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An unusual finding of Psoroptic mange in a North Chinese leopard (*Panthera pardus japonensis*) from the city ZOO and its treatment with ivermectin - a case report

**Tatjana Živičnjak^{1*}, Ingeborg Bata², Dagny Stojčević Jan¹,
and Franjo Martinković¹**

¹Department for Parasitology and Parasitic Diseases with Clinic, Faculty of Veterinary Medicine, University of Zagreb, Zagreb, Croatia

²ZOO Zagreb, Zagreb, Croatia

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ABSTRACT

Mange in a North Chinese leopard (*Panthera pardus japonensis*) from the city ZOO, caused by mites belonging to genus *Psoroptes* was presented. The literature review revealed that no data about mites from the genus *Psoroptes* being isolated from a carnivore had ever been recorded. The animal was successfully treated with ivermectin.

Key words: *Psoroptes*, incidental infestation, mange, leopard, ivermectin

Introduction

Mites from the genus *Psoroptes* (Acari: Psoroptidae) are cosmopolitan, non-burrowing, obligate ectoparasites, causing mange in herbivorous animals (sheep, goats, cattle, horses and rabbits as well as wild ungulates), leading to economic loss and welfare problems in livestock (RAMEY et al., 2000; VAN DEN BROEK and HUNTLEY 2003; SIEGFRIED et al., 2004).

The pathogenicity of this mite is attributable to the fact that, unlike most non-burrowing mites, it has piercing and chewing mouthparts which can severely damage the skin (URQUHART et al., 2007). Infestation may result in severe irritation to the herbivorous

*Corresponding author:

Tatjana Živičnjak, DVM, PhD, associate Professor, Department for Parasitology and Parasitic Diseases with Clinic, Faculty of Veterinary Medicine, Heinzelova 55, 10000 Zagreb, Croatia, Phone/Fax +385 1 2390 365; E-mail: tatjanaz@vef.hr

host, which may cause extensive pyodermitis in the ear or on the body surface (CORKE and BROOM, 1999; BERRIATUA et al., 2001; SIEGFRIED et al., 2004; BISDORFF et al., 2006). Mites very closely related to *Psoroptes* sp., belonging to the genus *Otodectes*, are fairly common in some carnivorous species (cats, dogs, foxes, and ferrets). *Otodectes cynotis* is usually found in the external ear canal, where it feeds on epidermal debris, although other parts of the head or body may be infested (CURTIS, 2004; ROBERTS and JANOBY, 2009).

According to BOWMAN (2009) generic differentiation and identification of mange mites in routine veterinary practice requires little more than examination of their pretarsi. The genus *Psoroptes* is distinguished by the presence of a trumpet-shaped terminal pulvillus on a relatively long, jointed pretarsus on the legs I, II and IV in adult females, and legs I, II, and III in adult males. In contrast, short pretarsi are found on *Chorioptes* sp. from ungulates and *Otodectes* sp. from dogs (BOWMAN, 2009), and also *Caparinia* sp., parasitizing the European hedgehog (BATES, 1999), all of them belonging to the Psoroptidae family.

Parasites normally do not infect different species of animals indiscriminately under natural conditions; they show varying degrees of preference for hosts and for habitats within them. Incidental (syn. accidental) parasites are those which occasionally appear in unusual hosts under natural conditions (OLSEN, 1986). Incidental parasites usually do not survive, or at least do not reproduce in the faulty host, but in some cases they can be extremely pathogenic (ROBERTS and JANOBY, 2009).

The aim of this paper is to present a case of incidental infestation of a carnivorous animal with mites belonging to the genus *Psoroptes*. The article also includes a description of the course and outcome of treatment with ivermectin.

Case description

In April 2012, a male, 17 year old North Chinese leopard (*Panthera pardus japonensis*), owned by the city ZOO, had been itchy for a few weeks, with intensely pruritic dermatitis, hair loss and hyperkeratosis, confined to the mid-back, lumbar area, tail and left rump (Figs. 1 and 2). Crusting and hair damage were to a large extent self-inflicted by extensive licking, biting, and rubbing.

In the animal's medical history there were some medical issues due to obesity and lipomatosis a year before the itchy skin problems were recorded (a giant skin lipoma had been surgically removed from the chest area). Whole blood tests were within normal range before surgery. Post-surgical recovery was smooth, but the animal remained overweight. Further examinations and procedures were not recommended due to potential problems with sedation. The animal was housed in a 225 m² fenced facility, comprising 200 m² of outer area covered with gravel, and it was kept together with a healthy 10 year old female

without signs of pruritus or coat and skin changes. The animals were fed with fresh beef from a store, and occasionally with freshly killed whole rabbits.



Fig. 1. The leopard restrained in a cage - affected area was sprinkled with an antibiotic powder



Fig. 2. Close-up view of the affected leopards' lumbosacral and left rump area

Topical antibiotic ointment treatment followed by an antibiotic powder prescribed by the ZOO veterinarian failed to result in any improvement. Samples of hair and scabs originating from the affected skin of the male leopard were submitted to the Parasitology laboratory in 10 % KOH. Light microscopy revealed large quantities of dead psoroptid

mites, and the ZOO staff was requested to submit freshly taken skin scrapings of the affected animal without any additive and both animals' faeces samples.

A new skin sample was mounted in glycerine and under a light microscope revealed a large number of eggs and active motile adult and juvenile mites, with morphological characteristics typical for *Psoroptes* genus (Fig. 3). Faecal samples were submitted to flotation (ZAJAC and CONBOY, 2012.) in Sheather's sucrose solution (s.g.1.25). Both animals' faecal samples were negative for endoparasite ova, cysts, oocysts or larvae, but the faecal sample from the affected male revealed a huge number of dead *Psoroptes* mites and eggs.



Fig. 3. Adult *Psoroptes* female mite, found in the leopard's skin scrapings (X 200). Characteristic sucker-like, trumpet-shaped pulvillus on the relatively long, jointed pretarsus (small nested picture x 400) on legs I, II and IV.

Ivermectin (Iverktin® 1 % Genera) was administered at 200 µg/kg body mass by SC injection to the restrained (by restricted movement) affected animal. A few days after the first ivermectin application the pruritus ceased. The application was repeated twice, 10 days apart. Twenty days after the first application the faecal flotation was clear. After two months, the hair had fully regrown.

Four months after the therapy, both animals' skin appeared healthy, and faecal flotation samples from both animals were negative.

Discussion

For many years it has generally been accepted that there are five *Psoroptes* species: *Psoroptes cervinus*, *P. cuniculi*, *P. equi*, *P. ovis*, and *P. natalensis*, based on host associations, location on the host, and the length of the outer opisthosomal setae (L4) of the adult males. Species are divided into those infesting the body and those infesting the ears of their hosts (SWEATMAN, 1958). Nowadays, the degree of host specificity is thought to have been overestimated, and the genus has been reduced to a single species, *Psoroptes equi* (BATES, 1999; ZÄHLER et al., 2000) or *P. ovis* (WALL and KOLBE, 2006), which is definitely not considered to be host specific, readily transferring among herbivorous hosts. However, some authors consider that host adapted isolates of the species exist with minor, but documented genetic differences (OCHS et al., 1999; SIEGFRIED et al., 2004).

Furthermore, molecular characterization, using sequence data from second internal transcribed spacer (ITS-2) region and microsatellite markers, found little or no consistent host-related variation among the mite population samples originating from domesticated and wild ruminants all over the world, and from three rabbit isolates from the U.K. and Argentina (PEGLER et al., 2005).

Specificity of the host-parasite relationship is determined by the success of the parasite to invade and reproduce inside or on the outside of the bodies of hosts. The factors involved in the development of host specificity among parasites are opportunities for contact between them and their hosts, their morphology (e.g. structure of the mouthparts), host behaviour (e.g. grooming), (MARSHALL, 1981; OLSEN, 1986) and the host's physiology, including the physical properties of the skin, immunological resistance, the nutritional condition of the host, stress, age, hormone level etc. (ARLIAN et al., 1981).

The literature review revealed that no data about mites from the genus *Psoroptes* being isolated from a carnivore had ever been recorded. It is difficult to draw conclusions, but since it is known that leopards in the ZOO were occasionally fed by freshly killed, unfrozen rabbits, it indeed might be assumed that the *Psoroptes* mites from a rabbit's ear could have been transferred during grooming after a meal or rolling over the carcass. It still remains unclear why the lesions were not observed on the animal's muzzle or head, which definitely was in the closest contact with the carcass during feeding. It also might be assumed that the infestation was established on the accidental host as the outcome of an insufficient defence reaction by the aged recipient animal.

According to our experience, it is not uncommon to find dead ectoparasites in a host's faecal material, especially among felids, due to grooming practices. Furthermore, endoparasite eggs or ectoparasites from the prey also are not uncommon.

Faecal flotation in Sheather's sucrose solution proved to be an appropriate supplementary and non-invasive diagnostic method, especially during follow up after

medication. As we anticipated, ivermectin resulted in clinical and parasitological cure within a few weeks, without any side effects.

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Neuobičajen nalaz psoroptoze kod leoparda (*Panthera pardus japonensis*) iz
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SAŽETAK

Prikazan je slučaj šuge kod leoparda (*Panthera pardus japonensis*) iz zoološkoga vrta, uzrokovane sa šugarcima iz roda *Psoroptes*. Pregledom literature ustanovljeno je da nikada nije opisan slučaj šuge uzrokovane šugarcima iz roda *Psoroptes* kod mesoždera. Životinja je uspješno izliječena ivermektinom.

Ključne riječi: *Psoroptes*, slučajna invazija, šuga, leopard, ivermektin
