

**PHILIPPINE MEALYBUGS OF
THE GENUS *PSEUDOCOCCUS*
(PSEUDOCOCCIDAE, COCCOIDEA, HEMIPTERA)**

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ABSTRACT

A taxonomic study of Philippine *Pseudococcus* species is presented. *Pseudococcus baliteus* Lit is described as a new species. *P. saccharicola* Takahashi and *P. longispinus* (Targioni-Tozzetti) are recorded for the first time in the Philippines. Notes on the occurrence and date of publication of *P. elisae* Borchsenius are provided.

Key words: mealybugs, *Pseudococcus*, new records, *Pseudococcus baliteus* Lit, n. sp.

INTRODUCTION

The genus *Pseudococcus* Westwood, described in 1840, used to be a "catch-all" genus, i.e. it included many species that are definitely not congeneric. As part of reducing the genus to a homogeneous group, several genera have been established for mealybugs formerly assigned to it. In the Philippines, 14 species/combinations have been referred to this genus including *P. spathoglottidis* described recently by Lit (1992). All except three have been transferred to other genera or sunk into synonymy with other species (Table 1). Hence, prior to this and the work of Lit (1992), only *P. citriculus* Green and *P. elisae* Borchsenius were known to occur in the Philippines. *P. elisae* which we earlier thought to be a new record (Lit et al., 1990) was also reported by Williams (1988).

All specimens examined in this study are deposited in the Entomological Museum (UPP) of the UPLB Museum of Natural History, unless otherwise stated. Complete citations of literature mentioned in the text, other than those listed at the end of this paper, may be found in the existing bibliographies of the Coccoidea (Morrison and Renk, 1957; Morrison and Morrison, 1965; Russell et al., 1974 and Kosztarab and Kosztarab, 1988).

Table 1. List of names of Philippine mealybugs previously or presently assigned to *Pseudococcus* Westwood.

SPECIFIC EPITHET AS COMBINED WITH <i>PSEUDOCOCCUS</i>	PRESENT STATUS OR GENERIC ASSIGNMENT
<i>brevipes</i> (Cockerell) ^a	<i>Dysmicoccus brevipes</i> or <i>D. neobrevipes</i> Beardsley
<i>bromeliae</i> Bouche ^a	<i>D. brevipes</i> or <i>D. neobrevipes</i>
<i>citri</i> (Risso) ^b	<i>Planococcus minor</i> (Maskell) (=P ¹). <i>pacificus</i> Cox
<i>citriculus</i> Green	<i>Pseudococcus</i>
<i>elisae</i> Borchsenius	<i>Pseudococcus</i>
<i>filamentosus</i> Cockerell ^b	<i>Nipaecoccus viridis</i> (Newstead)
<i>lilacinus</i> Cockerell	<i>Planococcus</i>
<i>palmarum</i> (Ehrhorn)	<i>Palmicultor</i>
<i>sacchari</i> (Cockerell)	<i>Saccharicoccus</i>
<i>spathoglottidis</i> Lit	<i>Pseudococcus</i>
<i>tayabanus</i> Cockerell	<i>Pl. lilacinus</i>
<i>vastator</i> Green	<i>N. viridis</i>
<i>virgatus</i> (Cockerell)	<i>Ferrisia virgata</i>
<i>virgatus</i> , variety (Cockerell)	<i>F. virgata</i>

^a Because *D. brevipes* and *D. neobrevipes* have many host plants common to both, old records of *Pseudococcus brevipes* (Cockerell) and *P. bromeliae* Bouche (misidentification) possibly refer to both species of *Dysmicoccus*.

^b Synonymies refer to Philippine records only. *Planococcus citri* (Risso) and *Nipaecoccus filamentosus* (Cockerell) are still considered good species but are probably not present in the Philippines.

Genus *PSEUDOCOCCUS* Westwood

Pseudococcus Westwood, 1840: 448, appendix 118 (Type-species: *Dactylopius longispinus* Targioni-Tozzetti, 1867, by designation under the plenary powers of the International Commission on Zoological Nomenclature, 1983: 77, Opinion 1247).

As presently understood, this genus includes species with 12-17 pairs of cerarii that usually have only two conical setae, 8-segmented antennae, and oral-rim tubular ducts. The last named character differentiates it from *Dysmicoccus*, a closely related genus.

Six species are here included. However, it is highly probable that more new Philippine species would be discovered in the future.

KEY TO THE PHILIPPINE SPECIES OF *PSEUDOCOCCUS*

1. With at most 16 pairs of cerarii, including frontal pair; oral-rim tubular ducts few, mostly on abdominal segments; on grasses.....
 *saccharicola* Takahashi
 With 17 pairs of cerarii; oral-rim tubular ducts numerous, at least about 50 all over body; on various host plants 2
- 2(1). All 17 cerarii borne on more or less well-defined sclerotized areas ... 3
 At most, only the two most posterior cerarii on well-defined sclerotized bases 4
- 3(2). With 6 to 8 discoidal pores around eyes..... *spathoglottidis* Lit
 Without discoidal pores around eyes *baliteus* Lit, **n. sp.**
- 4(2). Ventral multilocular disc pores confined to area or segments around vulva; with one large and one or two dorsal oral-rim tubular ducts near almost all cerarii *longispinus* (Targioni-Tozzetti)
 Ventral multilocular disc pores present from fourth or fifth abdominal segment 5
- 5(4). With six to eight discoidal pores near eyes; hind coxae without translucent dots *elisae* Borchsenius
 Without discoidal pores near eyes; hind coxae with translucent dots .
 *citriculus* Green

1. *PSEUDOCOCCUS BALITEUS* Lit, **new species**

Figure 1

DESCRIPTION. Live specimens with moderately thin covering of white powdery secretion; occurring on young prop roots of host plant, usually at or near apex.

Adult female (slide-mounted, elongate-oval, 2.20 mm long, 1.10 mm wide.

Dorsum. With 17 pairs of cerarii; anal lobe pair each with two large conical setae, 2-4 slender auxiliary setae and a cluster of closely spaced trilocular pores, all borne upon a more or less oblong, strongly sclerotized area. Penultimate cerarii each with 2 conical setae that are slightly larger than those of anterior cerarii, 4-5 slender auxiliary setae, a similar cluster of trilocular pores, all borne upon a more or less rounded sclerotized area. Other cerarii each with two conical setae that are smaller than those of the anal lobe pair, except for the cephalic and anterior metathoracic pairs which may have 3 or 4; several auxiliary setae; a cluster of trilocular pores and more or less circular sclerotized surrounding areas.

Two pairs of ostioles present. Trilocular pores numerous. Oral-rim tubu-

lar ducts present, one each in the following: just posterior to the frontal cerarii, near the first mesothoracic cerarii and near the first four pairs of abdominal cerarii. Apparently lacking on other parts of dorsum. A few oral-collars on margins. Multiloculars rare, when present, only at margins of abdomen. Body setae small, flagellate, scattered over. Anal ring rather large, apical, with 6 setae that are twice as long as diameter of ring.

Venter. Antennae 8-segmented. Legs quite large, translucent dots on hind coxae, femora and tibiae; tibia plus tarsus longer than coxa plus femur by about half the length of tarsus, without tooth on plantar surface of claw. Multilocular disc pores scattered over, numerous even at segments posterior to vulva. Oral-collar tubular ducts fairly numerous especially at margins. Oral-rim tubular ducts apparently lacking. Body setae numerous, long and slender. Circulus quite large, capable of folding along intersegmental line of fourth and fifth segment. Anal lobes with a somewhat broadly oblong, moderately sclerotized area, beset with a loose cluster of trilocular pores, several long slender setae and each bearing a very long slender apical seta.

Remarks. Specimens collected in 1989 were attended by *Dolichoderus* ants and were in mixed colonies with *Ferrisia virgata* (Cockerell) and an undetermined species of *Planococcus*. Those collected in 1983 in connection with the first author's undergraduate thesis (Lit, 1983) on mealybugs of Mount Makiling, Laguna had no attending ants and were not mixed with other mealybug species. In both cases, only the young prop roots (sometimes called "adventitious" roots) near the tips were observed to be infested.

This species is similar to *P. gilbertensis* Beardsley in a number of characters especially the presence of translucent pores on the hind coxae, femora and tibiae, but differs in having all the cerarii borne on sclerotized areas. The latter, in turn, makes *P. baliteus* Lit close to *P. spathoglottidis* Lit which, however, possesses discoidal pores near the eyes.

Etymology. The specific epithet is derived from the Filipino (Tagalog) common name of the type host plant, "balite"

Material examined. HOLOTYPE. LUZON: Laguna Province: UPLB Campus, College (Los Baños), on young prop roots of *Ficus elastica* L. (Moraceae), 1989. XI.11 (I.L. Lit, Jr., 85-9-310). **PARATYPES.** 19 adult females all collected with the holotype and 10 adult females, same locality and host plant, 1983.IV.07 (I.L. Lit, Jr., IL141). All types in the Entomological Museum, Museum of Natural History, University of the Philippines Los Baños, College, Laguna, 4031 Philippines.

2. *PSEUDOCOCCUS CITRICULUS* Green

Figure 2

Pseudococcus citriculus Green, 1922: 377, pl. 154 (Type: Royal Botanic Gardens, Sri Lanka (Ceylon) on *Citrus aurantia*); Zimmerman, 1948: 210, fig. 117 1/2.

This species was redescribed and illustrated by Ferris (In Zimmerman, 1948). It is similar to *Pseudococcus comstocki* by the absence of discoidal pores near the eyes and the presence of translucent pores on the hind coxae. It dif-

fers, however, in having longer body setae on the posterior margin of the anterior dorsal ostioles and mediodorsum of thorax. Capco (1959) first reported its occurrence in the Philippines.

Material examined. LUZON: Laguna Province: UPLB Campus, College (Los Baños), on *Citrus grandis*, 1975.IX.02 (S.M. Bato, SMB 24).

Distribution. Caroline Islands, Hawaii; Philippines, Sri Lanka.

3. *PSEUDOCOCCUS ELISAE* Borchsenius

Figure 3

Pseudococcus elisae Borchsenius, 1947b: 2110; 1948d: 418, 419 (Type: Colombia, on fruit and spurs of bananas); Beardsley, 1986: 31.

This species was described by Borchsenius as close to *P. maritimus* (Ehrhorn) among the group of *P. comstocki* (Kuwana) and allied species. Both *P. maritimus* and *P. elisae* possess discoidal pores near the eyes; the former has two or three while the latter has six to eight.

The first mention of *Pseudococcus elisae* and two other closely related Colombian species appeared in a key to *P. comstocki* and allied species (Borchsenius, 1947b). Prior to Borchsenius' work, the separation of species closely related to *P. comstocki* and *P. maritimus* presented considerable difficulty. Based on his key, *P. elisae* has the following distinguishing characters: without multilocular disc pores on the dorsal surface of the body; with six to eight discoidal pores near the eyes; oral-rim tubular ("mushroom-shaped") ducts with two discoidal micropores and one or two body setae; with irregular discoidal pores; body setae along a median dorsal line on thorax up to 0.030 mm long, those along posterior margin of anterior ostioles up to 0.022 mm long; and hind coxae without translucent pores. He also mentioned that this Colombian species was found on bananas.

A year later, Borchsenius (1948d) published *P. elisae* as a new species and gave a complete description. Borchsenius' key (1947b) nevertheless already gave sufficient distinguishing characters (diagnosis) to satisfy the criteria of availability and, therefore, the original date of publication of *P. elisae* is 1947.

Beardsley (1986) reported its discovery in Hawaii and confirmed its occurrence there as early as 1981. He gave further information on its distribution in Costa Rica, Guatemala, Honduras, Panama and Gilbert Island (Kiribati) in Micronesia. Its occurrence on cassava in Baybay, Leyte Island, Philippines was recorded by Williams (1988) and Lit *et al.* (1990). It is probably introduced and hence, the third Neotropical sternorrhynchous homopteran to enter the Philippines, possibly via the Pacific, the first being the spiraling whitefly, *Aleurodicus dispersus* Russell (Aleyrodidae) and the second, the *Leucaena* psyllid, *Heteropsylla cubana* Crawford (Psyllidae). Medina (1987) postulated that the mode of introduction of *A. dispersus* into the Philippines was possibly through wind during a typhoon. The same was one of the possibilities cited for the entry of *H. cubana* (Brewbaker, 1986). Most of the first reports of the occurrences of *A. dispersus* and *H. cubana* were from the Visayan regions, areas frequented by typhoons. Similarly, this species was collected from a Visayan island (Leyte) as early as 1985, which may suggest that the three insects followed, more or less, the same route. In all instances, however, laxity or lack of

vigilance at quarantine is always a possible factor for the entry of these unwanted insects. Considering the importance of *P. elisae* to the banana industry in Central America, it should be treated as potentially serious in the Philippines. Based on its reported host plants, *P. elisae* is polyphagous. In addition to bananas and cassava, food plants include other economically important crops such as ginger, red ginger, mango, cabbage and tomato.

Material examined. LEYTE Island: Leyte Province: Baybay: Visayas State College of Agriculture Campus, on *Manihot esculenta* Crantz, 1985. III.07 (L.T. Villacarlos and A. Bellotti) BMNH) (det. D.J. Williams); same locality and host, 1987.X.02 (V. Panggoy, 85-9-220) and 1989.IV.19 (I.L.Lit, Jr., 85-9-301). HONDURAS: La Lima, on *Rivina humilis* L. (Phytolaccaceae), 1967.IX-X (C. Evers) (det. J.W. Beardsley, Jr.).

Distribution. Philippines; Hawaii, Micronesia (Gilbert Is.); Colombia, Costa Rica, Honduras, Panama.

4. *PSEUDOCOCCUS LONGISPINUS* (Targioni-Tozzetti) Figures 4-

Dactylopius longispinus Targioni-Tozzetti, 1867: 1 (Type: Europe?, probably lost.

Pseudococcus longispinus: Fernald, 1903: 104; McKenzie, 1967: 303, fig. 119, color plate XVI.

The distinguishing features of this species are the presence of groups of three, dorsal oral-rim ducts (one large and two small ones), next to most cerari; the few ventral multilocular disc pores that are confined to areas around the vulva; the sclerotized bases of the penultimate and anal lobe cerarii; and the presence of 60-80 translucent dots on the hind tibiae and a circulus.

Specimens collected from *Salacca* leaves agree with the characters of this species except that only one large and one small dorsal oral-rim ducts are present near most cerari and there are less than 10 translucent dots on the hind tibiae, in addition to the relatively small size. They look like miniature individuals of *P. longispinus*. This species is a new record for the Philippines.

Material examined. MINDANAO: Zamboanga del Sur: Anuling, Pamucutan, Zamboanga City, on leaves of *Salacca zalacca*, 1987.VII.11 (I.L.Lit, Jr., 85-9-196); Davao del Norte: Hijo Plantation Wharf, Madaum, Tagum, on fruits of *Terminalia catappa* L., 1988.v.09 (I.L.Lit, Jr. / M.C.Lit / M.V.C. Fernando, 85-9-241).

Distribution. Cosmopolitan.

5. *PSEUDOCOCCUS SACCHARICOLA* Takahashi Figure 5

Pseudococcus saccharicola Takahashi, 1928: 331, plate 1, fig. 1 (Type: Taiwan on *Saccharum officinarum* L.); Williams, 1970: 167, fig. 24.

Williams (1970) redescribed and illustrated this species. Unlike other Philippine species of *Pseudococcus* which have 17 pairs of cerarii, *P. saccharicola* has at most only 16 pairs, each with only one oral-rim tubular duct nearby, when present.

Material at hand collected from the underground portion near the roots of *Saccharum spontaneum* agrees well with Takahashi's and Williams' descriptions except for the apparent lack of a circulus and an oral-rim tubular duct immediately posterior to each frontal cerarius.

P. saccharicola is a new record for the Philippines.

Material examined. MINDANAO: Zamboanga del Sur: Anuling, Pamucutan, Zamboanga City, on underground stem near roots of *Saccharum spontaneum* L., 1987.VII.II (I.L.Lit, Jr., 85-9-200).

Distribution. Bangladesh, India, Malaysia (Malacca), Philippines, Taiwan.

6. *PSEUDOCOCCUS SPATHOGLOTTIDIS* Lit

Figure 6

Pseudococcus spathoglottidis Lit, 1992: 1168, fig. 9 (type: Philippines, Luzon, Laguna, UPLB Campus on underground pseudobulbs of *Spathoglottis plicata* Blume).

Lit (1992) described this species as close to *P. pandanicola* Takahashi in having all the cerarii borne on well-defined sclerotized areas but differs mainly in lacking a row of three or four moderately large oral-rim tubular ducts on each side along the posterior margin on the venter of the seventh abdominal segment. Furthermore, the basal segment of each antenna of *P. spathoglottidis* is not notched or incised on its inner face near the base.

Material examined. Holotype and four paratypes. LUZON: Laguna Province: UPLB Campus, College (Los Baños), on base near roots hidden between leaf sheaths and pseudobulbs of *Spathoglottis plicata* Blume originally collected from Real, Quezon. 1987.X.17 (I.L.Lit, Jr., 85-9-221).

Distribution. Philippines.

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LITERATURE CITED

- BEARDSLEY, J.W. JR. 1986. Taxonomic notes on *Pseudococcus elisae* Borchsenius, a mealybug new to the Hawaiian fauna (Homoptera, Pseudococcidae). Proc. Hawaii. Ent. Soc. 26: 31-34.
- BREWBAKER, J.L. 1986. *Leucaena* Psyllids - Problems and Proposed Solutions. University of Hawaii at Manoa, College of Tropical Agriculture and Human Resources.
- KOSZTARAB, M. and M.P. KOSZTARAB. 1988. A Selected Bibliography of the Coccoidea (Homoptera), Third Supplement (1970-1985). Studies on the Morphology and Systematics of Scale Insects no. 14. Va. Polytech. Inst. & Sta. Bul. 88-1: 252.
- LIT, I. JR. L. 1983. Mealybugs (Pseudococcidae, Coccoidea, Hemiptera) of Mount Makiling and Environs, Laguna, Philippines. B.S.A. thesis. Dept. of Entom., UPLB. xiv + 165 p. Unpublished.
- LIT, I. JR. L. 1992. A new genus and ten new species of Philippine mealybugs (Pseudococcidae, Coccoidea, Hemiptera). Philipp. Ent. 8(5): 1158-1181, 10 figs.
- LIT, I. JR. L., V.J. CALILUNG and L.T. VILLACARLOS. 1990. Notes on scale insects and mealybugs (Coccoidea, Hemiptera) of cassava (*Manihot esculenta* Crantz). Philipp. Ent. 8(1): 707-708.
- MEDINA, C.P. 1987. Biology and ecology of the spiraling whitefly, *Aleurodicus dispersus* Russell (Homoptera: Aleyrodidae) and its natural enemies in the Philippines. M.S. thesis. Department of Entomology, UPLB. i-xii + 79 p. Unpublished.
- MORRISON, H. and A. V. RENK. 1957. A Selected Bibliography of the Coccoidea. U.S.D.A. Misc. Publ. 734: 1-222.
- MORRISON, H. and A.V. RENK. 1957. A Selected Bibliography of the Coccoidea. First Supplement. U.S.D.A. Misc. Publ. 987: 1-44.
- RUSSELL, L.M., KOSZTARAB, M. and M.P. KOSZTARAB. 1974. A Selected Bibliography of the Coccoidea. Second Supplement. U.S.D.A. Misc. Publ. 1281: 1-122.
- WILLIAMS, D.J. 1988. The distribution of the Neotropical mealybug *Pseudococcus elisae* Borchsenius in the Pacific Region and Southern Asia. Ent. Mon. Mag. 124: 1488-1491.

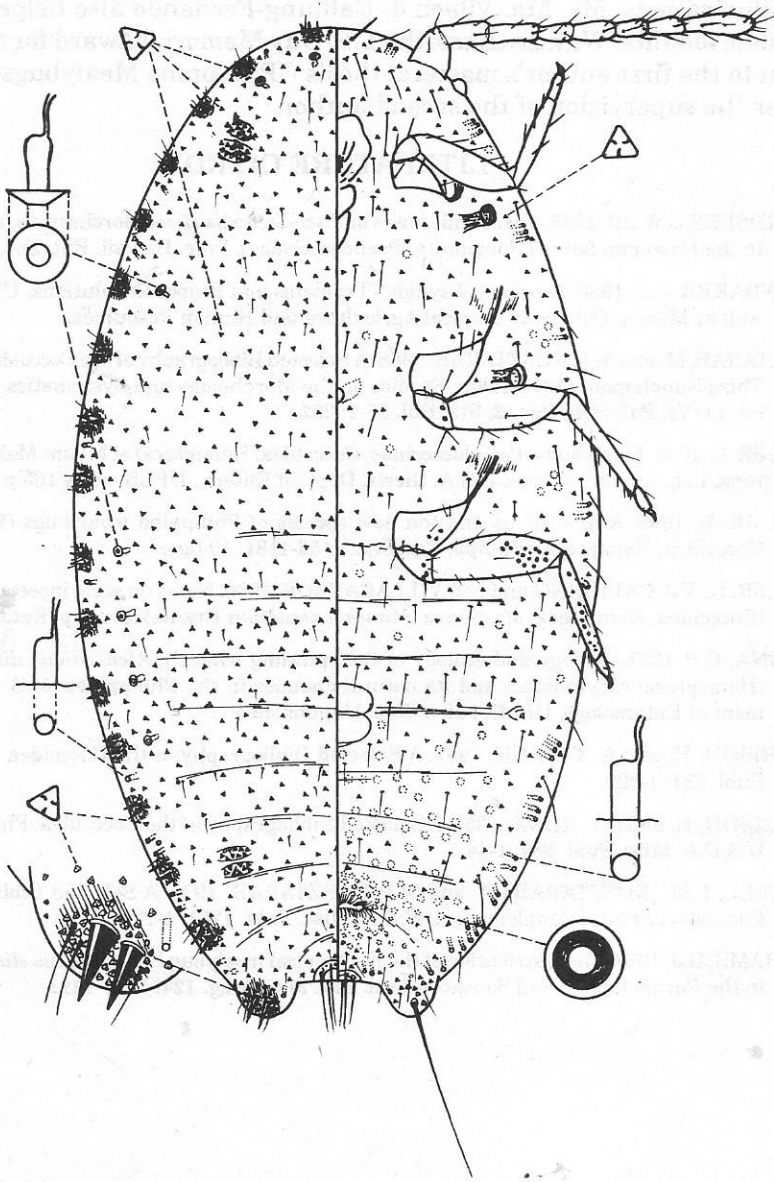


Figure 1. *Pseudococcus baliteus* Lit. new species

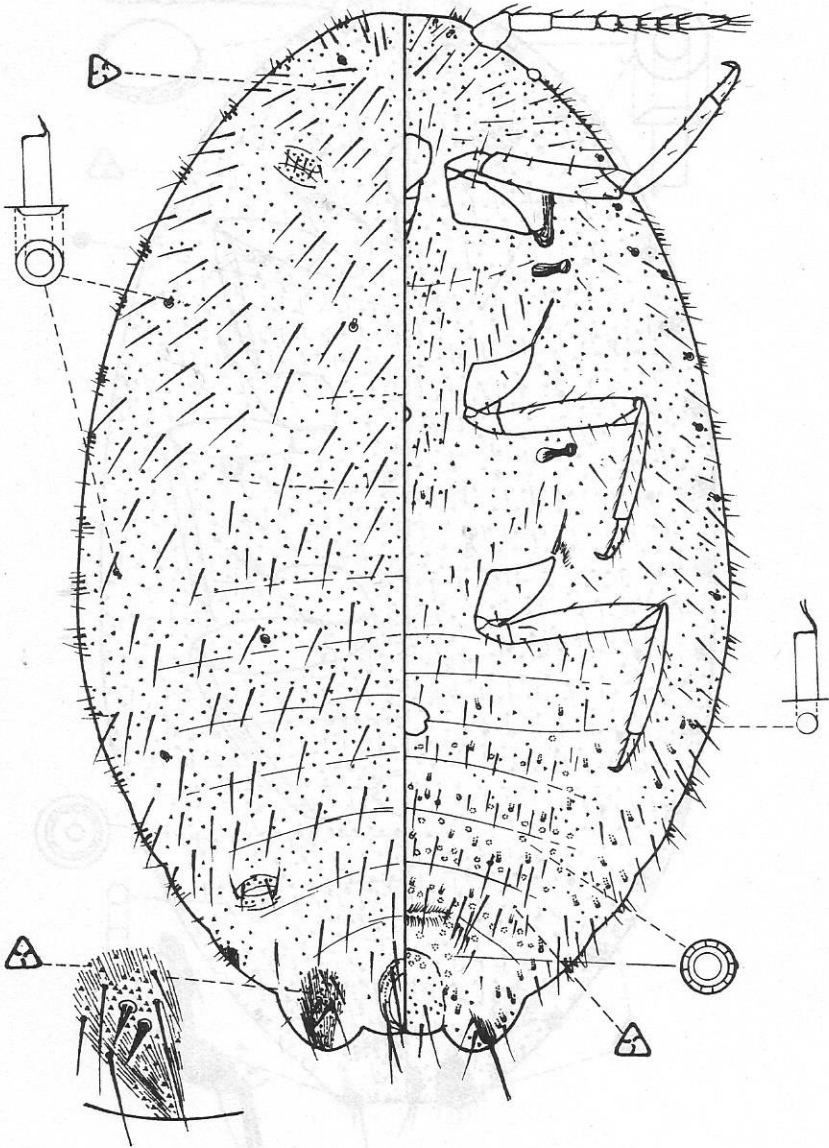


Figure 2. *Pseudococcus citriculus* Green

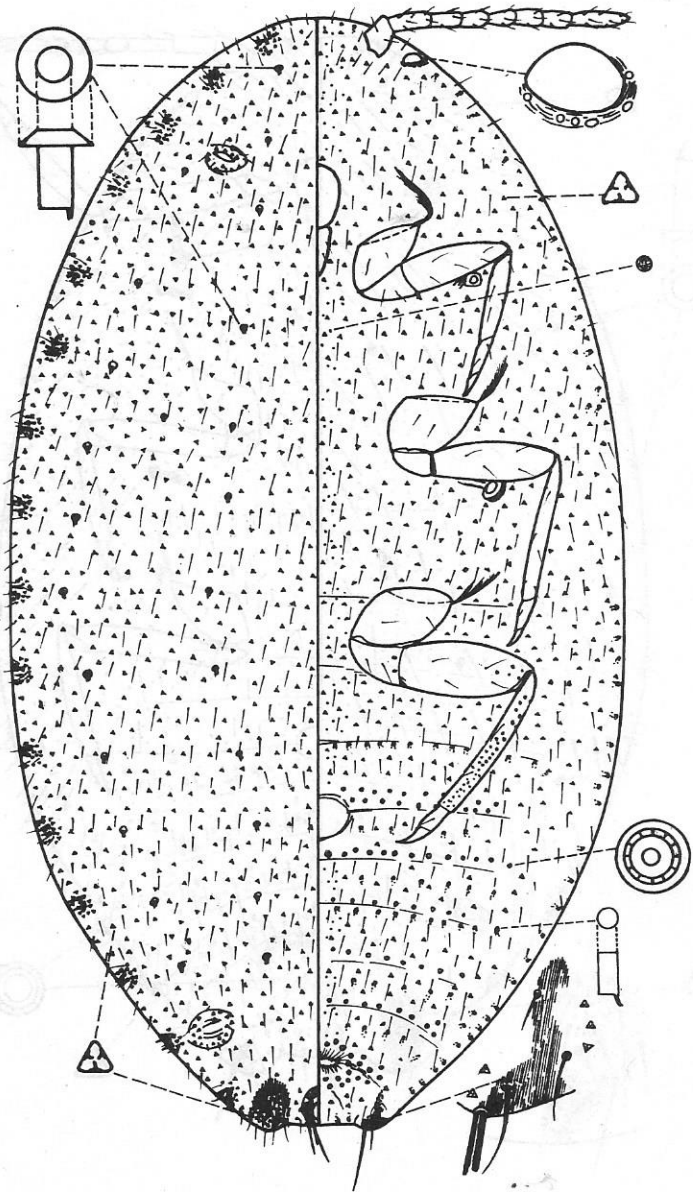


Figure 3. *Pseudococcus elisae* Borchsenius

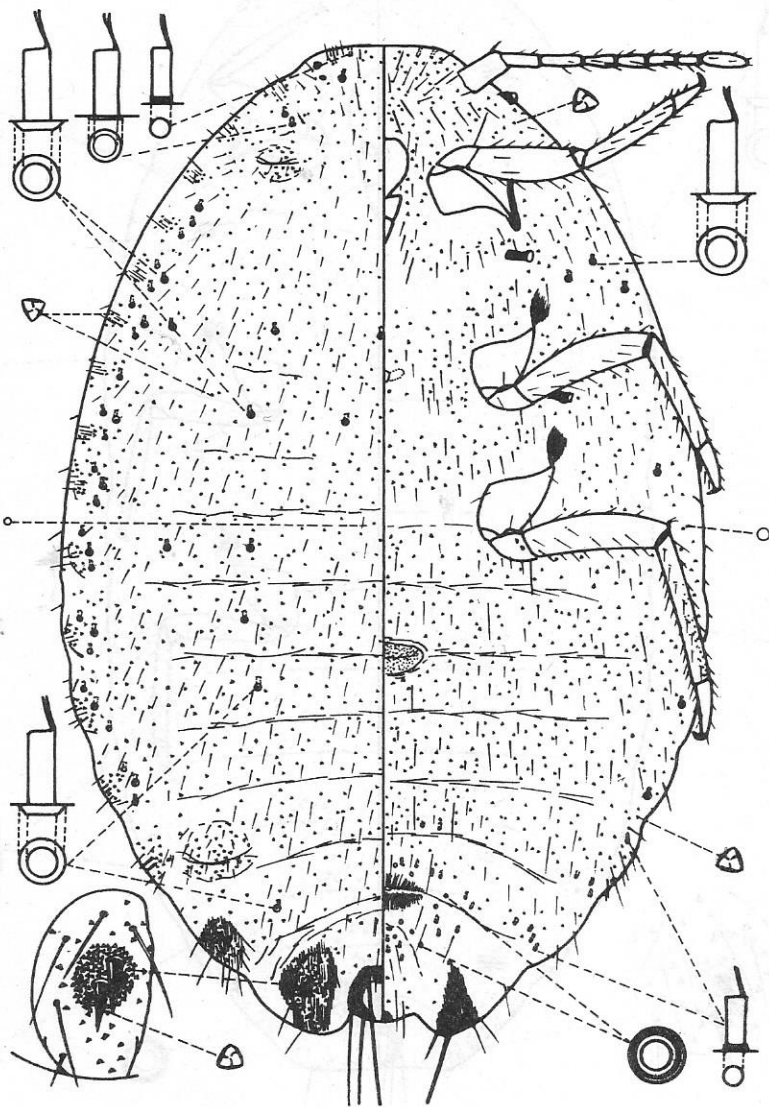


Figure 4. *Pseudococcus longispinus* (Targioni-Tozzeti)

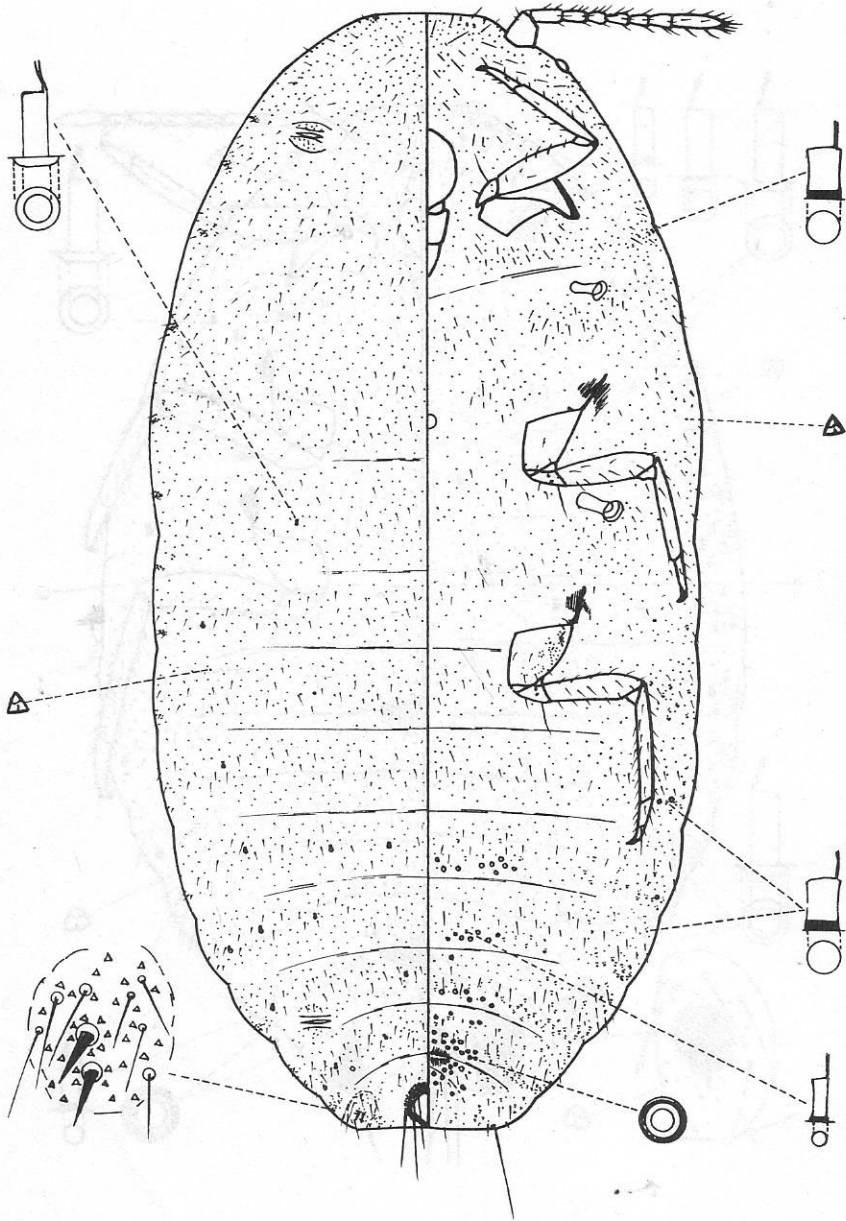


Figure 5. *Pseudococcus saccharicola* Takahashi

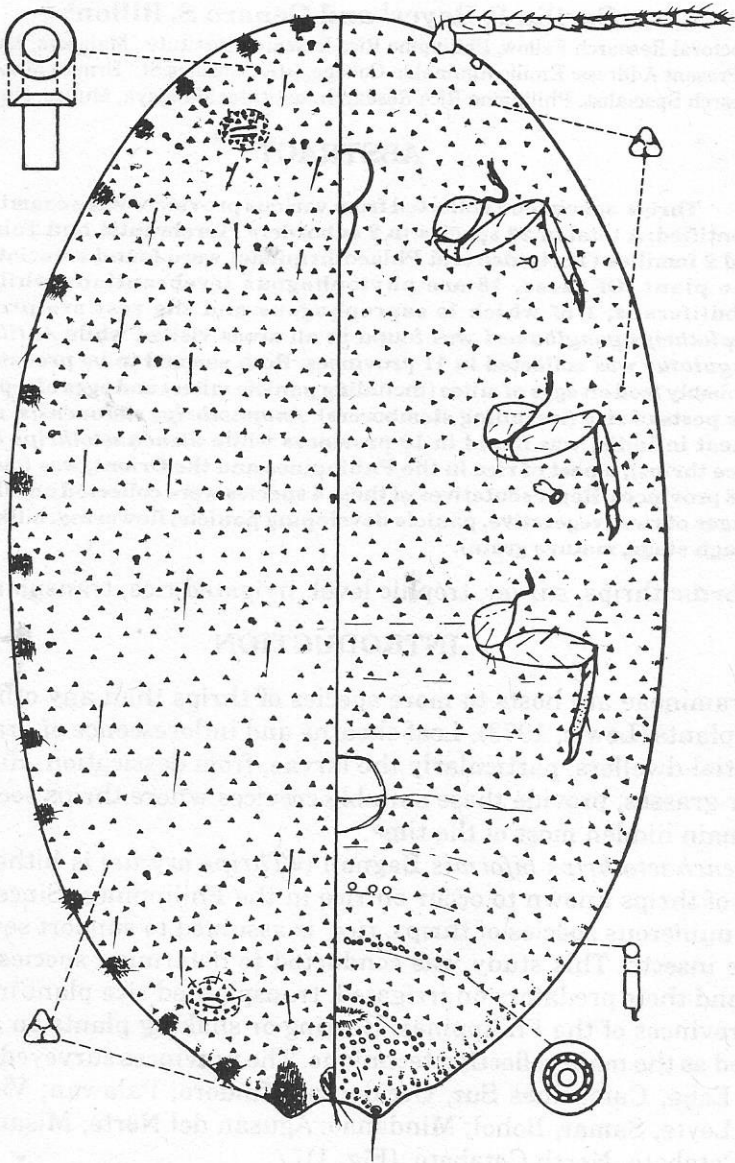


Figure 6. *Pseudococcus spathoglottidis* Lit