Outbreak of Tropical Rat Mite (Ornithonyssus bacoti) Dermatitis in a Home for Disabled Persons

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Key Words
Tropical rat mite • Ornithonyssus bacoti • Tropical rat mite dermatitis

Introduction
Different mite species, generally found on animals and/or in their environment, may infest humans temporarily; such arthropods should be considered as a possible cause of pruritic and erythematous skin reactions of unclear origin. The tropical rat mite, Ornithonyssus bacoti, is an external parasite occurring on rats (Rattus norvegicus, Rattus rattus), mice (Mus musculus), gerbils (Meriones unguiculatus) and various other small mammals. Although rats are known to be the preferred hosts, infestation of 10 other species of small mammals has been reported. However, in case the principal animal host is not available, human beings may become the victim of mite infestation. The relatively low host specificity might be the reason why laboratory personnel was infested while handling mice [1]. Little information is available about the distribution of tropical rat mite in wild and pet rodents more frequently than one might expect [10]. Single case reports from different parts of the world show the presence of this haematophagous pest arthropod also causing dermatitis in humans [2–10].

Case Report
Five mentally handicapped individuals living in a home for disabled persons in Southern Germany were seen in our outpatient department with pruritic, red papules predominantly located in groups on the upper extremities, neck, upper trunk and face. Over several weeks 40 inhabitants and 5 caretakers were affected by the same rash. Inspection of their home and the sheds nearby disclosed infestation with rat populations and mites. Finally the diagnosis of tropical rat mite dermatitis was made by the identification of the arthropod Ornithonyssus bacoti or so-called tropical rat mite. The patients were treated with topical corticosteroids and antihistamines. After elimination of the rats and disinfection of the rooms by a professional exterminator no new cases of rat mite dermatitis occurred. The tropical rat mite is an external parasite occurring on rats, mice, gerbils, hamsters and various other small mammals. When the principal animal host is not available, human beings may become the victim of mite infestation.

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of 70 inhabitants and 5 of the employees were affected by itching papules. The diagnosis of insect stings was based on clinical findings. The treatment of the patients was directed towards symptomatic relief. Five of them required oral antihistamines and a topical therapy with crotamiton lotion, and 1 patient in addition received topical corticosteroid and antiseptic ointment.

The home of the patients, the farm and sheds located next to the home, where the garbage is stored in bins for collection, as well as the stable for domestic animals including the storage room for feed were examined. These locations are kept open and are often visited by the disabled. There we discovered distinctive signs of a big population of rats. Inside the sheds lots of mites could be detected in various places. By examination of these mites with light microscopy female and male adults of the species *O. bacoti* could be identified (fig. 2).

Compared to other gamasid mite species belonging to the Macronyssidae, tropical rat mites show a variety of different morphological characteristics.

A professional exterminator was contracted to eliminate the rats in the garden and sheds. All rooms of the home were disinfected, the bed linen were changed several times and the garbage was collected and eliminated more frequently. After these interventions no more cases of tropical rat mite dermatitis occurred.

**Discussion**

All developmental stages of *O. bacoti* exclusively consume blood. Those parasites induce a nonspecific dermatitis by their mouth parts and saliva components; therefore, it is difficult to diagnose rat mite dermatitis unless the parasites are found. In most cases, the mites are recognized only when they attack humans. In cases of pet rodent infestation or attacked small mammals from household husbandries, veterinary practitioners sometimes see *O. bacoti* on the hosts’ integument or environment. The diagnosis of rat mite dermatitis requires detection of the parasite, which is more likely to be found in the environment of its host than on the hosts’ skin itself. Therefore, most mites are found in and around the animals’ sleeping area and nests, in the floor dust and in clothing [8–11].

*O. bacoti* belongs to the phylum Arthropoda, class Arachnida, order Acari and superfamily Parasitoidea (table 1). The life cycle of the tropical rat mite includes 5 developmental stages: egg, larva, protonymph, deutonymph and adult. The entire life cycle takes as little as 11–13 days under optimum environmental condi-

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<th>Parasitic Acari</th>
<th>Nonparasitic Acari</th>
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<td>Argasida</td>
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**Table 1. Classification of mites (Acari)** [18]
tions; however, protonymphs can survive for 43 days and adults for up to 63 days without blood meal [10, 11]. Female mites reach a size between 0.75 and 1.40 mm, males are a little smaller [13]. Usually those external parasites can be seen with the naked eye when crawling, especially on white backgrounds. The unfed mite is of a grey-white colour and is rather active in movement, but, after having engorged, it is darker, red-brown, and sluggish [11].

The identification of the tropical rat mite requires special knowledge about the morphological characteristics of these arthropods. At first sight, *O. bacoti* looks similar to *Dermanyssus gallinae* and *Ornithonyssus sylviarum*. All 3 mite species are haematophagous external parasites with the same physiology and developmental behaviour, but the preferred hosts of *D. gallinae* and *O. sylviarum* are wild and domestic birds or bats. These bird-specific mites might also be transmitted onto human skin and cause pruritic lesions. Trop-

ical rat mites are much more hairy than other mite species. The density of the hair coat of the abdomen is considerably higher in comparison to *D. gallinae* and *O. sylviarum*. There are remarkable differences in the shape of the dorsal shield (scutum), sternal and genital shield, position of the anus, number and location of various setae, etc. *O. bacoti*, in contrast to the other 2 mite species, shows a sharp caudal apex of the scutum, an oval genital shield with a cranial positioned anus.

Case reports about tropical rat mite infestation are rarely recorded in the human and veterinary literature, possibly because of the difficulty of detection and accurate identification of this ectoparasite. Furthermore, in contrast to other arthropod stings and bites [14] so far no systemic allergic reactions to tropical rat mite infestation have been reported. Dermatologists are keenly aware of dermatoses associated with mites; particularly when the preferred host is man, as is the case with *Sarcoptes scabiei* var. *hominis*, which burrow tunnels into the skin of their host. However, sometimes humans are also vulnerable to less frequently recognized forms of dermatitis caused by ectoparasites parasitic on various animals [15–18]. These dermatoses are often misdiagnosed as prurigo simplex, allergy, unspecific mosquito insect bites or bacterial folliculitis. We believe that the proper identification of epizootic animal mites is important for further treatment. The presence of *O. bacoti* is indicative of a rat-infested environment or infested small mammals in flats. Identification allows the physician or veterinarian to advise the patient and/or pet owner on eliminating the origin. Of note, the correlation of systemic symptoms such as eosinophilia and IgE induction would be of interest to possibly identify typical features of rat mite bites. We hope the new aspects given here will draw attention to this subject.

References


