

First Report of the Scale Insect Family Conchaspidae and of *Conchaspis angraeci* Cockerell (Hemiptera: Coccoomorpha) on *Hoya* spp. (Apocynaceae) in the Philippines

Ireneo L. Lit, Jr.^{1,2,*}, Cristian C. Lucañas², and Merdelyn T. Caasi-Lit³

Abstract

The occurrence of the scale insect family Conchaspidae (Hemiptera: Coccoomorpha) in the Philippines is reported for the first time, based on a collection of false armored scale insects from *Hoya landgrantensis* Kloppenburg et al. (Apocynaceae), and a few other wax plants that are endemic to the Philippines. The minute scale insects belong to the genus *Conchaspis* Cockerell, and are identified as *Conchaspis angraeci* Cockerell, the only widespread species in this family. The occurrence of *C. angraeci* on *H. cagayanensis*, *H. landgrantensis*, and *H. pimenteliana* also constitute new host records and the potential of this insect to become a pest of domesticated ornamental *Hoya* is also noted, should their population reach levels injurious to plants.

Keywords: Coccoidea, entomology, false armored scale, *Hoya*, Sternorrhyncha

Introduction

The scale insects (Infraorder Coccoomorpha) constitute a small but diverse family of sternorrhynchous Hemiptera in the Philippines. To date, 12 families are represented, namely: the armored scales (Diaspididae, 158 species), the mealybugs (Pseudococcidae, 75 species; Rhizoecidae, four species; Xenococcidae, one species), the soft and wax scales (Coccidae, 32 species), the giant and cottony cushion scales (Monophlebidae, 12 species), the pit scales (Asterolecaniidae, 17 species), false pit scales (Lecanodiaspididae, one species), lac insects (Kerriidae, three species), false mealybugs (Eriococcidae, four species), the flat grass scales (Acleridae, six species) and the ortheziids (Ortheziidae, one species) (Garcia-Morales *et al.* 2016; Lit *et al.* 2018)

A recent collection of what initially looked like tiny armored scales from a wax plant, *Hoya landgrantensis* Kloppenberg, Siar & Cajano (Apocynaceae), revealed the presence of a previously unrecorded species, *Conchaspis angraeci* Cockerell, which also represents a new record of the family Conchaspidae for the Philippines. Later, this false armored scale was also observed on two other Philippine endemic *Hoya* species: *H. cagayanensis* C.M. Burton and *H. pimenteliana* Kloppenb..

The Conchaspidae, also known as the false armored scales, are a small group of scale insects that, like the

Diaspididae, are covered with an armor-like scale. It is one of the families asserted by Ferris (1937) as distinct from all other scales. However, unlike diaspidids, conchaspids do not retain the exuviae from the nymphal molts on their scale cover, hence their common name as a group. Worldwide, only 30 species under four genera have been described, mostly from the Neotropical region and Madagascar (García Morales *et al.* 2016). Takagi (1997) reviewed the five currently known species from the Oriental Region. His discoveries then of novel species from Malaysia gave clues that the Southeast Asian tropics, particularly the forest canopies, are a promising, possibly diverse layer of microhabitats for this largely unstudied group.

This paper reports the new record of this family, genus and species for the Philippines. It also serves as a contribution to efforts to document insects and other arthropods that are associated with ornamental wax plants or *Hoya* spp. in the Philippines, currently under a collaboration between the Cave Ecology Laboratory of the Institute of Biological Sciences and the Entomology Laboratory of the Institute of Plant Breeding, both in the University of the Philippines Los Baños.

Materials and Methods

The false armored scale insects were collected together with the infested portions of the wax plants. Live specimens and habits were documented using a digital camera (Nikon D3100). The collected lots were examined in the laboratory under a stereomicroscope (Leica M 125). Individuals were then collected singly using fine pointed forceps and placed directly into a vial of 95% ethanol. Alcohol-preserved specimens were subsequently macerated overnight in 10% aqueous KOH under ambient room temperature. Loosened waxy tests were removed the following day. Cleared specimens were washed twice in distilled water and then soaked in alcoholic acid fuchsin stain for at least an hour. Excess stain, and water was removed by soaking the specimens a graded series of aqueous ethanol solution beginning at 50%, then 75%, 85%, 95% and finally two changes of absolute ethanol. Absolute propanol

¹Environmental Biology Division, Institute of Biological Sciences, College of Arts and Sciences, University of the Philippines Los Baños (UPLB), College, 4031 Laguna Philippines

²Entomology Section, Museum of Natural History, UPLB, College, 4031 Laguna, Philippines

³Entomology Laboratory, Institute of Plant Breeding, College of Agriculture and Food Science, UPLB, College, 4031 Laguna, Philippines

*Corresponding author: illit@up.edu.ph

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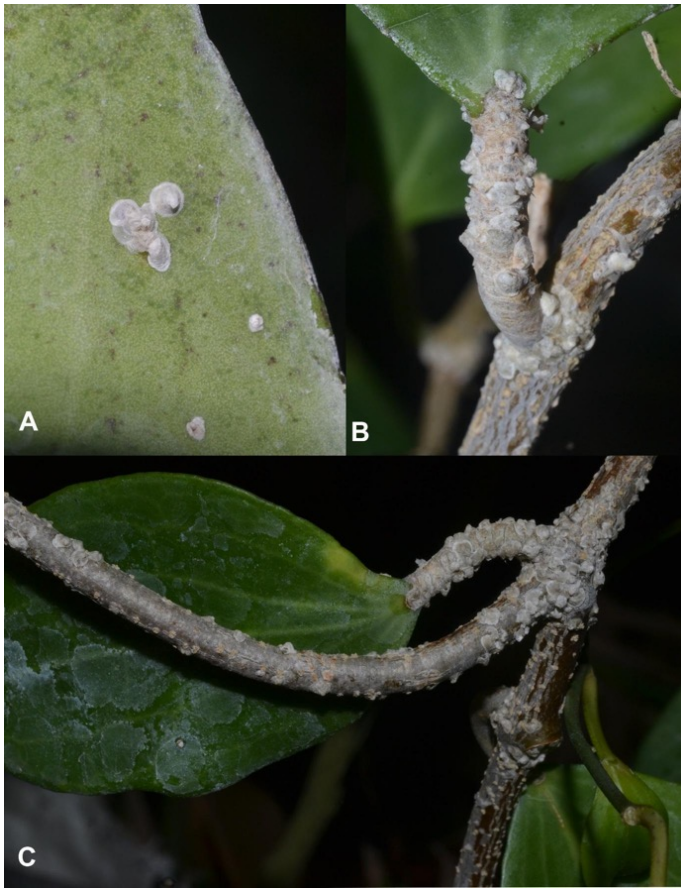


Figure 1. Some parts of the endemic wax plant, *Hoya landgrantensis*, infested by a colony of the common false armored scale *Conchaspis angraeci* Cockerell, 1893: (A) leaf; (B) petiole and node; (C) petiole, node and internode. Photographs by CC. Lucanas, 2022.

was used as the last wash before soaking for another 30 min in xylene. The specimens were then mounted on microscope slides with Canada balsam. Slides were labeled and dried in a laboratory oven.

Slide mounted adult females were examined under a compound microscope (Zeiss PrimoStar 3) connected to a screen and computer. Images were captured using the same set-up incorporating scale bars as indicators of size. Specimens are now deposited in the Entomology Section of the Museum of Natural History, University of the Philippines Los Baños, Philippines (UPLB-MNH).

Taxonomy

Family Conchaspidae Green

The scale insect family Conchaspidae, as catalogued by Ben-Dov (2006) and Garcia-Morales *et al.* (2016), currently consists of four accepted genera, with one species each for *Asceloconchaspis*, *Fagisuga*, and *Paraconchaspis*, and 26 species under the genus *Conchaspis*.

Diagnosis. Based on Williams' (1992) summary of the distinguishing features of this family, the Conchaspidae are similar to the Diaspididae in posterior segments of the abdomen fused into a pygidium. In addition, all species of conchaspids produce waxy secretions to form "tests" that covers the body of the adult female, resembling those of

Diaspididae. Unlike several coccoid families, the tests in both the Conchaspidae and Diaspididae are detached from the body. However, in the Conchaspidae, the scale cover never includes the exuviae of previous instars, unlike the diaspidid scale cover. Further, Williams (1992) mentioned that "adult females of the family Conchaspidae always possess well-developed and recognizable antennae, each with at least three segments, whereas in the Diaspididae the antennae are reduced to mere tubercles containing one or more setae," and "moreover, all adult females of Conchaspidae," except for *Asceloconchaspis*, "have been described with well-developed legs, with the tibia and tarsus fused or partly fused and with distinct claws." The legs are absent (occasionally vestigial) in adult females of Diaspididae.

Remarks. Studies have shown that the similarities between the Diaspididae and Conchaspidae are only superficial and reflect convergence rather than homology or recency of common ancestry (Takagi 1992, 1997; Afifi 1969; Brown 1959).

Genus *Conchaspis* Cockerell

Like the majority of all described Conchaspidae, most *Conchaspis* species are known from the New World. The relatively fewer Oriental species were described by only a few workers, notably Takagi (1992, 1997), Ben-Dov & Williams (1984), and Khoo (1978). Williams (1992) included a key to the four conchaspid genera where the following diagnostic characters for *Conchaspis* have been inferred.

Diagnosis. Like most conchaspids (except *Asceloconchaspis*), the legs are present in the adult female. Like *Paraconchaspis*, *Conchaspis* species have pointed pygidium (rounded in *Fagisuga*). However, *Conchaspis* differs from *Paraconchaspis* in having: (1) only the prosoma swollen (instead of the swelling extending to the anterior part of the postsoma in *Paraconchaspis*), (2) no eyes (eyes present in *Paraconchaspis*), and (3) the stigmatic pores, when present, quinquelocular (always multilocular in *Paraconchaspis*).

Species *Conchaspis angraeci* Cockerell, 1893 (Figures 1, 2)
Conchaspis angraeci Cockerell 1893: 7 (Syntypes, females: Jamaica, on *Angraecum eburneum* var., NHM, London, UK, USNM); Ben-Dov 2006: 185 (catalogue listed and accepted).

Material examined. 9 adult females, ex stems and petioles of *Hoya cagayanensis* (3), *H. landgrantensis* (3) and *H. pimenteliana* (3) in Museum's garden, Philippines: Luzon: Laguna Province: Los Baños, 29.iv.2021 (C.C. Lucañas) (UPLB MNH HEM-02577 to 02579, 02580-02582, and 02583-02585, respectively).

Habitus. Live scale insects are quite small and covered with almost circular, grayish white test (scale cover). The scale cover has 6-8 ridges that radiate from a central cone and hence, they laterally appear like tiny volcanoes. When the test is removed, the adult female body looks purple with yellowish brown pygidium, often surrounded by light yellow eggs.

Diagnosis. *Conchaspis angraeci* lacks tubular ducts and dermal slits. Dermal invaginations are present only posterior to the hind coxae. Multilocular disc pores usually occur in submedian, intermediate, and submarginal groups. Each claw has a small denticle on the plantar surface and the antennae has four segments. Miller et al. (2014) mentioned citations of interceptions of this species at plant quarantine inspections in the United States from many countries, including the Philippines, but hitherto, it has not been actually collected locally; hence, this paper establishes its occurrence in the Philippines.

Host plants and plant parts infested. These false armored scale insects infest wax plants often in dense colonies particularly on the branches and petioles (Figure 2). So far, we have observed them on *Hoya landgrantensis*, *H. pimenteliana*, and *H. cagayanensis*. Apparently, no honeydew is produced and based on that we may assume that they may also be mesophyll feeders like armored scales. Thus, they may also be potentially damaging to *Hoya* plants and other potential hosts.

Remarks. At present, *C. angraeci* is the only widespread species among all Conchaspidae. Previously, it has also been

recorded on another wax plant, *H. carnosa*, (Hamon 1979).

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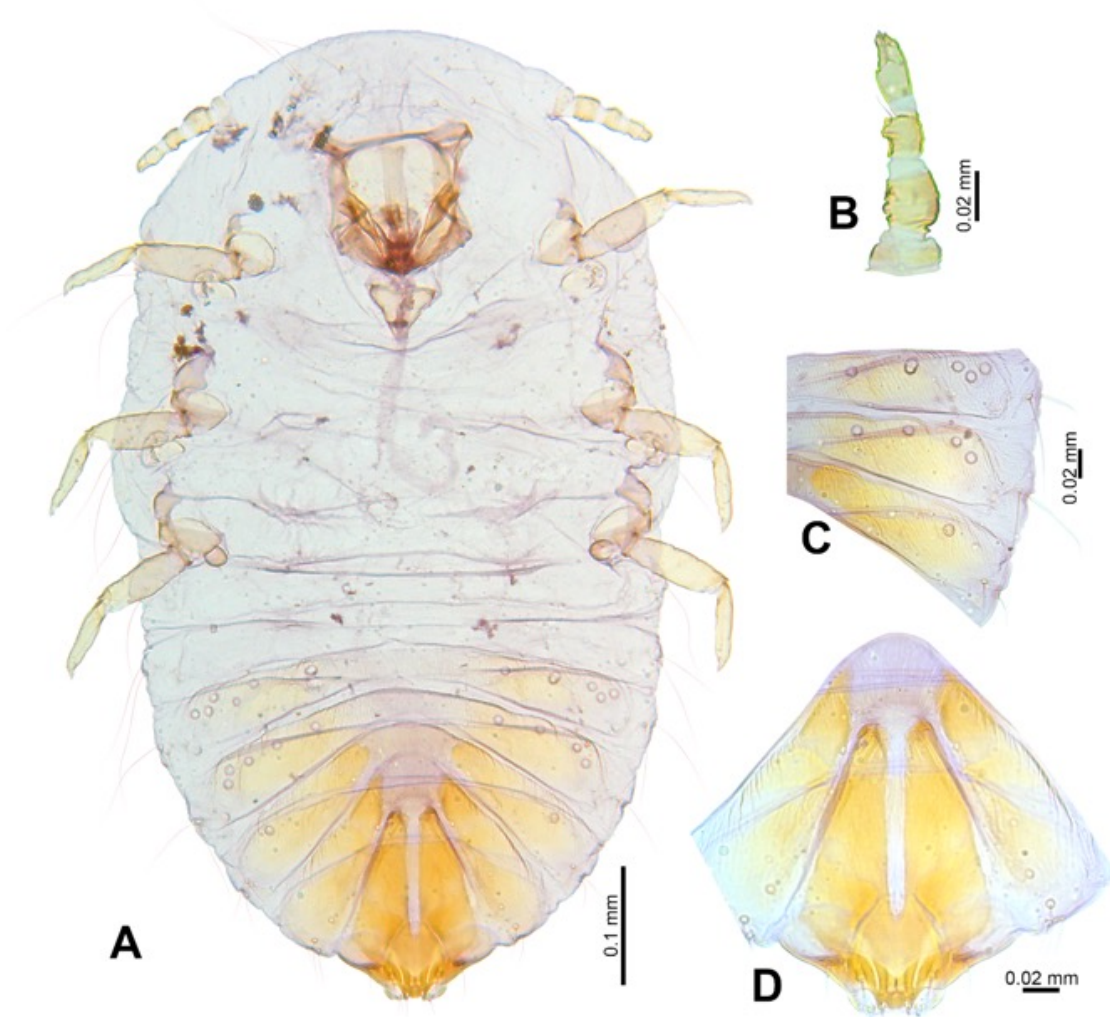


Figure 2. Adult female of the common false armored scale *Conchaspis angraeci* Cockerell, 1893: (A) Habitus; (B) antenna; (C) abdominal sternite 4-6; (D) pygidium.

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