

Coptosoma xanthogramma (White), (Hemiptera: Plataspidae) a New Pest of Legumes in Hawaii¹

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INTRODUCTION

Coptosoma xanthogramma (White), now commonly called the black stink bug, is the first known representative of the family Plataspidae to become established in the Hawaiian Islands. Since the initial discovery of this bug in Honolulu during September, 1965, very heavy populations have been observed on several legume hosts on Oahu, and it is considered a potentially serious pest of cultivated beans and certain ornamental vines and trees. Nothing on the biology of *C. xanthogramma* was found in published literature, and relatively little information is available on other members of the family Plataspidae.

The biological observations reported here were made principally on the campus of the University of Hawaii, with bugs infesting a maunaloa vine, *Canavalia cathardica*, growing on a fence near our laboratory. Life history data were obtained from bugs caged on the living vine and, in the laboratory, from confined bugs fed on fresh *Canavalia* shoots. Some details of the life history have not yet been worked out.

Coptosoma xanthogramma was described from specimens collected in the Philippine Islands (White, 1842), where it apparently occurs at least on the island of Luzon. In addition to Oahu in the Hawaiian Islands, it also has been found, apparently recently established, on Iwo Jima in the Volcano Islands, by C.F. Clagg (see February NOTES AND EXHIBITIONS p. 7). The first Hawaiian specimen was taken by the senior author on September 30, 1965, in an ultra-violet light trap on the campus of the University of Hawaii (Beardsley, 1966). This insect apparently is not normally attracted to light, and it is believed that the original specimen may have accidentally flown into the light trap from an adjacent maunaloa vine which was subsequently found to be infested with these bugs. *C. xanthogramma* did not come to our attention again until January, 1966, when a resident brought in specimens from an infested jade vine, *Strongylodon lucidus*, growing at his home near Aiea, Oahu, about 15 miles from the University. Through subsequent surveys, scattered infestations were found throughout the Honolulu area, and in the Kaneohe to Waimanalo section on the windward side of Oahu. These findings indicate that *C. xanthogramma* probably became established on Oahu six months to a year or more before the initial discovery in September, 1965. To date (Decem-

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ber, 1966) this insect has not been collected on any of the other islands of Hawaii.

HOSTS AND DAMAGE

In addition to jade vine and maunaloa vine, *C. xanthogramma* has been collected or reported from the following hosts: pigeon pea (*Cajanus flavus*), lima bean (*Phaseolus limensis*), several varieties of string beans (*P. vulgaris*), coral tree (*Erythrina* sp), shower trees (*Cassia* spp.) and African tulip-tree (*Spathodea campanulata*). Except for the African tulip-tree these hosts are all legumes. The insects prefer to feed on the succulent young growth of host plants. The tips of actively growing shoots, young leaves, and flower buds are favored feeding sites. On preferred hosts such as jade and maunaloa vines very heavy infestations containing up to several hundred individuals may be found concentrated on the terminal 6 to 10 inches or so of young shoots. Gregarious feeding of this type appears to be a common occurrence with both nymphs and adults of *C. xanthogramma*.

On maunaloa vine, heavy infestations of this insect were observed to produce a general loss of vigor in the host, coupled with some loss of leaves, a marked blossom-drop and reduction in pod-set, and deformation and occasionally die-back of young shoots. On jade vine, infestations apparently were responsible for considerable blossom-drop in infested flower panicles, and for die-back of young vegetative shoots. The type and extent of damage to other hosts has not been reported.

LIFE HISTORY

The eggs of *C. xanthogramma* (Fig. 1) are small, light-red colored, elon-

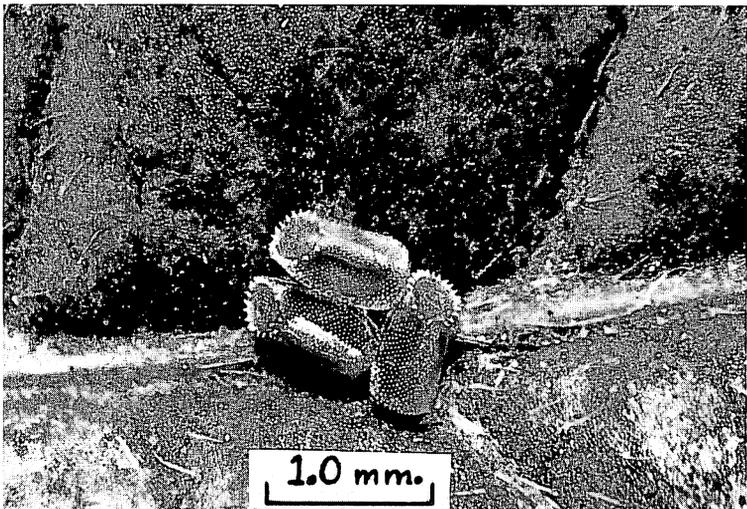


Fig. 1. Egg cluster of *C. xanthogramma* on *Canavalia* leaf Photo by P.D. Ashlock.

gate structures somewhat upturned at the opercular end. The upper surfaces of the chorion are densely and finely pitted. The lower surfaces are smoother, with relatively weakly developed pitting. The eggs normally appear partially collapsed rather than fully cylindrical as the sides are concave between a framework formed of four longitudinal ridgelike thickenings of the chorion; a pair of narrow, sharply-defined lateral ridges and more rounded, broader dorsal and ventral ridges. Eggs average about 0.85 mm in length. The conspicuous circular operculum has a peripheral circle of 22 short, whitish micropylar processes. These are believed to serve the dual function of allowing entrance of the sperm at fertilization, and as respiratory organs through which gaseous exchange takes place between the developing embryo and the external environment (Southwood, 1956).

The eggs, which are cemented to the surface of the substrate, are almost always deposited in groups of 3; 2 parallel and the 3rd at right angles across the antimicropylar end of the others. Rarely, eggs may be deposited in groups of 2 or 4, but never in 2 parallel rows as is apparently the rule with other species of Plataspidae which have been studied (Kershaw, 1910; Southwood, 1956). At the time of oviposition the female bug deposits a small black mass in the center of the group of 3 eggs. This mass apparently contains symbiotic microorganisms as invariably the nymphs were observed to feed for a few minutes on this "symbiont pellet" shortly after hatching. [For an account of the mechanism of symbiont transfer in a related species, *Coptosoma scutellatum* Geoffrey, see BUCHNE (1965) pp. 217-220].

Hatching is accomplished with the aid of an "egg-buster", a pointed sclerotized spine situated dorsally on the head of the mature embryo. The spine is used to help break open the operculum and is shed as the nymph leaves the egg. Duration of the egg stage from oviposition to hatching was 10 days in all eggs studied, both in the laboratory and caged on the host vine outdoors. Eggs frequently were found on leaves and shoots of infested plants in the open. In the laboratory, eggs were often deposited on the sides of rearing jars, on cloth tops of jars, or on paper toweling used to cover the jar bottoms, as well as on host material.

First-instar nymphs usually left the empty eggs within a half hour or so after hatching, and wandered about for a time before finding a suitable feeding site. Newly hatched 1st-instar nymphs are mostly orange in color with the dorsum of head and thorax light orange-brown. After feeding, the young nymphs take on a greenish tinge. All subsequent nymphal stages are bright green, and closely resemble the color of the young stems and leaves of the host plant. The nymphs are roughly circular or oval in outline with a flat venter and a smoothly convex dorsum. Feeding nymphs adhere closely to the surface of the host and those of the 2nd to 4th instars, particularly, are easily overlooked as they resemble small deformities of the host stems and leaves. The 5th-instar nymphs (Fig. 2) have well-developed

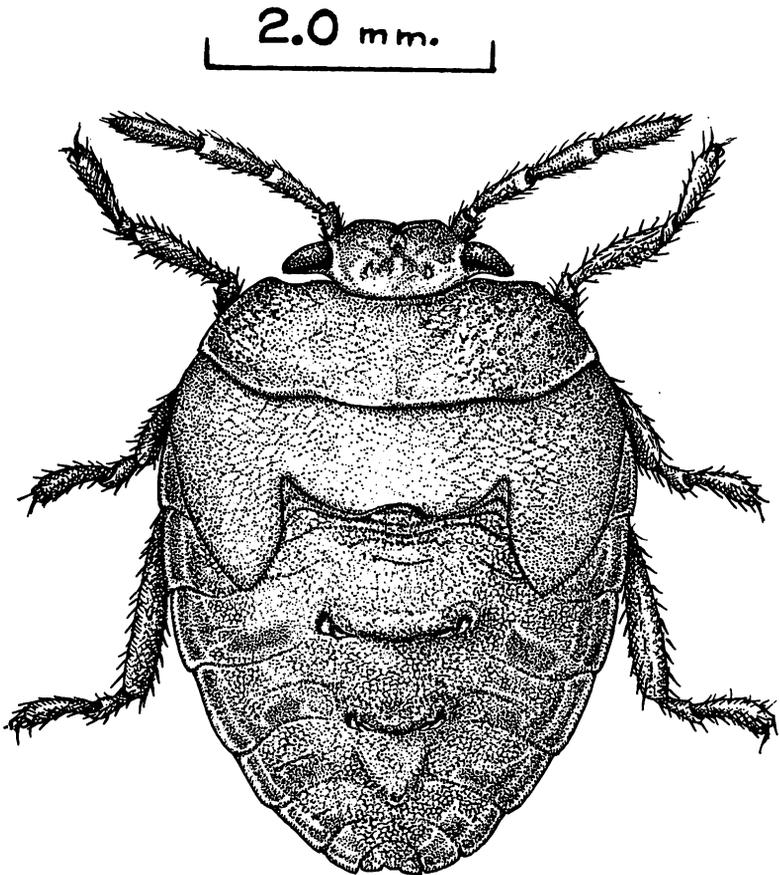


Fig. 2. Dorsal view of *C. xanthogramma* 5th-instar nymph. Drawn by Sybil Seto.

ed wing pads which are frequently somewhat darker than the rest of the insect. The compound eyes are bright red in all nymphal instars. The teneral adults are pale green, but darken rapidly after a few hours. If young adults are punctured while still in a teneral condition a drop of black body fluid will exude from the wound.

Data on nymphal stages were obtained from bugs caged outdoors on maunaloa vine during April to June. There are 5 nymphal instars, as is the case with *Brachyplatys subaeneus* (Westwood) and *Coptosoma cribraria* (Fabricius) (Kershaw, 1910). We began with 50 newly hatched 1st-instar nymphs, only 10 of which survived to maturity. The average time of development for these bugs from hatching to adult was 64 days, with a minimum of 60 days. No data were obtained on adult longevity, the pre mating or preoviposition periods, or the total egg production of adult females.

The adult bugs (Fig. 3) are 4.5 to 5.0 mm in length, broadly oval in outline, flattened ventrally and convex above. They are shining black with narrow pale stripes around the sides and posterior portion of the large, shield-like scutellum, across the anterior part of the pronotum and broadly across the anterior margin of the dorsal part of the head. There is also a pair of pale transverse dash marks, one on each side of the anterior margin of the scutellum. The venter is mostly dark except for the face and labrum and the lateral portions of the abdominal segments. The legs and antennae are largely pale, while the compound eyes are red.

The adult bugs will often drop from the host plant when disturbed but frequently take flight before reaching the ground.

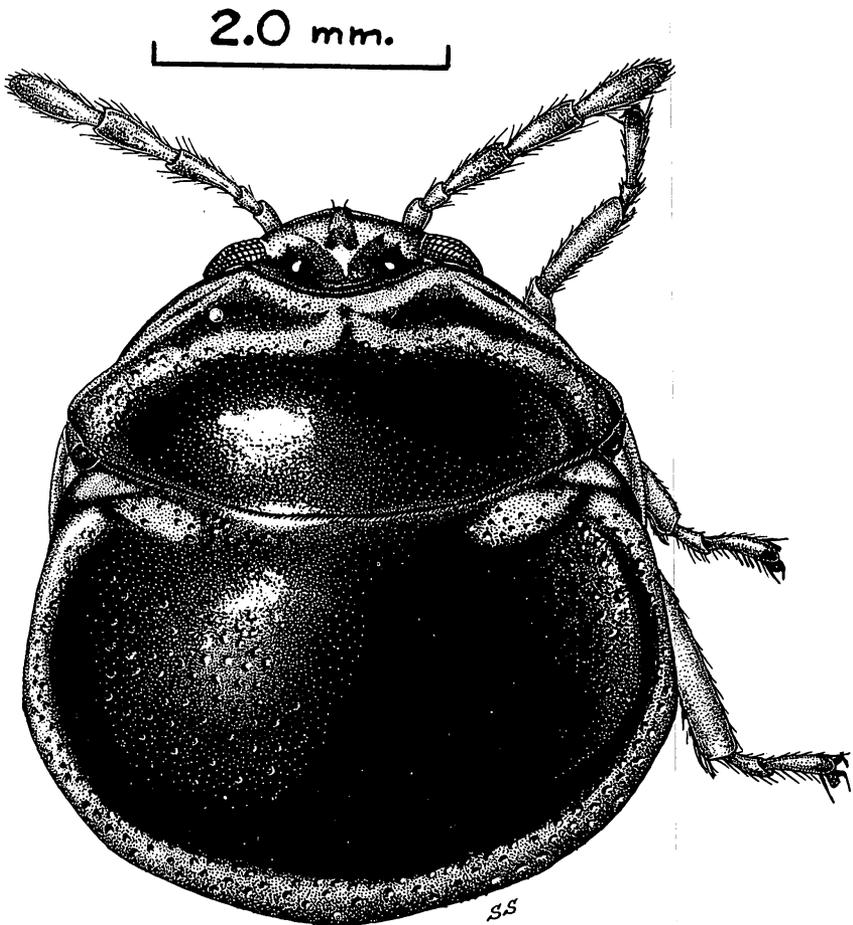


Fig. 3. Dorsal view of *C. xanthogramma* adult. Drawn by Sybil Seto.

NATURAL ENEMIES

There appear to be no insect parasites and very few predators which attack *C. xanthogramma* in Hawaii. An undetermined anthocorid bug was once observed to attack and feed on a newly hatched *C. xanthogramma* nymph on maunaloa vine. However, coccinellid beetles [*Coelophora inaequalis* (Fabricius)] refused to feed on any stage of *C. xanthogramma*, even when confined for several days without other visible food sources. Although no records of insect parasites were found, it is likely that one or more egg parasites of *C. xanthogramma* exist in areas where this bug is indigenous, and the discovery and importation of such natural enemies into Hawaii should be attempted.

REFERENCES

- BEARDSLEY, J.W. 1966. Notes and Exhibitions. *PROC. HAW. ENT. SOC.* 19(2): 144.
- BUCHNER, P. 1965. Endosymbiosis of animals with plant micororganisms. *INTERSCIENCE PUBLISHERS, NEW YORK, LONDON, SYDNEY.* xvii+909 pp.
- KERSHAW, J.C.W. 1910. Metamorphoses of two coptosomine Hemiptera from Macao, *ANN. SOC. ENT. D'BELGIQUE* 54:69-73.
- SOUTHWOOD, T.R.E. 1956. The structure of the eggs of the terrestrial Heteroptera and its relationship to the classification of the group. *TRANS. ROYAL ENT. SOC. LONDON* 108(6): 163-221.
- WHITE, H. 1842. In *GRAYS ZOOLOGICAL MISC.* 1:80. (Original description of *Plataspis xanthogramma*). (Not seen)