

New data on the distribution of *Chionea* Dalman, 1816 (Diptera, Limoniidae), and on habitat choice of *C. araneoides* Dalman, 1816 at high altitudes

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A number of new records of *Chionea araneoides* Dalman, 1816 from the county of Nordland (NSI and NSY) are presented. The total knowledge today indicates a distribution over the whole country. A single individual of *Chionea crassipes* Boheman, 1846 collected in Rana (NSI) contradicts an earlier assumption of a bicentric distribution in Norway. While *C. crassipes* has been found to be more common than *C. araneoides* in Finnmark, the opposite is the case south of Troms. In order to find out at which latitude the dominance between the two species shifts, more records of *Chionea* Dalman, 1816 from Troms are needed. At Vågå in northern Oppland County (ON), *C. araneoides* has been collected repeatedly above the tree line, up to 1465m above sea level, which is a new Norwegian altitude record. Habitat choice at high altitudes is commented on.

Key words: Diptera, Limoniidae, *Chionea araneoides*, *Chionea crassipes*, distribution, alpine habitat, altitude.

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Introduction

Hågvar *et al.* (2010) gave a review of the known Norwegian distribution of *Chionea* Dalman, 1816 (Diptera, Limoniidae). These wingless and spider-like insects are famous for being active on snow (Figure 1), and lay their eggs during winter (Hågvar 1976, 2010). While *Chionea araneoides*

Dalman, 1816 is common in southern Norway and rare in Finnmark, the opposite is the case with *Chionea crassipes* Boheman, 1846. However, records of *Chionea* from Nordland County have been lacking, so the present data shed new light on the distribution of the two species.

While *Chionea araneoides* is usually regarded as a typical forest-living species, recent studies in



FIGURE 1. A female *Chionea araneoides* Dalman, 1816 on snow. Adults of this wingless and cold-tolerant Diptera are only active during winter. Photo: Niels Sloth (Biopix).

Vågå, Oppland County, documented the species from various alpine habitats at high altitudes.

Material and methods

The main material from Nordland County was made available from Helgeland Museum. The alpine data from an altitudinal gradient in Vågå, Oppland county (approximately 62°N, 9°E), central south Norway, is part of a larger ecological project (LTAER) run by Jörg Löffler and co-scientists (for a closer description see e.g. Löffler 2003, 2005; Finch & Löffler 2010). The specimens are deposited at the University of Bonn, Germany. In the Vågå mountains, the low alpine belt reaches from the tree line at about 1030m.a.s.l. to about 1350m.a.s.l. (Dahl 1986). The transition zone between the low and middle alpine belt is situated between 1350m.a.s.l. and 1400m.a.s.l., followed by the middle alpine belt reaching up to 1618m.a.s.l. (Mt. Blåhø).

According to Moen (1999), the area belongs to the most continental part of Norway, with only 300–400mm annual precipitation. Only 13–15 weeks are snow-free in the low alpine, and 11–12 weeks in the middle alpine belt (Löffler 2002). Starting at the tree line, sampling sites were established for each new 100m altitude. At 1465m.a.s.l., large temperature variations were recorded by Hobo Data Loggers during the sampling period 15–29 September 2009. At 15cm above ground, the air temperature varied between -6.5–14.9°C, with a mean temperature of 2.5°C. Vegetation analyses were done according to a frequency method (Kratochwil & Schwabe 2001). Three pitfall traps with saturated salt solution as a preservative and Agepon as a detergent were installed at each sampling site from 30 September 2008 until June 2012. Pitfall traps were emptied on a biweekly (in 2009) or a three to four weekly basis (in 2011). The contents were transferred to 70% ethanol for preservation.

Results

New records of Chionea araneoides

NSI, Rana: Straumbygda, EIS 122, 20 December 1975, 1 ind., leg. Straumfors, P.; Rana: Ildgrublia, EIS 123, 20 February 1980, 1 ind., leg. Straumfors, P.; Rana: Selforsfjellet, EIS 123, 23 November 1985, 1♀, leg. Straumfors, P.; Rana: Utskarpen, EIS 122, 12 January 1972, 1♂, leg. Lundmo, S.; Rana: Utskarpen, EIS 122, 4 January 1973, 1♂, leg. Lundmo, S.; Rana: Utskarpen, EIS 122, 23 November 1979, 1♀, leg. Lundmo, S.; Rana: Utskarpen, EIS 122, 12 December 1979, 1♀, leg. Lundmo, S.; Rana: Utskarpen, EIS 122, 28 December 1979, 1♂, leg. Lundmo, S.; Rana: Utskarpen, EIS 122, 30 January 2011, 1♂, leg. Lundmo, S.; Rana: Utskarpen, EIS 122, 5 January 2013, 1♀, leg. Lundmo, S.; Rana: Steinhaugfjellet, EIS 122, 3 February 2013, 2♂♂ and 2♀♀, leg. Lundmo, S.; Rana: Raudvatnet, EIS 123, 22 February 2013, 2♀♀, leg. Rølvåg, H.; Rana: Bolna, EIS 124, 26 March 2013, 1♂, leg. Pedersen, A. K.; Fauske: Halshaugan i Øvre Valnesfjord, EIS 131, 30 December 2012, 1♀, leg. Husdal, T. A.; Beiarn: Tverrbrennvatnet, Beiarnfjell, EIS 126, 13 January 2013, 10 ind., leg. Husdal, T. A.; **NSY**, Bodø: Kalvhagosen, Mørkved, EIS 130, 2 February 2013, 1♀, leg. Ørsnes, G.; Bodø: Hunstadtoppen, EIS 130, 5 January 2013, 1 ind., leg. Husdal, T. A.; Lurøy: Kvina, EIS 122, 2 March 2013, 2♂♂, leg. Solvang, J.; Lurøy: Kvina, EIS 122, 10 March 2013, 1♂ 1♀, leg. Solvang, J.; **ON**,

Vågå: Several catches with pitfall traps on Blåhø, EIS 71, leg. Hein, N. & Löffler, J.: 8♂♂ 5♀♀ (see Table 1).

New record of Chionea crassipes

NSI, Rana: Hammeren, EIS 123, 5 March 2013, 1♀, leg. Rølvåg, H.

Habitat choice of C. araneoides at high altitudes

As shown in Table 1, *C. araneoides* was pitfall-trapped both in uppermost, open birch forest, in a slope just above the tree line, and on various ridges at different altitudes up to 1465m.a.s.l. This is the highest altitudinal record in Norway. Figures 2–3 illustrate sample sites on ridges at 1339m.a.s.l. and 1465m.a.s.l., respectively, showing large difference in surface structure and stone cover. However, the composition of vegetation was rather similar in the altitude span from 1339–1465m.a.s.l., being typical for middle alpine ridges in this part of Norway. The vegetation was more or less sparse and patchy, with open ground and scree in between. The lichen vegetation was dominated by species typical for no or only little snow coverage during winter (e.g. *Cetraria nivalis*, *Alectoria ochroleuca*, *Cetraria cucullata*). Gramineous species were quite common at the alpine ridge sites; *Carex bigelowii* and *Luzula confusa* being the most frequent species. Following Dahl (1987), the vegetation type can be described as *Cetrarietum*

TABLE 1. High altitude catches of *Chionea araneoides* Dalman, 1816 at Vågå, northern Oppland.

Altitude (m.a.s.l.)	Habitat	Sampling period	Males	Females
1029	Ridge in uppermost birch forest	28 Sept. 2010–19 June 2011	-	1
1029	Southfaced slope 30 m above tree line	28 Sept. 2010–19 June 2011	4	2
1339	Ridge	12-30 Sept. 2011	1	-
1363	Ridge	15-29 Sept. 2009	-	1
1452	Ridge	15-29 Sept. 2009	1	1
1465	Ridge	15-29 Sept. 2009	1	-
1465	Ridge	30 Sept. 2008–2 May 2009	1	-



FIGURE 2. Habitat for *Chionea araneoides* Dalman, 1816 on ridge at 1339m altitude. Photo: Nils Hein, September 2009.



FIGURE 3. Habitat for *Chionea araneoides* Dalman, 1816 on ridge at 1465m altitude. Photo: Nils Hein, September 2009.

nivalis caricetosum (Löffler 1998). According to Halvorsen et al. (2009), it is lime-poor wind-exposed alpine ridge and tundra, category T29: 23.

Discussion

Distribution

The new records of *C. araneoides* from six different EIS squares and from several winters in Nordland bind together the earlier records from southern and northernmost Norway, indicating a distribution over the whole country. As in southern Norway, *C. araneoides* seems to be more common than *C. crassipes* in Nordland. In Finnmark, however, the opposite is the case (Hågvar et al. 2010). *C. crassipes* seems to be a northern and eastern species, with records also in northern Sweden and Finland (Oosterbroek & Reusch, 2008, Hågvar et al. 2010). The single individual reported from Nordland in the present paper is, however, interesting since it contradicts the idea of a bicentric distribution in Norway (Hågvar et al. 2010). More northern material, especially from Troms, would be welcome in order to clarify at which latitude the dominance between the two species shifts. The absence of *C. crassipes* from the alpine material at Vågå supports the impression of its rarity in southern Norway, even at high altitudes.

Habitat choice of *C. araneoides*

C. araneoides has been considered to be a typical forest species, although a few records above the tree line, up to 1200m.a.s.l., have been reported (Hågvar et al. 2010). The present data from Vågå shows that the species is very flexible and fully capable to live above the tree line, in the alpine zone. The larva is known to develop in the soil, and perhaps they live as generalist decomposers, as near-related larvae of cold-tolerant Tipulidae and Trichoceridae do (Hågvar 2010). However, one should not underestimate the periodic heating of the open ground surfaces in alpine habitats, illustrated by the referred air temperature

maximum of 15°C.

At Finse on the Hardangervidda mountain plateau in central south Norway, pitfall trapping of invertebrates have been performed during many years at altitudes from 1200m.a.s.l. and upwards. The first author can confirm that *Chionea* specimens have never been reported from this alpine area. This may indicate local occurrence in alpine areas. However, another winter active insect, *Boreus hyemalis* (L., 1767) (Mecoptera) was collected, and also found in birds' stomachs at corresponding altitude at Stigstuv on Hardangervidda (Hågvar & Østbye 2011). Near Finse, *B. hyemalis* was sampled as high up as at 1400m.a.s.l. (Greve 1965, Fjellberg & Greve 1968). Like *C. araneoides*, *B. hyemalis* is usually considered to be a forest insect. The general tolerance for low temperatures in both species (Hågvar 2010) may explain their common altitudinal tolerance. Also, their soil-living larvae must be ecologically very flexible.

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