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REVIEW

Skin Reactions on Exposure to the Pine Processionary Caterpillar (*Thaumetopoea pityocampa*)[☆]

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PALABRAS CLAVE

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Abstract The pine processionary caterpillar is the larval form of the *Thaumetopoea pityocampa* moth. Mediterranean forests regularly suffer plagues of this insect, which has been moving north as a result of global warming. When the small urticating hairs that develop during the last 3 larval stages are shed and can become airborne. If they come in contact with skin, they can cause a variety of reactions, notably contact urticaria and papular rashes. Irritation can also occur if the hairs lodge in the mucosa of the conjunctiva or in the respiratory tract. Several cases of anaphylactic reactions have been reported in recent years. Mechanical (irritative) mechanisms may be involved in the pathogenesis of lesions, or immunoglobulin E-mediated allergic hypersensitivity reactions may be implicated when the process is rapid, recurrent, and progressively more severe.

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Manifestaciones cutáneas originadas por la oruga procesionaria del pino (*Thaumetopoea pityocampa*)

Resumen La oruga procesionaria del pino es la forma larvaria del lepidóptero nocturno *Thaumetopoea pityocampa* (TP). Supone una plaga forestal en los países mediterráneos y se está expandiendo hacia el norte de Europa por el calentamiento global. Durante sus tres últimos estadios larvarios presenta unos pelos urticantes de pequeño tamaño, que se desprenden con facilidad y pueden ser transportados por el viento. Estos pelos pueden producir distintas patologías, entre las que destaca la afectación cutánea que se manifiesta fundamentalmente como urticaria de contacto y dermatitis papulosa. También son capaces de clavarse e irritar

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la mucosa conjuntival y de penetrar en la vía respiratoria produciendo manifestaciones a este nivel. En los últimos años se han descrito varios casos de reacciones anafilácticas por este insecto.

Los mecanismos patogénicos implicados incluyen el mecánico o irritativo y el alérgico por hipersensibilidad mediada por IgE, donde las reacciones son inmediatas, repetidas y progresivamente más graves.

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Introduction

Lepidopteras are one of the most numerous orders of insects in the world, with almost 150 000 species described.¹ Caterpillars—the larval form of these insects—are responsible for most of the adverse reactions in humans, although such reactions have also been reported after contact with the adult insect (moths or butterflies). This is because caterpillars, which are the target of many predators, have defense mechanisms such as sharp spines, small urticating hairs, and a range of toxic substances.^{2–4}

The terminology used to describe reactions to lepidopteras is confusing and, at times, contradictory. The term *erucism* is derived from the Latin *eruca*, or caterpillar, and so should be reserved for any disease caused by caterpillars or the larval phase of these insects. The word *lepidopterism* is derived from the Greek *lepis*, or scale, and *pteron*, or wing, and its use should be limited to reactions caused exclusively by lepidopteras in the adult reproductive phase, ie, moths and butterflies. However, these terms are often used incorrectly, and erucism is used for exclusively cutaneous reaction to lepidopteras in any phase of development, and lepidoterism is used when there is noncutaneous involvement. In line with the approach of a recent review,² we will not use this terminology but rather refer directly to the type of clinical manifestation and its cause (for example *Thaumetopoea* contact urticaria).

This article will focus on the skin diseases caused by the pine processionary caterpillar (*Thaumetopoea pityocampa*), one of the main tree pests in southern Europe and other Mediterranean regions,^{5–7} and the most common cause of adverse reactions to lepidopteras in Spain. Recent studies also point to the expansion northwards of this insect as a result of global warming, and a greater incidence of disease in humans due to the growth of residential areas on the outskirts of towns, many of which are close to pine forests infested by pine processionary caterpillars.^{5,8,9} *Tpityocampa* feeds on the needles of different conifer species, including the stone pine (*Pinus pinea*), from which pine nuts are obtained for human consumption. Spain is the leading producer of these in the world (Fig. 1).

In the larval phase, the caterpillars are full of microscopic urticating hairs able to penetrate the epidermis and mucous membranes. The most frequent clinical manifestations are cutaneous, although cases of eye involvement, rhinitis, and even respiratory conditions and anaphylaxis have been reported. Explanations for these reactions include mechanical or irritant mechanisms, chemical or toxic mechanisms after substance release (currently out of favor), and



Figure 1 Large areas of pine forest (*Pinus pinea*) on the northern plains of Spain, infested with *Thaumetopoea pityocampa*.

triggering of an allergic immunoglobulin (Ig) E-mediated reaction to different caterpillar proteins.^{2,3,10–21}

Greater awareness among dermatologists of the biology of *T pityocampa* and the reactions it causes will enable correct diagnosis and appropriate treatment.

Biology

The pine processionary moth (*T pityocampa*) is a nocturnal lepidoptera of the Thaumetopoeidae (Notodontidae) family (Fig. 2). It is found in parts of Europe, northern Africa, and the Middle East. In Europe, there are 3 species of *Thaumetopoea*: *Thaumetopoea pinivora* predominates in the north, *Thaumetopoea processionea* in central regions, and *Tpityocampa* in Mediterranean regions.²² In Spain, it is present throughout the peninsula and the Balearic Islands, although it is mainly found in central and southern parts. It can affect all pine species, whether autochthonous or not (*Pinus pinaster*, *Pinus silvestris*, *Pinus halapensis*, *Pinus nigra*, *Pinus pinea*, *Pinus radiata*, *Pinus ponderosa*, and *Pinus canariensis*) and also cedar species.⁷

As with all lepidopteras, *Tpityocampa* goes through 4 phases of development: moth, egg, larva, and chrysalis. Its biological cycle (Fig. 3) is heavily influenced by climate. For this reason, its spread northwards is being studied as a biological marker in the context of climate change. Moths represent the adult phase of the reproductive cycle. After fertilization, the eggs are deposited in the needles of pines

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