HETEROMELES ARBUTIFOLIA (ROSACEAE: POMOIDEAE) FOUND TOXIC TO INSECTS[1,2]

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ABSTRACT: Leaves of *Heteromeles arbutifolia* Roem. (Rosaceae: Pomoideae) were found to be cyanogenic. Shredded leaves of this plant were toxic to insects in closed containers.

Heteromeles arbutifolia Roem., a member of the Rosaceae, subfamily Pomoideae, is a common shrub in southern California and northern Lower California. It is found both in the wild and occasionally in landscaping (Preston, 1976). Commonly called Christmasberry, holly, toyon or tollon, it is a spreading evergreen plant that reaches considerable size. We have encountered it from sea level to about 5,000 feet.

Several species of Coniopterygidae (Insecta: Neuroptera) are predators of mites and whiteflies that feed on *H. arbutifolia.* The observations reported here resulted from our attempts to rear two coniopterygid species (*Conwentzia barretti* (Banks) and *C. californica* Meinander) from larva to adult in the laboratory. We placed early instar larvae on leaves of *H. arbutifolia* infested with mites and then placed the leaves in 7 dram plastic snapcap vials. Occasionally, a leaf was too large to fit into the vial and the edges were trimmed to make it fit. We noticed that the coniopterygid larvae placed on trimmed leaves died soon after placement into the vials but no mortality was observed in larvae in vials containing untrimmed leaves. We suspected that the trimming of the leaves released some agent toxic to the larvae. To confirm this, we placed several larvae in vials with untrimmed leaves and several in vials containing shredded leaves. Within 2-3 minutes, the larvae in the vials with the shredded leaves were dead. Adult Coniopterygidae, unidentified specimens of Isopoda, Acaria (mites feeding on *H. arbutifolia* leaves), Dermaptera, Coleoptera (Carabidae), Hymenoptera, Homoptera, Diptera, and Lepidoptera placed in vials with shredded leaves were all killed. One shredded leaf knocked down about 20 muscid Diptera in less than 1 minute. Whiteflies are only occasional prey of these coniopterygid species and were unavailable for tests. Since the shredded leaves produced an odor similar to hydrogen cyanide, the

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Guignard sodium picrate paper test (Harborne, 1973) was used to test for the presence of hydrogen cyanide. Freshly shredded plant material was placed into test tubes and a strip of picrate test paper was held in place inside the tube by means of a neoprene stopper. A change in color from yellow to red-brown within 1 hr indicated enzymatic cyanogenesis.

All tests with leaves collected at different times of the year were positive for hydrogen cyanide. However, older or senescent leaves seemed to be less active. Fruit collected in early March was negative, even after 24 hr, a time sufficient to indicate nonenzymatic liberation of hydrogen cyanide.

Plants which synthesize compounds which are capable of liberating hydrogen cyanide upon hydrolysis are commonly known as cyanogenic plants. Cyanogenic glycosides, which are responsible for this cyanophoric capability in most cyanogenic plants, are known to occur in at least 800 species of plants representing 70 to 80 families (Seigler, 1975). Highest concentrations are usually found in leaves but other plant tissues have been shown to contain cyanogenic compounds. The Rosaceae are notable for their cyanogenetic substances, and cyanogenesis is especially pronounced in the Pomoideae (Alston and Turner, 1963). Therefore, it is not unusual that cyanogenesis was observed.

Several insects which feed on cyanogenic plants have been shown to contain enzymes capable of detoxifying cyanide (Jones, 1972). Arthropods we found feeding on *H. arbutifolia* included mites, whiteflies, scales, leafhoppers (Cicadellidae), and caterpillars (Arctiidae).

We hope that this report will stimulate further investigations into the ecological advantages of cyanogenicity to the plant and its effects on phytophagous organisms. In addition, this information can prove useful to entomologists who live (or work) within the distribution range of *H. arbutifolia*. We found that leaves of this plant were an effective killing agent for insects and could be used in temporary killing jars. We shredded several leaves, packed them into the bottom of a small jar, covered the leaves with tissue and then placed a piece of filter paper over the tissue. This served to kill insects placed in the jar.

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