

Short note

Morphological anomalies in the body structure of *Hoplopleura* spp. (Anoplura: Hoplopleuridae)

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ABSTRACT. Morphological anomalies in sucking lice (Phthiraptera: Anoplura) have been discussed sporadically, mainly when the changes were considerable, such as in the structure of the reproductive organs or pleural plates, and have concerned the most commonly-studied species. An analysis of 376 specimens from three species of the genus *Hoplopleura* (*H. acanthopus*, *H. affinis*, *H. edentula*) identified 13 individuals with changes in the number and size of the setae on the sternal plates of the abdomen and irregularities in the structure of the plate itself (3.5% of the collection). The above anomalies do not invalidate the taxonomic decisions.

Keywords: Anoplura, *Hoplopleura acanthopus*, *Hoplopleura affinis*, *Hoplopleura edentula*, morphological anomalies, sucking lice

Introduction

Anomalies are commonly observed in the morphological structure of insects. In the Phthiraptera, morphological anomalies have been recorded by Malcomson [1], by Palma and Pilgrim [2] and by Valim [3]; however, most of these findings refer to the biting lice (Mallophaga), and few studies have examined irregularities in the body structure of sucking lice [4,5]. There is also an absence of data on the morphological anomalies in lice of the family Hoplopleuridae, which comprise close to 30% of the known Anoplura species, associated mainly with rodents and soricomorphs. Within the most numerous genus, *Hoplopleura*, only a single study has noted changes in the paratergal plate structure and their chetotaxis, this being reported in a female *H. captiosa* Johnson, 1960 [5]. The author also assumed that such changes were developed at the stage of individual growth.

The present study presents anomalies in the number and size of setae on the sternal plates of the abdomen, as well as irregularities in the structure of the plate itself, in specimens from the three most

abundant species in Europe: *Hoplopleura acanthopus* (Burmeister, 1839), *H. affinis* (Burmeister, 1839) and *H. edentula* Fahrenholz, 1916. Such data is highly significant in determining the variability of morphological traits, and hence their applicability in taxonomy.

Materials and Methods

The study included 376 specimens of three species of the genus *Hoplopleura*: *H. acanthopus* (n=59), *H. affinis* (n=242) and *H. edentula* (n=75). All specimens with anomalies were collected from mammals classified in the rodent families Muridae and Cricetidae within the area of Poland. *H. acanthopus* were collected from *Microtus arvalis* (Pallas, 1779) (Eastern Baltic-Belarus Lowland: Podlasie-Belarus Heights – the area of the Białowieża National Park) and *Apodemus agrarius* (Pallas, 1771) (Polish Uplands: Lublin-Lviv Upland – Kijany); *H. edentula* from *Myodes glareolus* Schreber, 1780 (Eastern Baltic-Belarus Lowland: Podlasie-Belarus Heights – the area of the Białowieża National Park); *H. affinis* from *A. agrarius* (Central European Lowland: Central

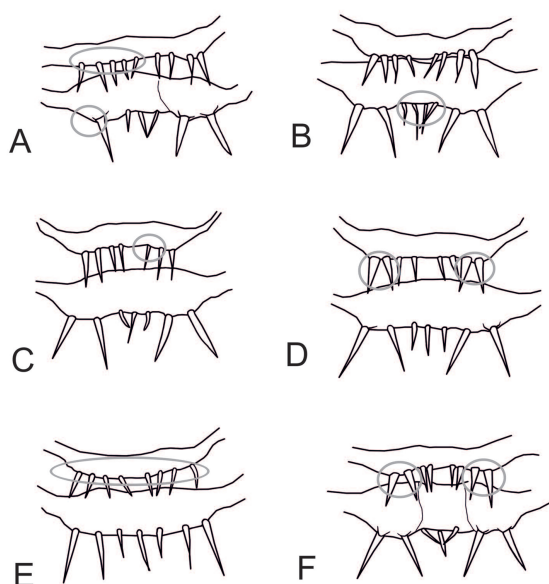


Figure 1. Anomalies in the structure and presence of setae on the sternal plate of the thorax of female *Hoplopleura affinis* (not to scale)

Poland Lowlands – Niemce; Southern Baltic Coastlands – Gdańsk, Hopowo, Łebieniec and Słomowo) [6].

The lice were collected from the dead animals by combing the hair with tweezers under a stereoscopic microscope. The collected lice prepared for the analysis under a light microscope: briefly, they were fixed and preserved in 70% ethyl alcohol solution, and then dumped in polyvinyl-lactophenol to form total preparations [7]. They were then subjected to morphoanatomical examination.

Each louse was subjected to qualitative and quantitative analysis regarding the structure of the morphological elements, with special emphasis placed on the traits constituting the most important criteria for species description and the key traits. The specimens were deposited in scientific collections within the framework of the Collection of Extant Invertebrates in Department of Invertebrate Zoology and Parasitology, University of Gdańsk, Poland (UGDIZP).

Results and Discussion

Morphological anomalies were identified for 13 adults (3.5%), i.e. four *H. acanthopus* (3♀, 1♂), six *H. affinis* (6♀), three *H. edentula* (3♀).

***H. affinis*:** number and size of setae on sternal plates of the second and third abdomen segment.

Variable number of setae. The above anomaly

was observed in four cases; in two cases, no setae were observed (without mechanical impacts) (Fig. 1 A and C); in the two remaining cases, extra setae were found (Fig. 1 A and B).

Seta size. In two cases, a clear difference in the proportions of the setae of the 2nd segment sternal plate were observed (Fig. 1 D and F); in one case, the setae on the sternal plates of the second and third segments were of identical size and thickness (Fig. 1 E).

***H. acanthopus*:** number of setae on the sternal plates of the second and third abdomen segments.

Variable number of setae. In all four cases (three females and one male), higher numbers of setae, or their absence, were observed on the second and third segments (Fig. 2 A, B, C and D).

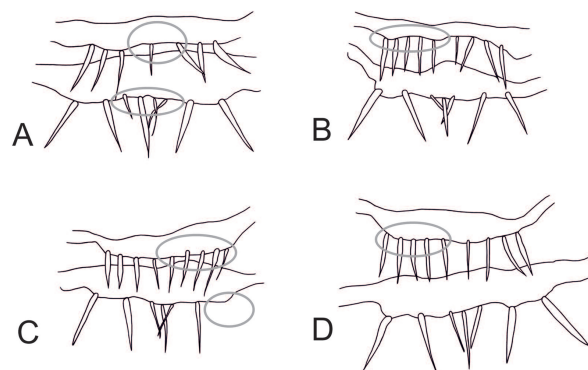


Figure 2. Anomalies in the structure and presence of setae on the sternal plate of the thorax of *Hoplopleura acanthopus* (not to scale)

***H. edentula*:** number and size of setae on the sternal plates of the second and third abdomen segments.

Variable number of setae. Extra setae observed in two cases (Fig. 3 A and C).

Setae size. In one case (Fig. 3 A), the setae on the plate of the second segment were of equal size, and in one case they were smaller than normal on plate 3 (Fig. 3 B).

Abnormal structure of the sternal plate. In one case (Fig. 3 A), hypertrophy of a part of the plate was observed.

It is interesting that the teratologies of the sternal plate setae in *H. affinis* and *H. edentula* were only observed in females. Based on the present study it can be suspected that these defects occurred during an improper course of nymphae moulting.

The observed anomalies can be viewed as an

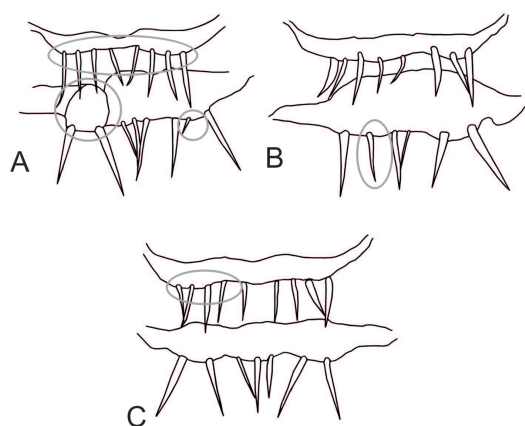


Figure 3. Anomalies in the structure and presence of setae on the sternal plate of the thorax of *Hoplopleura edentula* (not to scale)

element of individual variability, because the majority of the studied traits are not of a key nature and do not considerably affect the basic diagnostic criteria for these species; for example, the variations in the location or number of the fine setae. Also, the observed changes in the sternal plates do not affect correct identification. However, although the presented irregularities do not influence the correctness of species identification, these observations suggest that none of the above traits should be taken into account as taxonomic traits (criteria) for broader characteristics.

References

- [1] Malcomson R.O. 1953. Arthropod teratology. *Canadian Entomologist* 85: 313-315.
- [2] Palma R., Pilgrim R.L.C. 1977. An abnormal male of *Halipeurus* (*Halipeurus*) *consimilis* (Mallophaga: Philopteridae) without genitalia. *New Zealand Entomologist* 6: 290-292.
- [3] Valim M.P. 2006. *Tyranniphlopterus caiolukasi* sp. n. (Phthiraptera: Philopteridae) from the yellow-olive flycatcher (Aves: Tyrannidae), with observations on gut contents. *Lundiana* 7: 55-58.
- [4] Keilin S.D., Nuttall G.H.F. 1919. Hermaphroditism and other abnormalities in *Pediculus humanus*. *Parasitology* 11: 279-328.
- [5] Wegner Z. 1991. Morphological anomalies in lice (Anoplura, Hoplopleuridae). *Wiadomości Parazytologiczne* 37: 119-121.
- [6] Solon J., Borzyszkowski J., Bidłasik M., Richling A., Badora K., Balon J., Brzezińska-Wójcik T., Chabudziński Ł., Dobrowolski R., Grzegorzczak I., Jodłowski M., Kistowski M., Kot R., Kraż P., Lechnio J., Macias A., Majchrowska A., Malinowska E., Migoń P., Myga-Piątek U., Nita J., Papińska E., Rodzik J., Strzyż M., Terpiłowski S., Ziaja W. 2018. Physico-geographical mesoregions of Poland: Verification and adjustment of boundaries on the basis of contemporary spatial data. *Geographia Polonica* 91: 143-171. doi.org/10.7163/GPol.0115
- [7] Kadulski S., Izdebska J.N. 2006. Methods used in studies of parasitic arthropods in mammals. In: *Arthropods. Epidemiological importance*. (Eds. A. Buczek, C. Błaszak). Koliber, Lublin: 113-118.

Received 04 February 2021

Accepted 04 March 2021