



Short communication

Acute corrosion of the oral mucosa in a dog due to ingestion of Multicolored Asian Lady Beetles (*Harmonia axyridis*: Coccinellidae)

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ABSTRACT

A six-year old mixed-breed dog presented with severe trauma to the oral mucosa suggestive of chemical burn. Sixteen *Harmonia axyridis* (Coccinellidae) were removed from the oral cavity, which revealed trauma consistent with chemical burn. The beetles had become embedded in mucosa covering the hard palate and required manual removal. A diagnosis of beetle induced chemical burn was warranted and consistent with the nature of the chemical constituents of *H. axyridis* hemolymph.

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1. Introduction

A 22 kg mixed-breed bitch presented with a foul odor emanating from the mouth. Examination of the mouth revealed 16 *Harmonia axyridis* (Pallas) (Multicolored Asian Lady Beetle, MALB; family Coccinellidae) embedded in the hard palate, and damage (Figs. 1–3) to the oral and pharyngeal mucosa consistent with chemical burn. The absolute number of ingested beetles is unknown, nor the amount, if any, that actually passed into the stomach. The dog did not have a prior history of foreign object ingestion, and given the foul smell of MALB, it is surprising that a dog would attempt to ingest them. Coincidental ingestion of household chemicals was ruled out after interview with the owner, but the dog had been on a course of oral anti-inflammatory drugs (Carprofen) for cruciate condition, so the possibility exists that the dog presented with a rare drug-interaction phenomenon with one or more of the compounds in the beetle's hemolymph. An unremarkable recovery and the absence of signs other than those limited to the mouth area suggest that there were no systemic

sequelae. However, based on what little data are available, there appears to be the possibility of severe systemic effects if sufficient numbers of MALB are fully ingested.

2. Discussion

The veterinary implications of non-ectoparasitic insect species have become increasingly well known in recent years. Red imported fire ants (RIFA – *Solenopsis invicta* Buren, Formicidae) can cause trauma to both domestic pets and livestock (Conceição et al., 2006). Cantharidosis in horses (cantharidin poisoning caused by ingestion of blister beetles, family Meloidae) is now a well-known and well-studied phenomenon (Schoeb and Panciera, 1979). Ingestion of >0.5 l of assorted beetles (primarily Carabidae and Scarabaeidae) by a captive Beluga whale induced the emetic voidance of the lining of the forestomach, a reaction attributed to chemical trauma caused by the release from the beetles of irritant chemicals, including formic-, capric-, tiglic-, and methacrylic-acids, benzoquinones, and assorted alkane hydrocarbons (Eisner and Dalton, 1993).

Multicolored Asian Lady beetles have been a medical concern for several years, and there is now evidence that

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Fig. 1. *Harmonia axyridis* (MALB) embedded in hard palate mucosa. Note the color variation (polymorphism) amongst individuals.

they also pose a veterinary concern. This species is native to Asia, but by 1994 MALB had become established throughout most of North America (Koch, 2003). Until recently MALB was treated mainly as a nuisance species because it can enter homes by the thousands in winter months and cause inconvenience and minor damage. Reports in the medical literature in recent years suggest that MALB is responsible for allergy-related health problems, such as hypersensitivity to protein, IgE-mediated, allergens (Albright et al., 2006). Allergen exposure during MALB infestations can result in allergic rhinoconjunctivitis, scleral chemosis, and contact-based facial angioedema (Davis et al., 2006).

Coccinellid beetles, including MALB, also synthesize and store in their body fluid (hemolymph) an array of noxious chemicals that serve as a defense mechanism against predators (Glisan-King and Meinwald, 1996). Body fluid can be released either by trauma to the beetle or as part of a defensive reaction known as reflex-bleeding (also known as autohemorrhage), wherein the beetle deliberately ruptures membranes in the leg joints and expels droplets of

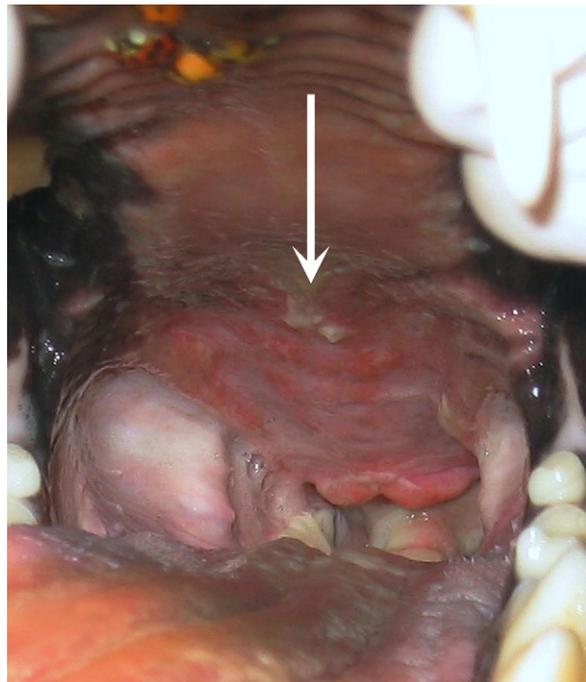


Fig. 2. Sloughing of the mucosa of the hard palate.

hemolymph fluid. Almost all coccinellid beetle species could potentially pose human and veterinary risk, but currently only MALB is a concern because its behavioral ecology predisposes it to associate with man-made structures in large numbers at certain times of the year.

A major class of defense chemicals is the alkaloids and their derivatives, including those that impart the repellent



Fig. 3. Chemical burn on the tongue.

odors characteristic of coccinellids, such as 3-alkyl-2-methoxy-pyrazine (Laurent et al., 2005). Experimentally determined total methoxy-pyrazine content for MALB revealed ~33 µg per beetle (0.98 µg/mg, given an average weight of 34.0 mg per MALB). Although many alkaloids are capable of causing chemically induced damage to soft tissues and toxicity after ingestion, the piperidine-based alkaloids are particularly potent. Piperidine (C₅H₁₁N) has a characteristic pepper-like odor, and both piperidine and piperidine derivatives are naturally occurring plant and animal compounds. The Material Safety Data Sheet (MSDS) for piperidine lists it as a severe irritant if inhaled or swallowed, leading to contact burns and blindness if applied to the eyes. The Lethal Dose (LD50) ratings range from 30 mg/kg for oral ingestion (mouse) to 276 mg/kg for administration onto skin (rabbit). Other piperidine derivatives of veterinary concern include those derived from hemlock (*Conium* species; e.g., coniine, resulting in neurotoxicity after ingestion) and RIFA venom (Solenopsin-A; trans-2-methyl-6-n-undecylpiperidine, resulting in dermonecrosis and cytotoxicity at sting site).

The piperidine derivative 3-hydroxypiperidin-2-one was isolated from MALB in experiments to identify compounds for therapeutic use, and was found to be significantly cytotoxic against several solid-tumor lines (Alam et al., 2002). No reports can be found in the literature that address the veterinary or medical implications of either ingestion of this compound or the result of hemolymph contact with soft tissues, but given that it is an hydroxylated piperidine backbone, the compound should react similarly to many other modified piperidines that have contact, inhalation, and ingestion warnings for their MSDS reports. Neither the average amount of 3-hydroxypiperidin-2-one nor the total amount per beetle of piperidine alkaloid derivatives is known for MALB.

MALB is, and will continue to be, an element of the insect fauna with which humans and their pets will have occasional interactions. Currently, MALB is the only species of lady bird beetle whose behavioral ecology predisposes it to cause significant problems. Unfortunately, MALB is highly polymorphic in color and pattern (Figs. 1–3), and recognizing any single individual as MALB may be difficult

for both the layperson and veterinarian. Furthermore, there is no consensus in the pest-control community regarding the best method for eradicating MALB infestations, although the concerns raised by most techniques are due to aesthetic (staining of upholstery, etc.) or allergy-related reasons. Many university and state extension agencies provide fact-sheets that discuss the biology and control of nuisance insects, and they can be consulted for further reference regarding control options.

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Conflict of interest

The authors state that they have no conflicts of interest.

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