Xestia gelida (Sparre Schneider, 1883) (Lepidoptera, Noctuidae) rediscovered in Norway

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The second Norwegian record of the boreal noctuid moth *Xestia gelida* (Sparre Schneider, 1883) is reported. The first Norwegian specimen, the holotype, was collected in Sør-Varanger, Finnmark, in 1882. The species was rediscovered in Nord-Trøndelag, Lierne municipality, in 2010. The faunistical history of the moth in Fennoscandia and its habitat and ecology are described. The habitat and the moth, including the holotype, are figured.

Key words: Lepidoptera, Noctuidae, *Xestia gelida*, Norway.

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Introduction

A group of species of the noctuid genus *Xestia* Hübner, 1818, is specially adapted to the northern conifer forests. These dull moths all have the same basic wing pattern and were placed in the subgenus *Anomogyna* Staudinger, 1871 (Fibiger 1993), currently in the extended subgenus *Pachnobia* Guenée, 1852 (Fibiger et al. 2010). They have strong affinity to an environment dominated by spruce and bilberry, and are more or less dependent on primeval forest. This makes them vulnerable to modern forestry, and several of the species are placed on national red lists, e.g. Gärdenfors ed. (2010) and Kålås et al. (2010). A striking adaption is the synchronized alternate year flight in *Pachnobia* species. This adaption is even shared with species of other genera of Noctuidae living in the same habitat. It probably makes them less vulnerable to parasites (Mikkola 1976). A typical member of *Pachnobia* is *Xestia gelida* (Sparre Schneider, 1883). The holotype was collected in Finnmark, Sør-Varanger in 1882. Until 2010 when the moth was rediscovered in Nord-Trøndelag, the type remained the only specimen known from Norway.

The records

The second (Fig. 1) and third Norwegian specimens of *X. gelida* were captured in Nord-Trøndelag (NTI), Lierne: Nordli, Kalvikbekken UTM 33W VM 4582 4861 (EIS 103), at 450 m. altitude on 5 July 2010, leg. L. Aarvik & C. Christiansen, and 12 July 2010, leg. C. Christiansen. Both specimens, males, were attracted to sugar ropes around midnight. These baits are ropes of sisal soaked in a solution of red wine and sugar. The ropes are cut in lengths of about one meter and are hung on low branches at dusk. The use of these ropes has proved to be effective in attracting moths (Elven 2006), and is especially useful in northern areas where the nights are too light to attract moths by artificial light.

FIGURE 1. The second Norwegian specimen of *Xestia gelida* from NTI, Lierne: Kalvikbekken 5. July 2010. Photo: Karsten Sund.

History

Hans Jacob Sparre Schneider (1853–1918) was curator at Tromsø museum from 1877 until his death (Sømme 2004). During his career he made numerous collecting trips to various parts of northern Norway. In July 1882 he went together with his friend, the minister Georg Sandberg (1842–1891), on an expedition to Sør-Varanger, Finnmark, at the time the least explored and poorest mapped part of Norway. Georg Sandberg was minister in Sør-Varanger in the years 1873–1883, and he could speak both Finnish and the language of the Laps. His knowledge of Finnish was essential for the success of the collecting trip because the few inhabitants of the area were Finnish settlers who did not know the Norwegian language. The most striking result of the trip was the first specimen of *Xestia gelida*, the sight of which first confused the collector. The circumstances of the event was described by Sparre Schneider [translated from Norwegian]: "*On the farm Eide close to Coalme-javre we received from a girl who by Sandberg had been taught to collect butterflies and moths, a quite pretty specimen of a strange Agrotis species, that temporarily is identified as this species [Agr. comparata Möschl.], so far only known from Labrador, but as likely to represent an until now unknown species*" (Sparre Schneider 1883). The specimen (Fig. 2) was said to have been captured in spring, end April-beginning of May. In an appendix to his paper Sparre Schneider actually described the moth as a new species and named it *Agrotis gelida*. He had received information from Dr. Möschler who considered it as an undescribed species.

The next reference to "*Agrotis gelida*" in the literature was in Christopher Aurivillius' monograph on the Macrolepidoptera of the Nordic countries (Aurivillius 1888–1891). Aurivillius mentioned two males collected in July by Friedrich Wilhelm Meves near Enafors in Jämtland. He described the Swedish specimens as a new variety: *Agrotis gelida* var. *mevesi* Aurivillius, 1889. This variety was more unicolorous dark grey than the specimen from Sør-Varanger. From Aurivillius' (1889) text it is clear that he had actually borrowed the *gelida* type and compared it carefully with

FIGURE 2. The holotype of *Xestia gelida* (Sparre Schneider). From FØ, Sør-Varanger: Eide 1882. Photo: Karsten Sund.

the two Swedish specimens. He brushed the abdomina to compare the valvae of the male genitalia (Fig. 3). This action obviously prevented him from describing *mevesi* as a new species distinct from *gelida*. However, Nordström et al. (1941) in the book on Swedish Macrolepidoptera, "Svenska fjärilar", treated it in the combination *Anomogyna mevesi* as a species distinct from *gelida*, though Nordström was not certain. His argument was that *gelida* had been found in May, whereas the two Swedish specimens from Jämtland had been collected on 27 July 1886 and 15 July 1888 respectively. In 1942 and 1944 the Finnish lepidopterist Birger Lingonblad collected numerous specimens in Muonio, Finnish Lapland (Lingonblad 1944). He found that the species is variable, but his material agreed more with the typical *gelida* from Sør-Varanger than with the Swedish var. *mevesi*. *Acronycta pfitzenmayeri* Herz, 1903 from Jakutsk in Siberia has turned out to be an additional synonym of *X. gelida* (Poole 1989, Fibiger 1993). For many years (Nordström et al. 1941, Imby & Palmqvist 1978) *gelida* was considered as a member of the genus *Anomogyna* Staudinger, 1871. Poole (1989) placed *gelida* in *Xestia* Hübner, 1818 which is a huge genus characterized by the presence of a ventral process, pollex, near the apex of the valva in the male genitalia. *Anomogyna* was considered as a valid subgenus of *Xestia* containing subalpine species of the taiga zone (Fibiger 1993). It was recently merged with another subgenus of *Xestia*, viz. *Pachnobia* Guenée, 1852 (Fibiger et al. 2010), and is a junior synonym of *Pachnobia*. All species of the extended subgenus have a boreo-alpine or boreal distribution.

FIGURE 3. Lateral view of the tip of the abdomen of the holotype of *Xestia gelida*, showing the male genitalia and the shape of the left valva. Photo: Karsten Sund.

Distribution

After its discovery in Jämtland by Meves, *X. gelida* was not rediscovered in Sweden until the 1940-ies (Imby & Palmqvist 1978). It is distributed along the mountain chain from Härjedalen in the south to Torne Lappmark in the north. It is rare in the southern part of its range, but locally common in the area of Kiruna/Jukkasjärvi in the north (Imby & Palmqvist 1978). In Finland known from 6 northern faunal provinces (Kullberg et al. 2002); Ostrobottnia kajanensis is the most southern, and this is situated about midway between the south coast and the Norwegian border in the north. Outside Fennoscandia it is distributed in northern Russia eastwards to Magadan in north-east Siberia (Fibiger 1993, Kononenko 2005).

Habitat and ecology

The species is classified as boreomontane (Kononenko 2005), which means that it inhabits the boreal taiga zone in the northern part of its range and the taiga belt in the mountains of the southern part of the range. The habitat is described as primeval spruce forest (Fibiger 1993, Imby & Palmqvist 1978). Lingonblad (1944) stated that the spruce forest was of the *myrtillus*-type, an indication that the field layer is dominated by bilberry (*Vaccinium myrtillus*). In Sweden single specimens have also been found on moraine hills in mountain birch forest with scattered pine trees (Imby & Palmqvist 1978). In this habitat the snow melts earlier in spring than in the surroundings. Prior to our search for the species in Norway we received additional hints from Claes U. Eliasson (pers. comm.) who had collected it in several Swedish localities. The features of the optimal habitat can be summed up as follows:

The forest should be on the top of a hill or on a slope of a hill which has tree cover all the way to the top. Thus the moths are sheltered from flows of cold air from mountains when they are on the wing during the night. The localities are often fringes of taiga forest along bogs. The forest must be of long continuity to give time for abundant growth of lichens on twigs and branches. The lichens enable the larvae to hide from their predators. The forest must be open to allow development of "skirts" on the trees. The lower branches reaching the bilberry plants, form a shelter for the larvae and also give access to the foodplants. The open forest will allow the sun to heat the habitat of the larvae and thus help them to complete their growth. This type of forest is also the habitat for other relatives of *X. gelida*, viz. *X. sincera* (Herrich-Schäffer, 1851), *X. fennica* (Brandt, 1936) (= *rhaetica* sensu auct.), *X. laetabilis* (Zetterstedt, 1839), *X. distensa* (Eversmann, 1851) and *X. borealis* (Nordström, 1933). The latter two species have not yet been recorded in Norway.

The locality (Fig. 4) in Lierne is a mosaic of bogs and low moraine ridges dominated by spruce, but also with some birch and pine trees. The field layer on the hills consists mainly of bilberry, *Vaccinium myrtillus*. The trees have abundant growth of lichens and are of different size and age, typical of old forest. The *X. gelida* specimens were collected on the small hill showing in the background on the photo. In this locality *Xestia laetabilis*, *X. speciosa* (Hübner, 1813) and *X. alpicola* (Zetterstedt, 1839) were recorded. The locality was visited both in 2008 and 2010, but only the last time we succeeded in obtaining specimens of *X. gelida*. The place has a lot in common with the well known Swedish *Xestia* locality at Jukkasjärvi in Torne Lappmark which has been visited by the second author (CC).

In captivity larvae were given *Vaccinium myrtillus* and *Taraxacum* (Lingonblad 1944). The larvae is described in detail by Lingonblad (op. cit.) and Imby & Palmqvist (1978). The latter authors present a black and white photo of it, and colour pictures are provided by Ahola & Silvonen (2011). The larva hibernates nearly half-grown and pupates in spring after the second hibernation. The flight period lasts about two weeks and normally starts around 25 June. The flight starts a few days later in the southern part of the range (Imby & Palmqvist 1978). The information in the original description (Sparre Schneider 1883) that the specimen had been collected in spring, is puzzling. This statement could result from poor memory or some kind of misunderstanding. Another possibility is that a full grown larva had

hibernated in the wall of one of the farm houses and actually pupated indoors in early spring. The higher temperature inside the house caused the moth to emerge much earlier than it normally would. This theory would explain the perfect condition of the type specimen.

The moth is on the wing only every second year. In Sweden mainly in even years. This flight pattern is also followed by the relatives *X. fennica* and *X. laetabilis.* Data from previous investigations indicate that these species also are synchronized in Lierne and fly mainly in even years. These data can be viewed on the website of Artsdatabanken (2011). In Sør-Varanger in Finnmark, however, the most recent data for *X. laetabilis*, 1963 and 1969, suggest that in this area these species fly in odd years. The holotype of *X. gelida* was captured in an even year, 1882. The *Xestia* species collected in the years 1878–1901 by W.M. Schøyen, H.J. Sparre Schneider and G. Sandberg were likewise found in even years (Mikkola 1976). Mikkola (op. cit.) suggested that a change had happened, and that the border between the two areas of alternate year flight had moved westwards. In northern Finland, apart from the westernmost area, the *Xestia'*s normally fly in odd years (Mikkola 1976). These facts suggest that the chance to rediscover *X. gelida* in Sør-Varanger is greatest in an odd year.

FIGURE 4.The locality in Lierne: Kalvikbekken, where *Xestia gelida* was rediscovered in 2010. Photo: Leif Aarvik.

Spruce is a very rare tree in Sør-Varanger, and the area has very little typical habitat for *Xestia gelida*. However, as the species also may live on moraine hills with scattered pine trees (Imby & Palmqvist 1978) a population of *X. gelida* probably is resident in Sør-Varanger. Since the species has not been rediscovered, it is likely to be present only in low numbers. In Norway *X. gelida* can be expected to occur also in northern Hedmark where there are places with suitable habitat. The authors have searched for it in a few localities in Engerdal municipality, so far without success. In southern part of Nordland there are also forests of spruce which could serve as habitat for *X. gelida*. The question is whether the species can tolerate the more humid climate of that area.

Threats

In the Swedish red list (Gärdenfors ed. 2010) *X. gelida* has been given the category near threatened (NT). In Sweden its habitat has become fragmented due to logging. This is particularly the case within the species' range south of Torne Lappmark. Overgrazing by reindeer also has negative impact on the populations of moths inhabiting the taiga (Imby & Eliasson 2007). In Lierne where the recent Norwegian record was made, the spruce forest has suffered from heavy logging, and there are huge clear cuts. There is, however, also a large part of this municipality that has been protected as a national park. The larger part of this park is above the timberline, and unfortunately is not suitable habitat for *X. gelida* and the other vulnerable congeners dependent on old forest. In some parts of Lierne there are patches of old forest surrounded by bogs. Probably these patches have been saved because they are less economic to cut. Our record was made in this kind of environment. It is to be hoped that at least some of these pockets

can remain untouched. They may turn out to have great value in terms of biodiversity. In Sør-Varanger overgrazing by reindeer affecting the foodplants, and pollution from the industry on Kola affecting the lichen growth on the trees, may have negative effect on the population of *X. gelida* and other moths.

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References

Ahola, M. & Silvonen, K. 2011. *Larvae of Northern European Noctuidae*. Vol. 3. Kuva seppälä -yhtiöt, Vaasa. 600 pp.

Artskart 2010. Artsdatabanken & GBIF Norge. *http://artskart.artsdatabanken.no/*. Accessed 20 January 2011.

Aurivillius, C. 1888–1891. *Nordens fjärilar*. Handbok i Sveriges, Norges, Danmarks och Finlands Macrolepidoptera. Hiertas bokförlag, Stockholm. 278 pp., 50 pls.

Elven, H. 2006. Rødvinstråder. *Insekt-Nytt* 31, 5–9.

Fibiger, M. 1993. *Noctuidae Europaea 2. Noctuinae II*. Entomological Press, Sorø. 230 pp.

Fibiger, M., Ronkay, L., Yela, J.L. & Zilli, A. 2010. *Noctuidae Europaea 12. Rivulinae, Boletobiinae, Araeopteroninae, Eublemminae, Herminiinae, Hypeninae, Phytometrinae, Euteliinae, and Micronoctuidae*. Including supplement to volumes 1–11. Entomological Press, Sorø. 451 pp.

Gärdenfors, U. (ed.) 2010. *Rödlistade arter i Sverige 2010 – The 2010 Red List of Swedish Species*. ArtDatabanken, SLU, Uppsala. 590 pp.

Imby, L. & Eliasson, C.U. 2007. *Xestia gelida - Meves fjällfly*. Artfaktablad. ArtDatabanken. http://snotra.artdata.slu.se/artfakta/GetSpecies.aspx?SearchType=Advanced. Accessed 10 February 2011.

Imby, L. & Palmqvist, G. 1978. De svenska Anomogyna-arternas utseende, biologi och utbredning (Lep., Noctuidae). *Entomologisk Tidskrift* 99, 97–107.

Kononenko, V.S. 2005. *Noctuidae Sibiricae 1. An annotated check list of the Noctuidae (s.l.) (Insecta, Lepidoptera) of the Asian part of Russia and the Ural region*. Entomological Press, Sorø. 243 pp.

Kullberg, J., Albrecht, A., Kaila, L. & Varis, V. 2002. Checklist of Finnish Lepidoptera – Suomen perhosten luettelo. *Sahlbergia* 6, 45–190.

Kålås, J.A., Viken, Å., Henriksen, S. & Skjelseth, S. (eds.). *Norsk rødliste for arter 2010*. Artsdatabanken, Trondheim. 480 pp.

Lingonblad, B. 1944. Iakttagelser över finska Lepidoptera III. Muonio, Enontekiö (Lkem., Le.). *Notulae entomologicae* 24, 44–71, 4 pls.

Mikkola, K. 1976. Alternate-year flight of Northern *Xestia* species (Lep., Noctuidae) and its adaptive significance. *Annales Entomologici Fennici* 42, 191–199.

Nordström, F., Wahlgren, E. & Tullgren, A. 1941. *Svenska fjärilar. Systematisk bearbetning av Sveriges storfjärilar. Macrolepidoptera.* Nordisk Familjeboks Förlags Aktiebolag, Stockholm. 354 pp., 50 pls.

Poole, R.W. 1989. *Lepidopterorum Catalogus (New Series)*, Fascicle 118. Noctuidae, Parts 1–3. E.J. Brill, New York. xii + 1314 pp.

Sparre Schneider, H.J. 1883. Fortsatte bidrag til kundskaben om Syd-Varangers Lepidopterfauna. *Entomologisk Tidskrift* 4, 63–88.

Sømme, L. 2004. *Entomologiens historie i Norge. Norsk entomologisk forening 1904–2004*. Norsk entomologisk forening, Oslo. 326 pp.

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