS 169 69.24651°N 29.46435°E), 1♀, 25.VII.2011, hand picking in forest by road, leg. WP.

Remarks: *T. diversus* is a trans-Palearctic-eastern-Nearctic species (Marusik *et al.* 2000) with quite a wide distribution in Fennoscandia; i.e. throughout Finland (Palmgren 1975), but only from Vesterbotten in Sweden (Jonsson pers comm.), and the discovery of this species in Norway was thus expected. It is clearly a species with an eastern distribution and it will be interesting to see how far west it extends in Fennoscandia.

Both the male palp (see Tullgren 1955) and the epigyne (Figure 20A) are highly characteristic. The latter consist of a large tongue-shaped scapus. The vulva is shown in Figure 20B.

***Trichoncus affinis* (Kulczynski, 1894)**

Material: **AAY**, Gjerstad: Solumsfetane (UTM: EIS 11, coordinates not available), 1♀, 8.V.2010, leg. AA. Solhomfjell Nature Reserve (EIS 11, 58.56994°N 08.47021°E), 6♂♂7♀♀, 5.VI.2011, leg. GHM. Mo (EIS 11, 58.51672°N 09.4472°E). 1♀, 25.V.2010, leg. GHM.

Remarks: The genus *Trichoncus* presents difficulties in identifying some of its members,

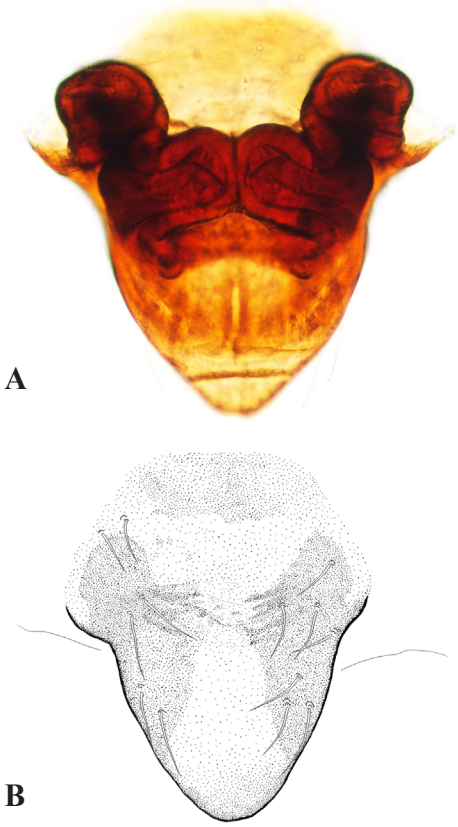

FIGURE 20. *Tibioplus diversus* (L. Koch, 1879). **A**. Vulvae. **B**. Epigyne. Photo: Walter P. Pfliegler. Drawing: Kjetil Aakra.

despite the revision by Denis (1965), as the species are very similar, both with regard to habitus and genitaliae (Roberts 1987). This difficulty is compounded by a somewhat confusing taxonomic history with subspecies being elevated to species level and vica-versa by various authors. The vulvae seem to offer the most reliable distinguishing character for females whereas males are distinguished by consideration of proportional relationships of tibial apophyses and palpal structures (Roberts 1987).

The vulva of the females reported here is in good accordance with the illustration in Wiehle (1960b).

The species is most often associated with xerothermic localtions with only low vegetation

FIGURE 21. *Trichopterna cito* (O.P.-Cambridge, 1872). Male habitus. Photo: Glenn Halvor Morka.

(Nentwig *et al.* 2016), which fits the Norwegian localities. It should be noted that several other *Trichonchus* specimens have been found in several other localities in South-Norway, but these are not listed here as their species identity needs to be confirned at the time of writing.

***Trichopterna cito* (O. P.-Cambridge, 1872)**

Material: **AAY**, Gjerstad: Mo (EIS 11, 58.86064°N 09.07474°E), 2♀♀, 18.IV.2010, leg. GHM. Stigfjell (EIS 11, 65.40127°N 01.57172°E), 2♀♀, 2.V.2010, leg. GHM. **TEY**, Bø: various localities, several individuals, leg MF. **VE**, Larvik: Grasås (EIS 19, 59.29020°N 09.98330°E), numermous males and females, 7.VI.2011, leg. AF. Tjøme: Øvre Barkevik Lykt, (EIS 19, 59.10890°N 10.38320°N), 1.VI.2011, numerous individuals, leg. AF. **Ø**, Hvaler: Ørekroken (EIS 12, 59.1826°N 11.0630°E), leg. SØ, see Ødegaard *et al.* 2009).

Remarks: This species was first published from Norway in a NINA report (Ødegaard *et al.* 2009), but has since been found in quite a few localities in Southeastern Norway. It has turned out to be quite common and very numerous in the appropriate habitat. Apart from Ørekroken the Norwegian records presented here consist of very dry and warm open situations in woods dominated at ground level by open exposed bedrock covered with sheets of dry moss and partly detritus. It is clearly a species demanding xerothermic habitats, but is able to use various types of such habitats as it is found among vegetation on sand and shingle in England (Roberts 1987). The locality

at Ørekroken consists of sand-dominated open habitats close to the seashore.

T. cito is widespread and common throughout most of Europe and Russia and has a Palearctic distribution (Nentwig *et al.* 2016).

The palp and epigyne of this species are very characteristic and it is a bit surprising that it has been overlooked for so long in Norway. The habitus of a male showing the modified carapace shape is shown in Figure 21.

***Troxochrus cirrifrons* (O.P.-Cambridge, 1871)**

Material: **VE**, Tjøme: Sandø (EIS 19, 59,08460°N 10,46650°E), 1♂, 2.IX.2010. Tønsberg: Ringshaugstranda (EIS 19, 59,27550°N 10,49220°E), 1♂, 7.XI.2010, both sieved from *Rosa regusa* litter, leg. AF.

Remarks: *T. cirrifrons* has for some time been considered a morphological form of *T. scabriculus* (Westring, 1851), e.g. by Roberts (1993), as only the males can be distinguished and then only by the shape of the carapace. However, it is listed as a separate species in Platnick (2016). *T. scabriculus* has been found in several localities in South-Norway, specifically in the south eastern corner around Oslofjord and around Trondheim (Aakra, unpub. data). It occurs on sandy localities, both along rivers and the coastline. *T. cirrifrons* is currently listed only from relatively few countries in continental Europe (Nentwing *et al.* 2010), which is no doubt due to the fact that it has often been treated as *T. scabriculus*. The latter species is very common and has been recorded from the majority of European countries as well as Russia and has a Palearctic distribution (Nentwig *et al.* 2016).

Recently, male specimens conforming to the morphology of *T. cirrifrons* have been discovered at two separate localities around the outer part of the Oslofjord and are here reported as a new species to Norway, in accordance with its status in Platnick (2016). It inhabits the same type of habitat as its sister species, i.e. open sand and shingle dominated localities near rivers, streams and the seashore.

The taxonomic problem of erigonine sibling species where only males exhibit morphological differences and then only in the shape of the carapace, is known from several other genera, like *Oedothorax gibbosus*/*tuberosus* (Blackwall, 1841) and *Diplocephalus conatus* Bertkau, 1889/*jacksoni* O.P.-Cambridge, 1903. For many

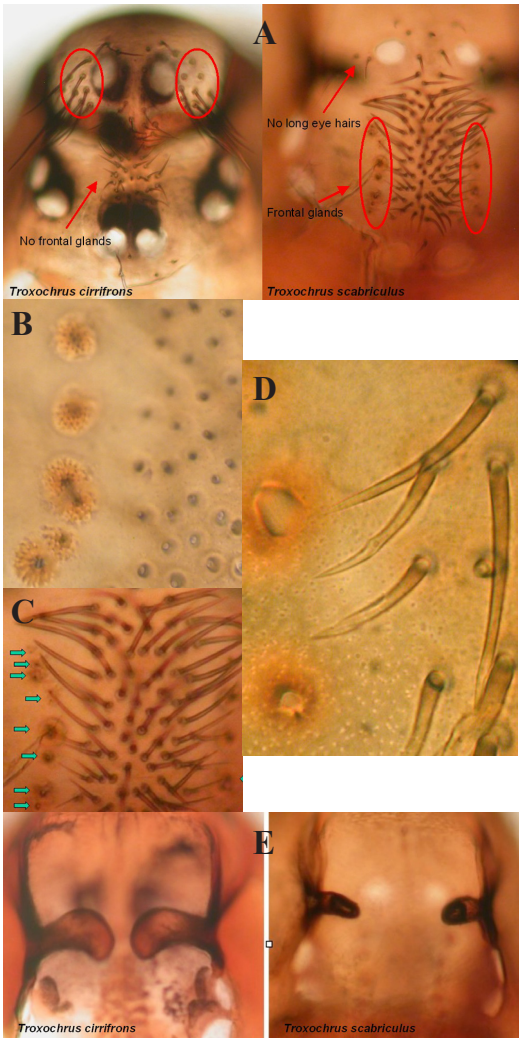

FIGURE 22. *Troxochrus cirrifrons (*O.P.-Cambridge, 1871) & *T. scabriculus* (Westring, 1851). **A**. Differences of the frontal part of carapace of males of *T. cirrifrons* and *T. scabriculus*, the set of glandular openings in the latter species is to be noted. **B**. Frontal glands of *T. scabriculus* seen from the inside of the carapace. **C**. Frontal glands (arrows) on each side of the hair field of *T. scabriculus*, seen from the outside. **D**. Glandular opening of *T. scabriculus* in detail. **E**. Internal morphology of the invaginations forming the sulci in *T. cirrifrons* and *T. scabriculus*. Photos: Arne Fjellberg

of these species groups the issue seem to be unresolved and can only be reliably solved by breeding experiments and/or genetic studies. However, here we'd like to present some striking morphological differences visible in the males of *T. cirrifrons* and *T. scabriculus*.

So far, the difference between the two forms have been recognized as the shape of the carapace (see e.g. Roberts 1987: 74) and the presence of some long bristles or setae next to each posterior median eye (Figure 22A). On the other hand, *T. scabriculus* also has a line of what appears to be glandular openings on each side of the field of short hairs above the anterior median eyes (Figure 22A, 22B, 22C & 22D), which is lacking in *T. cirrifrons*. There are also considerable differences in the internal morphology of the sulci (Figure 22E); the invaginations of the sulci being much larger in *T. cirrifrons*, almost meeting in the middle. It should be noted, however, that dimorphic forms of male cephalic structures with large differences in size of sulci and their invaginations have been recorded within a single species, as for *Pelecopsis mengei* (Simon, 1884), see Holm (1979).

The significance of these differences and especially of the extra set of glands in *T. scabriculus* is interesting to speculate upon. It has been shown that the primary function of the cephalic carapace modifications in male erigonines is to provide a structure which can be used to fix the position of the female during mating during which she places her chelicera on the corresponding male cephalic structures (Schaible *et al.* 1986). Often there are grooves or sulci in connection with the cephalic modifications in wich the female's fangs are placed and which presumably is the site of pheromone production. On the other hand, in dimorphic species such as *O. tuberosus*/*gibbosus*, the «extra» carapace modifications serve an excretory rather than a fixation purpose (Vanacker *et al.* 2003) and exudation of supposedly pheromonal and nutritional secretions are involved in some sort of nuptial feeding behaviour (Vanacker *et al.* 2003). These exudations are of interest not only to females, but to conspecific males and closely related species as well. Interestingly, copulatory success does not seem to be strongly correlated with such extra cephalic adornments and the investment into additional excretory products, in some cases it may actually reduce copulatory success due to interactions from conspecific or closely related males interested in the exudates.

Whether the extra glands of *T. scabriculus* shown in Figures 22B and 22C also serve such a nuptial feeding purpose can only be speculated upon at the time. However, it is possible, in which case it is more likely that we are dealing with two sibling species here as the situation parallels that seen in *Oedothorax tuberosus*/*gibbosus*.

***Walckenaeria alticeps* (Denis, 1952)**

Material: **FØ**, Sør-Varanger: Langfjordeid (EIS 169, 69.58735°N 029.97765°E), 1♂, 26.VII.2011, sieving of moss in bog, leg. GHM.

Remarks: *W. alticeps* is very similar til *W. antica* (Wider, 1834) and may have been confused with this species in Norway in earlier publications. There are some small but clear diagnostic characters in both sexes, however, which facilitate correct identification. In males the ratios of the various structures in the bulbs are used, along with the shape of the tip of the embolus whereas the females are differentiated by the shape of the vulval structures (see Kronestedt 1980, Palmgren 1982, Ruzicka & Bryja 2000).

The two species are also separated in regards to their habitat preferences. *W. antica* is a species of dry, open areas whereas *W. alticeps* only live in the wettest parts of bogs and other sites with constant levels of moisture (Kronestedt 1980, Palmgren 1982).

LYCOSIDAE

***Aulonia albimana* (Walckenaer, 1805)**

Material: **TEI**, Kvitseid: Flåvatn (EIS 17, 59.24137°N 08.29457°E), 10♀♀+, 13.VII.2011, handpicking on forest floor next to lake, leg. MF. **TEY**, Kragerø: Rapenetangen (EIS 10, 58.50083°N 09.26768°E), 4♀♀, 1.VII.2011, handpicking from detritus and vegetation on exposed rock, leg. GHM.

Remarks: This highly distinctive species is rather widespread in southern Sweden (Almquist 2005) and was thus expected to occur

in southeastern Norway, although the current locations are relatively far from the closest known Swedish populations. The proximity of the two know localities in Norway suggest that the species is widespread in this region in Norway, but as it has not been caught before, despite extensive sampling with pitfall traps and other means in southeastern Norway, we suggest that it is rather local and probably exhibit a fragmented distribution pattern.

The habitat of *A. albimana* has been variously described as sparsely vegetated and rocky pine forests with lichens, *Calluna*-heaths to marshes (Almquist 2005). The specimens (all females with egg cocoons) from Rapenetangen where found on such sparsely vegetated bedrock, but the site were right next to a boggy meadow. It may be that the species builds its characteristic webs and tubular retreats (see Job 1968) in such places with high vegetation, but utilizes the more xerothermic rocky and opens sites to warm its egg cocoons. No webs where observed in any of the localities listed above which indicates that females with egg cocoons do not feed.

The species is easily recognized by its bright white palpal patella enabling even juveniles to be identified. It is also considerably smaller than dark-coloured *Pardosa* spp. with which it may be confused at first sight.

***Pardosa saltans* Töpfer-Hofmann, 2000**

Material: **AAY**, Gjerstad: Mo (EIS 11, 58.51672°N 09.4472°E), 1♀6♂♂, 29.IV.2010, leg. GHM.

Remarks: This species is member of a complex of cryptic species formerly hidden in what was known as *Pardosa lugubris* (Walckenaer, 1802) (see Töpfer-Hofmann & Helversen 1990 & Töpfer *et al.* 2000) and its occurrence in Norway was anticipated. Apart from the locality detailed above it has proved to be very common and widespread in coastal areas in Southeastern Norway, with records from both Tjøme and Nøtterøy (leg. AF) and the Risør-area (leg. GHM). The species is otherwise known from central parts of continental Europe as well as Great Britain (Nentwig *et al.* 2016). The Norwegian specimens were found in low vegetation on the margin of an agricultural field and a mixed forest in a south facing slope. This suggests a certain level of thermophily, but it may also prefer some shading to avoid excessive temperatures. This is in accordance with records from continental parts of Europe where it has been found mainly in woodland (Nentwig *et al.* 2016). Almquist (2005) on the other hand simply mentioned «stony slopes» as the primary habitat of the species.

Being a cryptic species *P. saltans* strongly resembles *P. lugubris*, but there are noticeable morphological differences in the male palps (Figure 23A), specifically the longer cymbium of *P. saltans* and the small claw present at the cymbium tip compared to the large claw in *P. lugubris*, as well as the flattended dorsal surface of the cymbium which is much more concave in *P. lugubris* (Töpfer-Hofmann et al. 2000). The tip of the emboli (Figure 23B) also shows marked differences. Besides, careful examination will reveal some somatic differences in males as well (Figure 23C), at least in the Norwegian specimens studies thus far. The coxa of *P. lugubris* appears lighter than in *P. saltans* due to numerous short whitish hairs and the former species also usually has a thin band of whitish hairs at the carapace margins. Females of the two species are said to be indistinguishable (Töpfer-Hofmann *et al.* 2000), although *P. saltans* females may on average be slightly larger, at least in Bavarian populations. However, Adam (2007) did report certain morphological differences in females from Romania, but the reliability of these mostly morphometric characters are not known. Studies on Norwegian specimens on the other hand reveal what thus far appears to be a reliable character in females; the angle of the transverse bottom part of the epigynal septum differs in angles relative to the longitudinal part of the septum (Figure 23D).

MIMETIDAE

***Ero cambridgei* Kulczynski, 1911**

Material: **TEI**, Sauherad: Torhøl-evja (EIS 18, approx. 59.243645°N 09.174968°E), 1♀, 8.IX.2010,. leg. MF. Evjutjørn (EIS18, 59.243729°N 09.95698°E), 4♂♂, 13.IX.2010, leg. MF. **VE**, Tjøme: Mågerø, 1.X.2010 (EIS

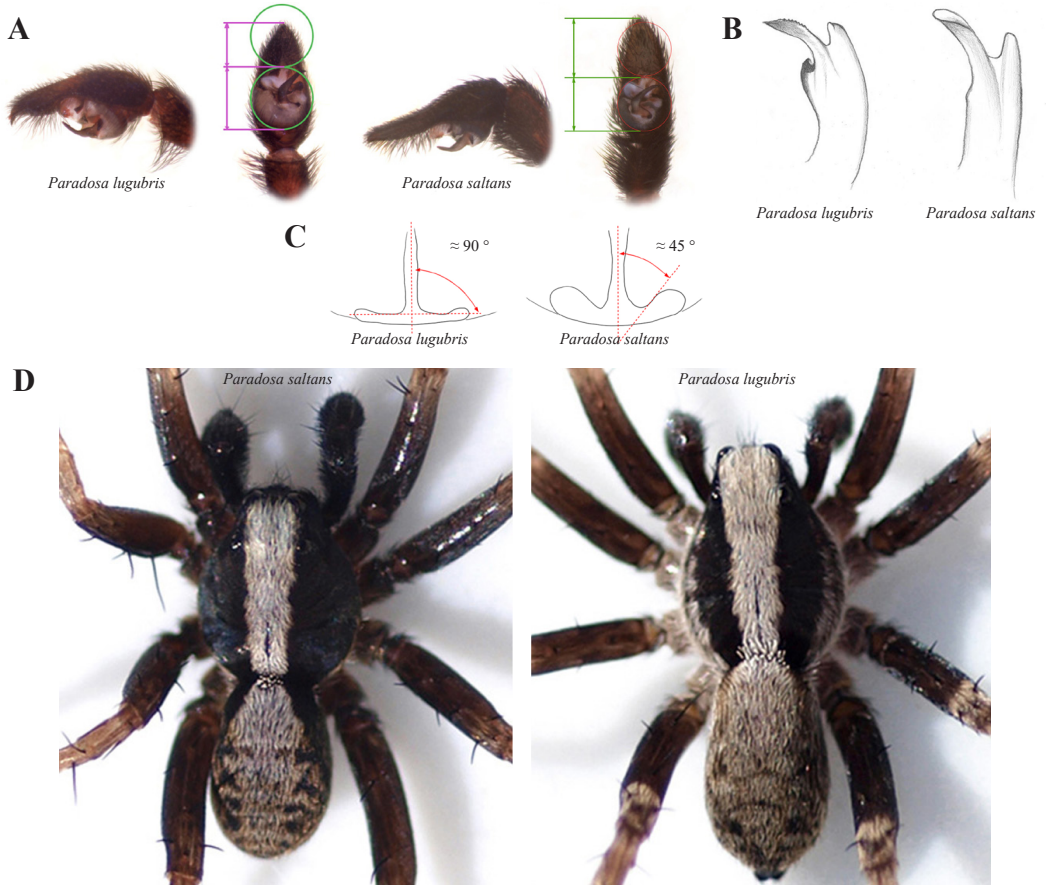

FIGURE 23. *Pardosa saltans* Töpfer-Hofmann, 2000 and *P. lugubris* (Walckenaer, 1802). **A**. Diagnostic differences in the male palp. These include the longer cymbium in *P. saltans* (compare ratio of length of bulbus and length of cymbium forward of this, indicated by circles), which has a small claw at the end in *P. saltans* compared to the larger claw in *P. lugubris*; and the flat dorsal suface of *P. saltans* contrasting with the more concave surface of *P. lugubris*. **B**. Tip of emboli in *P. saltans* and *P. lugubris*. **C**. Diagnostic differences in the females; the angles of the bottom part of the septal strutures differ as indicated on the drawing. **D**. Differences in habitus of male, note the thicker and stouter pedipalps and the lack of a white margin on the carapace and light-coloured coxae in *P. saltans*. Photos: Glenn Halvor Morka. Drawings: Glenn Halvor Morka (23B) & Kjetil Aakra.

19, 59.14850°N 10.42530°E). Tønsberg: Presterødkilen, 4.11.2010 (EIS 19, 59.26590°N 10.42920°E), leg. AF. **Ø**, Hvaler: Hvaler (EIS 12, unknown coordinates), 1♀, 22.V.2011, leg. RF. Arekilen 1.XI.2011 (EIS 12, 59.04480°N 11.01190°E), leg. AF.

Remarks: The discovery of this species was also anticipated, as it is quite common and widespread in Southern Sweden north to Uppland (Almquist 2005). The current records strongly suggests that it is quite widespread and locally numerous in the southereastern corner of Norway. It has probably been overlooked due to its mode of life (araneophagous, often evading pitfall traps) and specific habitats (marshes and other very damp localities).

The species is quite easy to distinguish from its much more common and widespread relative, *E. furcata* (Villiers, 1789). The genitals are distinctive in both species. *E. cambridgei* is also considerably darker, with much larger near-black or totally black areas around the carapace

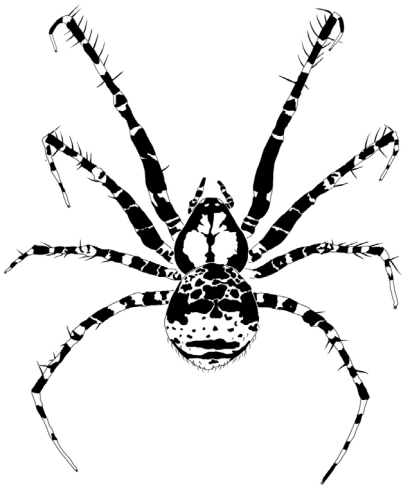

FIGURE 24. *Ero cambridgei* Kulczynski, 1911. Habitus of female showing extent of black markings. Drawing: Kjetil Aakra.

(especially the cephalic regions and the carapace margins), the first two pair of legs (in particular the femora and tibia) and the forward part of the abdomen (Figure 24). The extent of these black areas is apparently quite variable, but the species is always darker than *E. furcata* and the sternum of *E. cambridgei* has black markings forming the shape of a light brown arrow marking.

According to Almquist (2005) the primary habitat of this species is marshes, the Norwegian records are clearly consistent with this, but the species may also be found in collections of shrubbery and litter close to such habitats and not necessarily in them.

SALTICIDAE

***Neon levis* (Simon, 1871)**

Material: **AK**, Oslo: Ekebergskråningen (EIS 28, 59.53495°N 10.45751°E), 1♂, 6.VII.2007, leg. KMO. **TEI**, Kvitseid: Flåvatn (EIS 17, 59.182058°N 08°431316°E), 1♀, 13.VII.2011, hand picked from moss/detritus on bedrock in open pine forest, leg. MF. **SFI**, Sogndal: Mannheller (EIS 50, 61.16193°N 07.33939°E), 1♀, 21.IX.2011, from floor of dry pine forest on mountain slope by the ferry quay, leg. AF.

Remarks: The genus *Neon* is represented by four species in Sweden (Almquist 2006), but until quite recently only the widespread and common *N. reticulatus* (Blackwall, 1853) has been found in Norway (Aakra & Hauge 2003). Given their distribution in Sweden it is not surprising that other species of *Neon* can now be reported from Norway. *N. levis* is broadly similar in habitus to the other species, but can be reliable differentiated by its genitalia (Almquist 2006), in particular the vulval structures.

The habitat of this species seems to be xerothermic in character and is consistent with that reported by other authors (e.g. Almquist 2006). Like the other minute species in this genus *N. levis* is quite cryptic and has probably been overlooked in Norway because of this and the fact that pitfall traps are not easily employed in its habitat where there is hardly any substratum to place the traps in. It is thus expected to be rather widespread in at least the southeastern corner of Norway. The record from Sogndal may be representative of a rather local population living in favourable xerothermic situations caused by local climatic conditions known to occur in that region, as has been the case for certain species of insects.

***Neon robustus* Lohmmander, 1945**

Material: **AAY**, Risør: Skarvatnet, Øysang (EIS 10, 58.45568°N 09.14548°E), 1♀, 4.VII.2011, sieving in detritus and dry moss on bedrock in open pine forest, leg. GHM.

Remarks: *N. robustus* was a relatively recent addition to the British spider fauna (Snazel *et al.* 1999) and given the distribution map in that paper it is certainly not surprising to find this species in south Norway as well. Its habitat is broadly similar to that of *N. levis*, at least in Norway, and it is probably overlooked for the same reasons. *N. robustus* may only be reliably distinguished from its Fennoscandian congeners by the genitalia (see Snazell *et al.* 1999 and Almquist 2006 for details), although it is usually darker in both sexes than *N. reticulatus*.

***Sitticus ranieri* (Peckham & peckham, 1909)**

Material: **FN**, Porsanger: near border to Stabbursdalen Nasjonalpark (EIS 181, 70.8519°N

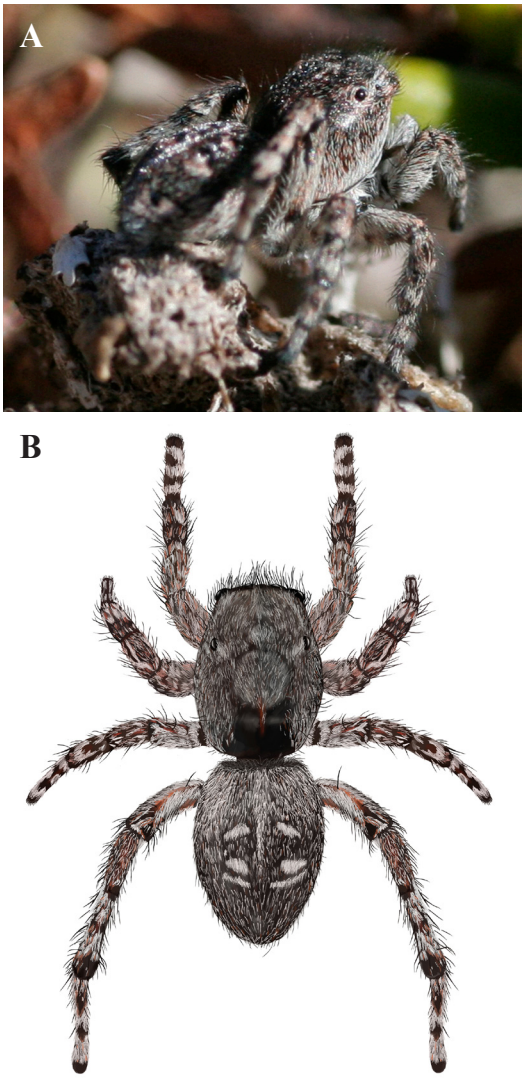

FIGURE 25. *Sitticus ranieri* (Peckham & Peckham, 1909). **A**. The collected female photographed in its natural environment at the collection site near Stabbursdalen National Park. **B**. Habitus of female. Photo: Arild Tangerud. Drawing: Kjetil Aakra.

24.51326°E), 1♀, 8.VII.2007, leg. AT.

Remarks: The single female collected (Figure 25A) was found in subalpine heathland close to the border of Stabbursdalen National park. The species has previously been misidentified in Northern Europe as *S. saxicola* (C. L. Koch, 1846) (see Kronestedt & Logunov 2001) and as the material of *S. saxicola* in Norway has not yet ben revised, it is unknown if other records of *S. ranieri* exist from Norway. It is mainly a species of heaths in the subalpine region, but may also occur in the alpine region (Almquist 2006).

The species is known from the northernmost counties in Sweden (Kronestedt & Logunov 2001, Almquist 2006) and ranges through Northern Europe and Siberia to North America (Kronestedt & Logunov 2001).

The species is quite similar to *S. saxicola*, both in regard to habitus and genital organs, but Kronestedt & Logunov (2001) provides a table of differences and excellent drawings showing these differences. Habitus of the specimen reported here is shown in detail in Figure 25B.

THERIDIIDAE

***Achaeridion conigerum* (Simon, 1914)**

Material: **TEY**, Bø: Aslakstulåi (EIS 17, approx. 59.304033°N 09.13532°E), 1♀, 25.VIII.2010, 2♀♀, 26.VIII.2010, leg. MF. locality about 20 km from the first one (EIS 17, 59.25499°N 08. 52421°E), between 50-100 juvenile and subadult specimens, 15.III.2012, handpicked and observed below rocks at the bottom of a sandy slope by a road, leg. MF.

Remarks: Judging by previous records of this species it is one of the most rare and enigmatic species in Northern Europe (Knopflach 1993). There is only one previously published record from Fennoscandia; from Kullaberg in Skåne, Southern Sweden (Knoflach, 1993, Almquist 1996, 2005) and that record consist of only a single specimen (a male) collected in 1942. According to Almquist (1996) there were only nine other known localities for this species at the time (see map in Knoflach 1993). However, the species was found on 22. August 2011 by Jørgen Lissner in the centre of Gothenburg City (a subadult male) and this record as well as the Norwegian ones suggests that the species is much more widespread and common than the scarcity of previous record suggests. In particular, the enormous aggregation of subadult/juvenile specimens found, presumably in hibernation, in one of the localities is noteworthy. This observation suggests the species may overwinter in large numbers. The species is obviously locally common.

The species is extremely small (adult size in both sexes is approximately 1,6 mm – Knopflach 1993) and unlike many species it remains still when disturbed (MF unpub. obs.), thus making the discovery of this minute spider even more unlikely when collecting by hand. This is in all likelihood the main reason we believe this species is probably more common and widespread than previously thought.

A. conigerum has been reported from rather dry habitats with a cover consisting of loose stones and detritus, both in heathland and various types of forests where the retreat and web is placed under large stones (Knopflach 1993, Almquist 1996, 2005, Nentwig *et al.* 2016). The Norwegian specimens where taken in a road cut with a lot of loose rocks. It has also been reported from taller vegetation in a bog (Kupryjanowicz 1997).

The epigyne is very hard to make out as it is not sclerotized and basically consists of the genital openings only (see Knopflach 1993: Figure 5), but the vulva (Figure 26A) is fairly characteristic. Subadult and juvenile specimens may be recognized by the typical tubercle on the abdomen in side view (Figure 26B).

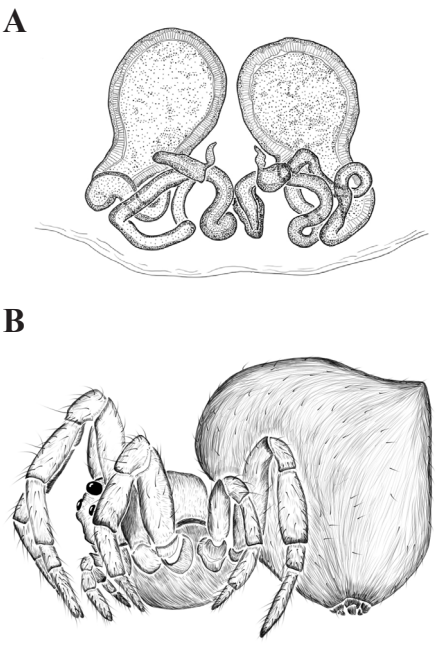

FIGURE 26. *Achaeridion conigerum* (Simon, 1914). **A**. Vulval structures. **B**. Habitus of female showing the characteristic tubercle on the abdomen. Drawings: Kjetil Aakra.

***Dipoena braccata* (C.L. Koch, 1841)**

Material: **AAY**, Risør: Ormdalsstranda (EIS 11, 58.445590°N 09.181645°E), 1♂, 24.VI.2010, sweep netted from coastal heatland, leg. GHM & AA). **TEY**, Kragerø, Rapenetangen (EIS 10, 58° 50083°N 09.26768°E), 1♂1♀, 14.VI.2011, leg. GHM & AA.

Remarks: The specimens reported here were sweep netted from very dry heath on bare rocks by the seashore with some stunted scattered pines in places. The species is normally associated with the lower branches of pine and spruce trees (Almquist 2006), especially in warm localities, but may also be found in dry heatland. The species is quite rare, with records only from the Gotland in Sweden (Almquist 2005), whereas there are none from Finland (Nentwig *et al.* 2016). It is otherwise only known from coninental parts of Europe (Nentwig *et al.* 2016).

D. braccata is very similar in appearance to *Lasaeola tristis* (Hahn, 1833) (previously also in *Dipoena*), but may be distinguished by details in

FIGURE 27. *Lasaeola tristis* (Hahn, 1833) & *Dipoena braccata* (C.L. Koch, 1841). Male palps compared, lateral view (top) and ventral view (bottom). Photos: Glenn Halvor Morka.

its genitalia. The male palp looks quite similar, but especially when viewed from below there are noticeable differences (see e.g. Almquist 2005). A comparison of of the male palps of both species is shown in Figure 27. Also in the habitus there are some clues to the identity, despite the overall similarity.

Examination of several individuals of *L. tristis* by GHM has revealed some of these differences and it is prudent to describe them here for future reference. It is sometimes maintained, e.g. by (Almquist 2005), that *L. tristis* has light brown lung covers whereas *D. braccata* has black lung covers, but it has become clear that at least some males of the former species also have black book lung covers, leaving some doubt about this character as a distinguishing feature. On the other hand, it is clear that the coxae are significantly lighter in colour in *D. braccata* and that the legs are faintly annulated. *L. tristis* may also have lightly coloured tarsal segments but darker annulation are lacking on the metatarsi. Both species have lightly coloured femora on legs IV, but *D. braccata* may also have similarly coloured femora on the remaining pairs of legs.

It should be noted that there have been some changes in the genus *Dipoena* recently, with *D. inornata* (O.P.-Cambridge, 1861) transferred to another genus (Fitzgerald & Sivid 2004), and at least some of the Norwegian species currently listed in *Dipoena* may eventually be transferred to other genera.

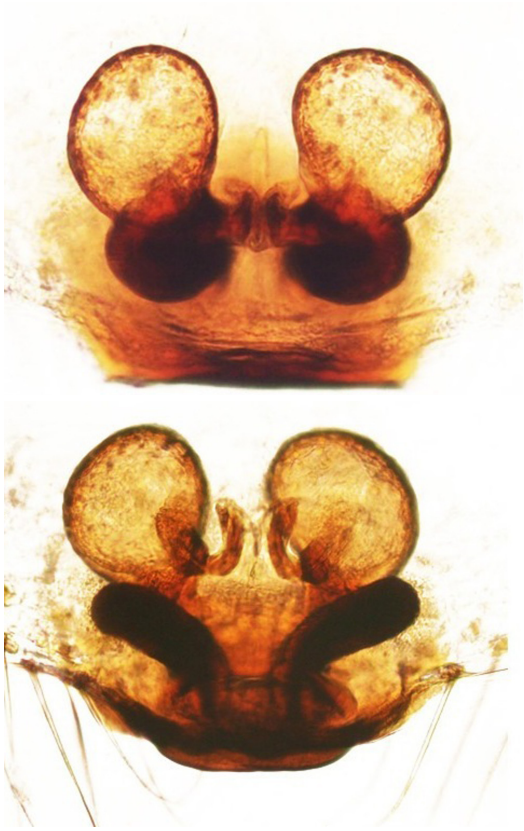

FIGURE 28. *Enoplognatha latimana* Hippa & Oksala 1982 and *E. ovata* (Clerck, 1757) **A**. Vulva of *E. latimana*. **B**. Vulva of *E. ovata*. Photos: Magne Farlund.

***Enoplognatha latimana* Hippa & Oksala, 1982**

Material: **TEY**, Bamble: Vinjestranda (EIS 11, 65.51492°N 19.35488°E), 3♀♀, 3.VII.2011, sweep netting in vegetation, leg. MF. Bø: near Bøelva (EIS 17, 59.263632°N 09.14975°E), 1♀, 21.VII.2011, sweep netting in vegetation by river, leg. MF.

Remarks: Up until the current paper the specious genus *Enoplognatha* was represented by only two species in Norway, the common and widespread *E. ovata* (Clerck, 1757) and the rarer *E. thoracica* (Hahn, 1833). Two new species are presented here; the first, *E. latimana*, is superficially very similar to *E. ovata*, but may be distinguished by details of the vulva (Figure 28A–B) and details of the male palp (see e.g. Hippa & Oksala 1982, Huseynov & Marusik 2007). It is so far only known from Skåne in southern Sweden (Jonsson 2002, Almquist 2005), but is probably much more widespread in that country given this new record from Norway. It has otherwise a Holarctic distribution (Nentwig *et al.* 2016).

E. latimana seems to prefer somewhat more open and drier sites than *E. ovata* (Barthel 1997), although both species may co-occur at the same site as was the case on the locality where *E. latimana* was found in Norway.

***Enoplognatha serratosignata* (L. Koch, 1879)**

Material: **ON**, Dovre: Nordre Hjelle (EIS 71, 61.2441°N 10.1427°E), 5♀♀, 2.VI.2010.

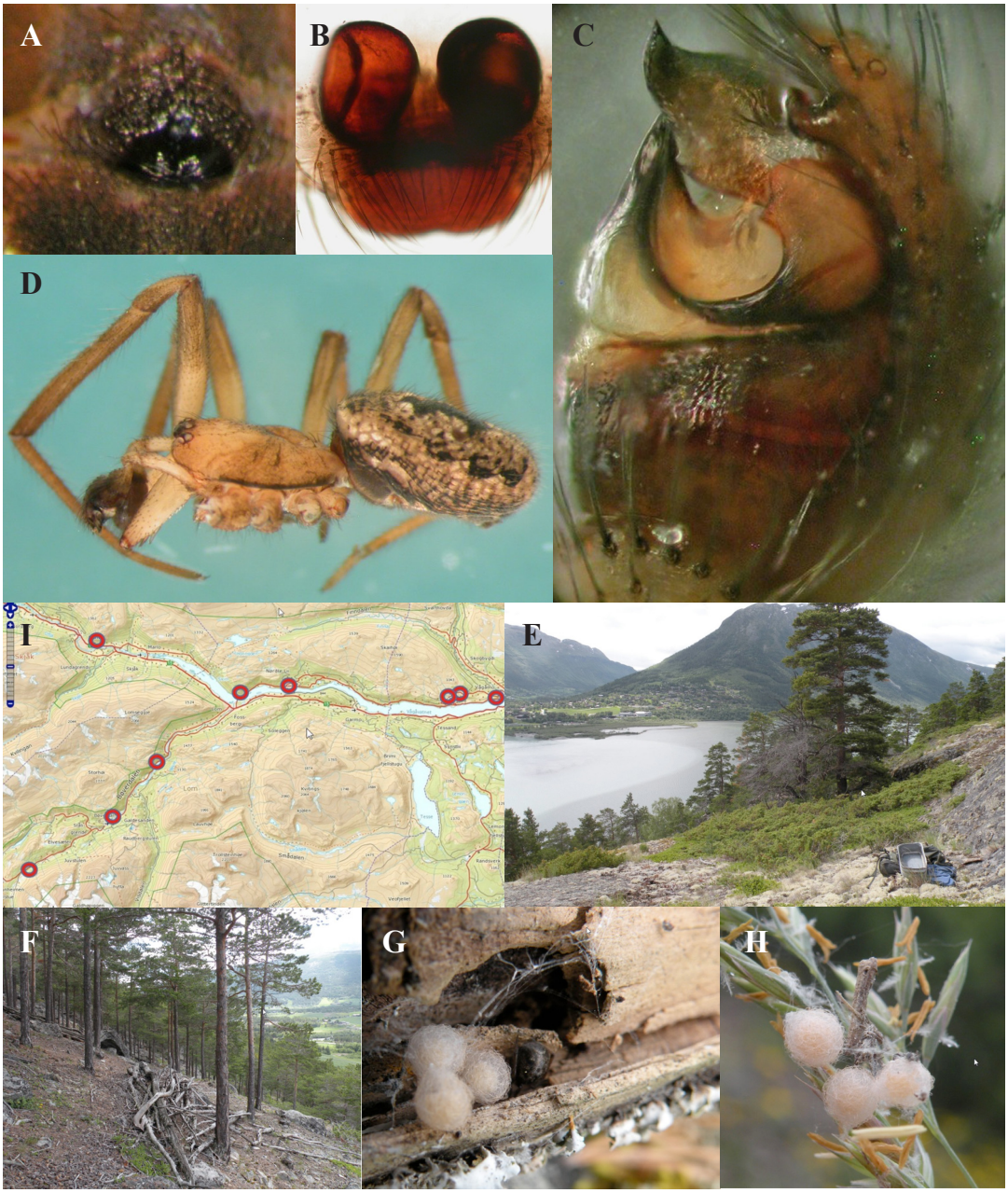

FIGURE 29. *Enoplognatha serratosignata* (L. Koch, 1879). **A**. Epigyne. **B**. Vulva. **C**. Male paplpal organ, ventral view. **D**. Adult male from Bispberget, Skjåk. **E**. Dry sites with exposed bedrock on Tronoberget with Lom in the background. **F**. Dry pine forest on Bisepberget, Skjåk, where *E. serratosignata* was the most common species under stones. **G**. Egg cocoons attached to a pine twig that was bent underneath a rock. **H**. Egg cocoons attached on a piece of grass by a female kept in culture. **I**. Collections sites in Ottadalen, June 2011. Photos and map: Arne Fjellberg.

Vågå: Aabakke (EIS 71), several ♀♀, 1.VI.2010. Lom, Tronoberget, several ♀♀, 20.VI.2011 (EIS 70, 61.84982°N 08.57550°E). Skjåk: Bismo (EIS 70, 61.88670°N 08.27520°E), several ♀♀,

21.VI.2011, Bispeberget (61.53572°N 08.17190° E), 1♂, several ♀♀, handpicking beneath stones, leg. AF.

Remarks: The discovery of this second new species of *Enoplognatha* in Norway is rather surprising as there are no known Swedish or Finnish records and the closest localities are in Germany (Merkens & Wunderlich 2000, Nentwig *et al.* 2016). The Norwegian records thus seem to represent isolated populations. This is especially interesting as one of the localities (Hjelle) also is very close to the site where the even more isolated linyphiid *Diastanillus pecuarius* (see above) was found, clearly indicating that this area harbours faunistically and taxonomically interesting spider species. The localities themselves are dry, grazed south facing slopes with lots of loose stones and occationally exposed bedrock. This species thus seem to represent a xerothermic faunal element. It is expected to occur in similar habitats in both Sweden and Finland.

The species was originally described on material collected in Jenisejsk in Russia and later redescribed on material from Krasjonarsk (Holm 1973) and these seem to be the closest records from Russia. European records are from north-central Germany (Merkens & Wunderlich 2000), Switzerland and Hungary while it has also been taken in China (Bosmans & van Keer 1999). Wordwide distribution is thus Palearctic (Platnick 2016).

The epigyne and vulva (Figure 29A–B) of the females reported here are in very good agreement with illustrations provided by Holm (1973: 76) as well as by Bosmans and van Keer (1999: 236). The male palp is also characteristic (Figure 29C). The habitus of the male is shown in Figure 29D.

Some interesting observations on the ecology of this species may be added, made by AF during fieldwork in June 2011.

The first records of this species were made on dry xerothermic calcareous meadows in the Dovre region (Hjelle) with a distinctive botanical steppe element and it was expected that the species was confined to such sites in Norway. However, collections made at lower elevations in the Gudbrandsdal valley put such anticipations to shame. The species turned out to be quite common in various types of habitats, from dry pine forests (Figure 29E) to open heathland dominated by exposed bedrock and south-facing screes (Figure 29F), but also man-made habitats like road-fillings. Thus the species is far from dependent upon xerothermic calcareous meadows.

The whitish egg cocoons of *E. serratosignata* (Figure 29G) measure ca. 5–6 mm in diameter and contain up to 50 yellowish eggs of about 0,5–0,6 mm in diameter. The cocoons can be very numerous in appropriate places and these are apparently always places under stones or sometimes fallens trees or logs in the habitat. The stones or logs need to be situated on dry sites, such as exposed bedrock, screes with shale or very dry pine needle detritus. South-facing sun-exposed hills seem to be preferred. At one place the egg cocoons were placed on a pine twig that had become lodged beneath a rock (Figure 29G).

Field observations suggest the females are quite stationary and use the same nesting place for a long time. Prey remains (consisting of various types of beetles, ants, hemipteran bugs, etc.) can be found in the female´s web beneath the rocks. The web usually also extends a little beyond the rock, thus giving away the position of the spider. Males seem to be relative scarce and have so far been found only in one locality. Field observations suggest that males may actively seek newly moulted females in order to ensure their virginity before mating. Males probably do not have a long life span (Huseynov & Marusik 2008).

It should be noted that the current records of *E. serratosignata* in Norway are from the driest region of the country (see Figure 29I).

***Lasaeola prona* (Menge, 1868)**

Material: **ON**, Vågå: Fellese (Brattland) (EIS 71, 61.86799°N 09.05783°E), 1♂, 21.VI.2011, hand picked from below rocks on dry rocky pasture grazed by sheep, leg. AF.

Remarks: As this species is also fairly widespread in the southern half of Sweden (Almquist 2005) it was expected to occur in the southern parts of Norway as well. The current record is from the very central parts of South Norway, suggesting it may be local but widespread

in the entire region in appropriate habitats. The species is otherwise generally regarded as rare throughout its Holarctic range (Nentwig *et al.* 2016).

Previously in *Dipoena*, the species is fairly easily distinguished from its other Norwegian congener, *L. tristis*, by its genitals as well as the more brownish overall coloration.

L. prona usually occurs in ground situations, often under stones (Roberts 1985), but also in heatland, sand dunes and on tree trunks and bushes (Almquist 2005).

***Steatoda triangulosa* (Walckenaer, 1802)**

Material: **Ø**, Fredrikstad: Øra, Øra Industripark (EIS 19, 65.68541°N 26.8771°e), 1♀, 30.III.2011, hand picked from inside industrial building, leg. RF.

Remarks: *Steatoda triangulosa* is a cosmopolitan species (Platnick 2016) that is known only from human habitations and other buildings in Central Europe (Nentwig *et al.* 2016). So far it is known from the majority of the continental European states as well as Great Britain, but it has not previously been recorded from any of the Fennoscandian countries. The site in Norway where the species has been found clearly indicates that this is an introducted species, probably having arrived by ship in the Øra industrial port. No other specimens have been found so far and it thus remains unknown wether the species has managed to establish itself in Norway.

The species is highly characteristic in appearance and the genitaliae also afford easy recognition features (see Nentwig *et al.* 2016). Its primary habitat is indoors where it contructs small cobwebs in dark corners and constricted spaces.

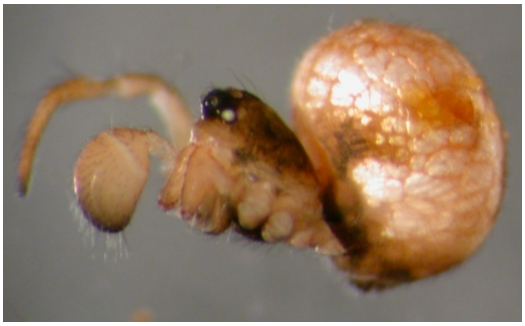

FIGURE 30. *Theridiosoma gemmosum* (L. Koch, 1877). Subadult male. Of note are the very large palps and the metallic lustre of the bright spots on the abdomen. Photo: Arne Fjellberg.

THERIDIOSOMATIDAE

***Theridiosoma gemmosum* (L. Koch, 1877)**

Material: **VE**, Tjøme: Kjynna (EIS 19, 59.15680°N 10.39570°E), 1 subadult ♂, 10.IX.2010, numerous subadults 6.I.2012, leg. AF. **Ø**, Hvaler: Arekilen, Kirkøy (EIS 12,59.15784°N 11.03.43°E), numerous subadult ♂♂ & ♀♀, 1.XI.2011, beating of small spruce trees in alder forest, leg. AF.

Remarks: This comparatively rare species represents not only a new species for Norway, but also the 30th spider family known from Norway. It has a distinctly southeastern distribution in Sweden, as it is only known from Skåne, Blekinge, Uppland and Gotland (Almquist 2005) and is otherwise widely distributed in Europe, but rather rare and local (Nentwig *et al.* 2016). World distribution is Holarctic (Platnick 2016).

The species is mainly associated with damp localities, including fens (Almquist 2005), bogs, in vegetation along water streams and above small water bodies (Nentwig *et al.* 2016). The current specimen was sweep netted from marsh vegetation at one end of a freshwater lake.

Even if the individuals thus far found in Norway have all been subadults, the characteristic habitus of this species (Figure 30) allows for easy identification. A few individuals (both sexes) have since been reared to mature by AF. The male palps (almost fully developed in the specimen pictured) are very large compared to the rest of the spider, almost as large as the prosoma, and the irregular patches on the globular abdomen have a distinctive metallic lustre, almost like mother of pearl. In adult specimens both the palp and epigyne are equally characteristic.

The species is presumably quite rare or uncommon in Norway as well, but it is known that similar, although smaller, juveniles have been found in Gjerstad (exact locality not recorded) and it will be interesting to see how widely distributed it is in Norway. The numerous individuals found

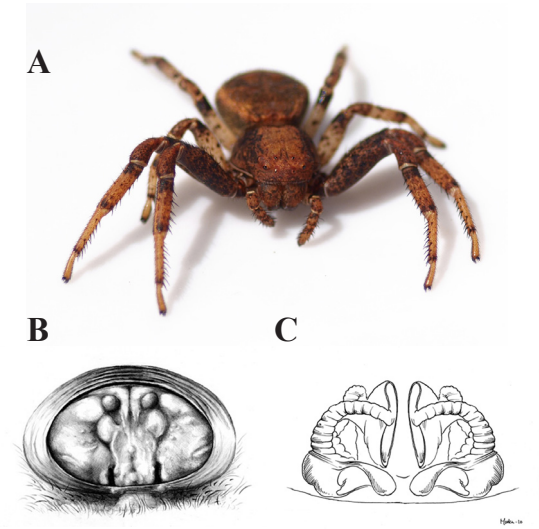

FIGURE 31. *Xysticus luctator* L. Koch, 1870. **A**. Habitus of female. **B**. Epigyne. **C**. Vulva. Photo and drawings: Glenn Halvor Morka.

in one site at Arekilen indicate the species may be locally bundant.

THOMISIDAE

***Xysticus luctator* L. Koch, 1870**

Material: **AAY**, Gjerstad: Mo (EIS 11, 58.51672°N 09.4472°E), 1♀, 20.VIII.2009, leg.GHM. 2♂♂, 27.IX.2009, leg. AA, all hand picked from low vegetation. In addition, between 20–30 individuals have been observed at the same locality, but not collected.

Remarks: This, the largest of the Fennoscandian *Xysticus*-species, has so far only been found in Gjerstad in Norway, despite extensive searches elsewhere. This is somewhat surprising as the species is know from southern Sweden north to Uppland (Almquist 2006) as well as Finland and most countries in Europe (Nentwig *et al.* 2016). It is associated with sites with low vegetation from both lowlands and mountainous regions (Nentwig *et al.* 2016) as well as dry heatland and leaf-litter (Roberts 1995). The Norwegian records on the other hand, are from low vegetation at the edges of mixed forests where the species can be seen to climb onto leaves and flowers at night time (Glenn Halvor Morka unpub. obs.) thus suggesting a nocturnal hunting strategy in this species.

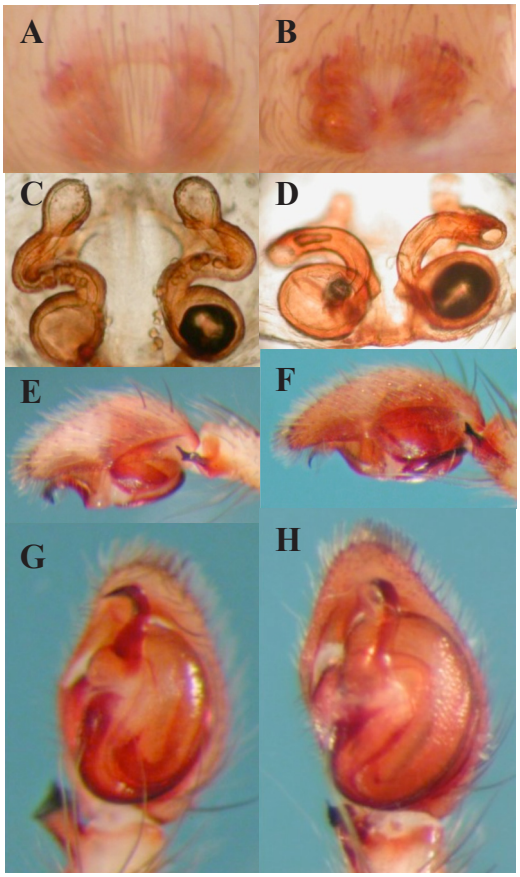

FIGURE 32. *Zora armillata* Simon, 1878 & *Z. spinimana* (Sundevall, 1833). **A**. Epigyne of *Z. armillata*. **B**. Epigyne of *Z. spinimana*. **C**. Vulva of *Z. armillata*. **D**. Vulva of *Z. spinimana*. **E**. Palpal organ of *Z. armillata*, lateral view. **F**. Palpal organ of *Z. spinimana*, lateral view. **G**. Palpal organ of *Z. armillata*, ventral view. **H**. Palpal organ of *Z. spinimana*, ventral view. Photos: Arne Fjellberg.

Both its size and the rust-red colour (Figure 31A) as well as the genitalia (Figure 31B–C) allow for easy identification of this species.

MITURGIDAE

***Zora armillata* Simon, 1878**

Material: **VE**, Tjøme: Ormelet (EIS 19, 59.63025°N 10.245811°E), 1♂, 22.IX.2010, hand picked from pile of twigs in garden, leg. AF. 1♀, same habitat, 23.IX.2010, leg. AF.

Remarks: For a very long time only two species of *Zora* have been known from Norway, i.e. the common and widespread *Z. spinimana* (Sundevall, 1833) and *Z. nemoralis* Blackwall, 1861. This is somewhat surprising as no less than six *Zora*-species are known from Sweden and Finland (Almquist 2006, Koponen 2008). New records of species from this genus were thus expected in Norway, especially in the southereastern corner. It is therefore with some anticipation and joy that two new *Zora*-species can be presented below.

The first to be found was *Z. armillata*. This is very similar to *Z. spinimana* in general appearance, but is distinguished both by details of its secondary genitalia as well as the lack of dense tufts of hairs on coxae IV in the males. The differences in epigynes, vulvae and palpal organs are illustrated in Figure 32A–H.

Z. armillata is known from central Sweden (Almquist 2006) and is known from most countries in Europe (Nentwig *et al.* 2016). It is usually associated with wet and moist habitats like bogs, swampy forests and moist meadows (Almquist 2006).

***Zora silvestris* Kulczynski, 1897**

Material: **TEY**, Bø: Folkestadmogane (EIS 17, 59.27267°N 09.2589°E), 1♂1♀, 10.X.2010, sieving from detritus, leg. GHM.

Remarks: This second new *Zora*-species also bears a considerable resemblance to *Z. spinimana* and *Z. armillata* (Figure 33A), but can be distinguished by its genitalia. The Norwegian specimens examined also have more dark brownish spots on the ventral side of both the prosoma and abdomen (Figure 33B) than the other species, which may be an aid in identification. Furthermore, the metatarsus of legs I & II have only two ventral spines (Figure 33C) in contrast to the other *Zora*-species, which have three pairs of ventral spines.

Z. silvestris is more widespread in Sweden than *Z. armillata*, having been taken throughout the southern half of the country (Almquist 2006) and is also widely distributed in Europe to Central Asia (Nentwig *et al.* 2016). It prefers rather dry habitats, such as heathland with junipers, dry, open pine forests with lichen, but it may also occasionally occur in *Sphagnum* in bogs (Almquist 2006).

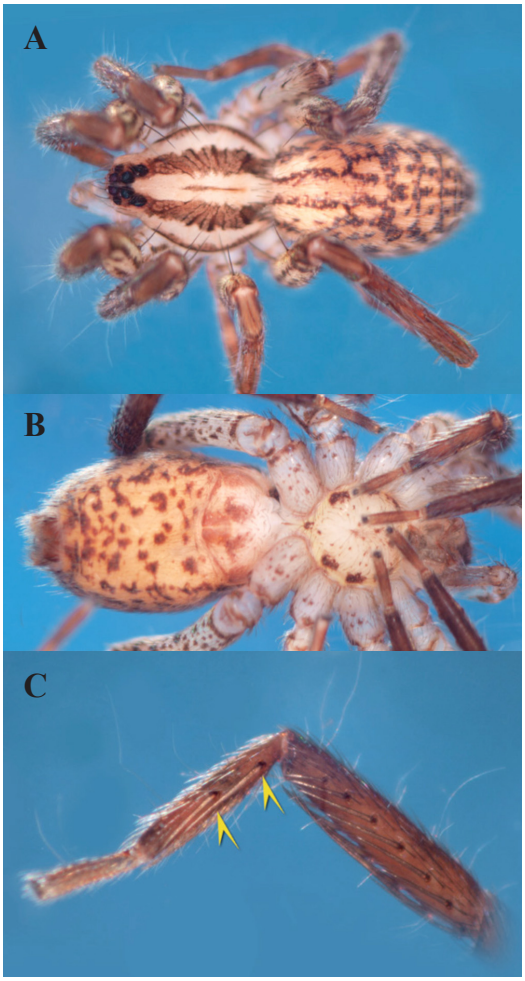

FIGURE 33. *Zora silvestris* Kulczynski, 1897. **A**. Habitus, dorsal view. **B**. Habitus, ventral view. Note dark brown spots. **C**. Leg I with two pairs of ventral spines on metatarsus clearly visible, distinguishing it from its congeners. Photos: Glenn Halvor Morka.

Discussion

With the 46 species presented here in addition to a previously undescribed *Zelotes*-species to be described elsewhere (Aakra & Morka in prep.), the Norwegian spider fauna currently stands at a grand total of 611 species. This represents a

marked increase since the publication of the last Norwegian checklist (Aakra & Hauge 2003) and the new species presented in the current paper thus alone constitutes 7 % of the new total number of species for Norway! As mentioned in the introduction, the new discoveries are due to a concerted and diverse collection effort by both trained specialists and amateurs alike, which has taken place over most parts of the country; from the southern coastal strip to eastern Finnmark. The establishment of a Norwegian spider forum on the internet in spring 2010 where most of the Norwegian collectors now participate and post images of their finds and habitats has contributed significantly to this, not only by stimulating collections but also by making it possible for amateurs to get help with identification. The forum also serves as a communal determination control and ensures that the distribution data that is made available to the public on the distribution database of Artsdatabanken (the Norwegian Biodiversity Information Centre) is of very high quality. An added advantage of this forum is that many more people than pure professionals working at established natural history museums have accumulated knowledge and determination skills on spiders which otherwise are difficult to obtain outside of such institutions.

Many of the species reported here have been included in the first author´s so-called "blue list" of species expected to occur in Norway (Aakra unpub. manuscript). This list was based on distributional and ecological data from neighbouring countries (principally Sweden and Finland) to estimate which species are likely to occur in Norway. However, a few of the species reported in the current paper are not on the blue list and their discovery in Norway was thus unexpected and somewhat surprising. These include the very rare and unusual myrmecophiles *Diastanillus pecuarius* and *Syedra apetlonensis*, a strong indication that the Fennoscandian myrmecophile spider fauna is still insufficiently known. These species probably occur in Sweden and possibly Finland as well and should be searched after in those countries.

Another such species is *Enoplognatha serratosignata*. It probably represents an eastern and southern faunal element, perhaps typical of the steppe-fauna. Its occurrence in the dry central continental parts of southern Norway may thus be relictual in nature. Another apparently very rare species, which quite unexpectedly was found in southern Norway, is *Achaeridion conigerum*. The apparent rarity of this species throughout Europe is quite obviously caused by its minute size and dark colour and cryptic behaviour, which make it very hard to see in its natural habitat. The two independent records reported here, one from southern Norway and one from Gothenburg, Sweden, indicates that the species may be found throughout southern Sweden and some distance into the southeastern corner of Norway.

Some of the new species reported here have proved to be quite numerous and locally common, such as *Trichopterna cito*, *Pardosa saltans* and *Estrandia grandaeva*. *T. cito* has probably been just missed in previous investigations in southern Norway, partly due to its habitat, whereas *P. saltans* has been "hidden" in the *P. lugubris*-complex of species. Examinations of collections of *P. lugubris* s. l. in museums may reveal additional records of *P. saltans*. *E. grandaeva* may have been missed because few studies have been undertaken in old-growth forests in southern Norway, and the same probably applies to eastern Finnmark where the species must definitely be characterized as a common member of the spider fauna of the undergrowth in pine forests and mixed forests.

A few of the species reported here have uncertain taxonomic status at the time of writing, including *Mastigusa macropthalma*, *Emblyna mitis* and *Troxochrus cirrifrons*. Their taxonomic status thus may change when revisions are made.

In addition to these species new to Norway, the Norwegian spider group have also found several rare and under-recorded species. These will be published in various reports and are also made available on Artdatabanken´s Species Observation site. Finally, a new annotated Norwegian checklist for spiders incorporating the new species reported here and elsewhere after Aakra & Hauge (2003) will be published separately (Aakra & Farlund in prep.).

Acknowledgements. We extend our sincerest thanks to Andrei Tanasevitch, Torbjørn Kronestedt, Cristoph Muster, Barbara Knoflach-Thaler and Seppo Koponen for help with various aspects of the species treated in this paper and for providing some key papers. We also thank Jørgen Lissner for allowing us to publish his record of *Acheridion conigerum* from Sweden. The first author would also like to thank his co-authors for their patience and all the work involved with the photos and illustrations made available for this paper. Some of the species reported here were found on expeditions (Southern Norway 2010 and Eastern Finnmark 2011) funded in part by SABIMA and Arne Fjellberg´s investigations were funded by INVENT-ART and Artsprosjektet (Norwegian Taxonomy Initiative) of Artsdatabanken (Norwegian Biodiversity Information Centre).

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