

Original papers

New data on the prevalence of *Trichodectes melis* (Phthiraptera, Trichodectidae) on the European badger *Meles meles* (Carnivora, Mustelidae)

Paulina Kozina, Aleksandra Gólczyńska, Joanna N. Izdebska

Department of Invertebrate Zoology and Parasitology, Faculty of Biology, University of Gdańsk, Wita Stwosza 59, 80-308 Gdańsk, Poland

Corresponding author: Paulina Kozina; e-mail: paulina.kozina@biol.ug.edu.pl

ABSTRACT. *Trichodectes melis* is a specific ectoparasite of the European badger *Meles meles*. Distribution of this chewing louse is little known, although presumably it coincides with the range of its typical host. In Poland, it has been found in only a few stands in the western part of the country. It has recently been observed in the area of the Białowieża Primeval Forest, where 81 specimens of *T. melis* (48 females, 7 males and 26 nymph forms) were collected from two female European badgers, mainly from the fur of the head area. No symptoms of infestation were observed.

Key words: *Trichodectes melis*, Ischnocera, chewing lice, *Meles meles*, European badger, Białowieża Primeval Forest

Introduction

The louse suborder Ischnocera (Phthiraptera) are highly specialized keratophagic parasites mainly of birds and some mammals, living in their fur or feathers. As a result of the long-term evolution of the parasite-host system, they have acquired advanced adaptations conditioning generation of host, topical or topographic specificity [1,2].

Trichodectes melis (Fabricius, 1805) parasitizes the fur of the European badger *Meles meles* (Linnaeus, 1758), the biggest predatory representative of the Mustelidae family in Poland. The geographical range of the European badger includes the whole of Europe, apart from Northern Scandinavia, and a large part of Asia. In Poland, despite being present in small numbers, it can be found throughout the country.

Although the range of *T. melis* presumably coincides with the range of occurrence of its hosts, i.e. various badger subspecies, it is rarely observed: for example, in Spain [3], the United Kingdom [4–6] and Hungary [7]. Similarly, in Poland, the louse is very rarely noted [1], with its stands being found mainly in the western part of the country:

Łeba, Międzyzdroje, Suchy Las, and Zielonka, near Poznań [8], the Lower Silesia region [9] and Łódź [10]. It appears to be absent from many other regions.

Most studies concerning badgers, including their parasitic fauna, come from areas more or less transformed by humans, and there is lack data on badgers from well-preserved primeval forest ecosystems. Fortunately, this gap is filled by studies within the area of the Białowieża Primeval Forest on the ecology and social behavior of the badger, as well as other carnivorous mammals [11,12]. So far, no data has been published on the external badger parasites within this region.

Materials and Methods

Material for the research was obtained from two dead female European badgers found on a road in the area of the Białowieża Primeval Forest (Północnopodlaska lowland, Poland). The first one was found on 19.03.2013, and the other on 21.08.2013. Material was collected in September 2013.

Table 1. Body size (mm) of adult stages of *Trichodectes melis* from badger

	Present		Złotorzycka 1972 [9]		Pérez-Jiménez et al. 1990 [15]	
	Male N=7	Female N=44	Male*	Female*	Male N=18	Female N=48
Length of head	0.45-0.51	0.48-0.61	-	-	0.5-0.53	0.52-0.58
Width of head	0.57-0.83	0.69-0.80	-	-	0.79-0.84	0.84-0.94
Length of thorax	0.21-0.27	0.18-0.30	-	-	0.3-0.35	0.27-0.35
Width of thorax	0.38-0.50	0.37-0.63	-	-	0.55-0.61	0.62-0.69
Length of abdomen	0.82-0.90	0.86-1.22	-	-	1.01-1.12	1.05-1.26
Width of abdomen	0.82-0.94	0.85-1.21	-	-	0.95-1.06	1.11-1.30
Total length of body	1.57-1.67	1.58-2.04	1.7-2.0	2.0-2.3	1.83-1.98	1.88-2.13

* no data on the number of individuals

The badgers were preserved by freezing, and after defrosting, they were examined for the presence of parasites of the fur and the surface of the skin [13]. The *T. melis* specimens were preserved in 70% ethanol, and examined with a stereo microscope. The parasites were measured in millimeters, and permanent preparations with polyvinyl-lactophenol were made when needed.

Results and Discussion



Fig. 1. *Trichodectes melis*, female



Fig. 2. *Trichodectes melis*, male

Altogether, 81 specimens of *Trichodectes melis* were found in the fur of the two badgers: 48 females (Fig. 1), 7 males (Fig. 2) and 26 nymph forms. A comparison of biometric data showed that the examined specimens do not differ significantly from those examined by other authors in terms of measurements (Table 1). The ratio of males to females in louse xenopopulations was 1:7, while the ratio of adults to juveniles was 2:1.

Twenty louse specimens were found on the badger obtained in March, including 11 females

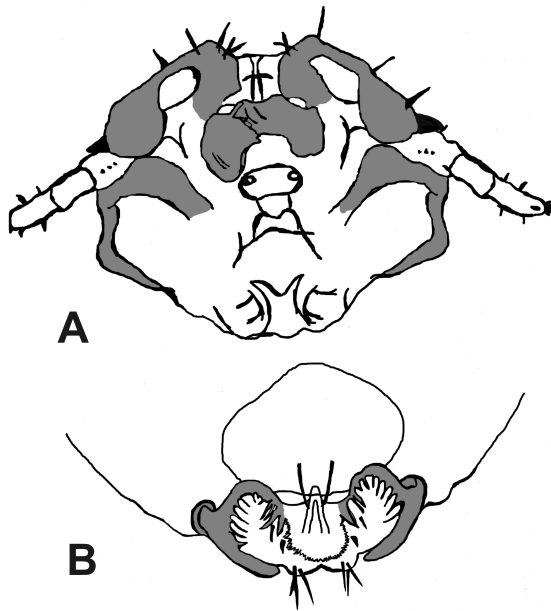


Fig. 3. *Trichodectes melis*, female; a. head, b. genital region

(Fig. 3), 3 males (Fig. 4) and 6 nymph forms, while 61 lice were noted in the badger received August, including 37 females, 4 males and 20 nymphs. Therefore, the male to female ratio and the ratio of imagines to juvenile stages in the louse infrapopulations amounted to ca. 1:4 and 2:1 for the March sample, and 1:9 and 2:1 for the August sample, respectively.

The lice of the examined badgers exhibited topographic specificity, i.e. the distribution in different body areas. Most specimens (56%) were located on the head, in the ear and neck area. Little data exists on the topography and topical

preferences, i.e. those related to the microhabitat, of the lice, however, topography is important e.g., in mechanisms of parasitic arthropod transmission [14].

T. melis has been reported to be present on the whole body of its host [15]. Data on the location and topographic preferences of ectoparasites is crucial to understand their potential pathogenic importance. A concentration of lice in a restricted area may more easily contribute to development of the population (which may result in parasitosis) than the dispersal of the same number of individuals across different body areas. In the present study, in spite of evident topographic preferences of lice, no pathogenic changes were observed on the surface of the skin or in the fur. Presumably the number and concentration of the specimens were not high enough to trouble the host.

Unfortunately, too little data exists to enable a comparison of morphological features with different aspects of the biology, ecology or parasitology of the lice infesting badgers from different regions and environments. As a rule, the few existing reports show only records of *T. melis* in the host, or the number of observed specimens, and more detailed information, including morphometric characterization, has been provided very rarely.

In case of the Trichodectidae, most data on the subject concerns species parasitizing domestic, game or farm mammals, or other wild ungulates. Although studies in Poland provide detailed data on the subject of species parasitizing roe deer, fallow deer [16], red deer [17] or European bison [18], predatory mammals have only occasionally been investigated for the presence of lice: for example, only two otters, *Lutra lutra*, have been

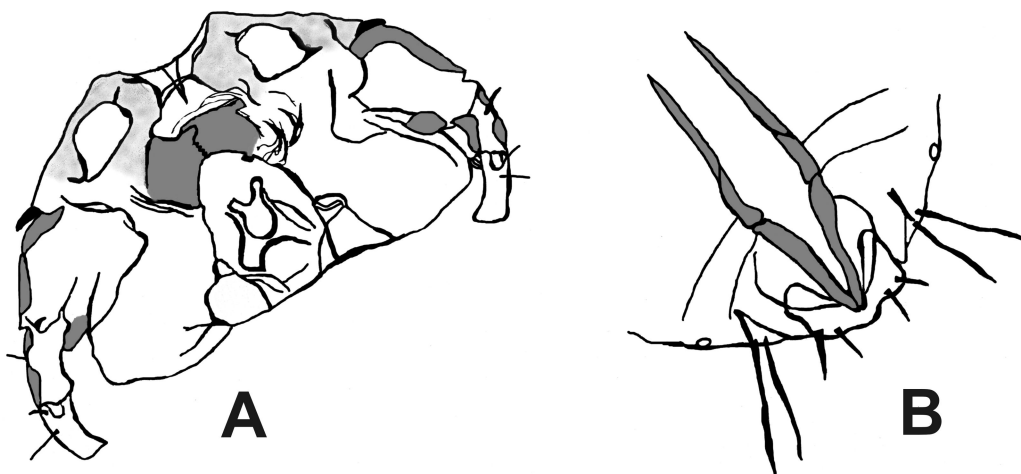


Fig. 4. *Trichodectes melis*, male; a. head, b. genital region

examined in the context of parasitic arthropods, and in one of them, the specific louse species *Lutridia exilis* (Nitzsch, 1861) was found [19,20]. In total, only eight chewing lice species have been found of the 84 chewing lice species known to infest predators [1,20]. However, these species were reported in several papers, and as individual reports do not allow the basic features of the parasite-host system to be analysed with regard to their frequency of occurrence in host populations and their pathogenic importance, the body of knowledge concerning them is fragmentary.

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References

- [1] Kadulski S. 2007. Wszy i Wszóły (Phthiraptera). In: *Fauna Polski – charakterystyka i wykaz gatunków*. (Eds. W. Bogdanowicz, E. Chudzicka, I. Pilipiuk, E. Skibińska). Muzeum i Instytut Zoologii PAN, Warszawa: 329-341.
- [2] Fryderyk S., Izdebska J.N. 2009. Chewing lice (Insecta, Phthiraptera) of White Stork (*Ciconia ciconia* L.) in Poland. *Annales UMCS, sectio C*, 64: 83-88.
- [3] Dominguez-Panafiel G., Gimenez-Pardo C., Gegundez M.I., Lledo L. 2011. Prevalence of ectoparasitic arthropods on wild animals and cattle in the Las Merindades Area (Burgos, Spain). *Parasite* 18: 251-260.
- [4] Britt D.P. 1981. Possible phoretic association between mallophagan and flea ectoparasites of the badger, *Meles meles* (L.). *Annals of Tropical Medicine and Parasitology* 76: 489-491.
- [5] Butler J. M., Roper T. J. 1996. Ectoparasites and sett use in European badgers. *Animal Behaviour* 52: 621-629.
- [6] Cox R., Steward P. D., MacDonald D. W. 1999. The ectoparasites of the European badger, *Meles meles*, and the behavior of the host-specific flea, *Paraceras melis*. *Journal of Insect Behavior* 12: 245-265.
- [7] Rekas J. 1994. Chewing lice parasitizing mammals in Central Europe, with notes on louse taxonomy and biogeography. *Parasitologia Hungarica* 27: 57-67.
- [8] Skuratowicz W. 1974. Materiały do znajomości wszołów (*Mallophaga*) występujących na ssakach w Polsce. *Polskie Pismo Entomologiczne* 44: 553-558.
- [9] Złotorzycka J. 1972. Wszóły – *Mallophaga*. Nadrodziny: Gonioidoidea i Trichodectoidea. Klucze do Oznaczania Owadów Polski 15: 35-37.
- [10] Złotorzycka J. 1983. Mallophagen aus Vögeln und Säugetieren in zoologist Garden. *Angewandte Parasitologie* 24: 166-178.
- [11] Jędrzejewska B., Jędrzejewski W. 2001. Ekologia zwierząt drapieżnych Puszczy Białowieskiej. Wydawnictwo Naukowe PWN: 130-132, 233-236.
- [12] Kowalczyk R., Zalewski A., Jędrzejewska B. 2004. Seasonal and spatial pattern of shelter use by badgers *Meles meles* in Białowieża Primeval Forest (Poland). *Acta Theriologica* 49: 75-92.
- [13] 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: 113-117.
- [14] Izdebska J.N., Rolbiecki L. 2013. Diversity of the parasite fauna of *Mus musculus* L. (Rodentia, Muridae) from different habitats. *Russian Journal of Ecology* 44: 428-432.
- [15] Pérez-Jiménez J M., Soler-Cruz M.D., Benitez-Rodriguez R., Ruiz-Martínez I., Díaz-López M., Palomares-Fernandez F., Delibes-de Castro M. 1990. Phthiraptera from some wild carnivores in Spain. *Systematic Parasitology* 15: 107-117.
- [16] Kadulski S., Szczurek B. 2004. Ectoparasites on fallow deer, *Dama dama* (L.) in Pomerania, Poland. *Acta Parasitologica* 49: 80-86.
- [17] Kadulski S. 2002. Trichodectidae (Ischnocera: Mallophaga) z Cervidae w Polsce. In: *Stawonogi w medycynie*. (Eds. A. Buczek, C. Błaszak). Liber, Lublin: 127-133.
- [18] Izdebska J.N. 2011. *Bisonicola sedecimdecembrii* (Phthiraptera: Trichodectidae) from European bison – redescription of adults and description of juvenile stages. *Entomologica Fennica* 22: 69-77.
- [19] Haitlinger R., Łupicki D. 2009. Arthropods (Acari, Mallophaga, Siphonaptera) collected from *Procyon lotor* (Linnaeus, 1758) (Mammalia, Carnivora, Procyonidae) in Poland. *Wiadomości Parazytologiczne* 55: 59-60.
- [20] Rolbiecki L., Izdebska J.N. 2014. New data on the parasites of the Eurasian otter (*Lutra lutra*). *Oceanological and Hydrobiological Studies* 43: 1-6.

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