

## Review articles

# Pine processionary caterpillar, *Thaumetopoea pityocampa* Denis and Schiffermüller, 1775 contact as a health risk for dogs

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**ABSTRACT.** Pine processionary, *Thaumetopoea pityocampa* Denis and Schiffermüller, 1775 is a moth that belongs to the order of insects Lepidoptera, and family Notodontidae. The larvae of pine processionary moth are the main pest of pines all over the world, but mainly in Mediterranean region. The contact with pine processionary caterpillar (lepidopterism) can produce a strong inflammatory reaction on skin and mucous membranes. Other findings include hyperthermia, tachypnoea, respiratory distress, cyanosis and tongue oedema, labial angioedema, ptyalism, bilateral submandibular lymphadenomegaly, conjunctivitis and severe tongue necrosis. Tough, few veterinary cases have been published. Also in Poland pine processionary moth (*Thaumetopoea pinivora*) is present, especially near the Baltic coast and can be a possible health risk for both humans and animals (especially dogs). The aim of this article is to increase knowledge about the clinical manifestations of pine processionary caterpillar contact, which may be useful for diagnosis of this dangerous disease.

**Key words:** pine processionary, *Thaumetopoea pityocampa*, dogs, lepidopterism

## Introduction

The caterpillar of pine processionary (*Thaumetopoea pityocampa*) moth and of other 200 species from Lepidoptera order are known as responsible for producing strong inflammatory reaction after skin contact in man and in animals [1–5]. The subfamily Thaumetopoeinae consists of about 100 species. The distribution of this moth includes mainly Mediterranean countries, Central Europe and Africa. The most common species are *Thaumetopoea wilkinsoni* with distribution in Near East and Turkey and *Thaumetopoea pityocampa* which is found in Mediterranean countries. *Thaumetopoea pinivora* and *Thaumetopoea processionea* are found in countries of central Europe (e.g. Poland) [6].



Fig. 1. Pine processionary moths during procession. The species *Thaumetopoea pityocampa* is notable for the behaviour of its caterpillars, which overwinter in tent-like nests high in pine trees, and which process through the woods in nose-to-tail columns, protected by their severely irritating hairs (source: Ilona Kaszak).

To author's knowledge many clinical cases of irritant contact with pine processionary caterpillar are reported every year in Spain. The caterpillars have a hair coat made of toxic chitinous spines that can penetrate epidermis and lead to dermatitis called erucism [2] (Fig. 1). Those chitinous spines when broken release irritant protein called thaumetopoein [7]. This protein causes an IgE independent degranulation of mast cells and is responsible for irritant properties of this caterpillar [8].

### Biological cycle of pine processionary

The larvae of pine processionary moth are the main pest of pines all over the world, but mainly in Mediterranean region [9–11]. The biological cycle begins in late summer, when insect males fecundates females. The females lay only one clutch on a pine needle. The hatching take place about 5–6 weeks later. There are four stages of growth and larvae are highly gregarious at all stages. The larvae of second stage get an irritant ability. Third stage larvae built a single silk nest where all stay when not feeding. The larvae move around the pine feeding on needles. After larval development, the larvae leave the nest in a procession and search for a suitable ground for pupation. This procession takes place at the beginning of spring when a slight temperature rise stimulates the larvae to leave.

### Clinical approach

The dogs usually have a contact with pine processionary caterpillars (PPC), when those are making a procession. Sometimes it can occur when a nest has fallen or occasionally when caterpillar's hair are blown by the wind. The consequences of this contact depend on body part that was in contact, the range of contact and finally how early treatment is applied. The most frequent localization is oral, and as a sequel normally stomatitis is produced. If it is more limited it can be called glossitis or cheilitis. The pathology is basically a toxine-mediated irritative dermatitis [11,12]. Histopathologically it can be considered as necrotic stomatitis preceded by two phases: erosive and ulcerative. Depending on the time the treatment is applied progression or total recovery may be achieved. The erosive phase leaves intact epithelial basement membrane, while ulcerative deepens into the submucosa preventing its full restitution. Blepharitis and ulcers may occur if eyes are affected, especially when caterpillar's



Fig. 2. Severe tongue swelling after contact with pine processionary caterpillar (source: Ilona Kaszak)

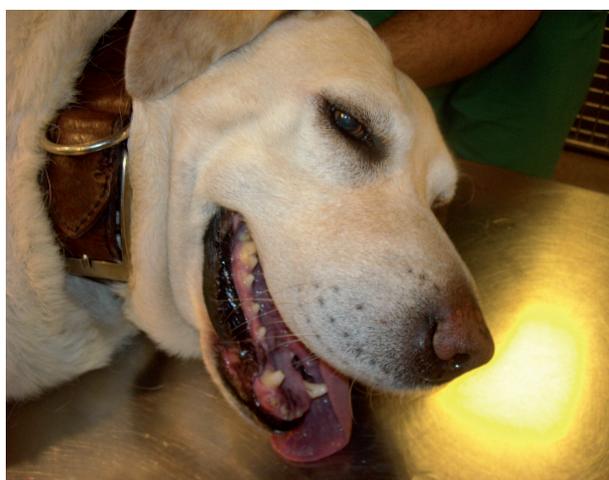


Fig. 3. Tongue oedema (source: Marta Planellas)

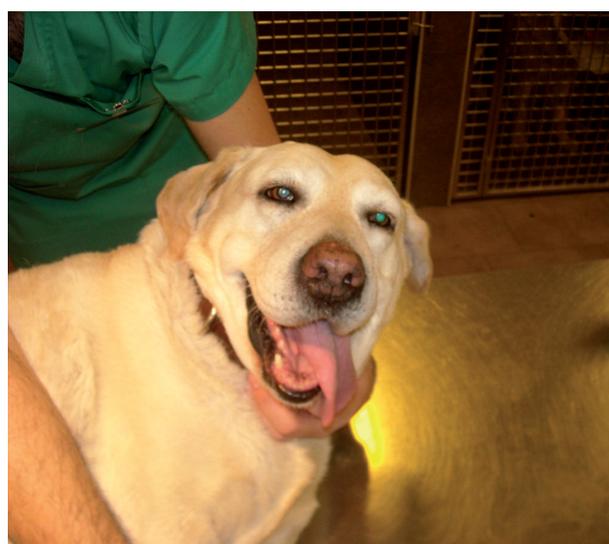


Fig. 4. Facial and periorbital angioedema (source: Marta Planellas)

hair is blown by the wind. If hair is aspirated when sniffing acute rhinitis can appear. In humans the most frequent complaint are skin lesions, which are rare in dogs.

The hair of PPC have specific integumentary structures on the dorsal side, which in case of danger break and release the toxin – thaumetopoein. Thaumetopoein causes degranulation of mast cells which starts the release of a histamine and inflammatory reaction develops [13]. It is very typical and similar to other acute allergic reactions, in which hypersensitivity of type I is produced mediated by IgE [14–16]. The inflammation can be prolonged because hair tend to remain fixed in mucocutaneous zone due to its particular structure.

### Clinical signs

The behaviour of dog that had an oral contact with PPC is pathognomic: dog becomes nervous, swallows a lot, tries to touch its mouth with paws and hypersalivation (ptyalism) may be observed. In few minutes tongue oedema (glositis) and stomatitis are developed (Figs. 2–4). Sometimes it can be so severe, that the animal may be unable to close its mouth, or even may present respiratory distress due to laryngeal oedema (Fig. 5). The symptoms are similar to anafilaxis [17]. If the PPM was ingested, vomits are frequent [18]. After some time cyanosis especially of tongue may occur due to difficulty in venous blood outflow. Due to alteration of salivary ducts emptying sublingual gland inflammation

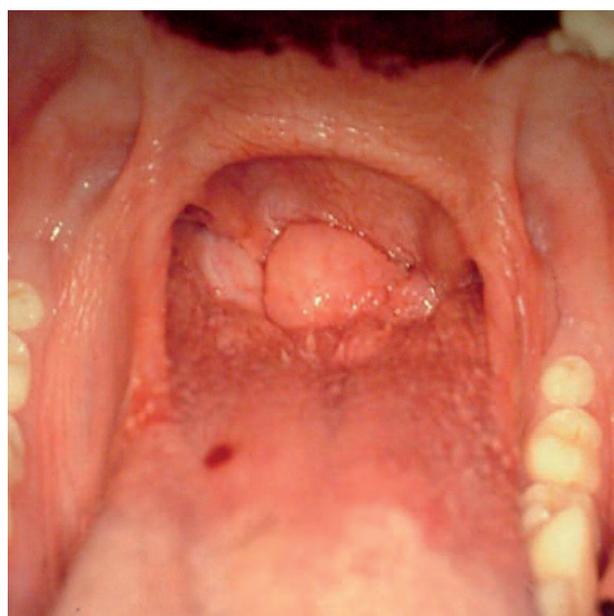


Fig. 5. Glottis oedema. Dog (source: Marta Planellas)



Fig. 6. Sublingual gland inflammation (ranula) (source: Marta Planellas)

(ranula) may be produced (Fig. 6). Other frequent consequences are: hypertermia, tachypnoea, sinus tachycardia, conjunctivitis, labial angioedema and bilateral submandibular lymphadenomegaly. In extreme cases disseminated intravascular coagulation (DIC) may occur due to systemic inflammatory response which can finally lead to animal's death. In some patients, 2–5 days after contact with PPC tongue necrosis and sloughing of its distal portion can appear. Sometimes parenteral or enteral alimentation is needed.

### Treatment

In dogs with severe respiratory distress immediate intubation may be necessary. The treatment consists of usage of corticosteroids of fast action (dexamethasone 1–4mg/kg i.v., i.m., methylprednisolone 8–15mg/kg i.v., i.m.) together with antihistaminic drugs. In case of tongue swelling irrigation with hot water may be helpful because it desactivates the toxin. Another option is usage of vinegar. Tongue scratching is not recommended because caterpillar's hair break and toxin is further released. Corticosteroids may be injected locally (tongue), in smaller dosis but always it should be done under sedation. If an animal presents signs of anaphylactic shock subcutaneous injections of epinefrine (solution 1:1000; 0.1–0.5 ml/animal) or adrenaline (0.01 mg/kg i.v., i.m., s.c. or even endotraqueal 0.2 mg/kg if an animal is intubated). Antihistaminic drugs may be applied together with corticosteroids (difenhydramine 1–2 mg/kg i.m., i.v). Gastrointestinal protectors should be used, when corticosteroids are applied. Metronidazole or enrofloxacin should be added. After hospitalization

treatment with prednisone (0.5–1 mg/kg via oral) and metronidazole should be continued [1,3].

## Prevention

Mainly during early spring (from February to April) walking with the dogs should be restricted to areas without pine trees. Nests of PPC on pine trees should be destroyed by cutting carefully affected branch and burning it. When destroying those nests, it is necessary to keep eyes and hands protected. Also insecticides can be used. Fumigations of 5% trichlorfon or pyrethrins at the end of summer or at early autumn can be done. Those products may also be applied directly to nests, if those are reachable.

## Conclusions

Pine processionary caterpillar is a pest of pine trees with a world wide distribution. Irritant properties of caterpillar's hair are responsible for strong inflammatory reactions on skin and mucous membranes. Therefore, close contact with this caterpillar can be dangerous for both humans and animals (especially dogs). If severe clinical signs are present, the prognosis depends on how fast the disease is diagnosed and the treatment is applied. Dogs living in Mediterranean region and in Near East are especially under risk, because of big pine processionary moth population. Not to forget, pine processionary moth is also present in other countries like Poland and the possibility of similar clinical cases also exists in other geographic regions, but they can be misdiagnosed. Though, to authors concern no clinical cases of dog irritant contact with pine processionary caterpillar in Poland were described.

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