First record of *Leptopilina longipes* (Hymenoptera: Eucoilidae) in The Netherlands, and its hosts identified

Ian C. W. Hardy, Jacques J. M. van Alphen & Marianne J. van Dijken

HARDY, I. C. W., J. J. M. VAN ALPHEN & M. J. VAN DIJKEN, 1992. FIRST RECORD OF *LEPTOPILINA LONGIPES* (HYMENOPTERA: EUCOILIDAE) IN THE NETHERLANDS, AND ITS HOSTS IDENTIFIED. – *ENT. BER., AMST.* 52 (9): 128-130.

Abstract: The eucoilid wasp *Leptopilina longipes* had never been found in The Netherlands and its biology was unknown. *L. longipes* is related to other northern European eucoilid species with parasitize drosophilid flies developing in decaying fruit, plant material and fungi. We put baits of decaying cucumber and mushroom out in woodlands in The Netherlands. An adult *L. longipes* was found on a cucumber bait in the field, and more were reared from a cucumber bait collected at the same site. We show that *L. longipes* is a parasitoid of the larvae of *Scaptomyza pallida* and *Drosophila* species of the *quinaria* group, as predicted on the basis of its phylogenetic relationships with other eucoilid species.

Department of Population Biology, University of Leiden, P.O. Box 9516, 2300 RA Leiden, The Netherlands.

Introduction

Leptopilina longipes (Hartig) (Hymenoptera: Eucoilidae) was described from material collected in Braunschweig, Germany (Hartig, 1841) and is also known from Sweden and Denmark (Nordlander, 1980). The distribution of known records suggested that *L. longipes* could also occur in The Netherlands.

Nothing was known of the biology of *L. longipes*, but four other eucoilid species occurring in northern Europe (*L. heterotoma* (Thompson), *L. clavipes* (Hartig), *L. australis* (Belizin) and *L. fimbriata* (Kieffer)) were already known to be larval parasitoids of drosophilid flies (Nordlander, 1980; Van Alphen et al., 1991). It was therefore expected that *L. longipes* would also be a parasitoid of *Drosophila*. Despite long experience, by us and our colleagues in Leiden, of rearing parasitoids of *Drosophila* from breeding substrates, *L. longipes* had never been collected. As part of a comparative study on foraging behaviour and niche segregation in European *Leptopilina* species, we attempted to find this species and to elucidate its biology.

Most of our, and our colleagues', fieldwork on *Drosophila* parasitoids had been in the vicinity of Leiden, where woodland is scarce and isolated from more extensively wooded areas by open polder landscape. Because known localities of *L. longipes* are all in wooded habitats, we decided to look for *L. longipes* in wooded areas in the eastern part of the country.

Using a cladistic analysis of external structure, Nordlander (unpublished) has constructed phylogenetic relationships for the northern European *Leptopilina* species (see also Van Alphen et al., 1991). Of these, *L. heterotoma* is the only species parasitizing hosts developing in substrates undergoing alcoholic fermentation (fruits and sap-streams) and, in this phylogeny, is placed separately from the other four species. *L. clavipes* parasitizes hosts in mushrooms and decaying plant matter, while *L. australis* and *L. fimbriata* find their hosts only in decaying plant matter (Van Alphen et al., 1991). *L. longipes* is placed nearest to *L. fimbriata* in the phylogeny, and on the basis of this we predicted that *L. longipes* would parasitize hosts developing in decaying plant matter, although we could not exclude fungi as potential breeding sites.

Apart from a number of exotic *Drosophila* species (for instance *D. immigrans* Sturtevant

and *D. busckii* Coquillett), mushrooms and decaying plants in The Netherlands are exploited by *Drosophila* belonging to the *quinaria* species group. The dominant fly species in many types of decaying plant matter is *Scaptomyza pallida* Zetterstedt. This suggests that either *S. pallida* or the *quinaria* species group are potential hosts of *L. longipes*. In previous research we and our colleagues have discovered that decaying cucumbers exposed on the forest floor are an attractive breeding substrate for at least three of the four European species belonging to the *quinaria* group. We thus decided to attempt to find *L. longipes* using cucumber and mushroom baits.

Methods

Field sampling was carried out at four sites: a deciduously wooded river bank at Rhenen (in the central part of The Netherlands), a mixed deciduous and coniferous wood near Berg en Dal (in the eastern part of The Netherlands), a deciduous woodland in Wijster and a mixed deciduous and coniferous forest near Spier (both in the north-eastern Netherlands).

Each site was visited once a week from mid-July until the last week of August in 1991. On the first visit, and subsequently until the penultimate visit, baits of sliced cucumber and of the whole fruiting bodies of edible cultivated mushrooms were put out. The bait material was placed on the base of a petri-dish (14 cm in diameter) containing a layer (approximately 2 cm thick) of moist vermiculite which helped to prevent the bait from drying out. Two drainage holes in the base prevented waterlogging. The bait material was surrounded by a barrier (6 cm high) of wire mesh (holes 2 mm in diameter) which allowed small insects such as parasitic wasps and *Drosophila* flies to pass through freely, but excluded larger animals (such as woodlice and mice). The lid of the petri-dish was placed on top of the barrier to protect the bait from rain and unwanted animals. These petri-dishes were placed directly on the ground.

About four baits of each sort (cucumber or mushroom) were put out at each site each week and were collected on the next visit that the plant material had reached an advanced stage of decay, this was usually two weeks after being put out. Any adult parasitoids seen on the bait material in the field were collected using a pooter. The collected baits and vermiculite were brought back to the laboratory (approximately 20 °C, natural light-dark cycle) and placed in cages. The material in the cages was kept moist by watering approximately every two days. The cages were inspected at least every two days, any adult insects emerged from the baits were collected using a pooter. Collected insects from both the field and the cages were either stored (dead) in 70% alcohol solution, or kept alive at 11-13 °C in jars containing an agar layer (to help prevent desication) and a streak of honey solution as food.

Results

Although all exposed baits were used as breeding substrates by *Drosophila*, an adult *L. longipes* was only observed on a cucumber bait exposed between 23rd and 30th July in an open spruce forest near Spier. From a bait collected on 6th August at the same site, 14 female and 5 male *L. longipes* were reared in the laboratory. From this bait puparia of *D. phalerata* Meigen, *D. kuntzei* Duda and *D. limbata* Roser (all members of the *quinaria* group) and *S. pallida* were collected. The eucoilid wasps *L. heterotoma* and *Kleidotoma bicolor* (Giraud) and the braconid wasps *Asobara tabida* (Nees), *Pentapleura angustula* (Haliday) and *Tanycarpa bicolor* (Nees) also emerged from this bait. Because more than one species of parasitoid emerged, we do not know which of the collected drosophilid species are hosts of *L. longipes*. In the laboratory we have been able to rear *L. longipes* from *D. limbata, D. kunzei, D. phalerata* and *S. pallida*, showing that the larvae of these species are potential hosts of *L. longipes*.

Discussion

We have shown that *L. longipes* occurs in The Netherlands and that it is, like all other *Lep-*

topilina species, a larval parasitoid of *Drosophila*. Moreover, *L. longipes* searches for hosts in decaying plant material and uses *S. pallida* and *Drosophila* species of the *quinaria* group as hosts. This is exactly as was predicted on basis of the phylogenetic relationship between the northern European species of *Leptopilina* and the habitat and host preferences of the other species.

Although habitat choice by *L. longipes* can be explained on historical grounds, a functional explanation of habitat use within the five sympatric species is less straightforward: *L. clavipes* and *L. australis* both attack larvae of the *quinaria* group in decaying plants. Likewise, the generalist *L. heterotoma* has often been found using this niche in nature. *L. fimbriata* is mainly a parasitoid of *S. pallida*. It seems therefore that considerable overlap in niche occurs between *L. longipes* and the other *Leptopilina* species.

Acknowledgements

We thank Göran Nordlander (Swedish University of Agricultural Sciences, Uppsala) for confirming the identification of *L. longipes*. Cees van Achterberg (Natural History Museum, Leiden, The Netherlands) helped us with the identification of the Braconidae. I. C. W. Hardy was supported by N.E.R.C. (U.K.).

References

Alphen, J. J. M. van, G. Nordlander & I. Eijs, 1991. Host habitat finding and host selection of the Drosophila parasitoid Leptopilina australis (Hymenoptera, Eucoilidae), with a comparison of the niches of European Drosophila species. – *Oecologia* 87: 324-329.

Hartig, T., 1841. Erster Nachtrag zur Naturgeschichte der Gallwespen. – *Z. Ent. (Germar)* 3: 322-358.

Nordlander, G., 1980. Revision of the Genus Leptopilina Förster, 1869, with notes on the status of some other genera (Hymenoptera, Cynipoidea: Eucoilidae). – *Entomologica scand.* 2: 428-453.

Accepted 15.ii.1992.