

A remarkable extension of range, the fungivorous moth *Dryadaula heindeli* Gaedike & Scholz, 1998 (Lepidoptera, Dryadaulidae) recorded in Norway

JØRN R. GUSTAD & LEIF AARVIK

Gustad, J.R. & Aarvik, L. 2017. A remarkable extension of range, the fungivorous moth *Dryadaula heindeli* Gaedike & Scholz, 1998 (Lepidoptera, Dryadaulidae) recorded in Norway. *Norwegian Journal of Entomology* 64, 138–142.

A male specimen of *Dryadaula heindeli* Gaedike & Scholz, 1998 (Lepidoptera, Dryadaulidae) was found in western Norway in Møre og Romsdal at Averøy: Rokset in August 2017. The circumstances of the record, the species' biology and geographical range are outlined. Figures of the moth and its genitalia as well as its habitat are given.

Key words: Lepidoptera, Dryadaulidae, *Dryadaula heindeli*, Norway, distribution, range extension, biology.

Jørn R. Gustad, Faculty of Business Administration and Social Sciences, Molde University College – Specialized University in Logistics, P.O. Box 2110, NO-6402 Molde, Norway.
E-mail: jorn.r.gustad@himolde.no

Leif Aarvik, Natural History Museum, University of Oslo, P.O. Box 1172 Blindern, NO-0318 Oslo, Norway. E-mail: leif.aarvik@nhm.uio.no

Introduction

The moth family Dryadaulidae with its single genus *Dryadaula* Meyrick, 1893 was recently separated from Tineidae (Regier *et al.* 2015). This was the result of molecular studies. *Dryadaula* contains 36 species, most of them known from the Neotropics, but the remaining are scattered in all zoogeographical regions, and eight species have been recorded in Europe (Gaedike 2015). Early stages are known only for four species which are fungus feeders (Gaedike 2015). Species of *Dryadaula* are rare, and all European species, apart from the type species, *D. pactolia* Meyrick, 1901, have been described rather recently. Both Tineidae and Dryadaulidae contain fungivorous species with isolated records in northern Europe,

e.g. *Dryadaula irinae* (Savenkov, 1989) from Latvia, elsewhere in Europe from Poland, Slovakia, Austria and Bulgaria (Gaedike 2015); *Agnathosia sandoensis* Jonasson, 1977 from Sweden and Latvia, elsewhere in Europe only from Austria (Gaedike 2015); and *Pelecystola fraudulentella* (Zeller, 1852) from Sweden, elsewhere in Europe from Slovenia and Slovakia (Lindeborg & Svensson 2009, Gaedike & Tokár 2010). The food substrate of the latter, however, is unknown. One additional *Dryadaula* species was collected in Sweden, *D. caucasica* (Zagulajev, 1970), but had been imported with timber from eastern Europe (Bengtsson 2015). This paper reports *Dryadaula heindeli* Gaedike & Scholz, 1998 for the first time from Norway and for the first time from northern Europe.

Diagnostic characters

Dryadaula heindeli is a small moth, wingspan 9–11 mm. (Figures 1 and 2). Species of *Dryadaula* resemble most members of Tineidae by having erect piliform scales forming a brush on the head, but they differ by lacking pecten on the antennal scape. Externally *D. heindeli* differs from other European species of the genus by the dominant blackish brown colour of the forewing. All European species are figured by Gaedike (2015). However, it may easily be mistaken for small species of *Nemapogon* Schrank, 1802 which occur in the same habitat. The common *Nemapogon cloacella* (Haworth, 1828) is present in the Norwegian locality where *D. heindeli* was found. The wing pattern in a *Nemapogon* species and *D. heindeli* is rather different, and this can be observed under higher magnification, compare figures in Bengtsson *et al.* (2008) and Gaedike (2015). All species of *Dryadaula* have complex and strongly asymmetrical male genitalia. The genitalia of the Norwegian specimen (Figure 3) agree completely with the illustrations given by Gaedike & Scholz (1998), Bryner (2013) and Gaedike (2015).

Material and methods

Møre og Romsdal (MRY, EIS 84), Averøy: Rokset, Kvernesveien 1283, 62.9830°N 7.6695°E, 1♂ 7. August 2017, leg. Jørn R. Gustad, genitalia slide NHMO 3272, coll. Natural History Museum, University of Oslo (NHMO). The specimen was observed and photographed in the evening (6:30 PM) on a window inside a barn. After photographing the specimen was captured. It was set and dried with wings in standard position. After drying the abdomen was removed, and the genitalia dissected and embedded in euparal on a glass slide.

The doors of the barn where the moth was captured had intentionally been left open, which made it work as a large insect trap during day and night. The barn has not been in use for many years and contains nothing that is likely to serve as food substrate for the moth. The specimen was

completely fresh, and must have hatched close to the collecting site. The locality is far from main roads and communication centres, and we consider it highly improbable that the specimen could have been transported from Central Europe.

The Norwegian locality is on an island, 175 square kilometres, 2 kilometres off the mainland. The barn is situated 30 metres above mean sea level and is 175 metres from the shore. It is surrounded by cultivated fields. The site is facing SSE, and forested valleys are leading down towards the barn. The forest is dominated by *Corylus avellana* L. and *Alnus incana* (L.) Moench. *Alnus glutinosa* (L.) Gaertn., *Betula pubescens* Ehrh., *Populus tremula* L., *Prunus padus* L. and *Salix caprea* L. are sparser, but the trees are often mature. Part of the ground usually gets flooded after heavy rain. The forest can be characterised as moist deciduous forest, and has trees of all ages and in all stages of decomposition (Figures 4 and 5). The soil is fertile, and among the herbs which are common at the locality are *Allium ursinum* L. and *Sanicula europaea* L. The former is the food plant of *Acrolepiopsis betulella* (Curtis, 1838) (Lepidoptera) and *Cheilosia fasciata* Schiner & Egger, 1853 (Diptera), and the latter is the food plant of *Agonopterix astrantiae* (Heinemann, 1870) (Lepidoptera). These three red listed insects are present at the locality. *Allium ursinum* L. and *Stachys sylvatica* L. are two of the four plants mentioned from the type locality of *Dryadaula heindeli* in Germany (Gaedike & Scholz 1998) which are common at the Norwegian site.

The locality is moderately affected by human activity; one power line, with towers, is crossing the forest.

Distribution and biology

The first specimens were found in Bavaria, southern Germany, in 1995 by Richard Heindel, and *Dryadaula heindeli* was described new to science in 1998 (Gaedike & Scholz 1998). Subsequently it has been collected in central parts of Europe: France, Italy, Spain and Switzerland (Gaedike 2015), Belgium (De Prins 2016) and the Netherlands (Corver *et al.* 2017). The type



FIGURE 1. *Dryadaula heindeli* Gaedike & Scholz, 1998. The Norwegian specimen with wings spread. Photo: Karsten Sund, NHMO.



FIGURE 2. *Dryadaula heindeli* Gaedike & Scholz, 1998. The Norwegian specimen photographed alive in resting position.



FIGURE 3. *Dryadaula heindeli* Gaedike & Scholz, 1998. The genitalia of the Norwegian specimen.



FIGURE 4. Moist deciduous forest at Rokset where the Norwegian specimen was collected.



FIGURE 5. Deciduous forest at Rokset dominated by *Corylus avellana* L.

locality is the only place where it has been found in numbers. A part of the type series was bred from the poroid fungus *Bjerkandera adusta* (Wild: Fr.) P. Karst. (Gaedike & Scholz 1998). Later the moth was bred from the jelly fungus *Auricularia*

mesenterica (Dick.: Fr.) Pers. (Gaedike 2015). These fungi are both present in western Norway, but the latter is only occasionally found on other substrates than *Ulmus glabra* Huds. and *Fraxinus excelsior* L. (Brandrud *et al.* 2015). *Bjerkandera*

adusta is a probable food substrate in the Norwegian locality as it can utilize all the tree species growing there (Ryvarden & Melo 2014). Gaedike & Scholz (1998) found larvae sympatric with larvae of *Nemapogon cloacella* (Haworth, 1828) and *N. granella* (Linnaeus, 1758). They found that the life cycle is unclear, as young larvae, pupae and imagines were present at the same time in the beginning of June. Imagines were observed sitting on the underside of the fungi or on the trunks, and they were very hard to flush. The moths mostly hatch before noon, and the males swarm in sunshine during midday close to the fungi. Some males have been attracted to artificial pheromones designed to attract the clearwing moths *Pennisetia hylaeiformis* (Laspeyres, 1801) and *Paranthrene tabaniformis* (Rottemburg, 1775) (Bryner 2013). The fact that it took so long before *Dryadula heindeli* was discovered, indicate a hidden lifestyle. The species is probably present in large parts of Europe, and the discovery in additional localities in Scandinavia can be expected. Due to its diurnal habits, it avoids being captured in light traps, and thus escapes the attention of lepidopterists. Besides breeding, the use of pheromones in suitable habitats, can probably be the most effective searching method.

Acknowledgements. We thank Karsten Sund, Natural History Museum, University of Oslo (NHMO) for taking the photo of the mounted specimen.

References

Bengtsson, B.Å. 2015. Anmärkningsvärda fynd av småfjärilar (Microlepidoptera) i Sverige 2014. *Entomologisk Tidskrift* 136, 49–63.

Bengtsson, B.Å., Johansson, R. & Palmqvist, G. 2008. Nationalnyckeln till Sveriges flora och fauna.

Fjärilar: Käkmalar – säckspinnare. Lepidoptera: Micropterigidae – Psychidae. ArtDatabanken, SLU, Uppsala. 646 pp.

Brandrud, T.E., Bendiksen, E., Jordal, J.B., Hofton, T.H., Larsson, K.-H. & Høiland, K. 2015. Sopper (Fungi) In: Henriksen, S. & Hilmo, O. (Eds.). *Norsk rødliste for arter 2015*. Artsdatabanken, Trondheim. 193 pp. <http://www.artsdatabanken.no/Rodliste/Artsgruppene/Sopper> (accessed 03.11.2017)

Bryner, R. 2013. *Dryadula heindeli* Gaedike & Scholz, 1998, neu für die Schweiz (Lepidoptera: Tineidae). *Entomo Helvetica* 6, 157–159.

Corver, S., Muus, T., van Roosmalen, J., Olsthoorn, L., Doorenweerd, C. & Damm, T. (2017) Atlas van de kleinere vlinders in Nederland. Available from: <http://www.microvlinders.nl/> (accessed 03.11.2017)

De Prins, W. 2016. Catalogue of the Lepidoptera of Belgium. *Entomobrochure* 9, 1–279.

Gaedike, R. 2015. Tineidae I (Dryadulinae, Hapsiferinae, Euplocaminae, Scardiinae, Nemapogoninae and Meessiinae). In: Karsholt, O., Mutanen, M. & Nuss, M. (eds). *Microlepidoptera of Europe* 7. Brill, Leiden. 308 pp.

Gaedike, R. & Scholz, 1998. *Dryadula heindeli* sp. n. aus Bayern (Lepidoptera, Tineidae). *Nachrichtenblatt der bayerischen Entomologen* 47, 106–114.

Gaedike, R. & Tokár, Z. 2010. *Pelecystola fraudulentella* (Zeller, 1852) discovered in Slovakia, a third locality record (Tineidae). *Nota lepidopterologica* 33, 25–29.

Lindeborg, M. & Bengtsson, B.Å. 2009. On the remarkable find of *Pelecystola fraudulentella* (Zeller, 1852) in Sweden (Lepidoptera: Tineidae). *Entomologisk Tidskrift* 130, 73–79.

Regier, J.C., Mitter, C., Davis, D.R., Harrison, T.L., Sohn, J.-C., Cummings, M.P., Zwick, A. & Mitter, K.T. 2015. A molecular phylogeny and revised classification for the oldest ditrysian moth lineages (Lepidoptera: Tineoidea), with implications for ancestral feeding habits of the mega-diverse Ditrysia. *Systematic Entomology* 40, 409–432.

Ryvarden, L. & Melo, I. 2014. Poroid fungi of Europe. *Synopsis Fungorum* 31. 455 pp.

Received: 15 November 2017

Accepted: 29 November 2017