

Contribution to the Fennoscandian distribution of the caddisfly *Crunoecia irrorata* Curtis, 1834 (Trichoptera, Lepidostomatidae)

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Bergan, M.A. 2015. Contribution to the Fennoscandian distribution of the caddisfly *Crunoecia irrorata* Curtis, 1834 (Trichoptera, Lepidostomatidae). *Norwegian Journal of Entomology* 62, 224–228.

During a seven-year period, from 2009 to 2015, with annual routine monitoring studies of macroinvertebrate communities in smaller streams in Trondheim municipality (Sør-Trøndelag County, Norway), two larvae specimens of the caddisfly *Crunoecia irrorata* Curtis, 1834 (Trichoptera, Lepidostomatidae), were recorded. The specimens were collected 29 October, 2010 and 24 October, 2012 in Høstadbekken; a small tributary-spring to the small-sized river Ristelva in Trondheim municipality. *C. irrorata* is widely dispersed across Europe, and occurs in southern parts of Norway, but the species has never been recorded north of Hordaland County. This record of *C. irrorata* is by far the northernmost observation of the species in Norway, and one of the northernmost for Fennoscandia. Glacial history and climate are factors suggested to limit the northern distribution of the species. The present record most likely represents an ancient population, and might indicate a broader northern distribution than previously known for the species.

Key words: *Crunoecia irrorata*, Trichoptera, distribution, spring, Fennoscandia, Norway.

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Introduction

The spring-dwelling caddisfly *Crunoecia irrorata* Curtis, 1834 (Trichoptera, Lepidostomatidae) is widely dispersed throughout south- and central-Europe (Malicky 2013). *C. irrorata* is classified as a rare species at the European scale (Rychla *et al.* 2015). The species is mostly recorded from the southern parts of the Nordic countries; Norway (Solem and Andersen 1996), Sweden (Gullefors 2002, Gardenfors 2005), and Finland (Ilmonen 2008). In north-western Russia the species is present (Malicky 2013), but has been recorded only in the St. Petersburg district, according to Ilmonen (2008). *C. irrorata* was recorded for the first time in 1996 in Finland (Saarela 1999), and was subsequently evaluated as endangered (EN) (Rassi *et al.* 2001). Nationwide surveys

of zoobenthos in springs in Finland show that the distribution of *C. irrorata* is restricted to the south-western part of the country (Ilmonen 2008). *C. irrorata* is also red-listed (vulnerable, VU) in Sweden (Gardenfors 2005). It occurs in the southern provinces, except for an isolated record in central Sweden (Gullefors 2002, Gardenfors 2005). In Norway the species is not considered as endangered, with red-list status least concern (LC) both in 2010 (Kålås *et al.* 2010) and in 2015 (Henriksen & Hilmo 2015), mainly due to several records from southern Norway. In Norway, the species has been recorded in the counties Vestfold (Andersen 1975), Hordaland (Andersen 1979), Telemark (Andersen *et al.* 1990) and Buskerud (Andersen *et al.* 1993). No records of *C. irrorata* is known north of Hordaland in Norway.

Methods

Benthic macroinvertebrate samples from the substratum was collected using a standard kicking technique (Frost *et al.* 1971), and the whole sample was preserved in 70 % ethanol for further studies in the laboratory. The collecting net had a mesh-size of 250 μm . Active collecting time was 3 minutes (R-3), emptying the net every minute to avoid clogging by detritus, and subsequent backwash of material. Sampling dates were 29. October 2010 and 24. October 2012.

Study site and habitat description

Høstadbekken, also known as Skirma, is a small tributary-spring to the small -sized river Ristelva/Ristbekken in Trondheim. Høstadbekken, despite its small size and narrow catchment area, never dries out and has lower water temperatures during

summer compared to nearby streams, caused by the groundwater supply and the well-developed riparian vegetation at the study site. The study site is located approximately 110 meters above sea level. Ristelva is located about 15 km west of Trondheim City center, in the area of Byneset. Upper and middle parts of Høstadbekken has a relatively undisturbed water quality and hydromorphology, appearing as a pristine spring (Figure 1), with the main catchment area consisting of undisturbed woodland, mires and small mire-ponds around Bosbergheia (537 m.a.s.l.). The catchment area of Høstadbekken is dominated by coniferous forests in the upper parts, but with abundant elements of deciduous forest further downstream. Riparian vegetation is undisturbed, abundant and well-developed, and partly dense at the study site, with a high degree of coarse woody debris, sunken wood (snags and root-wads), branches and trees/bushes overhanging the stream. The substratum is dominated by gravel (diameter: 2–6



FIGURE 1. Høstadbekken. Photo: Morten Andre Bergan

cm) and small stones (diameter: 6–15 cm), with larger stones (diameter: 15–40 cm) also present, interspersed with some sand (diameter: 0–2 cm) and organic matter (detritus). Water discharge is characterized by shallow rapid currents (depth: 5–10 cm), with a few shallow (depth maximum: 0.5 m) pools with moderate water velocity. Water-covered width of Høstadbekken at the study site varies between 1–3 meters, with restricted periphytic growth on the substratum. Scattered patches of mosses are present. Ristelva, including Høstadbekken, has a non-anadromous population of brown trout (*Salmo trutta* Linnaeus, 1758), and Høstadbekken functions as a key spawning habitat for the stream-resident trout-population in Ristelva (Bergan *et al.* 2008, Nøst 2015).

Results

Two individual larvae of *C. irrorata* were collected in two separate years (2010 and 2012) from the study site in Høstadbekken, at sampling dates 29 October, 2010 and 24 October, 2012. The



FIGURE 2. Map showing Ristelva including tributaries (yellow outline), with Høstadbekken emphasized (blue outline). Study site marked with black arrow and yellow dot. Map source: <http://vann-nett.no/saksbehandler>.

exact location of the records are UTM /EUREF89 32 V 7031274 N, 557996 E (see Figure 2 for an overview map). Both individuals appeared as late stadium larvae. The specimens were found inside their intact houses, and were undamaged larvae (Figure 3). Gender was not determined.

Discussion

This record of the larvae of *C. irrorata* is, by far, the northernmost observation of the species in Norway. It also appears to be one of the northernmost records of the species in Fennoscandia, as shown in the distribution map provided by Ilmonen (2008) (Figure 4). The record most likely represents an ancient population, as opposed to recent colonization.

The habitat in which *C. irrorata* was present

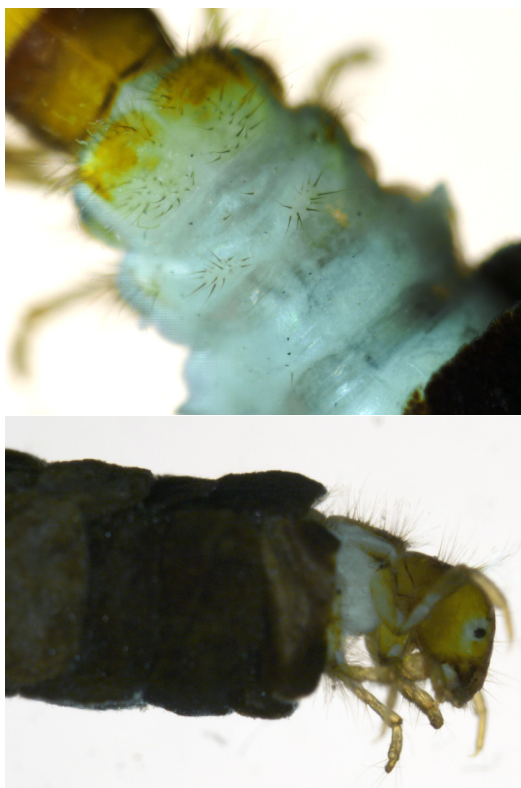


FIGURE 3. *C. Irrorata* Curtis, 1834 from Høstadbekken. Dorsal (top) and side (bottom) view. Specimen collected 24. October 2012. Photo: Morten Andre Bergan



FIGURE 4. The distribution of *Crunoecia irrorata* Curtis, 1834 in Europe, according to Ilmonen (2008). The recent record in Norway, Sør Trøndelag County, is indicated with a yellow dot on the map. “+” indicates recorded presence within a country or a large island, except for Russia, where the species has only been recorded in the St. Petersburg district.

meets the known preferences to *C. irrorata* larvae, according to the literature (Ilmonen (2008) and references therein). The larval development of *C. irrorata* lasts two years, and pupae are reported from June to early September, according to Ilmonen (2008). The present record, however, shows that within the northern range of the distribution, late stadium larvae can be found at least throughout October. Co-occurrence of *C. irrorata* with other red-listed spring-dependent taxa indicates high conservation value of the springs occupied (Ilmonen 2008). Agricultural activity, forestry, and water and gravel extraction are potential threats to *C. irrorata*. Therefore, populations of *C. irrorata* in the boreal zone should be conserved and monitored to ensure the species’ survival at the northern limits of its range. A substantial landslide affected both Ristelva and lower parts of Høstadbekken, approximately 1, 5 km downstream from the *C. irrorata* site,

during January 2012. This could potentially have reduced the spring’s population size of the species. Records of *C. irrorata* after 2012 in Høstadbekken have not occurred, despite annual macroinvertebrate monitoring studies. However, the annual sampling effort is low at the study site, confined to a small section (approximately 10-15 m) of the spring. No additional effort to document distribution, population size or other parameters regarding the presence of *C. irrorata* in Høstadbekken have been conducted. Effort should however be made to establish knowledge of *C. irrorata* population-size and distribution within Høstadbekken. Additionally, similar springs in the Trondheim-region should be sampled to detect possible presence of the species.

Acknowledgements. I would like to thank the water management office in Trondheim municipality and Technical manager Terje H. Nøst for acknowledging Høstadbekken and its value in their water management plans for the future. Thanks to Terje Bongard, Norwegian Institute for Nature Research (NINA) for verifying the taxonomic identification of the *C. irrorata* specimens, and thanks to Odd Terje Sandlund (NINA) for useful comments on the manuscript.

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Received: 26 June 2015

Accepted: 16 November 2015