



Opinion

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Phenomenon of Simultaneous Feeding of *Leptotrombidium* larvae (Acariformes: Trombiculidae) and *Myocoptes musculus* Koch (Acariformes: Listrophoridae) on Laboratory Mice



A B Shatrov*

Zoological Institute of the Russian Academy of Science, Universitetskaya nab., Russia

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*Corresponding author: A B Shatrov, Zoological Institute of the Russian Academy of Science, Universitetskaya nab., 1, 199034, St-Petersburg, Russia

Abstract

Skin damages in simultaneously feeding *Leptotrombidium* larvae (Trombiculidae) and *Myocoptes musculus* (Koch, 1836) (Myocoptidae) on laboratory mice have been studied histologically. These mites compete with each other, but if *Myocoptes* evolves a moderate superficial epidermal reaction, trombiculids produce feeding tube, stylostome, perforating the epidermis and extending into the dermis revealing significant skin reaction.

Opinion

Larvae of the genus *Leptotrombidium* (Acariformes, Trombiculidae) – are the well-known vectors of tsutsugamushi disease agents (*Rickettsia orientalis* Nagayo, Tamiya, Mitamura et Sato, 1930) in countries of the South-East Asia and on the Japanese Islands (...). Mites *Myocoptes musculus* – are the common parasites of laboratory mice in cultures. The material for investigation was sent to me by Dr. Takahashi (Department of Anesthesiology, Saitama Medical University, Saitama, Japan) and contained skin samples of mice, experimentally infected by larvae of three trombiculid species *Leptotrombidium fletcheri* (Womersley et Heaslip, 1943), *L. deliense* (Walch, 1922) and *L. scutellare* (Nagayo, Miyagawa, Mitamura, Tamiya et Tenjin, 1921) as well as by *M. musculus*. These samples were treated using histological methods. Histological investigations have shown that during mass parasitizing of *M. musculus* the following skin reactions of the mice proceed – an intensive hyperkeratosis and thickening of the epidermis, dilation of the terminal capillaries of dermis as well as infiltration of the dermal connective tissue layer by polymorphno nuclear neutrophils and lymphocytes. At the same time, an alteration of the epidermis, of its horn layer, by the mite's chelicerae is practically insignificant. However, around the immediate place of the chelicerae penetration a particular structure similar to the initial stages of the stylostome formation (see below) is evolved. A certain feeding substrate in the form of tightly packed round reddish, after azan staining, granules

surrounded by a peritrophic membrane may be observed in the myocoptes midgut during the mite feeding.

In such a form, the myocoptids' feeding makes a significant competition with feeding of trombiculid larvae. The latter, as is known, form a stylostome – feeding tube of different organization in different mite species that make possible to acquire a liquid feeding substance from deeper dermal layers, in particular the connective tissue layer. The thinner epidermis – the more effective feeding of trombiculids. But in the case of the simultaneous feeding with myocoptids, the attachment of trombiculid larvae inevitably occurs in the sites with the hyperkeratotic epidermis and scabs. In such cases, the evolving stylostomes cannot frequently reach the connective tissue layer of dermis and their structure is greatly altered. As a result, the feeding process may be inadequately changed and prolonged. Such feeding conditions appear to be unfavorable for transmitting of disease agents because of the altered stylostome formation. Nevertheless, the increased permeability of the walls of the blood vessels and abundance of the lymphoid cells in the site of feeding/inflammatory focus of all these mites create an evident background for the intensive circulation of the disease agents in the impact zone of the host tissues.

By contrast, in the case of trombiculid feeding in places without myocoptids, the relatively wide mixed stylostome (intermediate

between epidermal and mesenchymal stylostome) evolves, frequently penetrating into the subjacent connective tissue. In such cases an intensive hyperplasia of the epidermis and its perforation occur that provide the free access of the disease agents to the parasite (in this case – trombiculid larvae). Importantly, that in the midgut of larvae, a pre-oral digested substrate without any cells and their debris contain that is absorbed by the midgut

cells by means of phagocytosis. To conclude, this study shows that the mixed feeding of different parasites on the same area is significantly altered the feeding processes.

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