FIREFLY TOXICOSIS IN LIZARDS

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Abstract—Ingestion of fireflies of the genus Photinus (Lampyridae) can be lethal to Australian lizards of the genus Pogona (Agamidae), probably because of the poisonous steroidal pyrones (lucibufagins) that these fireflies contain. One Photinus may suffice to kill a Pogona. Captive Pogona kept as pets need to be shielded from firefly ingestion. African chameleons (Chamaeleo; Chamaeleonidae) appear also to be vulnerable to Photinus toxicosis.

Key Words—Pogona, Chamaeleo, Lacerta, Litoria (Pelodryas) Photinus, lucibufagins, cardiotonic agents, pet industry.

INTRODUCTION

Fireflies of the genus Photinus are poisonous. Their bodies contain lucibufagins (Eisner et al., 1978), steroidal pyrones related structurally to such well-known toxins as the bufodienolides of toads and the cardenolides of plants (Fieser and Fieser, 1949; Budavari et al., 1996) (Figure 1). Not surprisingly, the lucibufagins protect Photinus against predation. Spiders (Philippus spp.) are orally deterred by lucibufagins, as are birds (Hylocichla spp.), which also show reluctance to attack Photinus (Eisner et al., 1978, 1997). In the exceptional case where a

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Hylocichla was noted to ingest a Photinus, the bird reacted in short order by regurgitating it (Eisner et al., 1978). We know of no data on LD$_{50}$ determinations for lucibufagins, but have now learned that ingestion of Photinus can be fatal to Australian lizards of the genus Pogona, commonly known as bearded dragons.

Pogona lizards are highly tractable and easily maintained in captivity; they are bred in large numbers in the United States for the pet market (Vosjoli and Mailloux, 1996). The two instances in which ingestion of Photinus led to death of Pogona involved lizards that were maintained as pets. Their case histories follow.

**METHODS AND MATERIALS**

*Case 1.* The owner of a healthy 8-month-old male *P. vitticeps* (about 100 g body mass) captured a number of fireflies one July evening in the environs of his home (Iowa City, Iowa) and offered these to the lizard in its cage (aquarium tank). The lizard promptly ingested several of the fireflies. Within about 30 min the lizard began exhibiting violent head-shaking movements, followed by pronounced and increasingly frequent oral gaping. The animal seemed intent on vomiting, but no regurgitation was noted. As the gaping intensified, so did the lizard’s respiratory effort, and the animal soon showed severe dyspnea. Within the next 30 min, it underwent a conspicuous color transformation, its dorsal trunk and nape changing from the usual light tan to black. Within the hour after ingestion of the fireflies, and before veterinary assistance could be enlisted, the lizard died.

Postmortem examination showed the animal to have been in good nutritional condition. The stomach contained insect remains (mostly Acheta crickets,