

Original papers

The occurrence of *Demodex* spp. (Acari, Demodecidae) in the bank vole *Myodes glareolus* (Rodentia, Cricetidae) with data on its topographical preferences

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ABSTRACT. An examination of 16 bank voles from Poland (Pomerania) revealed the presence of two species of the family Demodecidae (Acari, Prostigmata), specific to the host. *Demodex buccalis* Bukva, Vitovec et Vlcek, 1985 was noted only in one bank vole, where 18 specimens were found: the prevalence of infestation being 6.3%. *D. glareoli* Hirst, 1919 was observed in 75% of the examined bank voles, in which were on average 5.1 specimens. Additionally, mites of the both species exhibited topical specificity – representatives of *D. buccalis* were found in the tissues of the tongue and oral cavity of the host, while *D. glareoli*, being a species associated with hair follicles, was noted in skin specimens from different body areas, particularly the head area. Infestations with demodecids were not accompanied by disease symptoms. *D. buccalis* and *D. glareoli* are a new species for the fauna of Poland.

Key words: *Demodex buccalis*, *Demodex glareoli*, demodectic mites, *Myodes glareolus*, bank vole

Introduction

The bank vole *Myodes (Clethrionomys) glareolus* (Schreber, 1780) (Rodentia, Cricetidae) is one of the most common palearctic mammals occurring in Poland. Its parasitic fauna also seems to be relatively well known, particularly regarding the occurrence of parasitic arthropods. Most data concerns assemblages of hair and skin surface ectoparasites [i. a. 1–6]. The parasites of bank voles are also named in monographs on arthropods from various groups, e.g. sucking lice [e.g. 7–10], ticks [e.g. 11–13] or fur mites [e.g. 14], however, there is considerably less information on the skin mites associated with this host. Also, occurrences of the following three representatives of the family Psorergatidae (Acari, Prostigmata) have been reported in the Netherlands: *Psorergates dissimilis* Fain, Lukoschus et Hallmann, 1966, *Psorergates microti* Fain, Lukoschus et Hallmann, 1966 and *Psorergates musculus* (Michael, 1889) [15], the latter two have also been found in hosts in Poland [16].

In addition, a small number of studies report the presence of mites of the family Demodecidae. So far, *Demodex glareoli* Hirst, 1919 (= *D. arvicolae glareoli* Hirst, 1919) have been found in hosts in England [17] and in Russia [18]. *Demodex buccalis* Bukva, Vitovec et Vlcek, 1985, was described much later, and has only been noted so far in the Czech Republic [19]. At present, both species have been found in bank voles from Poland.

Materials and Methods

The study included 16 specimens of the bank vole *Myodes glareolus* from the area of northern Poland; 15 specimens were obtained from one stand in Pomerania (Żuławy Wiślane 54°17'N/18°64'E), in August 2011, and one bank vole was found dead in the area of the zoological garden in Gdańsk-Oliwa (54°41'N/18°53'E) on 17 February 2012.

Skin mites were detected by digesting skin fragments of mites from host tissues. First, 1cm² skin specimens were collected from the heads of the examined bank voles, around the area of the eyes,

ears, nose, mouth and chin vibrissae, as well as from the neck, belly, back, limb and genital-anal regions; also tissue specimens were collected from the tongue, the inside of the oral cavity and the esophagus. The skin samples were fixed and preserved in 70% ethanol solution and then digested [20,21]. The obtained samples were decanted and analyzed with a phase-contrast light microscope. The obtained specimens were measured, all measurements being taken in micrometers, and permanent preparations in Faure's fluid were made when needed.

Three basic parasitic parameters were evaluated to assess the level of host infestation: prevalence (percentage of infested hosts), mean intensity (average number of parasites in infested hosts), as well as range of intensity (minimum and maximum number of parasite individuals per host in the infrapopulation under study).

Results

In total, 79 mites were identified in the 16 examined bank voles, representative of two species of demodecids: *Demodex buccalis* (Table 1, Fig. 1) and *D. glareoli* (Table 2, Fig. 2).

Specimens from the first species were noted only

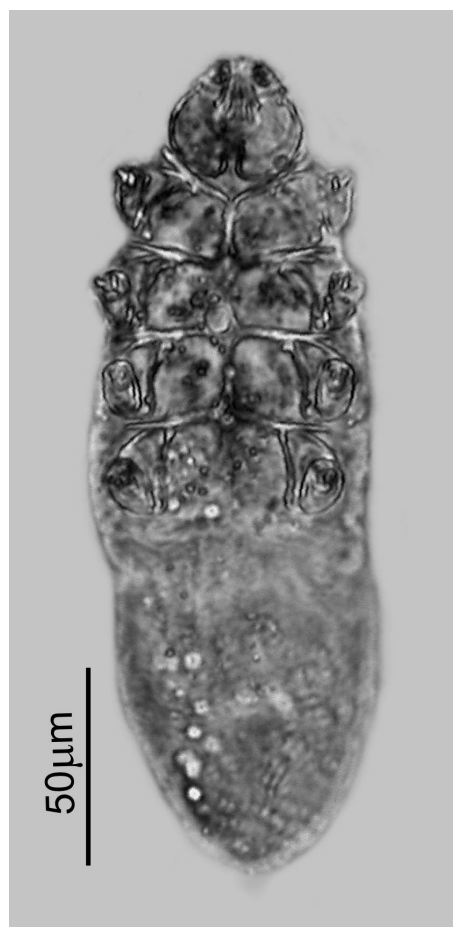


Fig. 1. *Demodex buccalis*, female

Table 1. The body size (means, ranges, standard deviations, in μm) of adult stages of *Demodex buccalis* from Poland compared with the data by Bukva et al. [19]

	Present		Bukva et al. [19]	
	Male N=6	Female N=12	Male N=9	Female N=20
Length of gnathosoma	23.2 (21.4–24.2) SD=1.2	26.1 (24.9–27.5) SD= 0.9	22.6 SD=1.3	25.1 SD=0.5
Width of gnathosoma (at base)	25.8 (24.4–27.7) SD=1.3	26.9 (25.0–28.9) SD=1.2	26.3 SD=1.7	28.1 SD=1.9
Length of podosoma	76.1 (73.0–78.8) SD=1.9	83.9 (79.8–86.8) SD=1.8	74.5 SD=1.4	84.4 SD=3.4
Width of podosoma	58.2 (52.5–61.1) SD=3.5	62.5 (55.3–65.6) SD=2.9	55.7 SD=3.6	64.3 SD=3.1
Length of opisthosoma	97.5 (94.7–101.4) SD=2.4	99.8 (89.7–115.0) SD=6.9	96.1 SD=4.8	99.0 SD=3.1
Width of opisthosoma	52.4 (48.8–55.8) SD=3.0	59.2 (57.2–61.8) SD=1.3	49.7 SD=4.9	58.3 SD=5.4
Total length of body	197.3 (189.1–202.3) SD=4.6	210.0 (195.4–230.2) SD=9.2	184.4 SD=5.9	199.9 SD=6.3

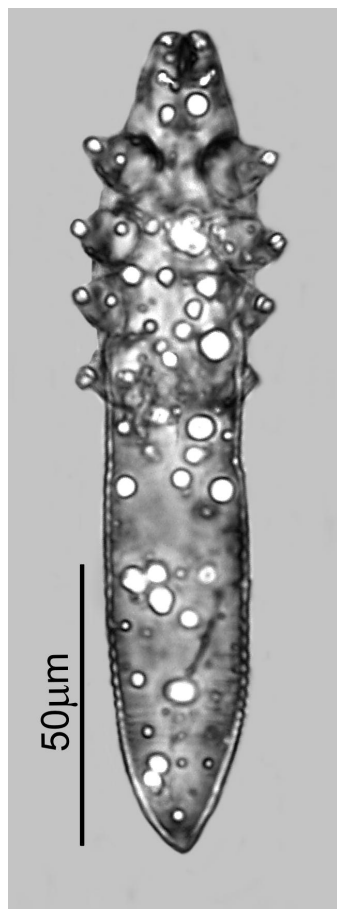


Fig. 2. *Demodex glareoli*, female

Table 2. The body size (means, ranges, standard deviations, in μm) of adult stages of *Demodex glareoli* from Poland compared with the data by Hirst [17]

	Present		Hirst [17]	
	Male N=10	Female N=10	Male N*	Female N*
Length of gnathosoma	14.9 (14.0–17.3) SD=1.0	19.8 (16.5–22.5) SD= 2.0	15	19–21
Width of gnathosoma	17.2 (14.5–20.0) SD=2.3	20.3 (17.6–22.6) SD=1.8	19	19–23
Length of podosoma	36.0 (32.8–39.0) SD=2.5	48.6 (40.0–53.2) SD=4.1	33	49–54
Width of podosoma	22.9 (20.0–29.8) SD=3.1	26.5 (23.6–29.2) SD=2.0	22	26–31
Length of opisthosoma	50.1 (43.0–56.9) SD=4.5	76.1 (63.0–84.5) SD=6.8	56	76–94
Width of opisthosoma	21.9 (20.0–25.0) SD=1.8	25.1 (23.6–26.0) SD=1.1	–	24–28
Total length of body	101.3 (90.7–109.5) SD=5.9	145.1 (125.5–157.5) SD=10.6	104	146–167

* – no data on the number of individuals

in one bank vole from the stand in Gdańsk-Oliwa, which accounted for 6.3% of the examined host group. Eighteen specimens were found, including 12 females and 6 males. The mites were located in the tissues of the tongue and oral cavity of the host without causing any disease symptoms.

D. glareoli had prevalence of infestation of 75.0% with a mean intensity of 5.1 specimens and a range of intensity ranging from 1 to 7. Representatives of this species were noted in bank voles from both stands. Altogether, 61 specimens were found, represented by 30 females, 28 males and 3 nymphs, including 4 males and 3 females found in the vole from the stand in Gdańsk-Oliwa. The demodecids were found in skin specimens from various body areas, however, most of them (54%) came from head skin. The other specimens were located in the skin of the genital-anal area (30%), back (13%) and limbs (3%). The infestations were not related to the occurrence of skin lesions.

Discussion

Mites of the family Demodecidae are usually characterized by both host and topical specificity. Although most known species are associated with

different microhabitats of mammalian skin (e.g. hair follicles, glands and their excretory ducts), demodecids living in the anterior segments of the gastrointestinal tract have also been described [22]. The first report of such a location concerned *Demodex* sp. in the oral cavity of a laboratory mouse [23], and another reported the presence of *Demodex* sp. in the tongue, esophagus and the oral cavity of *Onychomys leucogaster* (Wied-Neuwied, 1841) [24].

This small group also includes *Demodex rosus* Bukva, Vitovec et Vlcek, 1985, found in a yellow-necked mouse *Apodemus flavicollis* (Melchior, 1834) from the Czech Republic. The mites were identified in the oral cavity and esophagus, and histological analysis also confirmed their presence in the tissues of the gastrointestinal system [19]. What is more, the species has been confirmed only in Poland [25].

Demodex buccalis is not only found in similar locations as *D. rosus*, but also closely resembles it morphologically. This resemblance may result not only from adaptation to life in a similar microhabitat, which is reflected in a similar body shape, size and proportions: a range of traits, such as similarity between the structures of the gnathosoma, the structures of the legs or the male aedeagus, suggests a close relationship between the species.

The infestation parameters stated by Bukva et al. [19] for both species isolated from the rodent oral cavity were diverse – *D. rosus* was noted in 72.7% of 33 examined mice, while *D. buccalis* was found in 8.3% of 109 examined bank voles. Also according to Polish data, *D. rosus* was found to exhibit greater prevalence of infestation – 35% [25]: the prevalence of *D. buccalis* in the present study was barely 6.3%. On the basis of scarce data, it is hard to conclude whether the species is rare for its host; as it was only found in a single bank vole from a separate stand, it may be the case that it occurs only in some host populations.

Demodex glareoli, according to Hirst [17], originally regarded as a subspecies of *Demodex arvicolae* Zschokke, 1888, is included in the group of small demodectic mites inhabiting the hair follicles of rodents – mice and voles. However, individual forms described as subspecies or just specimens from different hosts exhibit considerable variability, proving the need for their systematic position to be verified [26]. Presumably, they are separate species with generally high parameters of host infestation, and therefore, the high level of

prevalence of infestation of voles in the present study is not surprising [27,26]. As demodecid transfer between hosts usually takes place by interspecimen relationships, higher parameters of infestation may concern species with parasite locations favoring their transmission – e.g. the head or the genital area [27,28].

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