

# REDESCRIPTION OF THE MYRMECOPHILOUS SOFT SCALE INSECT: *Aztecalecanium colimae* (COCKERELL), NEW GENUS AND NEW COMBINATION (HEMIPTERA: COCCOIDEA: COCCIDAE)

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## ABSTRACT

A myrmecophilous soft scale, *Akermes colimae* Cockerell is transferred to the new genus *Aztecalecanium* Kondo and Williams. The adult female and first-instar nymph are redescribed and described respectively. Diagnostic morphological characters of the species are given. This is the first time the insect has been illustrated.

**Key Words:** *Akermes colimae*, *Azteca longiceps*, coccid, Mexico.

## RESUMEN

Una escama blanda mirmecófila, *Akermes colimae* Cockerell se transfiere al nuevo género *Aztecalecanium* Kondo y Williams. La hembra adulta y la ninfa del primer estadio son redescrita y descrita respectivamente. Se listan caracteres morfológicos que diagnostican esta especie. Ésta es la primera vez que se ilustra este insecto.

**Palabras Clave:** *Akermes colimae*, *Azteca longiceps*, cóccido, México.

## INTRODUCTION

According to Miller<sup>1</sup> there are 63 scale insects in the family Coccidae described from Mexico. The scale insect database Scalenet<sup>2</sup> lists 23 species which are all included in Miller's taxonomic list with the exception of *Parthenolecanium quercifex* (Fitch). Recently, the new genus *Prionococcus* Williams, Hodgson & Danzig<sup>3</sup> was erected for two new species: *P. agave* and *P. americanus* occurring in Central America including Mexico. These together with the newly described erythrina scale<sup>4</sup>, *Toumeyella erythrinae* Kondo & Williams, increases the list of soft scales in Mexico to 67 species.

*Akermes colimae* Cockerell was collected by the late Dr. C.H.T. Townsend from hollow pyriform twig-galls on an undetermined tree 12 to 20 feet high. According to Cockerell, the galls were inhabited by ants, and certainly not made by coccids, but probably of a lepidopterous or coleopterous origin<sup>5</sup>. Cockerell's description of *A. colimae* did not include an illustration, consisted of a brief description of the insect, including color changes

when treated with KOH solution. *Akermes colimae* does not belong in the genus *Akermes* Cockerell<sup>6</sup>, and is here transferred to the new monotypic genus *Aztecalecanium*.

## MATERIALS AND METHODS

Dried specimens were borrowed from The National Museum of Natural History Coccoidea Collection, Beltsville, Maryland, U.S.A. (USNM). All specimens (see material studied) were slide mounted according to a method similar to that of Kosztarab<sup>7</sup>, 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. Enlargements of important characters were placed around the illustration.

## RESULTS

### *AZTECALECANIUM*, new genus

### TYPE SPECIES

*Akermes colimae* Cockerell, 1903: 47.

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## GENERIC DESCRIPTION, ADULT FEMALE

Insect oval to elongate oval, probably highly convex in life. Dorsal derm membranous. Dorsal body setae slender, present only in a narrow submarginal band. Submarginal tubercles absent. Dorsal simple disc pores of two distinct sizes. Dorsum with one or two groups of large bilocular pores (probably macroducts) present anterior to anal plates. Dorsal microducts with a bilocular, or occasionally a trilocular opening, evenly distributed on dorsum. Anal plates surrounded by a sclerotized rim. Anal plates triangular, with 18-24 setae on dorsal surface. Anal ring with 14 setae. Anal cleft about 1/5 of body length. Eyes absent. Margins smooth. Marginal setae slender, sharply spinose, with a pointed, lanceolate, or bifurcate apex, arranged in 1 or 2 rows, numerous but very few or absent on spiracular areas. Spiracular clefts absent. Spiracular setae not detected. Ventral body setae sharply spinose, straight or slightly bent. Preulvar setae longest. Antennae small, 6-segmented. Legs normal but very small in proportion to body. Legs without tibio-tarsal sclerotization. Tarsal digitules similar, knobbed. Claw digitules knobbed, one thicker than other. Claw without a denticle. Spiracles about same length or slightly smaller than legs. Anterior spiracular peritreme usually smaller than posterior peritreme. Spiracular and perivulvar pores similar, with 3-10 loculi. Perivulvar pores slightly larger, numerous, present around vulvar area and all abdominal segments, with a band connecting to posterior spiracles; spiracular pores found in a broad band reaching margins. Ventral microducts scattered evenly on venter. Tubular ducts absent.

## Etymology

The new genus *Aztecalecanium* is named after the tending ant *Azteca longiceps*, and *lecanium* which is the latinized version of the word "lekanion" meaning a small plate, probably referring to the anal plates of soft scale insects.

*Aztecalecanium colimae* (Cockerell), new combination  
*Akermes colimae* Cockerell, 1903a: 47.

## DESCRIPTION, ADULT FEMALE (FIG. 1)

### Living appearance

Female scale about 5 mm long, ferruginous or coffee-color, dorsum with partial covering of a sort of snuff-colored tomentum, covering also attached to inside wall of gall. Insects studied shrunken, but probably nearly globular in life. Anal plates small, corrugated, surrounded by dark thickened area. Surface of scale when seen with a lens appearing ferruginous, minutely marbled, spotted with black. No sign of waxy or glassy secretion.

### Slide mounted specimens

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

### Dorsum

Derm membranous. Dorsal body setae (Fig. 1E) slender, setose,

with straight or bent tips, 15-28  $\mu\text{m}$  long, apparently only present in a submarginal band of 1-2 setae wide around body. Submarginal tubercles absent. Dorsal pores variable. Simple disc pores of two distinct sizes, larger simple disc pores (Fig. 1F) about 3.6  $\mu\text{m}$  wide, smaller simple disc pores (Fig. 1G) about 2.7  $\mu\text{m}$  wide. Large bilocular pores (Fig. 1B) (probably macroducts), present in 1 or 2 small groups anterior to anal plates, 4.4-6.2  $\mu\text{m}$  wide, each bilocular pore single or occasionally fused. Dorsal microducts (Fig. 1D), with a bilocular or occasionally a trilocular opening, small, about 1.8  $\mu\text{m}$  wide, evenly distributed on dorsum. (Enlargement of dorsal derm shown in Fig. 1C). A sclerotized area around anal plates, present. Anal plates (Fig. 1H) triangular, 149-158  $\mu\text{m}$  long, 62-70  $\mu\text{m}$  wide, anterolateral margin 107-121  $\mu\text{m}$  long, posterolateral margin 75-87  $\mu\text{m}$  long, with 18-24 setae on dorsal surface, and 4 ventral subapical setae on each plate. Anal ring (Fig. 1J) with a characteristic number of 14 setae. Anal cleft about 1/5 of body length. Eyes absent.

### Margin

Margins smooth. Marginal setae (Fig. 1A) present, slender, sharply spinose, with tips mostly pointed, but some with lanceolate, or bifurcate apex, 26-64  $\mu\text{m}$  long, arranged in 1 or 2 rows, numerous but very few or completely absent in spiracular areas. Spiracular clefts absent. Spiracular setae not differentiated.

### Venter

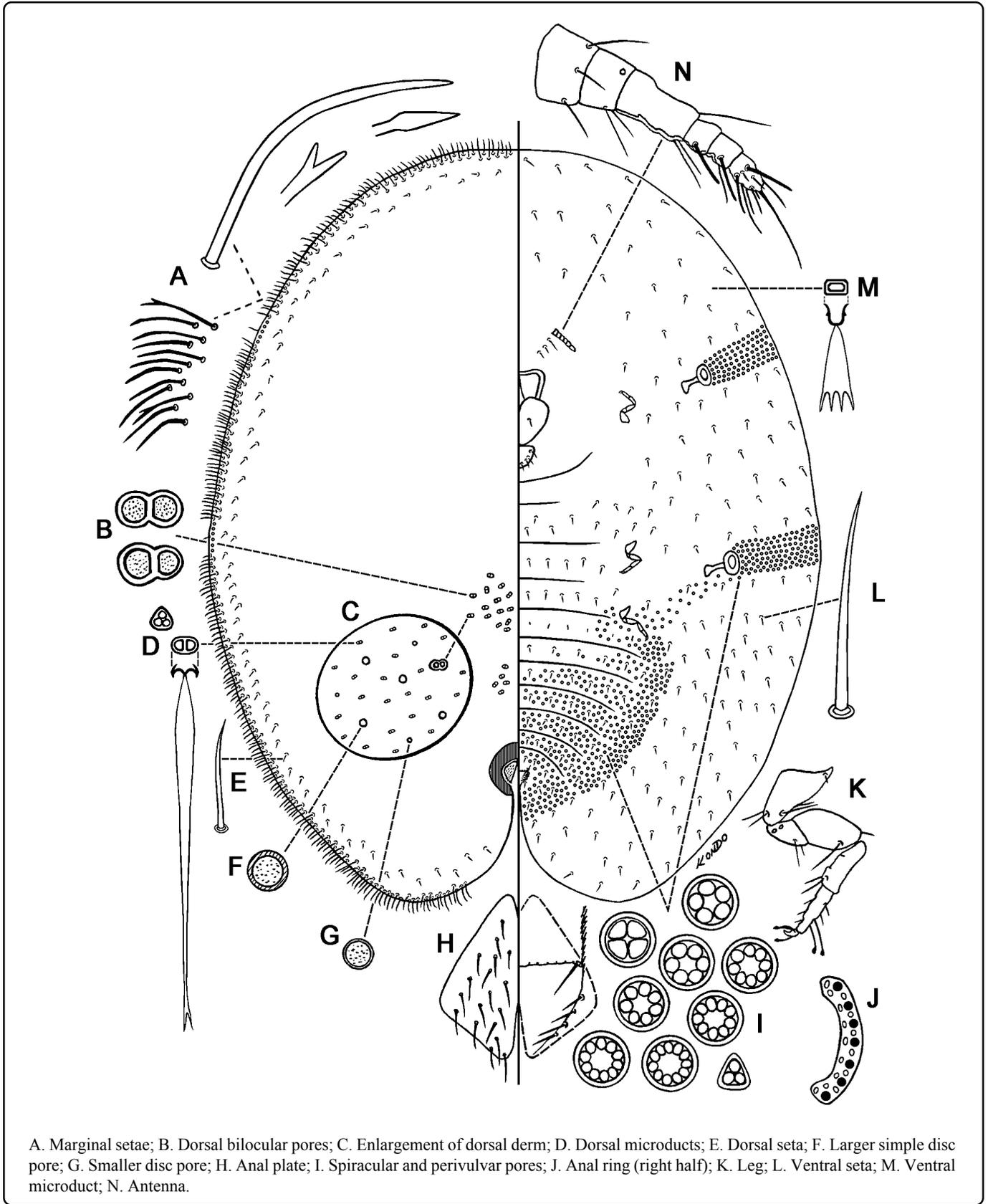
Ventral body setae (Fig. 1L) sharply spinose, straight or slightly bent. Preulvar setae longer, 45-51  $\mu\text{m}$  long, rest of ventral setae 17-38  $\mu\text{m}$  long. Antennae (Fig. 1N) small, 117-164  $\mu\text{m}$  long, 6-segmented, often shrunk and highly sclerotized. Legs (Fig. 1K) normal, but very small in proportion to body, total length 85-226  $\mu\text{m}$ . Legs without tibio-tarsal sclerotization. Tarsal digitules similar, knobbed. Claw digitules knobbed, one thicker than other. Claw without a denticle. Spiracles about same length or slightly smaller than legs. Anterior spiracular peritreme usually smaller than posterior peritreme. Anterior peritreme 128-141  $\mu\text{m}$ , posterior peritreme 132-160  $\mu\text{m}$  wide. Spiracular and perivulvar pores (Fig. 1I) similar, with 3-10 loculi, mostly 7-9 locular; perivulvar pores slightly larger, 5.3-8.9  $\mu\text{m}$  wide, numerous, present around vulvar area and all abdominal segments, with a band connecting to posterior spiracles; spiracular pores 4.4-6.2  $\mu\text{m}$  wide, found in a broad band reaching margins. Clypeolabral shield 270-297  $\mu\text{m}$  wide. Ventral microducts (Fig. 1M) scattered evenly on venter, about 2.0  $\mu\text{m}$  wide. Tubular ducts absent.

## DESCRIPTION. FIRST-INSTAR NYMPH (FIG. 2)

Slide mounted material elongate oval (Fig. 2), 420-539  $\mu\text{m}$  long, 270-334  $\mu\text{m}$  wide (n=7).

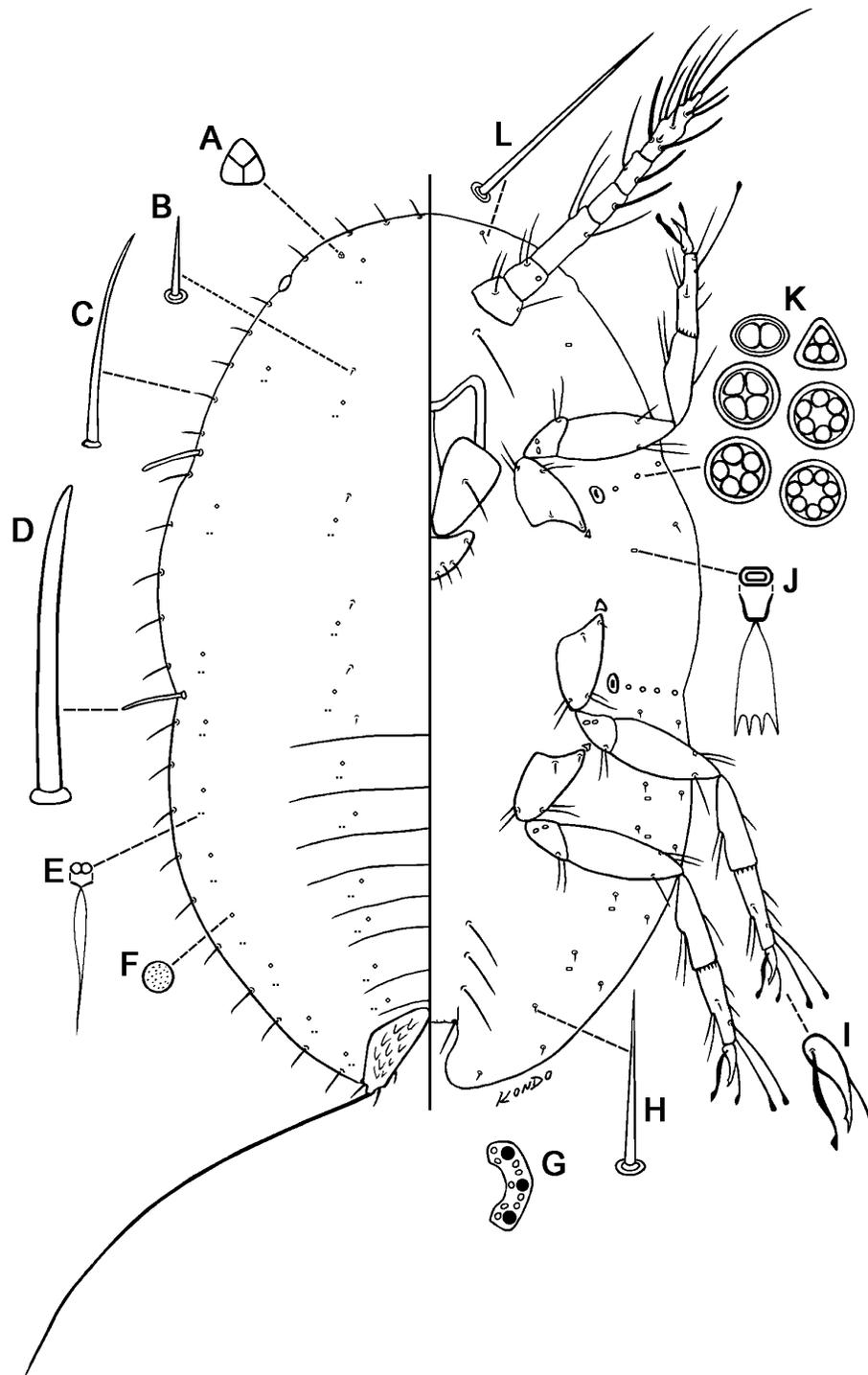
### Dorsum

Dorsal derm membranous, with segmentation delineated by membranous folds. Dorsal setae (Fig. 2B) short, 2.7-4.5  $\mu\text{m}$  long, present in two submedian longitudinal rows of about 5 setae. A trilocular pore (Fig. 2A) present on each side of head region



A. Marginal setae; B. Dorsal bilocular pores; C. Enlargement of dorsal derm; D. Dorsal microducts; E. Dorsal seta; F. Larger simple disc pore; G. Smaller disc pore; H. Anal plate; I. Spiracular and perivulvar pores; J. Anal ring (right half); K. Leg; L. Ventral seta; M. Ventral microduct; N. Antenna.

Figure 1. *Aztecalecanium colimae* (Cockerell), adult female.



A. Trilobular pore; B. Dorsal seta; C. Marginal seta; D. Spiracular seta; E. Dorsal microduct; F. Simple disc pore; G. Anal ring (right half); H. Ventral seta; I. Claw; J. Ventral microduct; K. Spiracular pores; L. Ventral cephalic seta.

Figure 2. *Aztecaleanium colimae* (Cockerell), first-instar nymph.

near margin. Bilobular microducts (Fig. 2E) small, about  $1.8\ \mu\text{m}$  wide, present in a submarginal and two submedian longitudinal rows. Most bilobular microducts associated with simple disc

pores (Fig. 2F), each simple disc pore about same width as microducts, very hard to detect. Anal plates each triangular, shingled,  $43\text{-}66\ \mu\text{m}$  long,  $17\text{-}26\ \mu\text{m}$  wide, with 4 dorsal apical setae,

1 ventral hypopygial setae and 1 fringe setae. Anal ring (Fig. 2G) typical of first-instar nymphs; with 6 setae and one irregular row of translucent wax pores.

### Margin

Outline smooth. Marginal setae (Fig. 2C) sharply spinose, straight or with slightly bent tips, total 46-52, numbering 8 anteriorly between eyes, 5-6 between each eye and anterior spiracular setae, 5-6 between each anterior and posterior spiracular setae, and 9-10 between each posterior spiracular setae and apex. Spiracular setae (Fig. 2D) single, well differentiated from marginal setae, sharply or bluntly spinose, 26-32  $\mu\text{m}$  long.

### Venter

Ventral derm membranous. Submedian abdominal setae 3 pairs. Seven outer submarginal setae and 6 inner submarginal setae on abdomen (Fig. 2H), a single seta between anterior and posterior spiracles, and one pair near apex of head (Fig. 2L). Six ventral microducts (Fig. 2J) present 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. 2K) with 2-7 loculi, about 3.6  $\mu\text{m}$  wide, 3 near anterior spiracle and 4 near posterior spiracle. Clypeolabral shield 68-96  $\mu\text{m}$  wide, with 8 labial setae. Legs well developed, trochanter + femur 85-92  $\mu\text{m}$  long, tibia + tarsus 90-102  $\mu\text{m}$  long, microtenidia present on tibial apex. Prothoracic tarsal digitules dissimilar, one knobbed and one spiniform; mesothoracic and metathoracic tarsal digitules similar, knobbed. Claw (Fig. 2I) with a denticle, claw digitules knobbed, one slightly broader than other. Antennae 6-segmented, with 3<sup>rd</sup> antennal segment longest; fleshy setae present on last 3 apical segments. One pair of interantennal setae present. Eyes present, located about same level of antennal scape.

### Associated ants

Dolichoderinae: *Azteca longiceps* (Cockerell)<sup>5</sup>.

### DISCUSSION

The above description of the living appearance of the adult female was taken from Cockerell<sup>5</sup>. In his description, Cockerell regretted not being able to collect the crawlers of this insect and also failed to see the legs and antennae, probably because of the small size of the limbs and the poor condition of the specimens. First-instar nymphs were obtained from under the body of adult females from the type dry material USNM #10503. One of the syntypes studied by Cockerell was successfully remounted and this allowed observation of previously undetectable morphological features. The adult female of *A. colimae* is characterized by having numerous slender marginal setae; having small legs and antennae but not showing fusion or great reduction of segments; lacking differentiated spiracular setae and preopercular pores; and an anal ring of 14 setae. The crawlers have 6-segmented antennae and only 1 spiracular seta per spiracular cleft. *Aztecalecanium* fits well into the subfamily Myzolecaniinae as defined by Hodgson<sup>8</sup>. Morphological features

that describe the adult female of members of the Myzolecaniinae include the lack of dorsal tubular ducts and eyespots, reduction in size of antennae and legs, large spiracles, numerous setae on the anal plates, and a reduced anal tube. Kondo and Williams<sup>9</sup> noted differences between New World and Old World members of the subfamily Myzolecaniinae and suggested that the subfamily is composed of several unrelated lineages. Members of this subfamily are closely associated with ants that constantly tend, clean, protect and even transport them in exchange for honeydew<sup>8,9</sup>. The reduction and loss of many important features in the Myzolecaniinae may have resulted from multiple cases of parallel evolution in unrelated groups of coccids as a result of morphological adaptations to symbiotic associations with tending ants.

### MATERIAL STUDIED

Adult ♀♀. *Akermes colimae* Cockerell: Mexico, Cualatan, Colima, 28-VII-1903, coll. T. & B., Cy. #1, ex. undetermined tree, in galls of *Azteca longiceps* Emery, remounted by T. Kondo, 2002, 1 slide, Lectotype here designated (USNM). Paralectotypes same data as Lectotype: 3 slides (USNM). Mexico, Cualatan, Colima, 28-VII-1903, coll. T. & B., Cy. #1 & 52, ex. ovate-leafed tree, in galls with *Azteca longiceps* Emery, slide mounted from type material # 10503, 11 slides poor condition (USNM). First-instar nymphs. Same data, 7 slides (USNM).

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