

***PSEUDEUROSTUS HILLERI* (REITTER, 1877) (COLEOPTERA: PTINIDAE) IN POLAND**

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ABSTRACT: The paper discusses the presence of *Pseudeurostus hilleri* (Reitter, 1877) (Coleoptera, Ptinidae) in various locations worldwide, as well as provides the characteristics of two localities where this species has been encountered in Poland. These localities are Małdyty and Godkowo, both situated in the northeastern part of the country. Furthermore, the paper discusses some elements of the bionomy of this species and casts light on how it might have been introduced in Poland.

KEY WORDS: Coleoptera, Ptinidae, *Pseudeurostus hilleri*, Poland, localities

Introduction

The genus *Pseudeurostus* Heyden, together with related genera, such as: *Niptus* Boield., *Epauloecus* Muls. et Rey, *Mezioniptus* Pic, and *Cyphoniptus* Bellés, includes flightless species, mainly ones inhabiting caves, where they live on the faeces of small mammals, especially bats. Less frequently they are encountered in ground nests of mammals, and in exceptional cases also in birds' nests. Very few species have become adjusted to living near human dwellings. These include the following: *Niptus hololeucus* (Fald.), *Epauloecus unicolor* (Pill. et Mitter.), *Cyphoniptus sulcithorax* (Pic) and *Pseudeurostus hilleri* (Reitt.). These species usually inhabit cool and rather damp sheds, where they develop in accumulated or stored mammal faeces.

Pseudeurostus hilleri (Fig. 1) was described by E. Reitter in 1877 as belonging to the genus *Niptus* Boield., on the basis of specimens collected in Japan by R. Hiller. The area where this species naturally occurs encompasses Eastern Palearctic: Eastern Siberia, Far East, Japan, Korea, as well as western, eastern and central China (Borowski 2007). It is very rarely encountered in natural environment, where it mainly inhabits rodents' burrows and small caves. Most data referring to this species has been gathered from the environment which is directly associated with human beings. Specimens have been found mainly in pens for domestic animals or in their immediate proximity. Due to its semi-synanthropic character the species has been, and still is, inadvertently brought to various countries of the world. In the 1920s it was carried to Germany (Zacher 1938). Then, in the years 1936, 1938-1939 its presence was discovered in Canada, where it inhabited mainly grain warehouses (Brown 1940). In the years 1939-1940 *P. hilleri* was recorded in many towns in England and Scotland (Howe 1940, Hinton 1941). After World War II the species was found also in Sweden (Lundberg 1963), Finland (Silfverberg 1992) and Ireland (Anderson et al. 1997).

Examined material

In the years 2007-2009 and in the year 2011, *P. hilleri* was collected in two localities in north-western Poland. A short characteristic of these localities is given below.

The locality in Małdyty

Material: Małdyty (DE 17), Masurian Lake District (Polish: Pojezierze Mazurskie); 13.05.2007 – 2 exx.; 13.04.2008 – 23 exx.; 20.09.2008 – 4 exx., 19.10.2008 – 24 exx., 25.10.2008 – 47 exx., 19.04.2009 – 8 exx., 17.05.2009 – 12 exx., all specimens sieved from the compost, leg. et det. R. Gawroński, coll. L. Borowiec (University of Wrocław), J. Borowski (Institute of Forest Sciences, University of Łódź), R. Gawroński (private collection), D. Kubisz (Museum of Natural History, Polish Academy of Sciences, Kraków).

The place, in which individuals of *P. hilleri* were collected, was a compost pile formed of litter from backyard rabbit farming. The compost was composed of remnants of herbs (either fresh or dry), old hay, rabbit droppings, grains of wheat, pieces of dry bread and rabbit fur. Various parts of the pile were characterised by diverse moisture, thermal and structural conditions. All specimens of *P. hilleri* were encountered in the part of the pile characterised by a loose structure, composed of highly fragmented material with a considerable admixture of grain and pieces of dried bread. *P. hilleri* was accompanied by numerous individuals of other species, i.e. *Ptinus fur* (L.) (Ptinidae), *Ahasverus advena* (Waltl) (Silvanidae), *Alphitophagus bifasciatus* (Say) (Tenebrionidae) and *Sitophilus granarius* (L.) (Curculionidae).

The locality in Godkowo

Material: Godkowo ad Pasłek (DE 29), Masurian Lake District; 02.04.2011 - 2 exx., 08.04.2011 - 1 ex., 17.04.2011 - 1 ex., 08.05.2011 - 1 ex., 08.10.2011 - 17 exx., 17.10.2011 - 14 exx., 10.11.2011 - 9 exx., 11.12.2011 - 10 exx., on the floor in a shed (cowshed/chicken coop), leg. M. Byk, det. J. Borowski, coll. J. Borowski (Institute of Forest Sciences, University of Łódź), A. Byk (Department of Forest Protection and Ecology, Warsaw University of Life Sciences – SGGW), M. Byk (private collection).

The beetles were collected in a shed, which was a permanent abode of several dozen chickens representing various breeds, as well as guinea fowl, and served as a

storage house for grain and chicken fodder (ingredients: corn, soy beans, wheat, gravel, vitamin supplement). The beetles were found under wooden planks and hollow bricks lying on the cement floor, among mouse and rat faeces stuck together by cobwebs, hen droppings and crumbled remains of grain left over by rodents. Imagines of *P. hilleri* inhabiting the 3-4 cm thick layer of waste on the shed floor were accompanied by the following species: *Carcinops pumilio* (Er.) (Histeridae), *Attagenus pellio* (L.) (Dermestidae), *Ptinus fur* and *P. latro* F. (Ptinidae), *Ahasverus advena* (Silvanidae), *Cryptophagus saginatus* Sturm and *C. pilosus* Gyll. (Cryptophagidae), *Mycetaea subterranea* (F.) (Endomychidae), *Cartodere nodifer* (Westw.) and *Thes bergrothi* (Reitt.) (Latridiidae), *Mycetophagus quadriguttatus* P.W.J. Müll. (Mycetophagidae), *Omonadus floralis* (L.) (Anthicidae), *Alphitophagus bifaciatus* and *Tenebrio molitor* L. (Tenebrionidae) as well as *Sitophilus granarius* (Curculionidae).



Fig. 1. *Pseudeurostus hilleri* (Reitt.) (left: male, right: female)

Discussion

P. hilleri is completely flightless and thus the colonisation of new sites without human assistance is improbable. In the Małdyty locality, specimens were collected during several consecutive seasons. It is likely that the species has established a sustainable population in the area, but this issue requires further study. The fact that several individuals of the species were collected in Godkowo in spring 2011 and several dozen were collected in autumn the same year indicated the completion of a breeding cycle and an increase of the *P. hilleri* population inhabiting the locality in question. As has already been mentioned in the introductory part of this paper, *P. hilleri* develops in the faeces of small mammals. The fact that the species has been collected in grain warehouses in Canada, Scotland and England does not prove that the beetle develops in the stored grain. In the course of its development it probably uses the faeces of rats and mice,

whose large populations are always present in such places. In the later years the presence of the species was recorded in various localities both in Great Britain and in Canada, but its abundance was clearly lower. It is possible that the abundance of *P. hilleri* populations is correlated with the abundance of rodents: rats and mice, whose populations also have a tendency to increase in particular years. The situation is similar in Polish localities. It is possible that in Małdyty, apart from developing in rodent faeces the species has also developed in rabbit droppings. Neither can the possibility of development in chicken droppings be excluded, although in the material collected in Godkowo the traces of foraging have been discovered only in rat faeces. In laboratories *P. hilleri* has been fed on fish meal and grain meal, but its development was the poorest in comparison to several other synanthropic species of the Ptinidae (Howe 1959). The research conducted by Howe has confirmed that *P. hilleri* prefers animal food to plant food.

At present the species might be accidentally brought (e.g. from China) together with animal fodder or its components. Two ways of import are probable:

- the imported fodder or its components come from places where the proper level of cleanness is not maintained in warehouses and production plants and thus rodents, and at the same time also insects, can obtain a pretty free access to stored products; then together with the fodder imagines are accidentally transported, or
- faeces, e.g. chicken droppings with an admixture of rat droppings are added to fodder or fodder components (according to an oral information of chicken breeders, such methods are known to have been implemented), and then together with the fodder there are transported eggs, larvae or imagines of *P. hilleri* (and probably many other insect species).

Once the fodder has arrived at its final destination, new generations of *P. hilleri* develop. However, a prerequisite for its development is the presence of a nutritional basis in the shape of rodent faeces and rather low temperatures (not exceeding 25°C). If the temperature does exceed 25°C, the development period is significantly prolonged and a majority of larvae and pupae degenerate and die out (Howe and Burges 1952). The above described situation could take place in the Polish localities mentioned in the present paper. In the case of Godkowo locality, chicken fodder and fodder components were purchased from companies which specialised in trading with such goods, and it was discovered, after an interrogation, that these companies imported some components from abroad, i.a. from Asia.

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