

Occurrence and Treatment of the Mange Mite *Notoedres muris* in Marsh Rats from South America

J. S. H. Klompen and M. W. Nachman, Museum of Zoology and Department of Biology, University of Michigan, Ann Arbor, Michigan 48109, USA

ABSTRACT: The mange mite *Notoedres muris* is reported from a new host, the marsh rat (*Holochilus brasiliensis*) from Argentina. The infection involved alopecia and encrustations on the ears and face, and was treated successfully by a subcutaneous injection of ivermectin. The new record suggests that *Notoedres muris* has become self-maintaining within this marsh rat population.

Key words: *Notoedres muris*, mange, *Holochilus brasiliensis*, ivermectin, mite control, case report.

Notoedres muris is a common parasite in some populations of *Rattus* spp. in Europe, southern Africa, Australia, New Zealand and the United States (Domrow, 1955; Whitten, 1962; DeGiusti and Hartley, 1965; Fain, 1965). It also has been reported from other murine and microtine rodents in Europe and southern Africa (Fain, 1965), endemic murine rodents and marsupials in Australia (Domrow, 1974), *Microtus californicus* in California (Lavoipierre, 1964), and hedgehogs (*Erinaceus europaeus*) in New Zealand (Heath et al., 1971). In this paper we present the first record of *N. muris* from South America and the first record of an association with a sigmodontine rodent, the marsh rat (*Holochilus brasiliensis*). In addition, we present notes on control of this mite using ivermectin.

Four male and two female marsh rats from South America were trapped alive between 1 and 7 November 1988, 6 km south of Puerto Ibicuy in the province of Entre Rios, Argentina (33°47'S, 59°10'W). These animals were transported to the Museum of Zoology (University of Michigan, Ann Arbor, Michigan 48109, USA) for use in breeding experiments. All of these rats showed alopecia and encrustations on the ears and facial region. Deep skin scrapings of the pinnae and snout revealed numerous mites, identified as *N. muris*. Voucher

specimens of *N. muris* are deposited in the Museum of Zoology (University of Michigan, Ann Arbor, Michigan 48109, USA; collection number HK 88-1117-1).

The pinnae of *H. brasiliensis* are normally covered both internally and externally with fine, short hairs, but in two males alopecia on the ears was complete, and the pinnae were thickened and hard. Subsequently, a 10 mm projection of stiff epidermal tissue developed on the tip of the noses of these same two males. Examination of the tissue of both the pinnae and the projection on the nose revealed extensive tunneling and a high density of mites in all developmental stages. The density of mites near the surface of the projection was relatively low, but high densities occurred near the base of the projection, closer to the dermal tissue. Three other rats showed less extensive damage to the epidermis and still retained some hair on the pinnae of the ears. Sixty marsh rats, trapped during the same expedition at three localities in Paraguay, showed no signs of infection with *N. muris*.

Ivermectin has previously been used successfully against *Notoedres* spp. (Evans, 1984) and was used to control this infection of *N. muris*. A commercial preparation of ivermectin (Merck and Co., Inc., Rahway, New Jersey 07065, USA) was diluted to 50 µg/ml with 100% propylene glycol and administered subcutaneously to all infected animals at a dose of 200 µg/kg body weight. During treatment, animals were housed in Plexiglas cages with dried pine shavings and cotton for litter and nest material. Cages were changed every five days and animals were provided with food (Purina rat chow #5015; Ralston Purina Co., St. Louis, Missouri 63164, USA) and water ad libidum.

Within 3 days following treatment there was partial resolution of skin lesions, and within 7 days the scabs on the pinnae and the epidermal projections on the noses had fallen off. Hair began to reappear on the ears after 5 to 8 days. After 3 wk a second subcutaneous injection (same dosage as first injection) was given to all animals. In the 6 wk following the second treatment, there was no reappearance of the lesions.

This new record allows some inferences concerning the status of *Notoedres muris* in wild populations of marsh rats. Based on the available host records and the observation that all species closely related to *N. muris* infect *Rattus* spp. in the Old World (Fain, 1965), we suggest that the ancestral hosts of *N. muris* are also *Rattus* spp. Since transmission of these mites is largely limited to direct contact between individuals (Flynn, 1973), close contact of a potential new host species with an established host (*Rattus* spp.) is probably required for transfer of mites. This hypothesis is supported by the observation that *R. norvegicus* has been observed in the same habitat as new hosts in Australia (McKenzie et al., 1976), New Zealand (Heath et al., 1971) and California (Lavoipierre, 1964).

Our observations of *H. brasiliensis* conform generally with such a view. Although *Rattus* spp. were not trapped or observed near the largely undisturbed rivers and marshes where the infected rats were collected, *H. brasiliensis* is known to inhabit plantations of sugar cane and other crops in different parts of its range (Hershkovitz, 1955). In these disturbed habitats, contact between *H. brasiliensis* and *Rattus* spp. is likely. The occurrence of *N. muris* in populations of *H. brasiliensis* which have no direct contact with a source host (*Rattus* spp.), strongly suggests that this mite has become self maintaining in wild populations of *H. brasiliensis*.

We wish to thank M. A. Barros and O. A. Reig and his graduate students for their kind assistance in Argentina. Financial support was provided by the Rackham Graduate School and the Museum of Zoology at the University of Michigan and by a grant from Sigma Xi. We thank B. M. O'Connor and P. Myers for comments on the manuscript.

LITERATURE CITED

- DEGIUSTI, D. L., AND C. F. HARTLEY. 1965. Ectoparasites of rats from Detroit, Michigan. *American Journal of Tropical Medicine and Hygiene* 14: 309-313.
- DOMROW, R. 1955. Acarine parasites of two species of *Rattus* from Brisbane, Australia. *Proceedings of the Linnean Society of New South Wales* 79: 155-158.
- . 1974. Miscellaneous mites from Australian vertebrates. 1-48. *Proceedings of the Linnean Society of New South Wales* 99: 15-35.
- EVANS, R. H. 1984. Ivermectin treatment of notoedric mange in two fox squirrels. *Journal of the American Veterinary Medical Association* 185: 1437-1438.
- FAIN, A. 1965. Notes sur le genre *Notoedres* Railliet, 1893 (Sarcoptidae: Sarcoptiformes). *Acarologia* 7: 321-342.
- FLYNN, R. J. 1973. Parasites of laboratory animals. Iowa State University Press, Ames, Iowa, 884 pp.
- HEATH, A. C. G., R. M. RUSH-MUNRO, AND D. M. RUTHERFORD. 1971. The hedgehog—A new host record for *Notoedres muris* (Acari: Sarcoptidae). *New Zealand Entomologist* 5: 100-103.
- HERSHKOVITZ, P. 1955. South American marsh rats, genus *Holochilus*, with a summary of sigmodont rodents. *Fieldiana: Zoology* 37: 639-673.
- LAVOPIERRE, M. M. H. 1964. Mange mites of the genus *Notoedres* (Acari: Sarcoptidae) with descriptions of two new species and remarks on notoedric mange in the squirrel and the vole. *Journal of Medical Entomology* 1: 5-17.
- MCKENZIE, R. A., P. E. GREEN, AND E. KNOX. 1976. *Notoedres muris* infestation in a naked-tailed rat, *Melomys cervinipes*. *Journal of Wildlife Diseases* 12: 486-487.
- WHITTEN, L. K. 1962. Parasitic mites of domestic animals in New Zealand. *New Zealand Entomologist* 3: 9-12.

Received for publication 19 April 1989.