Case Report

First Description of a Novel Parasite of the Genus *Demodex* in a Rat in Queensland, Australia

豪州クイーンズランドにおいてラットから分離された
新種のニキビダニ属に関する初回報告

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Abstract: Four species of *Demodex* mite have to date been reported as affecting the brown rat. This paper describes the finding of a possible fifth species. A pet rat was referred to a dermatology referral service in Queensland, Australia for evaluation of pruritus. Skin scrapings revealed the presence of numerous mites with the characteristic appearance of the genus *Demodex*, but with a truncated opisthosoma. Acaracidal treatment resulted in apparent clearance of the mites, but did not result in resolution of the pruritus.

Key words: *Demodex*, rat, *Rattus norvegicus*

要 約: これまでドブネズミからは4種のニキビダニが分離されている。本論文ではおそらく5種類目と思われるニキビダニ属について報告する。豪州クイーンズランドの皮膚科に、1頭の愛玩ラットが痒みの評価を目的として来院した。皮膚搔爬物鏡検ではニキビダニ属に特徴的な外観を呈するものの、後体部が短いダニが多数検出された。駆虫薬を用いた治療によりダニは消失したものの、そう痒は寛解しなかった。

キーワード: ニキビダニ, ネズミ, ラット

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Introduction

Four, apparently distinct, species of *Demodex* mite have to date been reported as affecting the brown rat, *Rattus norvegicus*⁶⁾ *Demodex nanus*, *Demodex norvegicus*, *Demodex rattii* and *Demodex ratticola*⁶⁾. This paper reports the finding of a possible fifth species in a domesticated brown rat in Bundaberg, Queensland, Australia.

Case Report

Two female pet rats, aged 12 and 18 months old, who

lived in a household with no other pets, were presented for evaluation of a pruritic dermatosis of unknown etiology to a visiting dermatology service in Bundaberg, Queensland, following referral from the primary care practice. One other rat had been euthanized one month prior to referral, due to intractable pruritus. The onset of pruritus in the two rats presented for evaluation was two months prior to presentation. Previous treatments given to the euthanized rat included enrofloxacin, doxycycline, trimethoprim/sulphamethoxazole, prednisolone, meloxicam, tramadol, miconazole/chlorhexidine shampoo, omega-3 and -6, and selamectin. Some of the above treatments were administered concurrently whilst others were administered as monotherapy. No treatment had had more than a transient impact on the level of pruritus. Previously performed fungal culture was negative and histopathology of a skin biopsy consistent

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Fig. 1. Line drawing of mite demonstrating main features

Fig. 2. Photomicrograph of mite

with self-trauma only. The rats were housed in a separate room in the owner's house and fed a balanced diet. The room was regularly cleaned and disinfected with sodium hypochlorite on a weekly basis.

On clinical examination both rats appeared healthy and alert. There was mild scaling on the dorsum of both. One rat was described as being more pruritic than the other, and the degree of scaling noted on that individual was greater than that on the less pruritic individual. However, the overall degree of scale was mild on both rats, and there were no other primary or secondary skin lesions noted. Skin scrapings were obtained from the more seriously affected individual using a blunted sterile No 10 scalpel blade over an area of the caudal dorsum that had been clipped and had liquid paraffin applied to the surface of the skin prior to scraping.

Examination of skin scrapings under light microscopy revealed the presence of numerous *Demodex* mites (10–15 mites per low power field). Adult mites were observed which demonstrated the characteristic head and thoracic anatomy of the genus, but with a very short abdominal section (see Fig. 1 and 2). In appearance, the observed mites were similar to the short bodied mites previously identified in dogs (*D. cornei*) and cats (*D. gato*). However, the length of the opisthosoma in the mites that were identified was markedly shorter than in the previously mentioned mites from dogs and

cats. The estimated length of the observed mites was approximately 100 μ m total body length with each body section conforming to the following approximate percentages of the total body length: gnathosoma 24%, podosoma 60%, opisthosoma 16%. The overall size of the mites observed appeared to be in between that of the short bodied *Demodex* mite of the dog as described by Chesney in 1999²⁾, and *Demodex gato* as described by Silbermayr more recently¹²⁾. On the basis of these findings a presumptive diagnosis of demodicosis due to short tailed *Demodex* mites was offered.

Both rats were treated with oral ivermectin at a dose rate of 1 mg/kg once daily⁷⁾ for four months following a five day upward dose titration period. After an initial mild decrease in pruritus in the first two weeks of treatment, no further clinical improvement or deterioration was noted. A skin scraping was performed by the referring veterinarian after three months of therapy; no mites were identified on skin scraping. At re-presentation to the visiting dermatology referral service after four months of therapy no mites could be found on skin scraping. However, the pruritus continued unchanged.

Discussion

Short bodied mites of the genus *Demodex* have been

reported in humans¹⁵⁾, Syrian hamsters¹⁰⁾, dogs^{3, 11)}, cats⁵⁾, ferrets⁹⁾, and the Mediterranean water shrew¹⁾. Recently it has been suggested on the basis of mitochondrial rDNA analyses that short-tailed forms in dogs and humans may be morphological variants of longer tailed *Demodex* species as opposed to separate species^{3, 11, 15)}. However, there appears to be disagreement as to the conclusions reached by different authors using this methodology in the dog^{3, 11)}. In contrast, a similar study in the cat concluded that the short-tailed mite, *Demodex gatoi*, is a distinct species from the longer tailed form, *Demodex cati*⁵⁾. Thus it would appear that both separate species and different morphological variants of the same species may be identified on mammalian hosts.

In previously published papers, short-tailed *Demodex* mites were found in skin scrapings alongside long-tailed forms in dogs¹³⁾, cats⁸⁾, and Syrian hamsters¹⁰⁾. In the case described here, only short forms of the mite were identified on skin scrapings. In dogs, it has been established that the presence of mites on hair pluckings is an abnormal finding⁴⁾, and the finding of large numbers of adult mites in skin scrapings is usually regarded as being diagnostic of disease. In man a causal relationship between the presence of mites on skin scrapings and clinical disease remains controversial¹⁴⁾, whilst in dogs and cats the connection is well established. In the case here described, failure to find mites on further skin scrapings was not accompanied by resolution of the clinical signs and thus it cannot be concluded in this case that the mites were the cause of the pruritus.

Four species of *Demodex* mite have to date been reported as affecting the brown rat: *Demodex nanus*, *Demodex ratti*, *Demodex Norvegicus* and *Demodex ratticola*^{1, 6)}. In all of these cases, authors have described a long tailed morphology. This paper describes a species of *Demodex* mite with a short tailed morphology, which differs significantly from previous reports. On this basis we propose a possible fifth species of *Demodex* mite affecting the brown rat, or a different morphological variant of one of the previously described species.

Peer reviewed papers detailing clinical disease associated with *Demodex* mites in rats are rare with most citations referring to anecdotal reports. To the authors' knowledge, this is the first paper to describe *Demodex* mites of any sort in *Rattus norvegicus* in Australia, and the first to describe a short-tailed form of the mite in the rat worldwide. In the case in question, a

pruritic dermatosis was coincident with the presence of large numbers of a short bodied *Demodex* mite on skin scrapings. However, despite an initial reported clinical improvement, the apparent elimination of the mites in this case did not appear to resolve the pruritus. The clinical relevance of the finding therefore remains obscure at this stage, and further case reports are required and investigations warranted to further assess the relevance of these findings. Nonetheless, the presence of large numbers of *Demodex* mites of a previously unreported morphological type, and in a host species in which there is a scarcity of literature, warrants the publication of these findings.

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