ABSTRACT: A pair of ball pythons (*Python regius*) developed neurologic and skin alterations after being sprayed with a commercial mite repellent containing tea tree and citronella oil. Despite systemic treatment with antibiotics, meloxicam, and fluid therapy, the health status of both animals deteriorated. The male was euthanized after 8 days of treatment, while the female died after 10 days of treatment. In both cases, encephalitis and colitis were diagnosed. No signs of any infectious disease coherent with the observed histopathologic changes and clinical signs could be detected. Given the documented toxicity of tea tree oil in both humans and animals, tea tree oil intoxication was considered the most likely cause of the demise of the two ball pythons.

KEY WORDS: ball python, tea tree oil, intoxication, *Python regius*, Melaleuca oil

INTRODUCTION

All over the world, tea tree oil is increasingly used for topical skin care, as an insect repellent or an antiseptic in both humans and animals. In recent years, however, several case reports of human and animal tea tree oil intoxication arouse suspicion regarding its safety of use.

The following case report documents the development of neurologic and skin alterations in a pair of ball pythons (*Python regius*) after being sprayed on with a mite repellent containing tea tree and citronella oil. It describes the diagnostic methods used to determine the cause of the clinical signs and the attempted therapy as well as the necropsy findings. Finally, the use of natural substances such as tea tree oil or citronella oil with potential health risks for the treatment of exotic animals is shortly discussed.

CASE REPORT: MELALEUCA OIL INTOXICATION IN BALL PYTHONS (*Python regius*)

A 3-year-old male and a 5-year-old female ball python (*Python regius*) had been kept together in the same terrarium for 2 years. Other reptiles, such as Boa constrictors (*Boa constrictor*) or Inland Bearded Dragons (*Pogona vitticeps*) were kept near each other in seperate terraria.
Due to an outbreak of snake mites (*Ophionyssus natricis*) within the boa terrarium, the owner decided to spray both terrarium contents and all his reptiles with a commercial “biological” mite repellent (Euro Zoo TerraPlus, Special Mite Spray, Germany). According to its label, tea tree and citronella oil constituted the main ingredients of the spray, without revealing any details regarding their concentration. The producing company did not reply to any requests on behalf of the concentrations or any other ingredients.

Ten days after being sprayed, the male python displayed a marked tilt of the head, reddish mucous membranes, a loss of muscle tone of the right mandible and discoloration of the skin. The animal became apathetic and refused to eat, with its general condition increasingly deteriorating. When presented to the clinic, it had developed star-gazing and a decreased righting reflex, as well as oedematous blisters of the ventral scales.

No pathologic changes could be detected on the radiographic images. Blood was obtained from the ventral caudal vein. Leucocytosis, lymphocytosis, monocytosis and slightly elevated calcium levels were the most prominent findings (Johnson and Benson, 1996).

The animal was treated for 8 days once daily with 10 mg/kg marbofloxacin (Marbocyl® 100 mg/ml, Vétoquinol, Lure, France) IM, 30 ml/kg of Ringer solution “Fresenius” and Glucose 5% “Fresenius” in a 1:1 ratio (Fresenius Kabi Deutschland GmbH, Bad Homburg, Germany) SC and for 5 days with 1 mg/kg meloxicam (Metacam® 5 mg/ml, Boehringer Ingelheim, Germany) SC. A combination of 5 mg/kg B vitamins (Vanavit® Vana GmbH, Vienna, Austria) and amino acids (Amynin® Pharma AG, Vienna, Austria) was added to the infusion.

Despite supportive treatment, the general condition of the animal deteriorated rapidly. In agreement with the owner, the animal was euthanized.

The necropsy of the animal revealed severe purulent-necrotizing encephalitis, severe dermatitis (of different cell types) on the dorsal head, as well as severe liver cell oedema. Additionally, pyogranulomas in liver and lung and colitis were observed.

About 2 months after being sprayed, the female ball python presented to the clinic, having developed similar, yet less prominent clinical signs than the male, such as head tilt, star-gazing, apathetic behaviour and red mucous membranes. Once again, no pathologic changes could be detected on the radiographic images. Blood was obtained from the ventral caudal vein. Similar to the male, leucocytosis, lymphocytosis, monocytosis as well as slightly elevated with calcium and uric acid levels being the most prominent findings (Johnson and Benson, 1996).

For 10 days, the female was treated like the male python with 10 mg/kg marbofloxacin (Marbocyl® 100 mg/ml, Vétoquinol, Lure, France) IM, 30 ml/kg of Ringer solution “Fresenius” and Glucose 5% “Fresenius” in a 1:1 ratio (Fresenius Kabi Deutschland GmbH, Bad Homburg, Germany) SC and for 5 days with 1 mg/kg meloxicam (Metacam® 5 mg/ml, Boehringer Ingelheim, Germany) SC. A combination of 5 mg/kg B vitamins (Vanavit® Vana GmbH,
Vienna, Austria) and amino acids (Aminin® Pharma AG, Vienna, Austria) was added to the infusion.

After an initial period of improvement, the animal was found dead in its tank after 10 days of treatment. The pathology revealed medium-graded nonpurulent multifocal encephalitis and medium-graded purulent colitis, slight enlargement of the lung follicles and a slightly increased amount of urinary concrements in the kidneys.

For further diagnostics, necropsy material was sent to the Institute of Pharmacology, Toxicology and Pharmacy of the LMU Munich. No apparent signs of intoxication could be determined. However, given the volatile nature of the ingredients in question, this had to be expected. No microbiologic cultures were done.

**DISCUSSION**

Neither the overall picture of the observed clinical signs nor the (histo)pathologic findings are completely coherent with any known infectious disease, may it be of viral (such as OPMV), bacterial (as secondary cause of the dermatitis observed in the male) or parasitic (*Acanthamoeba* spp., *Entamoeba invadens*) nature. Therefore, intoxication due to the use of the spray was assumed as the common element in both cases.

Tea tree oil/Melaleuca oil is the essential oil of *Melaleuca alternifolia* leaves. It is a mixture of various mono- and sesquiterpenes, as well as aromatic compounds. For many years, it has been used in Australia as a traditional medicine to treat skin lesions. In recent years, it has found an increased use in topical skin care and as an antiseptic all over the world (Beckmann and Ippen, 1998; Bassett et al., 1990).

In humans, tea tree oil intoxication can lead to a variety of symptoms. Among others, severe neurologic, gastrointestinal and dermatologic symptoms after oral intake of (pure) tea tree oil, allergic contact dermatitis / contact allergy eczema after topical application, gynaecomastia in male teenagers and most commonly, skin irritating and sensitising effects have been documented (Hausen et al., 1999; Rubel et al., 1998).

Several cases of tea tree oil intoxications in cats and dogs have been observed (Bischoff and Guale, 1998; Villar et al., 1994). General weakness and depression, muscle tremors, ataxia and hypothermia are among the witnessed clinical signs (Bischoff and Guale, 1998; Villar et al., 1994). In animal experiments, rabbits developed skin irritations after topical application of undiluted tea tree oil (Rubel et al., 1998).

According to the German Federal Institute for Risk Assessment (BfR), "Tea tree oil, a natural ingredient in cosmetic products, is an example for substances with a possible pharmacologic effect, which has not obtained marketing authorisation as a pharmaceutical product (…)."
In principle, a health risk from such substances cannot be excluded” (http://www.bfr.bund.de/cm/343/verwendung_von_unverduenntem_teebaumoel_als_kosmetisches_mittel.pdf Accessed April 10.04.2011).

Citronella oil is the essential oil obtained from lemongrass (Cymbopogon sp.) leaves and stems. It is used in the perfumery industry and as insect / animal repellent. As for toxicity, skin irritation / contact dermatitis in few human cases have been reported (Temple et al., 1991). According to studies of the U.S. EPA using laboratory animals, citronella oil shows low to no toxic acute effects when used topically. (http://www.epa.gov/pesticides/biopesticides/ingredients/factsheets/factsheet_021901.htm Accessed April 10.04.2011).

So far, no cases of tea tree oil or citronella oil intoxication have been documented in reptiles, although anecdotal reports exist (F. Mutschmann, oral communication 2010). Keeping the volatile nature of the ingredients in question in mind, identifying them accurately as causative agents is rather problematic.

In summary, tea tree oil intoxication (maybe in combination with the citronella oil) cannot be excluded as likely cause of the documented demise of both ball pythons. Histopathologic lesions (in particular encephalitis and colitis) were present in both snakes after being sprayed topically. Given the different chronology of the development of the clinical signs, one has to ask whether two different forms of intoxication (an acute and a chronic one) might exist, maybe in correlation with the absorbed amount of substance and/or the individual health status of the animal. Animal owners and veterinarians should be careful to use any allegedly harmless natural substances on reptiles, if any health risks from such substances cannot be fully excluded.

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REFERENCES

