First report of canine demodicosis by short-bodied *Demodex* Mite (Acari: Demodecidae) in Spain

REJAS LÓPEZ J.¹, DÍEZ REYERO R.² and DÍEZ BAÑOS N².

¹ Department of Veterinary Medicine, Surgery and Anatomy. Faculty of Veterinary Medicine. University of León. 24007 León. Spain.
² Department of Animal Health. Faculty of Veterinary Medicine. University of León. Campus de Vegazana s/n. 24007 León. Spain.

**ABSTRACT**

Demodicosis is a common dermatosis in dogs. Although follicular mites have been well-documented, new mite species residing in the follicular adnexa and on the surface epithelium have been identified. These newly observed species of *Demodex* mites have led to the identification of additional patterns of clinical disease. In the present paper we describe the occurrence of a short form of *Demodex* mite on a Yorkshire Terrier, its morphology, the clinical picture and post-treatment evolution.

**Key words**: *Demodex* sp., mite, dog, demodicosis, seborrhea, Spain.

**RESUMEN**

La sarna demodécica es una dermatitis frecuente en perros. Los ácaros foliculares están bien documentados, aunque se han identificado nuevas especies que residen en los anexos foliculares y en la superficie epitelial. Estas nuevas especies justifican la existencia de cuadros clínicos distintos. En este artículo se describe un caso de demodecia por un *Demodex* de cuerpo corto en un Yorkshire Terrier, su morfología, el cuadro clínico y la evolución tras el tratamiento.

**Palabras clave**: *Demodex* sp., ácaro, perro, demodicosis, seborrea, España.

**INTRODUCTION**

Demodectic mites are normal fauna of many mammalian species including the human’s skin (Chen, 1995). Canine demodicosis is an inflammatory, non pruritic and non contagious dermatosis characterized by the presence of larger than normal numbers of demodectic mites on a dog’s skin (Scott *et al*, 2001).
The *Demodex* mite (Acarina: Prostigmata, Fam. Demodecidae) is a very host-specific ectoparasite (Chesney, 1999). Two or more different *Demodex* species can appear in the same host, but in different ecologic niches (Mueller and Bettenay 1999). Canine demodicosis are commonly seen in patients associated with immunologic abnormalities (Scott et al, 2001).

It is clear that domestic dogs can be affected by three different forms of *Demodex*: the typical form of *D. canis* (Leydig, 1859, Nutting and Desch, 1978), the large form of *D. injai* (Desch and Hillier, 2003) and a short form. At the moment, this unclassified *Demodex* mite could be a *D. canis* mutant or a new canine parasite. Molecular techniques based on the DNA of the mite will help to determine the taxonomic status (Álvarez et al, 2007).

Clinically, the most common is *D. canis*, which lives in the pilosebaceous unit and has been described in the hair follicle, sebaceous duct, and sebaceous gland (Scott et al, 2001).

Desch and Hillier (2003) recently described a longer-bodied mite (*Demodex injai*) which occupied follicles from the orifice down to and into the sebaceous glands. Its infection is associated primarily with truncal seborrhea oleosa and alopecia (Mueller and Bettenay 1999, Hillier and Desch 2002).

Chesney (1999) described the occurrence and size of a short-form of *Demodex* mite found in canine cases in the U.K., which has tentatively been named *D. cornei* (Shipstone, 2000). This mite resided in the host’s stratum corneum (Chesney, 1999).

The aim of the present study was to investigate in the province of León (northwest of Spain) one report of canine demodicosis that was mainly infected by the unclassified short-form of *Demodex* and co-infected, in minor proportion, by *D. canis*.

**MATERIALS AND METHODS**

A 1.3-yr-old, 2-kg intact male Yorkshire Terrier was referred to the Veterinary Teaching Hospital at The University of León (Spain) for evaluation of seborrhea and mildly pruritic truncal skin disease of ten months of duration (Figure 1). The previous use of fipronil spray (Frontline®; Merial) and a diet change, suggested by a local practitioner, were unhelpful. No lesions were observed in the skin of the owner, which suggested a non-zoonotic infection. Physical examination revealed numerous scales and a slight diffuse hypotrichosis of the trunk and proximal portions of the limbs.

Adhesive tape stripping of surface scale showed the presence of *Demodex* mites. Large numbers of a short-tailed demodectic mite, and some of the *D. canis* mite, were obtained in superficial skin scrapings from the dorsal trunk region. Adult mites were most common, although immature stages were also seen. No microbial overgrowth was observed at cytologic examination of the skin surface.

Material obtained from scotch-test or superficial scrapings was placed on glass slides with a drop of 10% KOH and black ink solution, and coverslips were placed on top of each. The slides were examined microscopically to detect the presence of mites.

Measurements are given in micrometres (µm) and were performed using a calibrated ocular micrometer. Mites were photographed using an optical microscope (Nikon Eclipse 80i) with a camera Head DS-Fi at 10x and 40x.

The entire coat was clipped and the dog was treated with milbemycin oxime (1.9 mg/kg PO, q 24 h) (Interceptor®; Novartis), and weekly baths with 2.5% benzoyl peroxide shampoo (Paxcutol®; Virbac); 0.05% amitraz rinses (Ectodex® solución; Intervet) were applied to the entire body surface after shampoo.

Figure 1. Lesions observed in the patient. Numerous scales and a diffuse hypotrichosis of the trunk.
RESULTS

Large numbers of the short-tailed demodectic mite (Figure 2), and some of the *D. canis* mite (Figure 3), were obtained in various superficial skin scrapings taken from different sites.

Body length and width of short-tailed adult mites (*n* = 15) collected from infected areas ranged from 120 to 155 µm (x = 139.3 ± 10.4) and 21 to 44 (x = 32.7 ± 7.1), respectively. (Table 1) Gnathosoma, podosoma and opisthosoma length ranged from 18 to 25 µm (x = 21.9 ± 2.2), 52 to 68 µm (x = 61.2±4.6) and 48 to 69 µm (x = 56.2 ± 8.4), respectively. Gnathosoma, podosoma and opisthosoma width ranged from 18 to 28 µm (x = 20.6 ± 2.3), 29 to 44 µm (x = 33.5±5.6) and 26 to 35 µm (x = 29.9 ± 2.6), respectively.

Egg length and width (*n=10*) ranged from 68 to 79 µm (x = 71.7 ± 2.5) and 20 to 24 µm (x = 22.1 ± 1.4), respectively (Figure 4).

The dorsal surface of podosoma was flat and thin fold lines were observed at opisthosoma.

Opisthosomal terminal segment was rounded. The morphology of the fourth coxisternal plate was rectangular. Mites presented a plate with belt shape which divided clearly the podosoma and the opisthosoma (Figure 5). Female genital aperture was longitudinal at level of the posterior area of the ventral podosoma.

The dog was reexamined 3 weeks post-treatment (day 21). The owner reported that pruritus had disappeared. On dermatological examination, a slight decrease in severity of the seborrhea sicca was detected. Evaluation of superficial skin scrapings revealed a substantial decrease in short-bodied *Demodex* mites at the same locations affected previously, being mostly dead mites or mite fragments. Treatment was continued, but peroxide benzoyl shampoo was changed by an emollient shampoo (Dermocanis alergias®; Esteve).

The dog was reevaluated 5 weeks later (day 56). There was total resolution of all skin lesions and superficial skin scrapings were free of *Demodex* mites. Six months later the dog remained clinically normal.
Table 1. Means and standard deviations for specimens of *Demodex* referred to the author’s.

All Measurements in micrometres (µm)

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<tbody>
<tr>
<td><strong>D. canis ♂/♀</strong></td>
<td>n = 20</td>
<td>n = 20</td>
<td>n = 39</td>
<td>-</td>
<td>n = 50</td>
<td></td>
<td>n = 15 (min-max)</td>
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<td>Gnathosoma</td>
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<tr>
<td>length</td>
<td>20.4 ± 1.9/ 24.0 ± 2.0</td>
<td>22.1 ± 0.7/ 23.4 ± 1.1</td>
<td>19.0 ± 2.6</td>
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<td>21.9 ± 2.2 (18 - 25)</td>
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<td>width</td>
<td>22.9 ± 1.9/ 22.6 ± 2.9</td>
<td>28.0 ± 1.7/ 29.4 ± 1.2</td>
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<td>20.6 ± 2.3 (18 - 28)</td>
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<td>Podosoma</td>
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<tr>
<td>length</td>
<td>55.8 ± 5.2/ 63.9 ± 3.7</td>
<td>87.0 ± 3.6/ 85.4 ± 2.9</td>
<td>56.3 ± 8.0</td>
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<td>61.2 ± 4.6 (52 - 68)</td>
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<td>width</td>
<td>32.9 ± 3.3/ 36.9 ± 1.9</td>
<td>44.3 ± 2.5/ 467.5 ± 1.2</td>
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<td>33.5 ± 5.6 (29 - 44)</td>
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<td>Opisthosoma</td>
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<tr>
<td>length</td>
<td>91.6 ± 3.9/ 135.9 ± 17.7</td>
<td>253.3 ± 42.3/ 225.4 ± 29.1</td>
<td>47.2 ± 9.2</td>
<td>80.0 ± 18.0</td>
<td>56.4 ± 10.3</td>
<td>56.0 ± 10.3</td>
<td>56.2 ± 8.4 (48 - 69)</td>
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<tr>
<td>width</td>
<td>29.2±1.5/ 32.2±1.8</td>
<td>35.6 ± 2.9/ 37.6 ± 1.5</td>
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<td></td>
<td>31.5±6.2</td>
<td>32.0±6.0</td>
<td>29.9±2.6 (26 - 35)</td>
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<tr>
<td>Body length</td>
<td>168 ± 5.3/ 224.3 ± 18.3</td>
<td>361.3 ± 43.9/ 334.1 ± 28.9</td>
<td>122.6 ± 12.0</td>
<td>165.0 ± 19.0</td>
<td>139.0 ± 21.6</td>
<td>138 ± 23.0</td>
<td>139.3 ± 10.4 (120 - 155)</td>
</tr>
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**(D. canis body length)**

| Egg length     | 81.5 ± 3.5 | 104.6 ± 5.0 | 226 ± 11.7 | 221 ± 27.0 | 229.7 ± 35.1 |                  | 71.7 ± 2.5 (68 - 79) |
| Egg width      | 26.6±2.4   | 29.93 ± 1.9 | 22.1 ± 1.4 (20 - 24) |
DISCUSSION

Most of the cases previously reported (Mason 1993, Chen 1995, Chesney 1999, Saridomichelakis et al, 1999, Tamura et al, 2001, Pérez Tort 2006, Álvarez et al, 2007) are mixed infections with *D. canis*. In only two cases many more short form mites were recovered in superficial or deep skin scrapings, and only two referred the presence of a few mites at adhesive tape stripping (Auxilia 1999, Chesney 1999, Saridomichelakis et al, 1999). On the contrary, in the present case there were large numbers of demodetic mites in the acetate tape preparations.

The mean length and width of the specimens of the short-bodied *Demodex* found in this survey was almost identical with those reported by Chesney (1999), Tamura et al, (2001) and Pérez Tort (2006), but shorter than the reported by Saridomichelakis et al, (1999).

The mean length and width of the eggs (71.7 x 22.1 µm) are shorter than the reported to *D. canis* (81.5 x 26.6 µm) (Nutting and Desch 1978) and *D. injai* (104.6 x 29.9 µm) (Hillier and Desch 2002). To the authors’ knowledge, this is the first description of the egg size.

Total body length is lower than that of *D. canis*. While gnathosomal and podosomal lengths are similar to *D. canis*, opistosomal one is about half of *D. canis*. Moreover, the fourth coxisternal plate is rectangular; while in *D. canis* is trapezoidal (Tamura et al, 2001).

In infestations mainly by the short-bodied *Demodex*, total body length and the presence of large number of mites in superficial scrapings or adhesive tape stripping seems to be diagnostic. Nevertheless, in mixed infestations Chen et al, (2002) reported that total body length and width did not easily differentiate the short-bodied mite from *D. canis* in the clinic. In that case, the use of the body ratio (opisthosoma/body length) plus morphological characteristics (rounded end of the abdomen and bilateral abdominal grooves) could be the easiest method to identify the short-tailed demodectic mite (Chen et al, 2002).

The short-bodied *Demodex* mite lives on the skin surface as can be deduced of large number observed in the acetate tape preparations and in superficial skin scrapings. Although it has been found in the follicles, most of them have been found in the stratum corneum (Chesney 1999). Similarly, Saridomichelakis et al, (1999) reported that it was more frequent in the differential mite counts in the superficial compared to the deep skin scrapings.

Short-bodied *Demodex* mite infection is associated primarily with scaling and alopecia, affecting to the trunk and limbs (Chen 1995, Chesney 1999). In present case the dog was mildly pruritic, without secondary infection, as reported by Mason (1993). Other infections by short-bodied and superficial *Demodex* are pruritic, such *D. gatoi* infection in cats (Chesney 1988). Nevertheless, Chesney (1999) did not report the presence of pruritus in dogs infected with the short-tailed *Demodex*.

As reported, frequently clinical signs had been present for several months before presentation to the referral clinic (Auxilia 1999, Chesney 1999).

Both topical (amitraz) and oral (ivermectin and milbemycin oxime) miticides have been used successfully in mixed infections (Auxilia 1999, Chesney 1999, Saridomichelakis et al, 1999), although some dogs have not improved after amitraz rinses (Chesney 1999), probably due to a wrong application technique. In the present case the combination of amitraz rinses and oral milbemycin oxime achieve a complete cure in eight weeks. Oral milbemycin oxime is unlicensed for demodicosis treatment in the dog and was used after full discussion with the owners.
It hoped that future description of new cases of canine demodicosis by mites other than *D. canis* will help to differentiate its clinical picture.

REFERENCES