

REDESCRIPTION OF *OCTOLECANIUM PERCONVEXUM* (COCKERELL), NEW GENUS AND NEW COMBINATION, WITH DESCRIPTION OF A NEW SPECIES FROM GUATEMALA (HEMIPTERA: COCCOIDEA: COCCIDAE)

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ABSTRACT

Neolecanium perconvexum (Cockerell) is transferred to the new genus *Octolecanium* Kondo. The adult female and first-instar nymph are redescribed and described respectively. A new species, *O. guatemalensis* Kondo is also described based on the adult female. A key to separate the two species is given.

Key Words: Brazil, coccid, Guatemala, new genus, *Octolecanium*.

RESUMEN

Neolecanium perconvexum (Cockerell) se transfiere al nuevo género *Octolecanium* Kondo. La hembra adulta y la ninfa del primer estadio son redescrita y descrita respectivamente. También se describe la hembra adulta de una nueva especie, *O. guatemalensis* Kondo. Se provee una clave para separar las dos especies.

Palabras Clave: Brasil, cóccido, Guatemala, nuevo género, *Octolecanium*.

INTRODUCTION

O*ctolecanium* Kondo gen. nov. keys to the subfamily Myzolecaniinae in Hodgson's¹ key to subfamilies of the Coccidae, and well fits into the *Toumeyella*-group, a New World group composed of *Akermes*, *Cyclolecanium*, *Megasaissetia*, *Neolecanium*, *Pseudophilippia* and *Toumeyella*². Kondo and Williams² listed the following characteristics for the adult females of the New World Myzolecaniinae (mostly composed of the *Toumeyella*-group) as follows: i) presence of large and thick preopercular pores extending anterior to anal plates (absent in *Pseudophilippia*), ii) ventral tubular ducts restricted to vulvar area when present, iii) anal plates usually with less than 10 setae, iv) stigmatic setae usually three, with median setae longest, and v) the absence of clusters of dorsal setae. For the first-instar nymph, Kondo and Williams² listed the following characteristics: i) antennae 5-segmented, with the exception of *Toumeyella sonorensis*

(Cockerell & Parrott) which has 6-segmented antennae, ii) stigmatic setae usually 3, with median stigmatic setae longest, and iii) ventral median abdominal setae usually in three pairs.

Here we transfer the Brazilian species *Neolecanium perconvexum* (Cockerell) to *Octolecanium* gen. nov. and describe a new species from Guatemala based on the adult female. The adult female of *O. perconvexum* is redescribed and fully illustrated, and its first-instar nymph is described for the first time.

MATERIALS AND METHODS

All specimens (see material studied) were slide mounted according to the method discussed by Kosztarab³, and were studied under a Zeiss RA phase contrast compound microscope. The illustrations of the insects follows the style adopted for the Coccoidea, with the dorsal side drawn on the left side and the ventral side drawn on the right side. Measurements of slide mounted specimens were made using an ocular micrometer under magnifications of 320x to 2000x.

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Enlargements of important characters were placed around the illustration. The total number of specimens used for each description is given in parentheses.

Depositories

The Auburn University Coccoidea Collection, Auburn, Alabama, U.S.A. (AUCC); The Museu Zoologico de São Paulo, São Paulo, Brazil (MZSP); The National Museum of Natural History Coccoidea Collection, Beltsville, Maryland, U.S.A. (USNM).

RESULTS

OCTOLECANIUM Kondo, new genus

TYPE SPECIES

Lecanium perconvexum Cockerell, 1898a⁴.

GENERIC DESCRIPTION, ADULT FEMALE

Dorsal derm membranous. Dorsal setae lanceolate, stout, evenly distributed. Submarginal tubercles absent. Dorsal pores variable. Simple disc pores present, scattered evenly on dorsum. Preopercular pores, present anterior to anal plates and extending to about metathoracic region. Dorsal microducts, of two types; large bilocular microducts resembling somewhat 8-shaped pores, present around margin; smaller, bilocular microducts similar in shape to larger microducts, occurring evenly on dorsum. A narrow sclerotized crescent present around anal plates. Anal plates each triangular. Anal ring with 10 setae. Anal cleft about 1/5 of body length. Eyes absent. Margins smooth. Marginal setae slender, sharply spinose, with tips straight or slightly bent. Spiracular clefts absent. With 3, or rarely, 4 spiracular setae, median spiracular seta longest. Ventral derm membranous. Ventral setae setose, straight or slightly bent. Preulvar setae longest. Antennae reduced, 3-5 segmented, with 2-3 pairs of interantennal setae. Legs reduced but with main segments present, without tibio-tarsal sclerotization. Claw without a denticle. Spiracles slightly smaller than legs. Spiracular pores with 3-6 loculi, mostly 5 locular. Perivulvar pores similar to spiracular pores, with 3-6 loculi, mostly 5 locular, scarce, occurring in vulvar area and a few extending submedially towards metathoracic leg. Ventral microducts present, scattered evenly on venter. Ventral tubular ducts present or absent.

ETYMOLOGY

The new genus *Octolecanium* is named after the characteristic eight-shaped dorsal submarginal macroducts, the latin word "octo" meaning eight, and *lecanium* which is an ending commonly used in coccid names.

KEY TO THE ADULT FEMALES OF *Octolecanium* KONDO

1. With ventral tubular ducts only in the vulvar region.....
O. guatemalensis sp. nov.
- Without ventral tubular ducts.....
O. perconvexum (Cockerell)

Octolecanium perconvexum (Cockerell), new combination

Lecanium perconvexum Cockerell, 1898a⁴: 132; 1898b⁵: 41; 1899⁶: 393; Hempel, 1900⁷: 422; *Neolecanium perconvexum* (Cockerell), Cockerell, 1902a⁸: 339; Cockerell, 1902b⁹: 451; Fernald, 1903¹⁰: 177; Hempel, 1912¹¹: 39; Vernalha, 1953¹²: 139; Ben-Dov, 1993¹³: 193.

DESCRIPTION, ADULT FEMALE (FIG. 1)

Living appearance

Scale 3.25 mm long, 2 mm wide 2.25 mm high; highly convex, brown-black, not too shiny; with minute specks on lighter color; with irregular patches of dull white waxy secretion, especially at margins.

Slide mounted specimens

Body outline oval to elongate oval, 2.0-5.5 mm long, 1.8-4.6 mm wide (n=11).

Dorsum

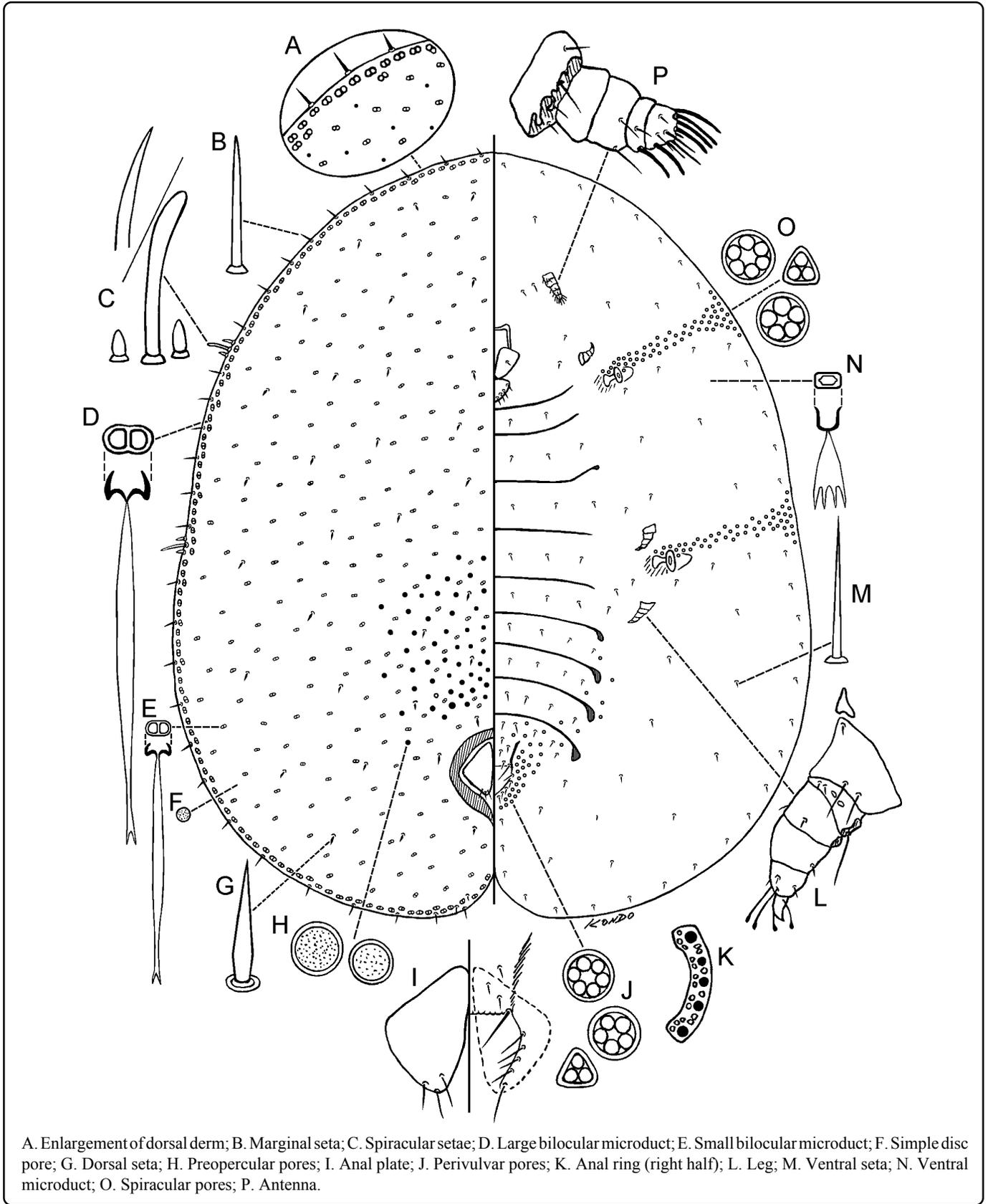
Dorsal setae (Fig. 1G) lanceolate, stout, 8.5-15.0 µm long, evenly distributed. Submarginal tubercles absent. Dorsal pores variable. Simple disc pores (Fig. 1F), small, 1.8 µm wide, scattered evenly on dorsum. (Enlargement of dorsum shown in Fig. 1A.) Preopercular pores (Fig. 1H), present just anterior to anal plates and extending to about metathoracic region. Dorsal microducts of two types; large bilocular microducts (Fig. 1D) about 7 µm wide, present around margin; smaller, bilocular microducts (Fig. 1E) about 3.6 µm wide, similar in shape to larger microducts, occurring evenly on dorsum. A narrow sclerotized crescent present around anal plates. Anal plates (Fig. 1I) triangular, 167-183 µm long, 81-119 µm wide, with 3 apical setae, and 5 ventral subapical setae on each plate. Anal ring (Fig. 1K) with 10 setae. Anal cleft about 1/5 of body length. Eyes absent.

Margin

Margins smooth. Marginal setae (Fig. 1B) slender, sharply spinose, with tips straight or slightly bent, 15-26 µm long. Number of marginal setae between spiracular setae about 6-8. Spiracular clefts absent. Spiracular setae (Fig. 1C) numbering 3, rarely 4, median seta longest, 13-32 µm long, lateral setae shorter, 4-11 µm long.

Venter

Ventral setae (Fig. 1M) setose, straight or slightly bent, 7-11 µm long. Preulvar setae longest. Antennae (Fig. 1P) reduced, 38-81 µm long, 3-5 segmented. Interantennal setae 2-3 pairs. Legs (Fig. 1L) reduced but with main segments present, without tibio-tarsal sclerotization, small, total length 66-132 µm. Prothoracic tarsal digitules dissimilar, one knobbed and one spiniform, meso- and metathoracic tarsal digitules similar, knobbed. Claw digitules, slender, knobbed. Claw without a denticle. Spiracles slightly smaller than legs, anterior peritreme usually smaller than posterior peritreme. Anterior peritreme 47-66 µm, posterior peritreme 58-81 µm wide. Spiracular pores (Fig. 1O) with 3-6 loculi, mostly 5-locular,



A. Enlargement of dorsal derm; B. Marginal seta; C. Spiracular setae; D. Large bilocular microduct; E. Small bilocular microduct; F. Simple disc pore; G. Dorsal seta; H. Preopercular pores; I. Anal plate; J. Perivulvar pores; K. Anal ring (right half); L. Leg; M. Ventral seta; N. Ventral microduct; O. Spiracular pores; P. Antenna.

Figure 1. *Octolecanium perconvexum* (Cockerell), adult female.

4.4-6.2 μm wide. Spiracular pore band about 2 pores wide, becoming wider, about 7-8 pores wide near margin. Perivulvar pores (Fig. 1J) similar to spiracular pores, with 3-6 loculi, mostly 5 locular, 4.4-6.2 μm wide, scarce, present around vulvar area and a few present submedially towards metathoracic leg. Clypeolabral shield 178-194 μm wide. Ventral microducts (Fig. 1N) present, scattered evenly on venter, about 2.7 μm wide. Tubular ducts absent.

DESCRIPTION, FIRST-INSTAR NYMPH (FIG. 2)

Slide mounted material elongate oval (Fig. 2), 405-652 μm long, 243-420 μm wide (n=71).

Dorsum

Dorsal derm membranous, with segmentation delineated by membranous folds. Dorsal setae (Fig. 2B) short, 2.7-4.4 μm long, one pair present on mid area of head region. A trilocular pore (Fig. 2A) present on each side of head region near margin. Bilocular microducts (Fig. 2D) large, about 6.4 μm wide, present in 2-3 submarginal and submedian longitudinal rows. Simple disc pores not detected. Anal plates each triangular, shingled, 51-55 μm long, 21-32 μm wide, with 4 dorsal apical setae, 1 ventral hypopygial setae and 1 fringe setae. Anal ring (Fig. 2F) typical of first-instar nymphs; with 6 setae and one irregular row of translucent wax pores.

Margin

Outline smooth. Marginal setae (Fig. 2E) sharply spinose, straight or with slightly bent tips, total 32, numbering 8 anteriorly between eyes, 2 between each eye and anterior spiracular setae, 2 between each anterior and posterior spiracular setae, and 8 between each posterior spiracular setae and apex. Spiracular setae (Fig. 2C) in groups of 3, rarely 4, well differentiated from marginal setae, sharply or bluntly spinose, median setae 20-23 μm long, lateral setae 4-7 μm long.

Venter

Ventral derm membranous. Ventral setae slender; submedial abdominal setae 3 pairs. Seven inner and outer submarginal setae (Fig. 2G) on abdomen, 2 submarginal setae between anterior and posterior spiracles, and one pair near apex of head (Fig. 2K). Ventral microducts (Fig. 2I) 2.7 μm wide, numbering 6 between inner and outer submarginal setae on abdomen, 1 between anterior and posterior spiracle, and 1 near base of each antennal scape. Spiracular pores (Fig. 2J) with 4 loculi, 2.7-3.6 wide, 3 near anterior spiracle and 4 near posterior spiracle. Clypeolabral shield 68-75 μm wide, with 8 labial setae. Legs well developed, trochanter + femur 62-70 μm long, tibia + tarsus 77-81 μm long, microctenidia present on tibial apex. Prothoracic tarsal digitules dissimilar, one knobbed and one spiniform; mesothoracic and metathoracic tarsal digitules similar, knobbed. Claw (Fig. 2H) with a small denticle, claw digitules knobbed, one slightly broader than other. Antennae 5-segmented, with 3rd antennal segment longest; fleshy setae present on last 2 apical segments. One pair of interantennal setae present. Eyes present,

located just above level of antennal scape.

Octolecanium guatemalensis Kondo, sp. nov.

DESCRIPTION, ADULT FEMALE (FIG. 3)

Living appearance

Living insects or unmounted material not available during present study.

Slide mounted specimens

Body oval to elongate oval, with a smooth or irregular outline, 2.0-5.0 mm long, 1.8-4.1 mm wide (n=3).

Dorsum

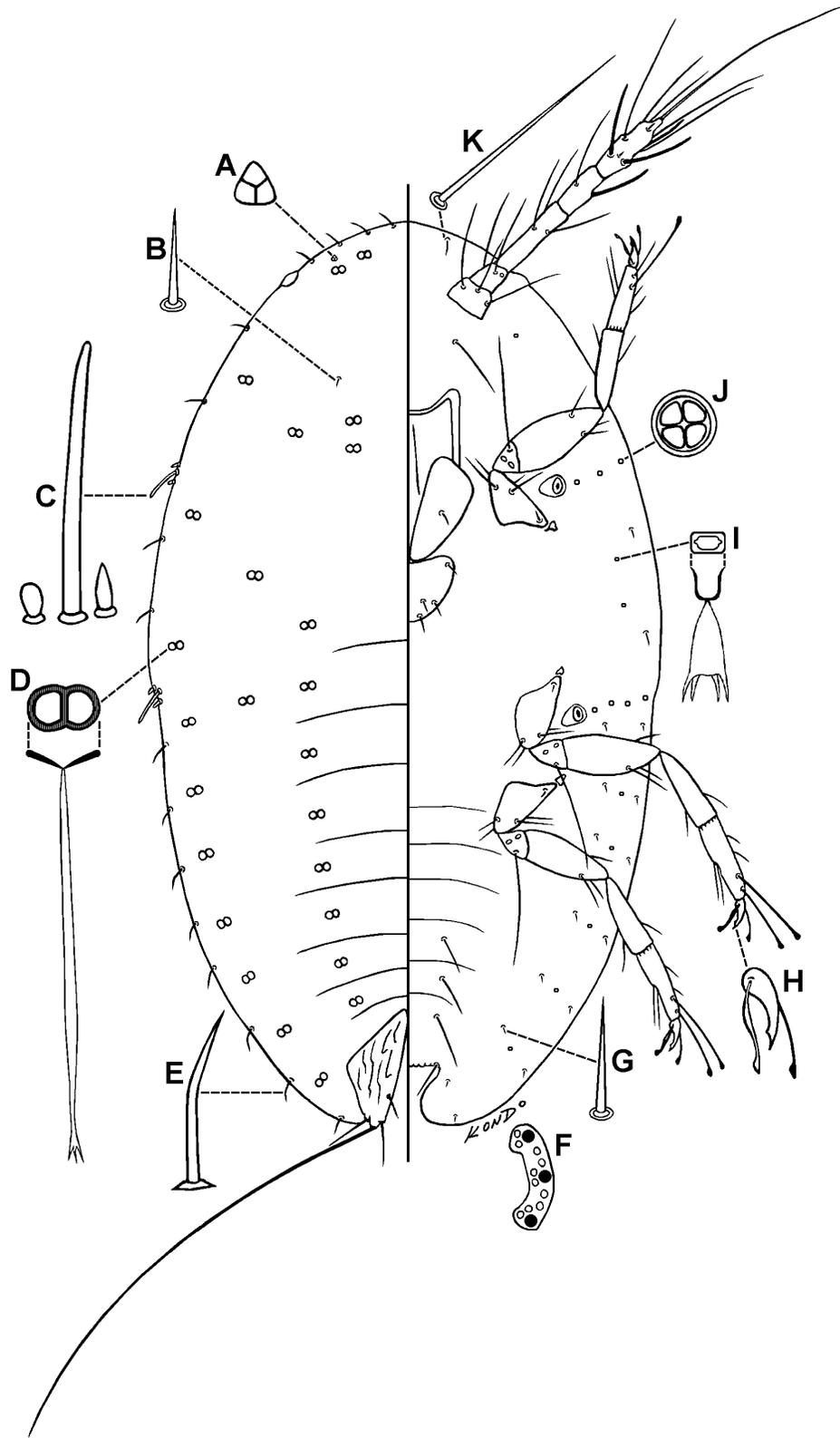
Derm membranous, becoming highly sclerotized at maturity. Dorsal setae (Fig. 3G) slender, short, 5-14 μm long, evenly distributed. Simple disc pores (Fig. 3F), 2.5 μm wide, scattered evenly on dorsum. (Enlargement of dorsum shown in Fig. 3A.) Preopercular pores (Fig. 3H), present just anterior to anal plates and extending to about to mid-abdominal area. Dorsal microducts, of two types; large bilocular microducts (Fig. 3D) 7-10 μm wide, present only around margin; smaller, bilocular microducts (Fig. 3E) 7.5 μm wide, similar in shape to larger microducts, occurring evenly on dorsum. Area around anal plates membranous. Anal plates (Fig. 3I) triangular, 175-205 μm long, 100-130 μm wide, with 3-4 apical setae, and 4 ventral subapical setae on each plate. Anal ring (Fig. 3K) with 10 setae. Anal cleft about 1/5 of body length. Eyes absent.

Margin

Margins smooth. Marginal setae (Fig. 3C) slender, sharply spinose, with tips mostly bent, 13-35 μm long, those on apex at anal lobes longest, 38-63 μm long. Number of marginal setae between spiracular setae 7-10. Spiracular clefts shallow or absent. Spiracular setae (Fig. 3B) numbering 3, median seta longest, 37-40 μm long, lateral setae shorter, 12-13 μm long.

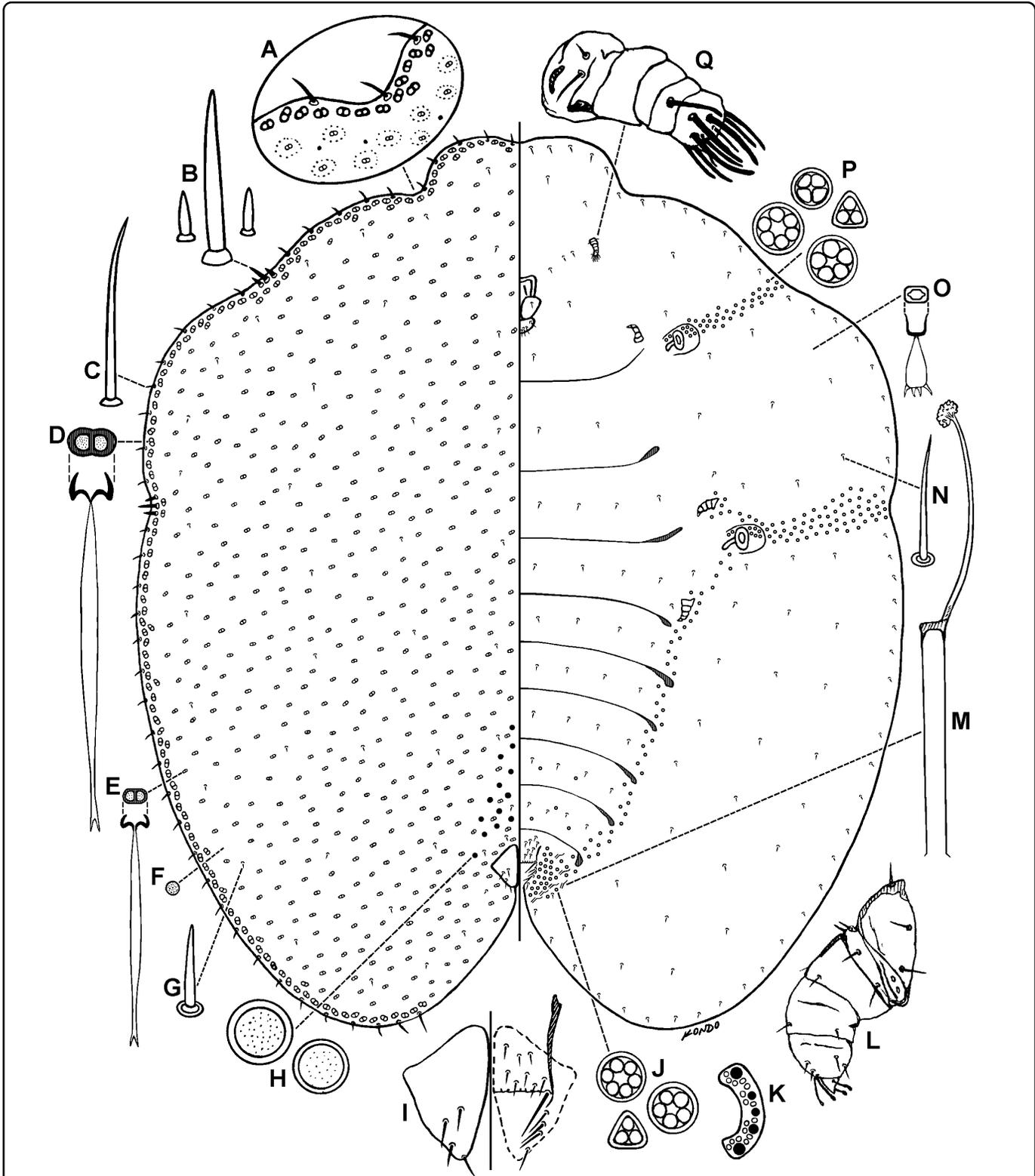
Venter

Ventral setae (Fig. 3N) slender, 10-18 μm long. Antennae (Fig. 3Q) very short, 55-83 μm long, atrophied, about 4-5 segmented. Interantennal setae 3 pairs. Legs (Fig. 3L) reduced but with main segments present, small, total length 50-115 μm . Tarsal digitules similar, knobbed. Claw digitules, slender, knobbed. Claw without a denticle. Spiracles about same size or slightly smaller than legs, anterior peritreme usually smaller than posterior peritreme. Anterior peritreme 75-80 μm , posterior peritreme 80-98 μm wide. Spiracular pores (Fig. 3P) with 3-6 (mostly 5) loculi, 6.0-7.5 μm wide. Spiracular pore band about 2-6 pores wide. Perivulvar pores (Fig. 3J) of the same type as spiracular pores, present around vulvar area and a few on last abdominal segments, with a narrow band of pores extending towards metathoracic leg and connecting to posterior spiracles. Clypeolabral shield 200-210 μm wide. Ventral microducts (Fig. 3O) 4.5-5.0 μm wide, scattered evenly on venter. Ventral tubular ducts (Fig. 3M) present in a small group on perivulvar region.



A. Trilocular pore; B. Dorsal seta; C. Spiracular setae; D. Bilocular microduct; E. Marginal seta; F. Anal ring (right half); G. Ventral seta; H. Claw; I. Ventral microduct; J. Spiracular pore; K. Ventral cephalic seta.

Figure 2. *Octolecanium perconvexum* (Cockerell), first-instar nymph.



A. Enlargement of dorsal derm; B. Spiracular setae; C. Marginal seta; D. Large bilocular microduct; E. Small bilocular microduct; F. Simple disc pore; G. Dorsal seta; H. Preopercular pores; I. Anal plate; J. Perivulvar pores; K. Anal ring (right half); L. Leg; M. Ventral tubular ducts; N. Ventral seta; O. Ventral microduct; P. Spiracular pores; Q. Antenna.

Figure 3. *Octolecanium guatemalensis* Kondo, adult female.

DISCUSSION

The description of the unmounted material of *O. perconvexum* was taken from Cockerell's original description⁴. *Octolecanium* is closest to *Toumeyella* but differs in having two different types of dorsal bilocular microducts; a smaller type of bilocular microduct is scattered on the dorsum, as in most *Toumeyella*, and a larger type of bilocular microducts are present only around the body margin, a feature unique to this genus. The "irregular patches of dull white waxy secretion, especially at the sides" described by Cockerell⁴ are probably secreted by these bilocular microducts. According to Cockerell⁴, *O. perconvexum* has males: "♂ Scale very small, scarcely over 1 mm. long, about 2/3 mm. broad, pale brownish, shiny, wrinkled, covered with a coating of dull white secretion, which is easily deciduous". *Octolecanium guatemalensis* also has males (see material studied). At present, there is only one slide of a male pupa of *O. guatemalensis*, and there are no slides of adult males of *O. perconvexum*. Therefore a comparison of the male adult stage is not possible at this time. The two species included in the present study are quite similar, with the exception of the presence or absence of ventral tubular ducts.

According to the scale insect database Scalenet¹⁴, there are 109 species of scale insects (Hemiptera: Coccoidea) recorded in Guatemala of which 12 belong to the family Coccidae. The addition of *Octolecanium guatemalensis* Kondo, sp. nov. increases the total number of species in Guatemala to 110 species. A soft scale closely related to *Toumeyella erythrinae* Kondo & Williams has been reported on *Erythrina* in Guatemala¹⁵, and it is expected that many more species will be discovered in this country. The family Coccidae is the third most species rich family of scale insects, and more species of coccids in the genus *Octolecanium* are expected to be discovered considering the vast area and species rich habitats between Brazil and Guatemala.

MATERIAL STUDIED

Adult ♀♀. *Neolecanium perconvexum* (Cockerell): Brazil, Campinas, 20-XII-1847, coll. Noaek, ex. *Nectandra* sp. (Lauraceae), 1 slide 1 specimen, **Lectotype** here designated (USNM); **Paralectotypes**: Brazil, Ipiranga, 28-IV-1900, coll. not given, No. 32, 1 slide 1 specimen (USNM); Brazil, Campinas, 20-VII-1897, coll. F. Noaek, ex. Lauraceae, slide mounted from type material, 11 slides 11 specimens (USNM: 7, AUCC: 4); Brazil, São Paulo, 18-VI-1912, coll. Luderwaldt, ex. *Nectandra* sp., dry mounted from dry material MZSP No. 128 (No. 95.274), 18 slides, 9 specimens split dorso-ventrally (AUCC: 4, MZSP: 5). First-instar nymphs. *Neolecanium perconvexum* (Cockerell): Brazil, Campinas, 20-XII-1847, coll. Noaek, ex. *Nectandra* sp. (Lauraceae), 6 slides 23 specimens, slide mounted from type material, AL-310-75 (AUCC); Brazil, São Paulo, 18-VI-1912, coll. Luderwaldt, ex. *Nectandra* sp., slide mounted from dry material MZSP No. 128 (No. 95.274), 8 slides 48 specimens (AUCC: 4, MZSP: 4).

Adult ♀♀. *Octolecanium guatemalensis* Kondo. **Holotype**: Guatemala, Santa Rosa, Barberena, Finca los Pocitos, 18-V-1990, coll. R. Perez, No. 81-1990-1, 1 slide 1 specimen (USNM); **Paratypes** same data as Holotype, 2 slides 2 specimens (USNM). Pupa ♂, same data, 1 slide 1 specimen (USNM).

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