

Case Report

Dermatitis after contact with *Pheropsophus* sp (Coleoptera, Carabidae, Brachininae) in the Pará State, Brazilian Amazon

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Abstract

Dermatitis caused by bombardier beetles is rarely reported. Here, we report a case of beetle-caused dermatitis that occurred in Pará State, the Brazilian Amazon. A female patient while putting on her shoes, felt a burning pain in the right hallux and noticed a beetle inside the shoe. During medical consultation, the physician observed that the injury site was brown and discolored. The patient complained of localized burning pain and blurred vision. The beetle responsible for the injury was identified as *Pheropsophus* sp. Administered treatment included cleaning with saline, analgesics, and topical hydrocortisone acetate and the patient was discharged without complaints.

Keywords: Bombardier beetle. *Pheropsophus*. Dermatitis.

INTRODUCTION

Vesicant beetles are ubiquitous and cause injuries in people in every continent, except the polar regions⁽¹⁾. Dermatitis may occur after contact with several groups of beetles belonging to the Coleoptera order, especially those belonging to the *Paederus* genus, Staphylinidae family, in Brazil and other tropical countries⁽¹⁾⁽²⁾⁽³⁾. Among other toxins, this genus produces pederin which is a toxic alkaloid capable of blocking mitosis which leads to cell death, and causes acute irritant dermatitis in the upper epidermis after contact with the skin⁽¹⁾. Other beetle families also known for causing blisters on the human skin after contact include Meloidae and Oedemeridae, producers of cantharidin, an inhibitor of phosphatases 1 and 2A, which have key roles in cell-cycle progression⁽¹⁾⁽²⁾⁽³⁾. Furthermore, many species of bombardier beetles (family Carabidae) of the tribes Brachinini, Crepidogastrini, Metriini, Mystropomini, Paussini, and Ozaenini are able to cause skin injuries after contact with their secretions used in self-defense⁽⁴⁾⁽⁵⁾⁽⁶⁾.

Carabids are abundant in agricultural fields all over the world and may be important natural enemies of agricultural pests⁽⁷⁾. In South America, carabid fauna is markedly abundant, divergent,

and diverse, but is still poorly known in terms of ecological relationships in anthropical environments⁽⁸⁾. When bombardier beetles are threatened, they are able to emit a defensive spray of heated benzoquinones and other toxic compounds from the tip of the abdomen⁽⁹⁾. On touching the skin, this secretion may cause initial burning pain and a throbbing ache for several hours associated with a brown discoloration⁽¹⁾⁽⁵⁾⁽⁶⁾. Bombardier beetle injuries are rarely reported worldwide and, to the best of our knowledge, have not been reported previously in the Brazilian literature. This paper reports a case of bombardier beetle-related dermatitis that occurred in Pará State, in the Brazilian Amazon.

CASE REPORT

We describe a case of dermatitis on the right hallux after contact with beetle secretions. The patient was a 30-year-old woman living in the urban area of Ananindeua (01°21'56 "S and 48°22'22" W), metropolitan region of Belém City, in the Brazilian Amazon (**Figure 1**). At home, while putting on her shoes, she felt a burning pain in the right hallux and noticed a beetle inside her shoe. The patient reported that the lesion site immediately became erythematous and painful. Over time, the erythema took a more intense coloration and the patient complained of blurred vision and sought medical attention at a local emergency service, about an hour after the injury. On admission, skin examination revealed brown discoloration about 2.0x1.0cm in size at the external face of the right hallux, just below the nail base (**Figure 2A**). The patient still complained of localized burning pain and blurred vision but denied putting her hand in the lesion and touching her eyes.

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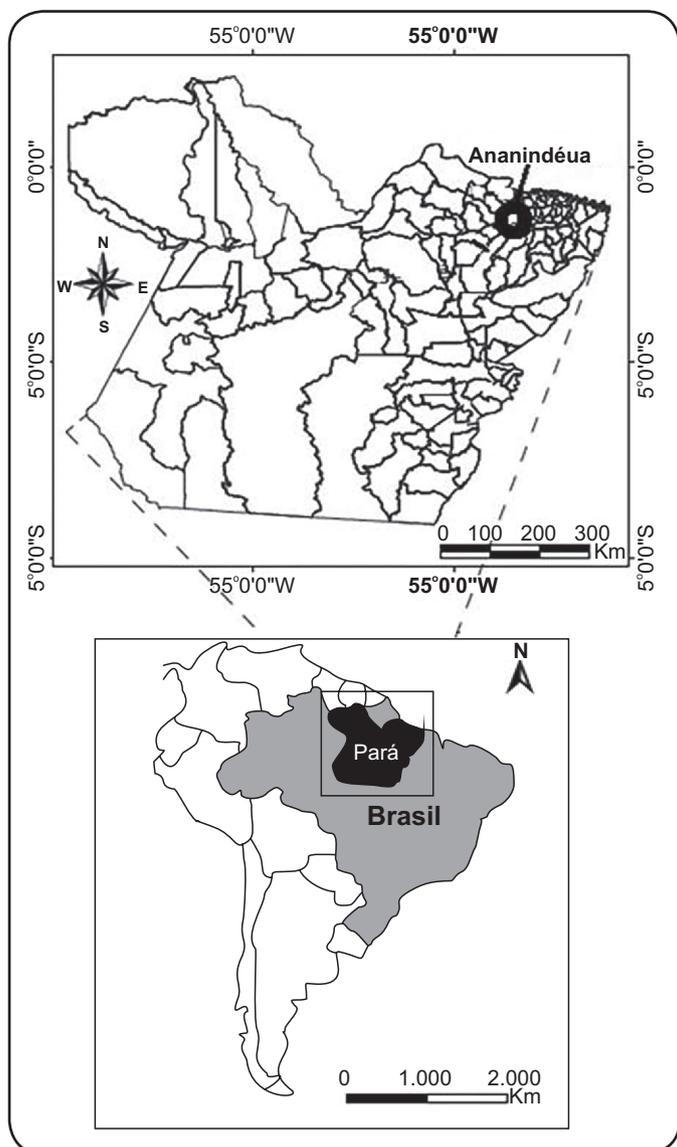


FIGURE 1. Location of the City of Ananindeua, in the State of Pará, the Brazilian Amazon.



FIGURE 2. (A): Dermatitis resulting from bombardier beetle injury. (B): The bombardier beetle specimen responsible for the injury was identified as *Pheropsophus* sp.

The patient had a normal heart rate and blood pressure and reported no past illnesses. Clinical manifestations were classified as mild and laboratory tests were not requested. The injury site was cleaned with saline and analgesics were prescribed for pain. She was discharged without complaints and on and topical hydrocortisone acetate therapy.

The beetle responsible for the injury was brought by the patient and was later identified at the genus level in the *Museu Paraense Emilio Goeldi* (Dr. Inocêncio Gorayeb Laboratory) as *Pheropsophus* sp, commonly known as the bombardier beetle (**Figure 2B**).

Ethical considerations

This case report was approved by the Ethics Review Board of the *Hospital Universitário João de Barros Barreto* (approval number 41165215.0.0000.0017).

DISCUSSION

Bombardier beetles store reactant chemical compounds in a reservoir and, when attacked, they contract their muscles which force these reactants into a rigid-walled reaction chamber containing catalytic enzymes. In this chamber, the compound starts to react exothermically, increasing the chamber pressure and ultimately forcing the reactants out of glands in the beetle's abdomen at temperatures of up to 100°C⁽¹⁰⁾. In our case, the bombardier beetle injury caused initial burning and a throbbing ache for several hours and was associated with a brown discoloration⁽⁵⁾⁽⁶⁾.

In Central Europe, the repeated exposure of the fingertips to the secretion of the carabid *Pseudoophonus rufipes* provoked erythema, followed by dotted hemorrhages which later developed to edema and resulted in the formation of flat intraepidermal vesicles⁽⁵⁾. A case of dermatitis caused by

Pheropsophus jessoensis, the Asian bombardier beetle, was reported in the Korea⁽⁶⁾. As in the case presented here, no severe manifestations were reported among these cases. Based on the extent and number of contacts, injury can be classified as mild, moderate, or severe. In the latter case, there are systemic manifestations, such as nausea, vomiting, and fever⁽²⁾. In the absence of other plausible causes, stress after the injury may have been the cause of the temporary blurred vision in this patient.

Medical management of beetle injuries is based on evidence from a few case series. Lesions should be immediately and intensively washed with clean water and soap. Vesicles, crusts, and pustules should be treated with potassium permanganate compresses twice a day and topical corticosteroids^{(1) (2) (3)}. If there is secondary infection, it would be necessary to use topical or systemic antibiotics⁽²⁾. In our case, local cleaning was performed with 0.9% saline solution and oral analgesics and local corticosteroid (hydrocortisone acetate) therapy were prescribed; and the patient was discharged without complaints after about 3 hours of observation.

This report presents a case of dermatitis caused by *Pheropsophus* sp which was classified as mild. Although carabids are markedly abundant, divergent, and diverse in the forest and agricultural fields in neotropical regions, including the Amazon⁽⁷⁾⁽⁸⁾, carabid injuries seem to be a very uncommon or more likely, a grossly underreported and neglected medical condition. Differential diagnosis of similar lesions caused by other arthropods needs to be encouraged in order to better estimate the real burden of beetle dermatitis caused by different species. In this context, a burning sensation associated with brown discoloration suggests bombardier beetle dermatitis. Moreover, when patients bring the causative agent to the health service, its identification should be encouraged. Population and hospital-based field studies in remote areas may help to bridge this gap in beetle dermatitis epidemiology. Lack of standardization regarding concepts and protocols for clinical management will be reduced after a more active surveillance of cases. In addition, training of health teams in beetle injuries management and case monitoring are needed in Amazonian health services.

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Conflict of Interest

The authors declare no conflict of interest regarding this study.

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