

Original papers

Presence of blood-sucking mesostigmatic mites in rodents and birds kept in pet stores in the Cracow area, Poland

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ABSTRACT. The aim of the study was to investigate the occurrence of zoonotic arthropod parasites in small animals sold in selected pet stores in the Cracow area. The research was conducted in seven pet stores, keeping a total of six species of rodents and three species of birds. In two shops, two species of mites of the order Mesostigmata were detected on the animals and in their surrounding: *Dermanyssus gallinae*, the poultry red mite, and *Ornithonyssus bacoti*, the rat mite. Both observed species of mites may be harmful to animals, as well as to people working in the shops or potential pet owners. This study discusses the possible origin of the parasites and their importance to human health.

Key words: *Ornithonyssus*, *Dermanyssus*, rodents, birds, pet stores

Introduction

Many species of vertebrates are kept for companionship at home. However, as with other domestic animals, contact with birds and small mammals such as rodents might constitute some health risk due to the transmission of pathogenic microorganisms or parasites to human. In pet stores, the high turnover of animals and their varied origin, from commercial farms or home breeding, increase the probability of the occurrence of these pathogens. The blood-sucking mites are the example of organisms that could be easily introduced via the host to rodent or bird-breeding colonies and then to homes, where they may attack animals and people. Therefore, the aim of this study was to estimate the occurrence of parasitic arthropods in small animals kept for sale in pet stores, and to assess the potential hazard for their employees and the future owners of the animals.

Materials and Methods

The study was conducted in the years 2010–2011, in seven pet stores located in the Cracow area. Altogether, the shops kept a total of

six species of rodents: syrian (golden) hamster (*Mesocricetus auratus*), Djungarian hamster (*Phodopus sungorus*), mouse (*Mus musculus*), rat (*Rattus norvegicus*), gerbil (*Meriones* sp.) and chinchilla (*Chinchilla lanigera*). They also kept three species of birds: budgerigar (*Melopsittacus undulatus*), cockatiel (*Nymphicus hollandicus*) and canary (*Serinus canaria*). The animals were kept in groups on shelves in all stores apart from store 2 (Table 1), where separate cages were mounted in a special room. In all stores, feeding was based on ready-made mixtures intended for particular species.

The cages and rooms where the animals were kept, as well as the animals themselves, were searched for parasitic mites from the order Mesostigmata [1]. All of the stores were examined bimonthly for the period of a year. Additionally, the animal keepers were checked for the appearance of mite bites and related skin lesions. Specimens of mites were collected and identified according to Pratt and Stojanovich [2] and Hirst [3]. After the examination, insecticides containing permethrin or carbaminiams were used to eradicate the presence of the mites.

Table 1. The occurrence of blood-sucking mites in the examined pet stores

Stores positive for mites*	Mite species	Host species with mites observed on their skin	No. of mites observed in the environment
Store No. 1	<i>Dermanyssus gallinae</i>	Canaries Hamsters Mice	>1000
Store No. 2	<i>Ornithonyssus bacoti</i>	Canaries Budgerigars Hamsters Mice Rats Gerbils	~100
	<i>D. gallinae</i> **	Canaries Cockatiels Budgerigars Gerbils	~100

* in the stores No. 3–7 no mites were found

***D. gallinae* was observed six months after *O. bacoti* eradication

Results

The occurrence of a particular mite species on a host and in the environment is summarized in Table 1. In two out of the seven stores examined, three times the occurrence of blood-sucking mites from two species of the order Mesostigmata were noted: *Dermanyssus gallinae* and *Ornithonyssus* (syn. *Liponyssus*, *Bdellonyssus*) *bacoti*. Fig.1 shows the morphological features used to distinguish *O. bacoti* specimens from the more commonly found *D. gallinae*.

In the course of the study, although a large number of *D. gallinae* specimens were found, they generally did not attack store staff. On the contrary, *O. bacoti* was less frequently observed but showed great aggressiveness toward humans. Regarding mite eradication, although *D. gallinae* demonstrated permethrin resistance, carbaminian-based insecticides were later found to be highly effective.

Discussion

The mite species found during the study are potentially dangerous for the health of people handling animals. The possibility of transporting them to homes with the purchased animals also creates a risk for the future pet owners.

Dermanyssus gallinae is a cosmopolitan parasite closely related to bird hosts, especially farmed ones [4], although it can also attack mammals, including humans [5]. Two cases of poultry red mite occurrence in the home have been described

elsewhere, with gerbils mentioned as the source of infection for the owners [6]. In one of the pet stores investigated in the present study, the mites may have originated from a commercial bird farm, however, their occurrence in the other may be associated with the presence of infected birds outside the building, where some cages were exposed. Mites of farm origin identified in the shops were found to be resistant to permethrin, as is often noted in reared poultry [7,8].

The occurrence of *Ornithonyssus bacoti* has been described earlier in rodents kept at home and in experimental rodent colonies. Its presence was often related to the incidence of skin lesions in rodent owners and keepers [9,12]. These mites have been known to spread throughout an entire building, which has been attributed to the presence of wild rodents [13]. The species *O. bacoti* was classified in Poland as “a permanent part of the synantropic biocenosis” [14], which was verified by further research focused on parasitic arthropods of the wild brown rat (*Rattus norvegicus*) [15]. As no wild rodents were found in the building where the examined store was located, the origin of *O. bacoti* invasion was probably the animals, which had been delivered from a commercial rodent colony. The glass-enclosed, poorly-ventilated, heated space where the animals were kept provided very good conditions for the further development and reproduction of the mites.

The bites of *O. bacoti* and *D. gallinae* are harmful to humans, and can cause skin lesions in the form of a spotted papillary or papillary-vesicular

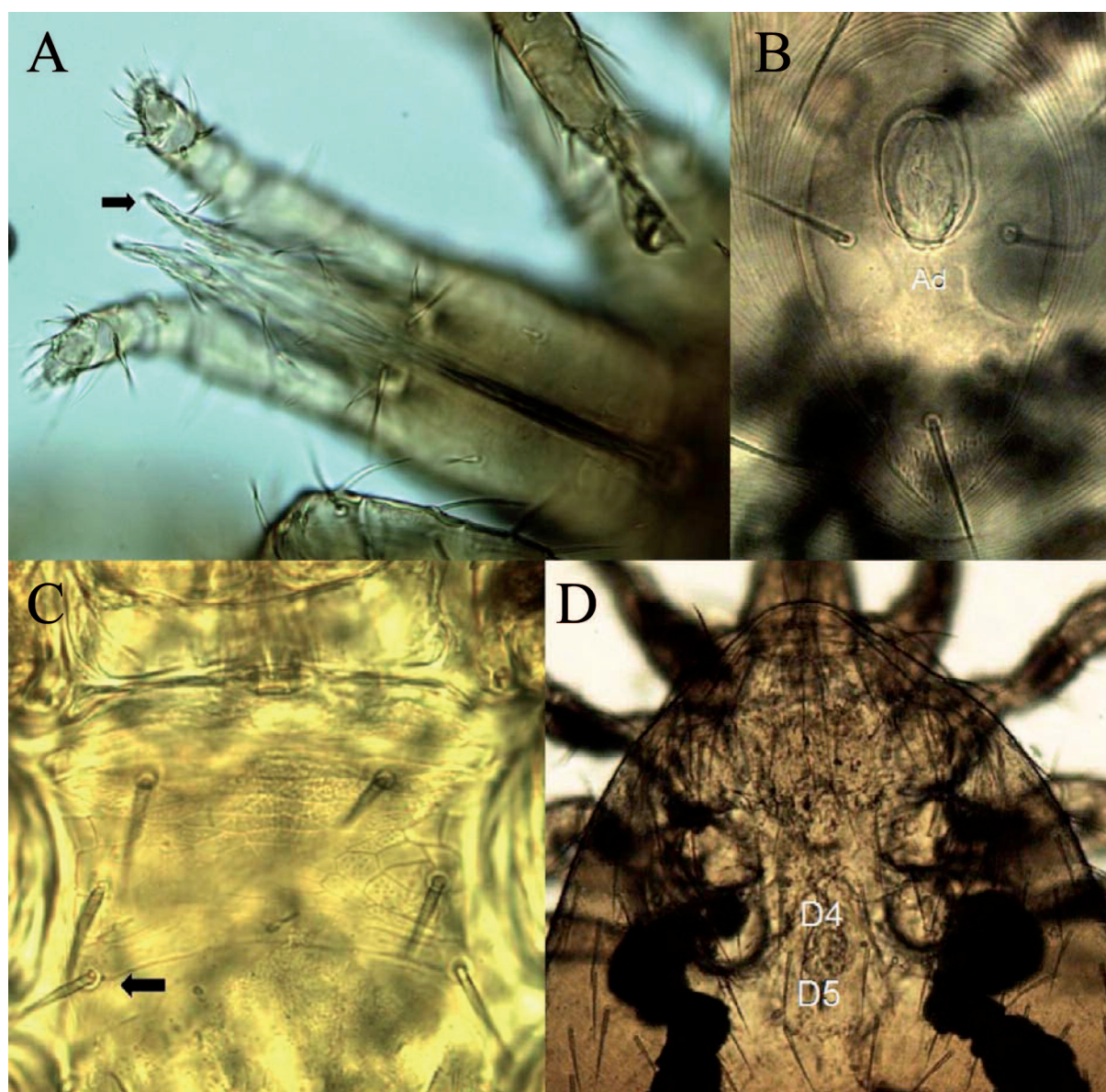


Fig. 1. Diagnostic features of *Ornithonyssus bacoti* adult female (A–C ventral view, magnification 400×; D dorsal view, 100×): A. Gnathostoma, shear-like chelae (arrow-pointed); B. Anal plate, Ad setae on the lower margin of anal opening ; C. Sternal plate, third setae pair located on the plate (arrow pointed); D. setae (D4 and D5) on the dorsal plate, with equal length.

rash [14,16]. Such symptoms were observed on the skin of one of the animal keepers in the store where *O. bacoti* was found. An additional potential threat to human health is the ability of these mites to spread viral and bacterial pathogens [17].

Conclusions

Due to the presence of mite parasites in the examined pet shops, more attention should be paid to provide adequate zoohygienic conditions, and proper veterinary care in stores, as well as in the breeding colonies providing rodents and birds for

the shops. Preventive measures against the spread of mite infection should also include parasitological quarantine for newly-arrived rodents and birds, as well as the regular monitoring of the presence of mites in the immediate vicinity, particularly if synanthropic animals such as rats or pigeons are known to be present inside or outside the buildings.

References

- [1] Ziomko I., Cencek T. 1999. Inwazje pasożytnicze zwierząt gospodarskich. Wybrane metody diagnostyczne. Drukarnia Piotra Włodkowica,

- Warszawa.
- [2] Pratt H.D., Stojanovich C.J. 1984. Acarina: Illustrated key to some common adult female mites and adult ticks. In: *Pictorial keys to arthropods, reptiles, birds and mammals of public health significance*. Public Health Service publication No. 1955. National Communicable Disease Center, Atlanta: 26-28.
- [3] Hirst S. 1922. Mites injurious to domestic animals. The British Museum (Natural History), London.
- [4] Boczek J., Błaszak C. 2005. Znaczenie roztoczy w życiu i gospodarce człowieka. W: *Roztocze (Acari) znaczenie w życiu i gospodarce człowieka*. Wydawnictwo SGGW, Warszawa: 200-202.
- [5] Wegner Z. 1999. Arachnoentomologia lekarska. In: *Zarys parazytologii lekarskiej dla studentów*. (Eds. R. Kadłubowski, A. Kurnatowska). Wydawnictwo Lekarskie PZWL, Warszawa: 303-304.
- [6] Lucky A.W., Sayers C., Argus J.D., Lucky A. 2001. Avian mite bites acquired from a new source-pet gerbils: report of 2 cases and review of the literature. *Archives of Dermatology* 137: 167-170.
- [7] Beugnet F., Chauve C., Gauthey M., Beert L. 1997. Resistance of the red poultry mite to pyrethroids in France. *Veterinary Record* 140: 577-579.
- [8] Zdybel J., Karamon J., Cencek T. 2011. In vitro effectiveness of selected acaricides against red poultry mites (*Dermanyssus gallinae*, De Geer, 1778) isolated from laying hen battery cage farms localised in different regions of Poland. *Bulletin of the Veterinary Institute in Pulawy* 55: 411-416.
- [9] Beck W. 2008. Occurrence of a house-infesting tropical rat mite (*Ornithonyssus bacoti*) on murides and human beings. *Travel Medicine and Infectious Disease* 6: 245-249.
- [10] Beck W., Fölster-Host R. 2009. Tropical rat mites (*Ornithonyssus bacoti*) – serious ectoparasites. *Journal of the German Society of Dermatology* 8: 667-670.
- [11] Cole J.S., Sabol-Jones M., Karolewski B., Byford T. 2005. *Ornithonyssus bacoti* infestation and elimination from a mouse colony. *Contemporary Topics in Laboratory Animal Science* 44: 27-30.
- [12] Śmiełowska R., Śmiełowski J. 1981. Przypadek masowego pojawu *Ornithonyssus bacoti* (Hirst) (Acari, Gamasida) na myszokoczce algierskiej (*Meriones libycus lichtenstein*) w Poznaniu. *Wiadomości Parazytologiczne* 27: 83-84.
- [13] Grzywiński L. 1956. Masowa inwazja *Bdellonyssus bacoti* Hirst u ludzi. *Wiadomości Parazytologiczne* 4: 231-233.
- [14] Humiczewska M., Rajska A. 1981. *Ornithonyssus bacoti* (Hirst) stałym składnikiem biocenozy synantropijnej w Polsce. *Wiadomości Parazytologiczne* 27: 71-82.
- [15] Haitlinger R., Jankowska A. 2005. Arthropods occurring on *Rattus norvegicus* (Berkenhout, 1769) (Rodentia: Muridae) in Poland. *Zeszyty Naukowe AR Wrocław, Zootechnika LIII*. 529: 35-44.
- [16] Rosen S., Yeruham I., Braverman Y. 2002. Dermatitis in humans associated with the mites *Pyemotes tritici*, *Dermanyssus gallinae*, *Ornithonyssus bacoti* and *Androlelaps casalis* in Israel. *Medical and Veterinary Entomology* 16: 442-444.
- [17] Valiente Moro C., Chauve C., Zenner L. 2005. Vectorial role of some dermanyssoid mites (Acari, Mesostigmata, Dermanyssoidea). *Parasite* 12: 99-109.

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