

Occurrence of *Platyarthrus schoblii* (Isopoda, Oniscidea) and its ant hosts in Hungary

Elisabeth Hornung^{a,*}, Ferenc Vilisics^a, András Tartally^b

^a Department of Ecology, Institute for Zoology, Faculty of Veterinary Science, Szent István University, P.O.B. 2, 1400 Budapest, Hungary

^b Department of Evolutionary Zoology and Human Biology, Faculty of Science, Debrecen University, P.O.B. 3, 4010 Debrecen, Hungary

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Abstract

The myrmecophilous *Platyarthrus schoblii* Budde-Lund, 1885 is widely distributed and native in the Mediterranean region. In Hungary it was first found at Budapest, in 2001, in a colony of *Lasius neglectus* van Loon, Boomsma and Andrásfalvy, 1990 (Hymenoptera: Formicidae). This invasive and polygynous ant species is dispersing in an antropochorous way throughout Europe. There are 16 known colonies of *L. neglectus* in Hungary. Fourteen of them have been surveyed for the isopod, which was detected in eight cases (57%). In addition to *L. neglectus*, the isopod has been recently found with other native ant species [*Lasius niger* (Linnaeus, 1758), *Lasius emarginatus* (Olivier, 1791) and *Tetramorium caespitum* (Linnaeus, 1758)] in the country. We have also found the joint occurrence of *P. hoffmannseggii* Brandt, 1833 and *P. schoblii*. The co-occurrence and joint expansion of the ranges of *L. neglectus* and *P. schoblii* indicates their co-habitation and antropochorous dispersal while the appearance with *L. emarginatus*, *L. niger* and *T. caespitum* supports our hypothesis about possible adoption by different ant species.

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1. Introduction

Platyarthrus schoblii Budde-Lund, 1885 was found for the first time in Hungary at Budatétény (Budapest) in 2001 [22]. It was in the type colony of the invasive garden ant *Lasius neglectus* van Loon, Boomsma and Andrásfalvy, 1990 [23]. This polygynous ant species lives in supercolonies that may cover several hectares [3,23]. The ant is characteristic of disturbed urban–suburban sites. Its appearance can be connected first to botanical gardens and plant nurseries [21,23]. Jump dispersal of the ant species by colony budding may happen

mainly by human introduction [2]. It is considered to be a pest and an invasive species that has established supercolonies in several cities in the Palaearctic region [18]. Many of these features are the main characteristics of tramp ants [13].

The isopod *P. schoblii* was previously unknown from the Carpathian Basin, in contrast to *P. hoffmannseggii* Brandt, 1833, which is a widespread species in Hungary and in Europe, north to Finland [5,16]. *P. hoffmannseggii* frequently occurs in the nests of different ant species and 24 different hosts have been reported to date worldwide ([1,7] present data). *P. schoblii* is known as a holomediterranean species complex (Macaronesian Islands, Black Sea Coast, Mediterranean Region) [16,17] with several subspecies. Its distribution may be much more extensive and it might

* Corresponding author. Tel.: +36 1 478 4233;
fax: +36 1 478 4232.

E-mail address: Hornung.Erzsebet@aotk.szie.hu (E. Hornung).

occur at all localities where its host ant establishes [22]. One of the most recent reports on *P. schoblii*'s occurrence is from the Socotra Archipelago, in Yemen [20]. The systematic status of the species needs taxonomic revision [16,19]. Members of the genus are known for their myrmecophilous behaviour: they occur almost exclusively in ant nests, adapted morphologically and ecologically to their microhabitat conditions (white, blind, pigmy, hygrophilous, microcavernicolous species, having restricted environmental tolerance) [7,9].

2. Methods

2.1. Locality

To explore the distribution of this woodlouse species in Hungary, *L. neglectus* colonies were checked. The overwhelming majority of the 16 known *L. neglectus* colonies can be found in Budapest. Three are situated near to the city (Érd, Tahi) or far from the capital (Debrecen in East Hungary). Out of the 16 colonies, 14 were available for the present investigation. Exact localities, distribution map and sampling data are given in Tartally et al. [22].

2.2. Sampling method

Collecting was made by hand sorting for the presence of *P. schoblii* and/or *P. hoffmannseggii* by turning over stones and opening nests in wood debris on several occasions between April 2001 and October 2004. Furthermore we paid special attention to the occurrence of *Platyarthrus* specimens during other collecting activities and have also checked nests of other ant species in the neighbourhood of *L. neglectus* colonies for isopod presence. Additional field sampling and revisions of previously collected material were made for further specimens.

2.3. Ecological backgrounds

The habitat of the isopods is determined by that of the ants: *L. neglectus* is known in Europe only from disturbed communities, mainly from urban habitats (e.g. road sides, plant nurseries, botanical gardens, city parks, etc.). The biology, morphology, pest status and the up-to-date European distribution of the ant (including Hungary) with references and further links can be found on the *L. neglectus* homepage compiled by Espadaler and Bernal [4].

2.4. Identification

The target isopod species can be easily distinguished from the wider ranging *P. hoffmannseggii* Brandt, 1833 (Fig. 1A, B) by its more convex body, by the lobes on the head and by the longitudinal ribs on the tergites (see Fig. 2A–C) [15,17,24].

3. Results

Although the taxonomic status of this isopod species needs revision it is considered here as the *P. schoblii*-complex [16,19], no sign of morphological differentiation could be detected compared to the type form of the species (H. Schmalfuss and S. Taiti, pers. comm.).

The presence of *P. schoblii* was recorded in eight *L. neglectus* colonies out of the 14 investigated ones [22]. *P. schoblii* was collected also from the nests of three further ant species in Hungary. It was found with *Lasius emarginatus* (Olivier, 1791) at Pécs (PTE Botanical Garden, 5.V.2004, leg. F. Vilisics) and later it was hosted by *Tetramorium caespitum* (Linnaeus, 1758) at the same spot, under the same stone. Late in 2004 we collected the species with *Lasius niger* (Linnaeus, 1758) in Budatétény, at the edge of Budapest (29.IV.2004, leg. F. Vilisics). All three ant species are nowadays native of Hungary [6]. As the locality in Pécs belongs to the Uni-

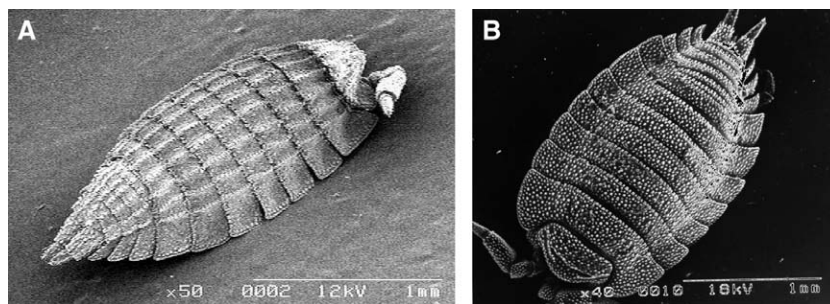


Fig. 1. A: Habitus of *P. schoblii* Budde-Lund, 1885, and B: *P. hoffmannseggii* Brandt, 1833 (SEM photos taken by E. Mihalik and E. Hornung).

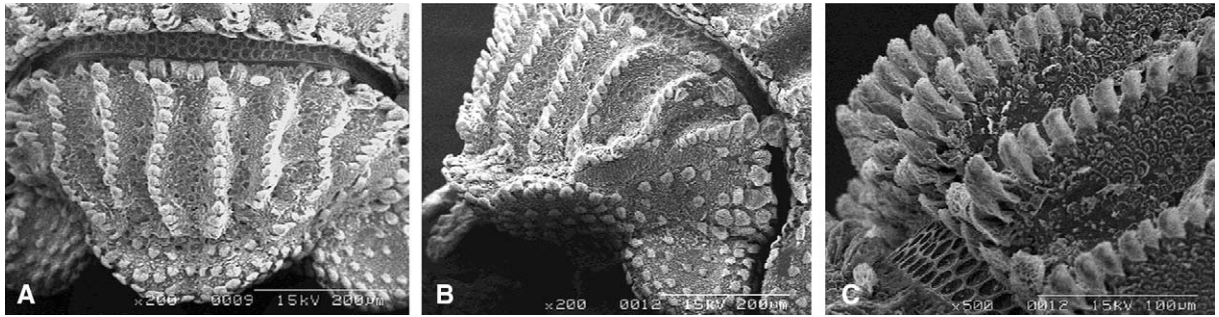


Fig. 2. Scanning electron micrograph of *P. schoblii* A: dorsal view of the head; B: frontal view of head lobes; C: tergal ribs (SEM photos taken by E. Mihalik and E. Hornung).

versity Botanical Garden, the presence of the isopod species could be an introduction with ornamental plants. The original ant host is unknown.

At the Budatétény site, the host ant species *L. niger* lives within the type habitat of the primary host, *L. neglectus*. Here we suppose an adoption phenomenon: the isopod species originating from a *L. neglectus* colony successfully invaded *L. niger* nest and was accepted by the new host.

Our continuous survey on isopod-ant co-habitation resulted in the discovery of the co-occurrence of the two *Platyarthrus* species in neighbouring nests or in the same ant nest recently. *P. schoblii* and *P. hoffmannseggii* were found together in the nests of *L. neglectus* (Budatétény, Park Str., and Budatétény: between the train track and highway, 3.X.2004, leg. F. Vilisics and E. Hornung), *P. hoffmannseggii* with *T. caespitum* and *P. schoblii* with *L. neglectus* within half-a-meter distance (Buda Castle District, Budapest, Lovas Str., 26. III.2004 and 1.IV.2004, leg. F. Vilisics).

Voucher specimens are deposited in the collections of the Hungarian Natural History Museum/Budapest, Hungary; Department of Ecology, Faculty of Veterinary Science, Szent István University/Budapest, Hungary (Hungarian and Spanish localities), respectively.

4. Discussion

Isopods in general can be good subjects for propagation because of their reproductive strategy. They are able to store sperm; expanding species are usually iteroparous and have a high reproductive output [8,10–12]. Theoretically one gravid female can establish a new population. As they are detritivores, litter provides both a food source and shelter for their survival. They are decomposers feeding on all kinds of plant debris. They can easily find their ecological needs in urban environments [8].

The northern natural boundary of *P. schoblii*-complex—including e.g. *P. esterelanus* Verhoeff, 1931—extends from southern France through northern Italy, Croatia, Bulgaria to the Black Sea coast of Romania (see [16] for references). The records are all from the Mediterranean vegetation belt (with olive tree as key species; H. Schmalfuss, pers. comm.), thus the records from Hungary are very probably due to introduction and not the edge of a natural distribution. The woodlouse *P. schoblii* is rather a new coloniser to Hungary and it might have been introduced together with *L. neglectus*. The co-occurrence and joint expansion of the ranges of the two taxa indicates their antropochorous dispersal. Small fragments of the polygyn ant colonies containing some isopod specimens can be spread along with horticultural goods and plants.

It is hard to determine the northern and eastern distribution boundaries of the isopod species as it can find suitable conditions in any nests of its host ant. Based on our experiences and the nature of the species we predict for *P. schoblii* a wide distribution both in Hungary and in Europe, first, within the range of the invasively expanding ant species, *L. neglectus*. The repeated co-occurrence and joint expansion of the two taxa indicate their antropochorous dispersal [22].

In Spain *P. schoblii* is hosted by several ant species [e.g. *Linepithema humile* (Mayr, 1868), *Lasius brunneus* (Latreille, 1798), *L. neglectus*, *Formica rufibarbis* Fabricius, 1793, *Formica gagates* Latreille, 1798, *Messor structor* (Latreille, 1798)] [22]. We know of 16 published [14,22,24] host ant species of the *P. schoblii* species complex. The known *P. schoblii*-ant co-habitation is summarised in Table 1. In comparison, the widely distributed *P. hoffmannseggii* was found with 24 host ants worldwide ([1,7] and present study). The experimental proof of the phenomenon of successful adoption in the case of *P. hoffmannseggii* and different ant species was mentioned in six cases by Gruner [7]. Similar

Table 1
The list of ants with known co-occurrence with *P. schoblii* species complex

Isopod	Host ant	Country ^a				Reference
		E	F	H	ISR	
<i>P. schoblii</i> Budde-Lund, 1885	<i>Aphaenogaster subterranea</i> (Latreille, 1798)		+			[24]
	<i>Formica gagates</i> Latreille, 1798	+				[21]
	<i>F. rufibarbis</i> Fabricius, 1793	+				[21]
	<i>Lasius brunneus</i> (Latreille, 1798)	+				[21]
	<i>L. emarginatus</i> (Olivier, 1791)			+		Present paper
	<i>L. flavus</i> (Fabricius, 1781)		+			[24]
	<i>L. neglectus</i> van Loon, Boomsma and Andrásfalvy, 1990	+		+		[21]
	<i>L. niger</i> (Linnaeus, 1758)			+		Present paper
	<i>Linepithema humile</i> (Mayr, 1868)	+	+			[21] [24]
	<i>Messor barbarus</i> (Linnaeus, 1767)		+			[24]
	<i>M. structor</i> (Latreille, 1798)	+				[21]
	<i>Myrmica</i> sp.		+			[24]
	<i>Pheidole pallidula</i> (Nylander, 1849)		+			[24]
	<i>Plagiolepis pygmaea</i> (Latreille, 1798)		+			[24]
<i>Tetramorium caespitum</i> (Linnaeus, 1758)		+	+		[24], Present paper	
<i>P. s. hemicaelatus</i> Strouhal, 1975	<i>Bothriomyrmex atlantis</i> Forel, 1894				+	[14]

^a E: Spain, F: France, H: Hungary, ISR: Israel.

adoption can be considered likely in Spain where *P. schoblii* is native and appears regularly in the nests of the introduced Argentine ant, *L. humile* [22].

The sympatry of the two *Platyarthus* species provokes several new ecological questions worth investigating (e.g. species interactions: competition; niche separation).

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