

Two species of *Arboridia* (Auchenorrhyncha: Cicadellidae) new to Fennoscandia

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With *Arboridia parvula* (Boheman, 1845) one species of the genus *Arboridia* Zachvatkin, 1946 (Auchenorrhyncha: Cicadellidae) has been reported from Fennoscandia so far. This paper reports on two additional species of this genus in Fennoscandia: *A. erecta* (Ribaut, 1931) and *A. pusilla* (Ribaut, 1936). *A. pusilla* has never been recorded from Northern Europe. Both species probably have a very restricted distribution in Fennoscandia.

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1. Introduction

In her monograph of the genus *Arboridia* Zachvatkin, 1946, Dworakowska (1970) lists 33 species worldwide (including *Erythroneura defecta* (Dlabola, 1957), now *A. defecta*), 15 of them from Europe. Nast (1972, 1987) lists 32 species from the Palaearctic (excluding *Erythroneura lawsoniana* = *Arboridia* (*Erythridula*) *dorsalis* (Gillette, 1898) comb. n. Dworakowska 1970) and – based on Dworakowska (1970) – 15 species from Europe. Two species described from Asia have recently been discovered in Europe. *A. loginovae* (Emeljanov, 1964), previously only known from Altai Mts. and Kazakhstan (Dworakowska 1970), has been reported from the Czech Republic (Lauterer 2000). *A. kakogawana* (Matsumura, 1932), previously only known from Japan and Korea (Dworakowska 1970), has recently been found to be a pest on grapevine in southern Russia (Gnezdilov et al. 2008). Two new *Arboridia* species have also been described from Europe after Dworakowska (1970). One was described from Strandža in Bulgaria in 1987

(*A. strandjensis* Bayryamova, 1987) and another one was described from France in 1999 (*A. pititia* Della Giustina, Remane & Wilson, 1999). Nickel (2003) considers the species *A. versuta* (Melichar, 1897), the holotype of which is a female, as dubious and reintroduces *A. spathulata* (Ribaut, 1931) previously treated as a junior synonym of *A. versuta* by Dworakowska (1970). Both species are erroneously treated as valid by Jach (2010). Nast (1987) discusses a possible synonymy of *A. simillima* (Wagner, 1939) and *A. potentillae* (Moravskaja, 1948). Another synonym of *A. simillima* might be *A. loginovae* (Emeljanov, 1964) (H. Nickel pers. comm.). If considering all three as valid, there are now 19 European species within the genus *Arboridia*.

According to Ossiannilsson (1981), only one species of the genus is found in Fennoscandia and Denmark, namely *Arboridia parvula* (Boheman, 1845). This is confirmed in the latest catalogue of the Auchenorrhyncha of Northern Europe (Söderman et al. 2009). This catalogue lists four species of *Arboridia* from Northern Europe, all except the widely distributed *A. parvula* are found

only in the Baltic countries (Latvia and Lithuania). Dworakowska (1970) and Nast (1972) list *A. ribauti* (Ossiannilsson, 1937) from Sweden, but this has been omitted in later works (Nast 1987, Ossiannilsson 1983, Söderman *et al.* 2009).

Since 2003, the Norwegian Institute for Nature Research (NINA) has directed the project “Red-listed species – Survey and Monitoring” (ARKO) as a part of the government-initiated “National Program for Survey and Monitoring Biodiversity”, the main target of which has been to identify important habitat types (hot-spot habitats) for threatened species (Sverdrup-Thygeson *et al.* 2007, 2009). A substantial amount of data has been recorded about rare and threatened species, including many species which previously never have been recorded from Norway or Scandinavia (Ødegaard *et al.* 2009).

One of the hot-spot habitats defined within the ARKO project is dry, calcareous meadows, a habitat known to harbour many rare and threatened species (Endrestøl *et al.* 2005, 2006, 2007). Here I report on two new *Arboridia* species to Fennoscandia, which were found in the Oslo-fjord region in Norway in material collected in this habitat type.

2. Material and methods

In 2009, three localities of dry, calcareous meadows in three different islands/peninsulas in the Oslo-fjord region where investigated using a base-line trap design of two Malaise traps, two intercept traps and 20 pitfall traps in each area. The traps were mounted at the beginning of May and checked once a month until the beginning of September. All specimens listed below were caught using Malaise-traps with a preservative fluid consisting of two-thirds propylene glycol and one-third water. Coordinates (decimal degrees) are given for the centre of the localities, with the Malaise traps no more than 50 m away. If nothing else is mentioned, leg./det. A. Endrestøl, coll. NINA.

3. Results

Leafhoppers of the genus *Arboridia* are very similar in their morphology. Males can be separated by the shape of the aedeagus and styles (Bieder-

mann & Niedringhaus 2004), but females cannot be distinguished morphologically (Aguin Pombo 2001, Nickel 2003). Therefore, female records are listed at the end. On at least one locality both species coexist.

3.1. *Arboridia erecta* (Ribaut, 1931) ♂♂

Norway, Akershus county, Bærum municipality, Ostøya (Ringerikshaugene), 59.86668N–10.58245E: 06.V.–03.VI.2009, 1♂; 29.VII.–02.IX.2009, 3♂♂

A. erecta is polyphagous on deciduous trees and shrubs. Most host plants belong to the families Fagaceae, Corylaceae, Aceraceae and Rosaceae (Aguin Pombo 2001, Nickel 2003). I found adults in V and VIII, which is consistent with other literature (Aguin Pombo 2001, Nickel 2003). *A. erecta* is thermophilous (Nickel 2003). European records are from central and southern parts, and it was recently published new to the Iberian Peninsula (Aguin Pombo 2001). It was reported new to Germany in 1996 (Heller 1996) and according to Nickel (2003) at its northern edge of its range there with only four known localities from the country. In addition to the records published here, the only Northern European record is from Latvia (Söderman *et al.* 2009).

3.2. *Arboridia pusilla* (Ribaut, 1936) ♂♂

Norway, Akershus county, Bærum municipality, Ostøya (Ringerikshaugene), 59.86668N–10.58245E: 06.V.–03.VI.2009, 1♂; 24.VI.–29.VII.2009, 2♂♂; 29.VII.–02.IX.2009, 3♂♂

Norway, Oslo county, Oslo municipality, Bleikøya, 59.8905N–10.743E: 05.V.–02.VI.2009, 9♂♂; 02.–26.VI.2009, 4♂♂; 26.VI.–28.VII.2009, 9♂♂; 28.VII.–01.IX.2009, 15♂♂

Host plants given by Dworakowska (1970) are *Geranium sanguineum*, *Ulmus campestris* (= *U. minor*), *Prunus spinosa* and *Prunus cerasus*. *A. pusilla* is in Germany strictly confined to *Geranium sanguineum* (Nickel 2003). Both Norwegian localities given above have *G. sanguineum* (teste Endrestøl), and it is suspected that this is the host plant in Norway. This species is thermo-

philous and German records are restricted to warm regions in southern parts of the country (Nickel 2003). European records are from central parts (Austria, Belgium, Bulgaria, Corsica, Czech Republic, Germany, Hungary, Russia Central, Switzerland, Ukraine and former Yugoslavia) (Jach 2010). It is also listed from France according to Nast (1987). This species is new to Northern Europe according to Söderman *et al.* (2009).

3.3. *Arboridia* sp./spp. ♀♀

Norway, Akershus county, Bærum municipality, Ostøya (Ringerikshaugene), 59.86668N–10.58245E: 06.V.–03.VI.2009, 6♀♀; 03.–24.VI.2009, 3♀♀; 24.VI.–29.VII.2009, 1♀; 29.VII.–02.IX.2009, 3♀♀

Norway, Oslo county, Oslo municipality, Bleikøya, 59.8905N–10.743E: 05.V.–02.VI.2009, 5♀♀; 02.–26.VI.2009, 3♀♀; 26.VI.–28.VII.2009, 5♀♀; 28.VII. 01.IX.2009, 14♀♀

Norway, Østfold county, Moss municipality, Jeløya [NE], 59.50219N–10.66622E: 05.VI.–01.VII.2009, 3♀♀ (leg. A. Endrestøl & T. J. Olsen)

4. Discussion

Dry, calcareous meadows in the Oslo-fjord region are found at bedrock of Cambro-Silurian origin, in a zone between the sea and forested inland areas. The habitat is frequently exposed to drought, due to a combination of high soil drainage and exposure to wind and sun. This results in a diverse and specialized flora and fauna, both as a combination of the soils and the relatively high overall temperatures (Fjellberg *et al.* 2010). This habitat type has mostly been destroyed on the mainland as a result of urbanization and other anthropogenic influences, but is still present in several islands and peninsulas in the inner Oslo fjord area due to less anthropogenic pressure. Fragmentation of these habitats is likely to be more severe for monophagous herbivores and species with reduced dispersal abilities (Steffan-Dewenter & Tscharrntke 2002), which is true for many of the Auchenorrhyncha species (e.g. Nickel 2003).

The findings of *Arboridia erecta* and *A. pusilla* from Norway were not expected as they both are known as thermophilic species from Central Europe (H. Nickel pers. comm.). Even so, the characteristics of the areas described above are evidently suitable for these species, both regarding host plants and climate, and underline the role of the calcareous meadows in inner Oslo fjord basin as a hot-spot for biodiversity, both in a national and international perspective. Even though the host plants of the both species are present along other parts of the Norwegian coastline, it is unlikely that they have a broader range in Norway than in the inner Oslo fjord area due to their climatic constraints. They are probably not undersampled, and even though they might be present in additional areas in southern parts of Fennoscandia (e.g. southern Sweden), it is unlikely that they are widely distributed in this region.

Including the records reported here, there are now a total of three species of *Arboridia* in Fennoscandia and five in northern Europe.

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