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TWO NEW SPECIES OF MEALYBUGS (HEMIPTERA: COCCOIDEA: PSEUDOCOCCIDAE) FROM PATAGONIA, ARGENTINA

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Abstract.—Two **new species** of mealybugs, ***Eurycoccus chubutensis*** and ***Pseudantonina vernacula***, have been discovered in the Patagonia Region of Argentina collected on *Nothofagus dombeyi* and on a grass, probably *Stipa* sp. Adult females and available immature stages of each species are described and illustrated and are compared with other mealybugs from the area.

Key Words: Coccoidea, *Nothofagus,* Patagonia, grass, Neotropical

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The mealybug fauna of Argentina appears to be inadequately described. A quick comparison of relatively well-known areas of the world gives important insight on the state of knowledge of Argentina's fauna. The number of mealybug species reported in California (land area of about 158,000 square miles and a large diversity of habitats) is 201 (Ben-Dov 2002), the number of species in England (land area of about 50,000 square miles and a relatively uniform diversity of habitats) is 46 (Ben-Dov 2002), and even in Maryland (about 10,000 square miles and relatively uniform habitats) there are 43 species known (Ben-Dov 2002). In comparison, the number of mealybug species in Argentina (land area of about 1,000,000 square miles and quite diverse habitats) is only 46 (Ben-Dov 2002). The works of Leonardi (1911a, b), Granara de Willink (1979, 1981, 1983a, b, 1986, 1991a, b, c), Williams (1973), Williams (1985b), and Williams and Granara de Willink (1992) have added significantly to knowledge about the mealybug fauna of the country, but much remains to be discovered and recorded.

It is important to understand the mealybug fauna of Argentina, not only to fill major gaps in the knowledge base of the Pseudococcidae, but also to know the identity of species that could be pests either in Argentina or other parts of the world. With the vast temperate climate of major parts of the country it would seem likely that native mealybug species could easily adapt to the temperate climates of the heavily populated northern hemisphere areas of the world such as Europe, China, and the United States. Williams and Granara de Willink (1992) made the case that a comprehensive understanding of the mealybug fauna of Central and South America was an effective weapon for combating mealybug species that could become invasive pests in other parts of the world. Their suggestion has been substantiated by the introduction of the invasive papaya mealybug (*Paracoccus marginatus*

Williams and Granara de Willink) in the Caribbean, Florida, and recently the Pacific (Meyerdirk, personal communication 2002). Unlike the years that it took to identify, describe, locate the area of origin, and develop effective biological control strategies for the cassava mealybug (*Phenacoccus manihoti* Matile-Ferrero) (Miller and Rossman 1995), control for the papaya mealybug has been relatively rapid (Meyerdirk, personal communication 2002). The quick response was possible primarily because the mealybug was known, well characterized, and potential areas of origin for discovering biological control agents were understood before it became an invasive pest.

Within Patagonia in Argentina most research on scale insects has focused on the mountainous, forested areas which are important as sources of wood and other biological resources. However, the steppe zone of Patagonia has numerous species of grasses and other unique vegetation and harbors a wealth of unknown mealybug species that could be important in the future. These natural pastures are especially resistant to the adversities of the harsh climate and are beneficial by maintaining soil moisture and preventing soil erosion. The grasses and low vegetation of the pampas are also important as the primary food source of sheep and cattle and provide shelter for many small mammals and numerous birds. This work examines two unusual mealybug species from Patagonia and is part of a larger study on the scale-insect biodiversity of Argentina.

Materials and Methods

Specimens were prepared following the techniques described by McKenzie (1967) and were slide mounted in Canada balsam. Illustrations were made with a drawing tube and follow the international conventions generally used for illustrating scale insects (e.g., Williams 1985c). All specimens were examined in detail and were used to formulate the ranges and means for the numeric characters. Measurements of the holotype are given separately. Ranges are given first, followed by the mean in parentheses. Specimens are deposited in the Institute and Fundacion Miguel Lillo (IMLA), of Tucumán, Argentina, and the Coccoidea Collection of the The National Museum of Natural History, Beltsville, Maryland, USA (USNM).

Results

Eurycoccus Ferris

Eurycoccus Ferris, 1950; type species, by original designation, *Pseudococcus jessica* Hollinger 1916 (junior synonym of *E. blanchardii* (King and Cockerell)).

This genus includes 14 species from most continents of the world (Afrotropical 3, Australasian 2, Nearctic 4, Oriental 2, and Palearctic 3) but has never been recorded from the Neotropical Region (Ben-Dov 2002). At present, *Eurycoccus* may contain several unrelated lineages, but we reluctantly decided to include the new Patagonian species in it rather than add to the confusion by describing another monotypic genus.

We have examined illustrations or specimens of all 14 *Eurycoccus* species (*E. antiscius* Williams, *E. blanchardii*, *E. bothriochloae* Williams, *E. campbelli* Kosztarab, *E. coccineus* (Newstead), *E. copallinae* Ferris, *E. cuniculorum* Williams, *E. esakii* (Kanda), *E. glomerulus* De Lotto, *E. monodi* Balachowsky and Ferrero, *E. saudiensis* Matile-Ferrero, *E. sternlichti* Williams, *E. tamariscus* Williams, *E. yuccae* Ferris) and note similarities that occur in nearly all species (Table 1).

The new species possesses all of these characteristics but differs by having: 1 more seta on each side of the basal segment of the labium; more numerous setae on the clypeolabral shield; an unusual type of discoidal pore that has a broad basal sclerotized ring and a non-sclerotized area that protrudes from the ring; a rectangular ventral invaginated pocket on the intersegmental line between segments VIII and IX; no

Table 1. Distribution of characters considered important in diagnosing *Eurycoccus*.

Eurycoccus Species	Large, Rotund Body	Coxal Pores	Number of Cerarii	With Paired Cerarian Setae	Ventral Tubular Ducts
antiscius	yes	no	1	yes, elongate	yes
blanchardii	yes	no	1	yes, conical	yes
bothriochloae	yes	yes	1	yes, conical	yes
campbelli	no	yes	1	yes, conical	yes
coccineus	yes	?	1	yes, elongate	no
copallinae	yes	?	1	yes, conical	yes
cuniculorum	yes	yes	0	no	yes
esakii	yes	yes	1	yes, conical	yes
glomerulus	no	yes	1	yes, elongate	yes
monodi	yes	yes	1	yes, conical	yes
saudiensis	no	yes	0	no	yes
sternlichti	yes	yes	1	yes, conical	yes
tamariscus	no	yes	1	yes, elongate	yes
yuccae	yes	yes	1	yes, elongate	yes

tubular ducts; no elongate anal-lobe seta; and multilocular and trilocular pores with obscure loculi. Although these characters may be diagnostic of a group of mealybugs, with only a single representative of that clade we hesitate to describe it as a unique genus. Other species of *Eurycoccus* have unusual small pores similar to those on the new species (*E. cuniculorum* and *E. tamariscus*) and one lacks ventral tubular ducts (*E. coccineus*). Therefore, we are placing the new species in *Eurycoccus*.

Key to Slide-Mounted Adult Females of the Genus *Eurycoccus*

1 Tubular ducts present at least near vulva 3
– Tubular ducts absent 2
2(1) Translucent pores present on hind coxa and femur; multilocular pores present on thorax . . . . . *chubutensis* Granara de Willink and Miller, n. sp.
– Translucent pores absent from hind legs; multilocular pores absent from thorax . . . . . *coccineus* (Newstead)
3(1) Translucent pores present on hind coxae 5
– Translucent pores absent from hind coxae 4
4(3) Translucent pores present on hind femur and tibia *blanchardii* (King and Cockerell)
– Translucent pores absent from hind pair of legs . . . . . *antiscius* Williams
5(3) Circulus large, quadrate or laterally expanded, usually divided by intersegmental line 10
– Circulus absent or small, round, usually not divided by intersegmental line 6
6(5) Translucent pores absent from hind tibia; circulus present 7
– Translucent pores present on hind tibia; circulus absent 9
7(6) Ventral multilocular pores present on anterior margin of abdominal segment VII 8
– Ventral multilocular pores absent from anterior margin of abdominal segment VII . . . . . *bothriochloae* Williams
8(7) Dorsal anal lobe with concentration of about 10 flagellate setae and 2 associated conical setae; antennae 8-segmented . . . . . *esakii* (Kanda)
– Dorsal anal lobe with 2 or 3 slightly enlarged setae only; antennae 6- or 7-segmented . . . . . *glomerulus* De Lotto
9(6) Dorsal anal lobe with pair of slightly enlarged setae and 1 or 2 flagellate setae . . . . . *tamariscus* Williams
– Dorsal anal lobe without enlarged setae but with cluster of about 10 flagellate setae . . . . . *cuniculorum* Williams
10(5) Dorsal oral-collar tubular ducts absent 11
– Dorsal oral-collar tubular ducts present . . . . . *campbelli* Kosztarab
11(10) Translucent pores present on hind tibia 13
– Translucent pores absent from hind tibia 12
12(11) Ventral anal lobe with distinct anal bar; most body setae elongate, longer than diameter of spiracular atrium . . . . . *monodi* Balachowsky and Ferrero

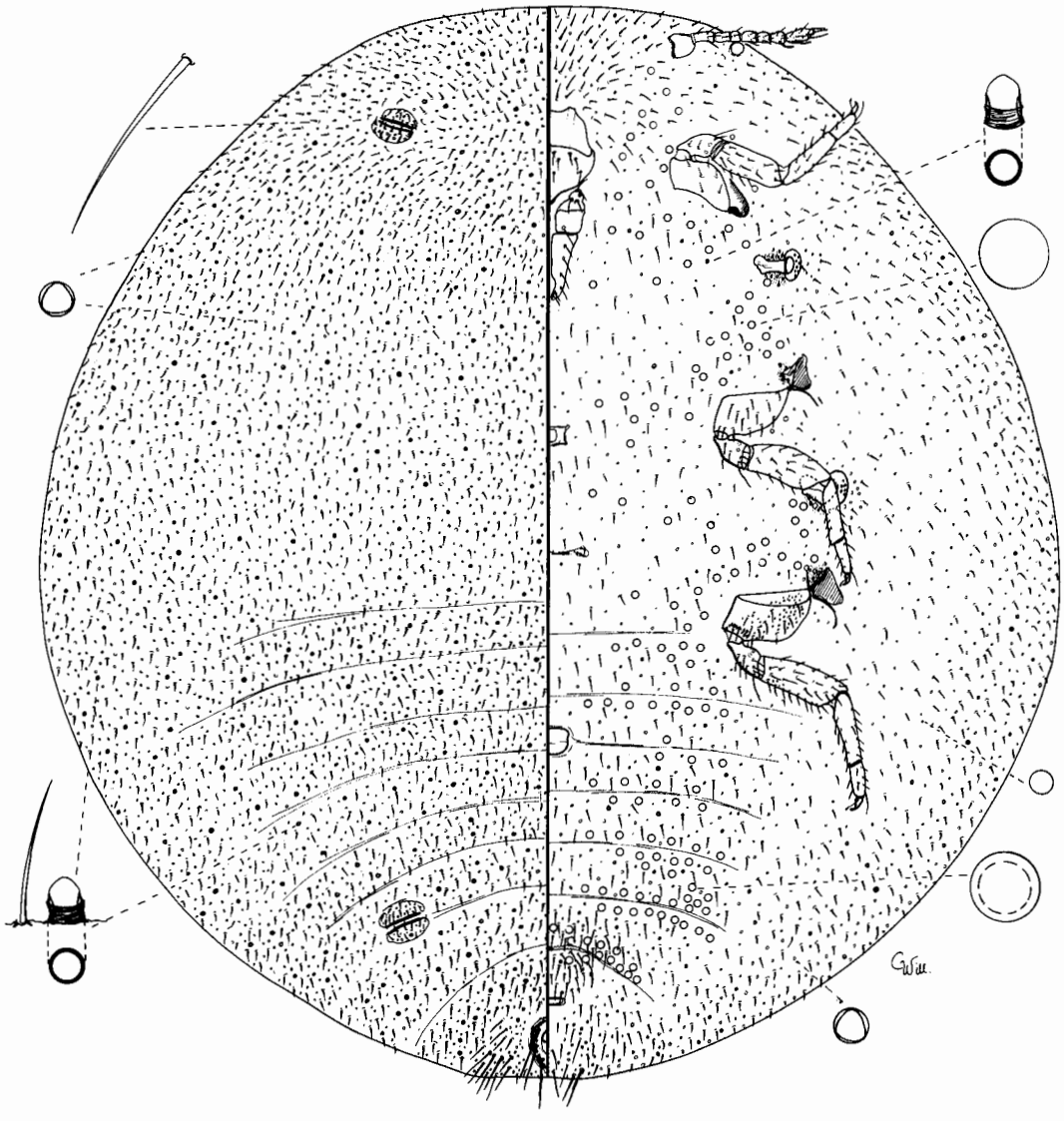

Fig. 1. *Eurycoccus chubutensis,* fourth-instar female (adult).

– Ventral anal lobe without anal bar; most body setae short, shorter than diameter of spiracular atrium . . . . . *sternlichti* Williams

13(11) Ventral oral-collar tubular ducts absent from thorax and head 14

– Ventral oral-collar tubular ducts present on thorax and head . . *saudiensis* Matile-Ferrero

14(13) Anal-lobe cerarian setae conical; multilocular pores restricted to posterior 2 or 3 abdominal segments . . . . . *copallinae* Ferris

– Anal-lobe cerarian setae flagellate, not conical; multilocular pores restricted to posterior 5 or 6 abdominal segments . . . . . *yuccae* Ferris

Eurycoccus chubutensis Granara de Willink and Miller, new species

(Figs. 1–3)

Description.—*Adult female:* In life very convex, body yellowish, covered with white wax. Slide-mounted specimens (Fig. 1) circular or broadly oval, holotype 3.8 mm long (paratypes 2.5–4.3(3.6) mm), and 3.1 mm wide (paratypes 2.0–3.4(2.9) mm). Antenna well developed with 7- or 8-segments, several specimens with third seg-

ment only partially divided, holotype antenna 549μ long (paratypes 429–585(519) μ). Legs well developed with numerous setae on all segments, with translucent pores on both surfaces of hind coxa and dorsal surface of hind femur; hind trochanter+femur of holotype 460 μ long (paratypes 331–470(427) μ); femur of holotype 339μ long (paratypes 315–352(338) μ); tibia+tarsus of holotype 398 μ long (paratypes 304–415(370) μ); tibia of holotype 281 μ long (paratypes 195–284(249) μ); tarsus of holotype 142 μ long (paratypes 133–140(137) μ); tibia considerably longer than tarsus, tibia/tarsus 2.0 in holotype (paratypes 1.4–2.0(1.8)); and claw without a denticle on plantar surface; digitules on claw with clubbed apex; tarsal digitules with thin apex, not extending to tip of claw. With 2 pairs of ostioles, each ostiole lip with many trilocular pores (much more abundant than on surrounding derm) and setae, ostiole opening with sclerotized edge. Eyes on venter near body margin, in 3 specimens a few trilocular or discoidal pores incorporated in sclerotization. Anal ring dorsal, near posterior end of body, oval, 132 μ long on holotype (paratypes 74–138(119) μ) with 3 rows of pores, outer 2 rows weakly sclerotized, and 3 pairs of setae, longest seta on holotype 93 μ long (paratypes 91–122(106) μ). Mouthparts well developed, clypeolabral shield of holotype 363 μ long (paratypes 319–385(352) μ), holotype with 14 setae on shield (paratypes 7–13(11) setae); labium 3-segmented, some specimens with narrow labium, others with structure broad, on holotype 382 μ long (paratypes 380–415(392) μ), basal segment with 4 setae on each side, middle segment with 1 seta on each side, and apical segment with 5 setae on each side and a group of 4 setae on each side along stylet canal at apex of labium; inner side of labium with 1 seta on each side in middle area of apical segment and 1 on each side near apex of apical segment. Circulus with well defined perimeter, divided by intersegmental line between segments III and IV, rectangular, holotype 144 μ wide (paratypes 98–156(136) μ). Spiracles conspicuous, anterior pair on holotype 125 μ long (paratypes 185–230(201) μ) and 82 μ wide (paratypes 185–230(201) μ), anterior pair larger than posterior pair; trilocular pores and setae in membranous opening leading to spiracle, but not in sclerotized peritreme; often with few multilocular or trilocular pores incorporated into sclerotization on middle area of spiracle.

Cerarii absent. Anal-lobe area without normal elongate anal-lobe seta, several setae at posterior apex slightly longer than remaining dorsal setae, longest on holotype 86 μ long (paratypes 49–86(72) μ).

Dorsal surface: Trilocular pores round, with obliterated internal structure, about 4 μ in diameter, abundant over surface. Cone-shaped discoidal pores slightly larger than triloculars, abundant over surface. Dorsal setae flagellate, slightly enlarged basally, numerous, ranging from 15–42 μ long, about same length over surface except on segment VIII where longest setae range from 60 to 100 μ long.

Ventral surface: Trilocular pores abundant over surface. Cone-shaped discoidal pores most numerous along body margin, nearly absent medially. Small discoidal pores uncommon. Multilocular pores about 2 times larger than triloculars, about 7 μ in diameter, present in medial and mediolateral areas from near vulva forward to area between mouthparts and front pair of legs, absent from marginal areas laterad of legs and spiracles. Setae flagellate, unusually short for mealybug, largest setae about 45 μ long. Cisanal setae not always distinguishable from other setae, about 75 μ long, about same length as dorsal setae near anal ring. Invaginated pocket present in medial area on intersegmental line of segments VIII and IX, rectangular in shape, with definite opening.

Material examined.—Holotype (IMLA) and 8 paratypes (IMLA, USNM) from Argentina, Chubut, Lago Puelo National Park, road to Los Hitos, on woody roots of *Noth-*

ofagus dombeyii, Fagaceae, I-1999, Cuezzo y Granara de Willink.

Description.—*Second- (or third-) instar female* (Fig. 2): Same as adult female except as follows: Body circular or broadly oval, 1.9 mm long, 1.3 mm wide. Antennae in only specimen available apparently abnormal, 6 segments on 1 side and partially divided 7 segments on other, antenna 420 μ long. Legs with hind trochanter+femur 275 μ long; femur 207 μ long; tibia+tarsus 275 μ; tibia 145 μ long; and claw 42 μ long; tibia slightly longer than tarsus, tibia/tarsus 1.1; digitules on tarsus and claw apparently broken. Each posterior lip of ostioles with many trilocular pores and 1 or 2 setae; anterior lip usually without setae. Eyes without trilocular or discoidal pores incorporated in sclerotization. Anal ring dorsal, near posterior end of body, oval, 83 μ long with 2 rows of pores, outer row weakly sclerotized, and 3 pairs of setae (1 side of specimen abnormal, with 2 setae), longest seta 80 μ long. Mouthparts with clypeolabral shield with 8 setae, 225 μ long; labium 255 μ long. Circulus 98 μ wide. Anterior spiracles 132 μ long and 55 μ wide; trilocular pores in membranous opening leading to spiracle, but not in sclerotized peritreme.

Cerarii absent. Anal-lobe area without normal, elongate anal-lobe seta, setae at posterior apex mostly broken.

Dorsal surface: Trilocular pores about 3 μ in diameter, abundant over surface. Large discoidal pores slightly larger than triloculars, without cone-shaped protrusion, abundant over surface. Small discoidal pores absent. Dorsal setae ranging from 15–22 μ long, about same length over surface except on segment VIII where longest setae about 34 μ long.

Ventral surface: Trilocular pores uncommon posteriorly and in medial areas. Large discoidal pores most numerous along body margin, nearly absent medially. Small discoidal pores absent. Multilocular pores about 2 times larger than triloculars, about 5 μ in diameter, present in medial and mediolateral areas of thorax. Setae about 34 μ long. Cisanal setae about 33 μ long. Invaginated pocket may be represented by internal, elongate oval structure visible near intersegmental line of segments VIII and IX, without definite opening.

Notes.—The single specimen of this instar is in poor condition with many of the setae broken, the median area has a large cut and hole, and the abdomen is rolled. Thus, in some instances it was necessary to extrapolate patterns from both sides of the specimen.

Material examined.—1 specimen with same data as holotype (IMLA).

Description.—*First instar* (sex not determined) (Fig. 3): Same as adult female except as follows: Body oval, 0.9 mm long, 0.5–0.6(0.6) mm wide. Antenna 6-segmented, 290–300(297) μ long. Legs with hind trochanter+femur 172–175(174) μ long; femur 130–142(136) μ long; tibia+tarsus 182–210(198) μ; tibia 95–100(98) μ long; claw 38 μ. Each posterior lip of ostioles with several trilocular pores; each anterior lip with or without large discoidal, several triloculars, and 0–1(0) seta. Eyes without trilocular or discoidal pores incorporated in sclerotization. Anal ring apical, oval, with 2 rows of pores, and 3 pairs of setae, longest seta 80–112(97) μ long. Mouthparts with 6 setae on clypeolabral shield; 125–142(133) μ long; labium 175–200(192) μ long. Circulus 65–78(72) μ wide. Anterior spiracle 52–75(64) μ long and 32–35(34) μ wide; trilocular pores in membranous opening leading to spiracle, but not in sclerotized peritreme.

Cerarii absent. Anal-lobe area with normal elongate anal-lobe seta, 125–150(138) μ long.

Dorsal surface: Trilocular pores about 3 μ in diameter, abundant over surface. Large discoidal pores without conical protrusion, slightly larger than triloculars, scattered over surface. Small discoidal pores absent. Dorsal setae ranging from 15–50 μ long, longest setae in posterior areas of abdomen.

Ventral surface: Trilocular pores in small numbers in medial areas. Large dis-

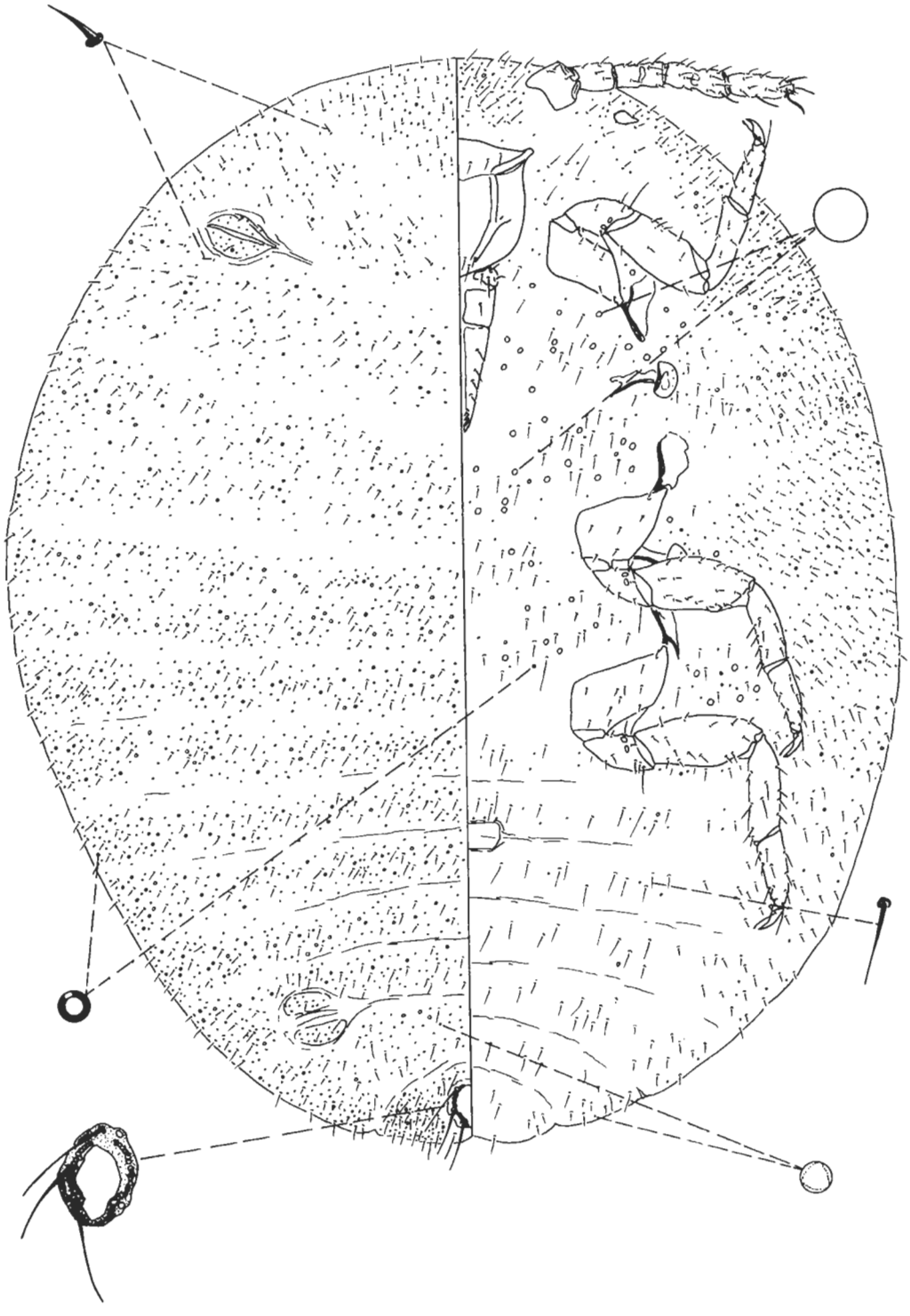

Fig. 2. *Eurycoccus chubutensis,* second- or third-instar female.

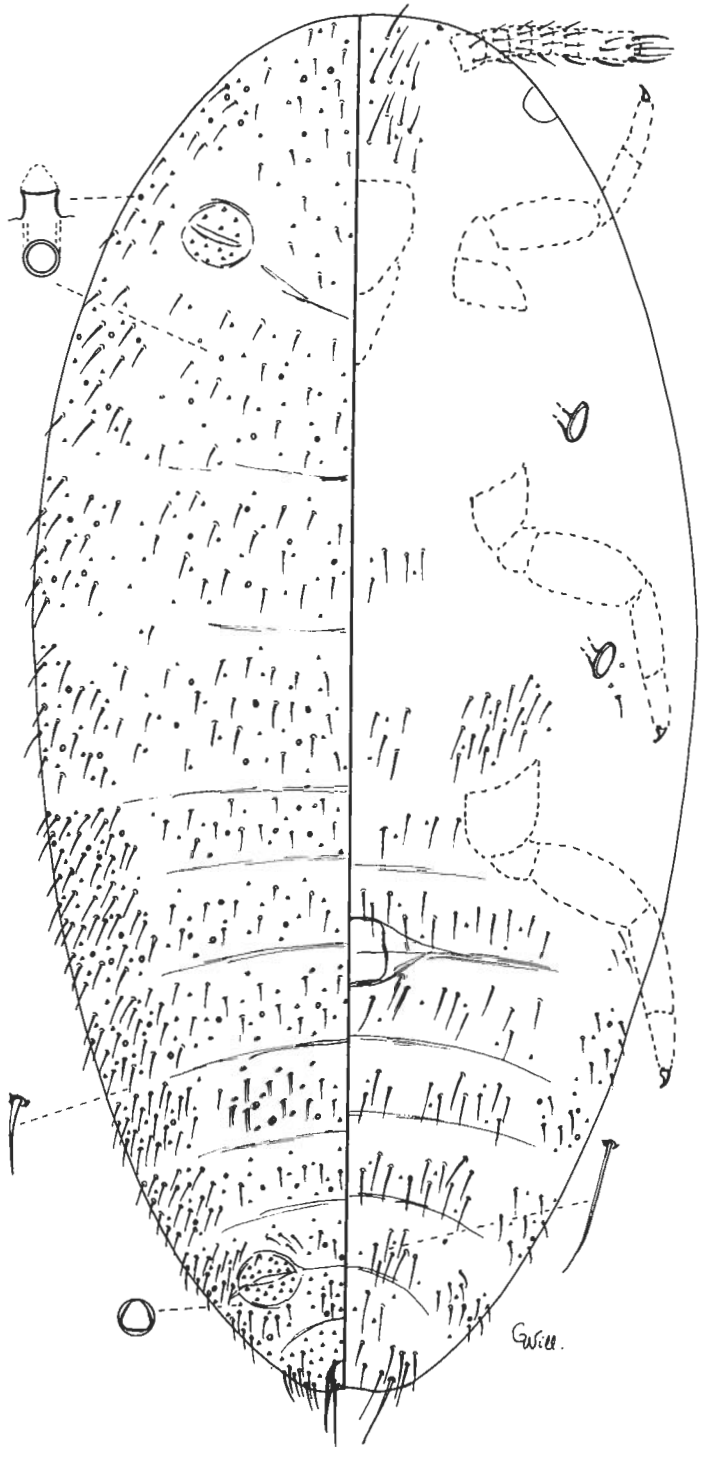

Fig. 3. *Eurycoccus chubutensis,* first instar (sex undetermined).

coidal pores most numerous along body margin, nearly absent medially. Small discoidal pores absent. Multilocular pores absent. Setae ranging from 18–60 μ long. Cisanal setae about 38–54(43) μ long. Invaginated pocket absent.

Material examined.—This description is based on 3 embryos that are in poor condition with same data as holotype (IMLA).

Biology.—The species was found on the woody roots of a large specimen of *Nothofagus dombeyii* (Mirb.) Oest. and was tended by the ant *Camponotus chilensis* Spinola.

Comments.—*Nothofagus* is the only genus in the family Fagaceae in the Southern Hemisphere and occurs in temperate areas of Australia, South America, New Caledonia, New Guinea, and New Zealand. Argentina has several native species of *Nothofagus,* but the scale insects that feed on them are virtually unknown. Williams (1985a) summarized available information on the *Nothofagus* scale fauna of South America. The scale-insect fauna of *Nothofagus* is probably best known in New Zealand, but even there the emphasis has been on four families, the coccids (Hodgson and Henderson 2000), eriococcids (Hoy 1962), margarodids (Morales 1991), and pseudococcids (Cox 1987) and other scale families are more poorly described.

Eurycoccus chubutensis differs from other species of *Eurycoccus* by having multiple setae on the clypeolabral shield, 4 setae on each side of the basal labial segment, large discoidal pores with a cone-shaped projection, an unusual invaginated pocket on the venter between segments VIII and IX, and multilocular and trilocular pores with obscured locular structure, and by lacking long anal-lobe setae and tubular ducts.

Maskellococcus obtectus (Maskell) shows some resemblance to *E. chubutensis* by occurring on *Nothofagus*; having reduced numbers of cerarii; and multilocular pores restricted to venter. *Eurycoccus chubutenis* differs by lacking the narrow pear-shaped body characteristic of *M. obtectus* and in lacking tubular ducts.

Neosimmondsia hirsuta Laing also resembles the new species because both lack cerarii, have numerous setae and trilocular pores, have translucent pores on the hind coxa, 2 pairs of ostioles, a circulus, and ventral multilocular pores on the venter only. *Neosimmondsia hirsuta* differs by having: tubular ducts; 6-segmented antenna; dorsal setae that are as long as the anal-ring setae; no cone-shaped discoidals; no invaginated pocket; and elongate anal-lobe setae. *Eurycoccus chubutensis* has: no tubular ducts; 7- or 8-segmented antenna; dorsal setae that are shorter than the anal-ring setae; cone-shaped discoidal pores; an invaginated pocket; and no distinct anal-lobe setae that are longer than the other setae in the area.

Pseudantonina Green

Pseudantonina Green 1922; type species, *Pseudantonina bambusae* Green 1922, by monotypy.

This genus includes 8 species (Ben-Dov 2002) that are recorded from several different zoogeographic regions (Neotropical 1, Nearctic 5, Oriental 1, and Palearctic 1) including Argentina (*Pseudantonina aeria* Williams and Granara de Willink). It is possible that two or more unrelated groups are currently placed in the genus. Confusion about the status of several of the New World species is exemplified by Hendricks and Kosztarab's (1999) treatment of *P. aeria, P. arundinariae* McConnell, *P. giganticoxa* Lobdell, and *P. texana* Ferris as "Species of Uncertain Placement." They also indicated that *P. magnotubulata* Borchsenius had been transferred to another genus, but we can find no evidence that such action has taken place. Ben-Dov (2002), continued to include them in *Pseudantonina,* and Kosztarab (1996) mentioned *P. arundinariae* and *P. giganticoxa* as members of the genus along with two new species (*P. nakaharai* Kosztarab and *P. wilkeyi*

Table 2. Distribution of characters considered important in diagnosing *Pseudantonina*.

Pseudantonina Species	Front Legs	Hind Legs Distorted	Many Transl. Pores	Pores Near Hind Coxae	Clustered Spirac. Pores	Pairs of Cerarii	Circulus	Antennal Segs.
aeria	normal	yes	yes	no	no	1	absent	6
arundinariae	small	no	no	yes	yes	1	absent	6
bambusae	small	yes	no	yes	yes	0	absent	3–6
giganticoxa	small	yes	yes	no	yes	0–1	absent	6
magnatubulata	normal	no	yes	no	no	0	present	6
nakaharai	normal	yes	yes	no	yes	1	absent	6
texana	normal	yes	yes	no	yes	1	absent	6
wilkeyi	normal	yes	yes	no	yes	2 or 3	absent	6

Kosztarab). Although Hendricks and Kosztarab (1999) was published after Kosztarab (1996), it was essentially the same as the Hendricks dissertation completed three years earlier (Hendricks 1993).

We have examined illustrations, descriptions, or specimens of all 8 *Pseudantonina* species (*P.aeria, P. arundinariae, P. bambusae, P. giganticoxa, P. magnatubulata, P. nakaharai, P. texana, P. wilkeyi*) and note similarities that occur in nearly all species (Table 2).

The new species possesses most of the characteristics commonly considered to be diagnostic of the genus and is therefore placed here until a detailed revision of *Pseudantonina* and relatives is undertaken. Other genera that share characters with *Pseudantonina* are: *Antonina* Signoret, *Acrochordonus* Cox, and *Renicaula* Cox, all of which occur on grasses. *Antonina* differs by lacking legs; *Acrochordonus* lacks pore clusters in or adjacent to the spiracular atria and has normally developed legs; and *Renicaula* lacks multilocular pores.

Key to Slide-Mounted Adult Females of the Genus *Pseudantonina*

1 Multilocular pores not restricted to marginal areas of venter 3
– Multilocular pores forming distinct band along ventral body margin 2
2(1) Pore cluster surrounding anterior spiracles without multilocular pores; middle legs with all segments . . . . . *arundinariae* McConnell
– Pore cluster surrounding anterior spiracles with multilocular pores; middle legs abortive, without all segments . . . *bambusae* Green
3(1) Circulus absent 4
– Circulus present *magnatubulata* Borchsenius
4(3) Translucent pores absent from hind tibiae 5
– Translucent pores present on hind tibiae . . . . *vernacula* Granara de Willink and Miller, n. sp.
5(4) Multilocular pores present on dorsal areas of thorax and head 7
– Multilocular pores absent from dorsal areas of thorax and head 6
6(5) Anal ring small, with 2 or fewer rows of pores; trilocular pores sparsely scattered over body surfaces, absent from anterior lip of posterior ostiole . . . . . *aeria* Williams and Granara de Willink
– Anal ring large, with 3 or more rows of pores; trilocular pores abundant over body surfaces, present on anterior lip of posterior ostiole . . . . . *texana* Ferris
7(5) Hind coxae shorter than remainder of hind leg 8
– Hind coxae longer than remainder of hind leg . . . . . *giganticoxa* Lobdell
8(7) Anterior ostioles present; spiracles without pores in sclerotized atrium; anal-ring setae less than twice diameter of ring . . . . . *nakaharai* Kosztarab
– Anterior ostioles absent; spiracles with pores in sclerotized atrium; anal-ring setae more than twice diameter of ring *wilkeyi* Kosztarab

Pseudantonina vernacula Granara de Willink and Miller, new species

(Figs. 4–7)

Description.—*Adult female:* Found in grass sheath, body pink, lightly dusted with white wax.

Slide-mounted specimens (Fig. 4) oval; length of holotype 2.7 mm long (paratype 2.9 mm), and 1.8 mm wide (paratype 1.9 mm), posterior abdominal segment narrow-

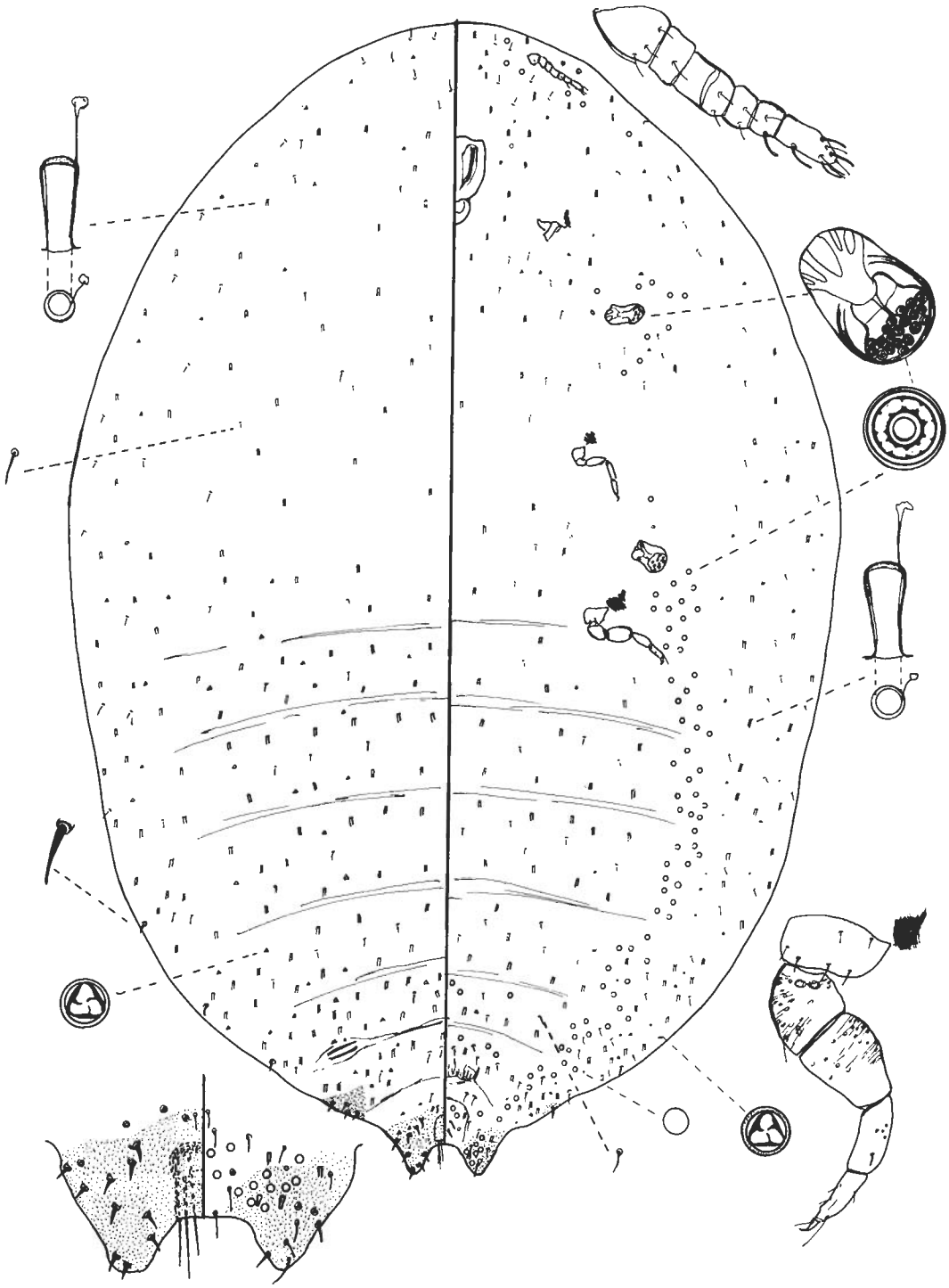

Fig. 4. *Pseudantonina vernacula*, fourth-instar female (adult).

est, partially sclerotized, with prominent lobes. Antenna 6-segmented, third segment partially divided on some specimens, holotype antenna 167 μ long (paratype 172 μ). Legs small compared to many mealybugs; with few setae; hind legs with trochanter and femur enlarged, with translucent pores on both surfaces of trochanter and femur, on dorsal surface of tibia; hind coxa noticeably smaller than trochanter+femur; trochanter of holotype 83 μ long (paratype with trochanter fused with femur); femur of holotype 54 μ long; trochanter+femur of holotype 127 μ long (paratype 82 μ); tibia of holotype 37 μ (paratype 35 μ); tarsus of holotype 32 μ (paratype 55 μ), tibia/tarsus on holotype 1.1 (paratype 0.6); tibia+tarsus of holotype 68 μ (paratype 90 μ); claw sometimes present; tarsal digitules thin, slightly thickened apices; claw digitules unequal or equal depending on specimen, thin, slightly thickened apices. Mouthparts well developed (but absent on paratype), clypeolabral shield of holotype 147 μ long, holotype with 2 setae on shield; labium 3-segmented, relatively short and broad, on holotype 59 μ long, basal segment with 3 setae on each side, middle segment with 1 seta on each side, and apical segment with 2 setae on each side and a group of 3 or 4 setae on each side along stylet canal at apex of labium; inner side of labium without setae. With posterior pair of ostioles only, with lips sclerotized, usually without pores or setae, occasionally with anterior lip with 1 trilocular pore. Anal ring invaginated in pocket near posterior end of body; diameter on holotype 61 μ (paratype 72 μ), with 2 rows of pores and 6 setae, longest seta on holotype about 135 μ long, broken on paratype. Circulus absent. Spiracles large, in sclerotized invagination, peritreme large, with more than 20 multilocular pores in sclerotization of each spiracle.

Cerarii absent (depending on definition of cerarius) or reduced to 2 indistinct pairs on posterior abdominal segments. Dorsal anal-lobe conspicuous, protruding, sclerotized, with 14 slightly enlarged, curved setae, not clustered, 2 or 3 scattered trilocular pores near edge of sclerotization, and conspicuous basal sclerotization, without basal clusters of pores or auxiliary setae, sclerotization covering half of segment VIII; segment VII with 3 or 4 slightly enlarged setae, with basal, triangular shaped sclerotized area. Marginal areas of segments IV, V, and VI each with 1 slightly enlarged seta, without associated trilocular pores or sclerotization. Ventral surface of protruding lobes sclerotized in lateral and medial area with 4 small setae and cluster of multilocular pores; without elongate anal-lobe seta.

Dorsal surface: With numerous oral-collar tubular ducts on surface, length about 12 μ, diameter at dermal orifice about 2 μ, diameter at inner end about 5 μ, with glandular filament. Setae short, flagellate, thin varying from 10–18 μ long. Trilocular pores small, with thick walls, scattered over surface.

Ventral surface: Setae flagellate, short; setae around vulva undifferentiated; cisanal setae, short about 25 μ long, 2 pairs. Trilocular pores primarily in lateral areas, uncommon. Multilocular pores with 9 or 10 loculi forming a submarginal line from posterior spiracle to abdominal apex, also present on head and near anterior spiracles. Discoidal pores rare. Oral-collar tubular ducts similar to dorsal ducts, scattered over surface, less abundant than on dorsum.

Material examined.—Holotype adult female from: Argentina, Neuquén, on Ruta 40 between La Angostura and Confluencia, 4-I-99, on Gramineae, possibly *Stipa,* Granara de Willink (IMLA). Paratype female with same data in USNM.

Description.—*Third-instar female* (Fig. 5): Same as adult female except as follows: Slide-mounted specimen elongate oval; length 1.7 mm long, 0.6 mm wide, posterior abdominal segment with sclerotization and slightly protruding anal lobes. Antenna 6-segmented, 165 and 167 μ long. Legs well developed, without translucent pores; hind trochanter+femur 88 and 92 μ long; tibia

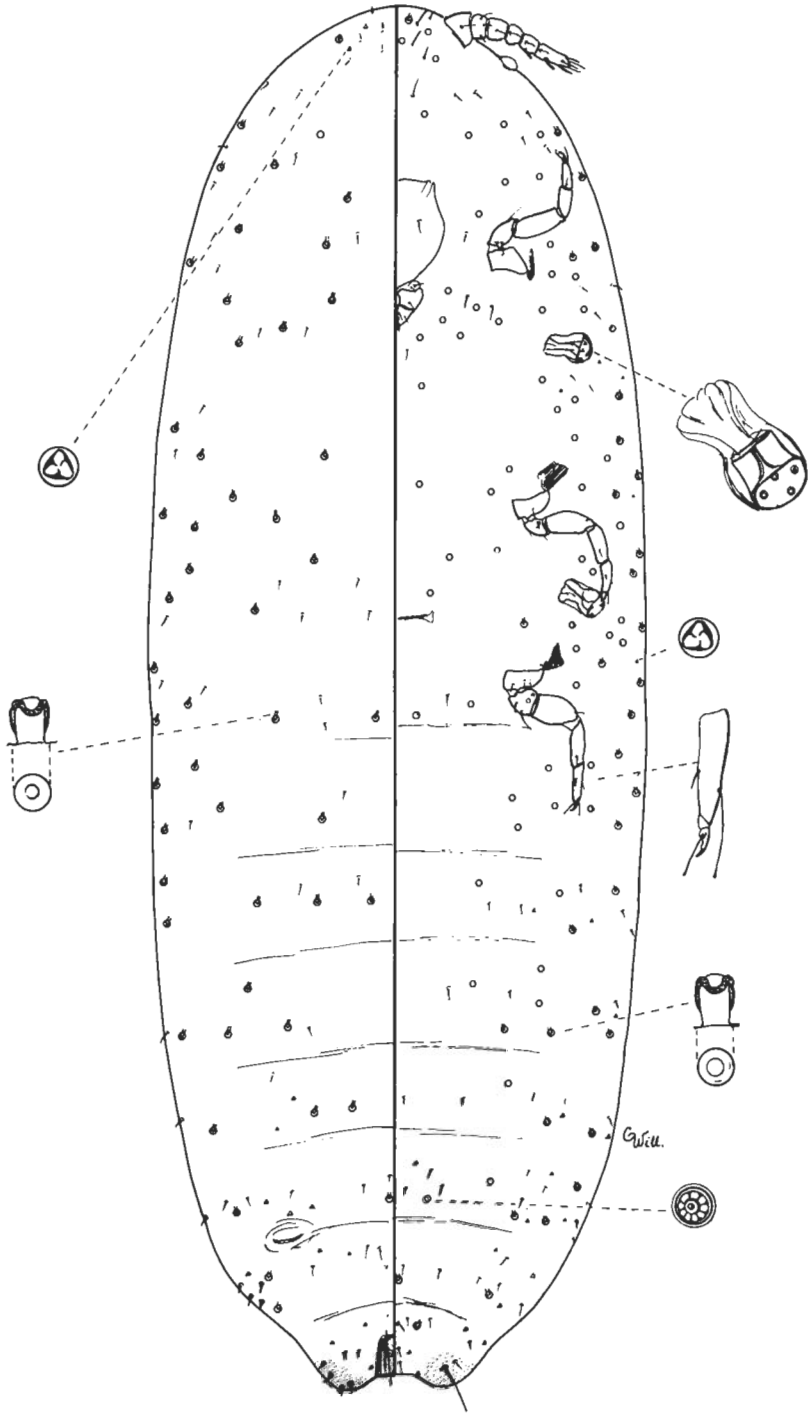

Fig. 5. *Pseudantonina vernacula,* third-instar female.

48 and 50 μ long; tarsus 50 and 51 μ long; tibia+tarsus 99 and 100 μ long; tibia/tarsus 0.9 and 1.0; tarsal digitules very different in size, 1 conspicuous and extending beyond tip of claw with small apical club, other setose without club not reaching tip of claw; claw digitules equal or unequal depending on specimen, with apical club. Mouth parts well developed, labium short and broad, with 3 segments, 50 μ long; clypeolabral shield 138 μ long. With posterior pair of ostioles only, without pores or setae. Anal ring invaginated, near apex of abdomen; diameter 45 μ; with 2 row of pores; anal ring setae with narrow apices, longest seta 62 μ long. Spiracles with enlarged peritreme, with at least 3 or 4 trilocular pores in peritreme sclerotization.

Cerarii present from segments VI to VIII; on segment VI represented by 1 slightly enlarged seta, no basal sclerotization; on segments VII with 2 or 3 associated enlarged setae and 1 trilocular pore, no basal sclerotization; on segment VIII with 4 associated setae, no trilocular pore, and basal sclerotization dispersed beyond base of cerarian setae. Anal lobes protruding, sclerotized, ventral surface with 1 small setae, with elongate anal-lobe seta 70 and 78 μ long, 2 or 3 marginal enlarged setae, and 1 trilocular pore.

Dorsal surface: With more than 3 longitudinal lines of flagellate setae on each side of abdomen excluding cerariian setae; trilocular pores most abundant along posterior body margin, with 1 or 2 on head and thoracic body margin. Setae and tubular ducts scattered over surface. Tubular ducts decreasing in size anteriorly.

Ventral surface: With 3 to 5 longitudinal lines of flagellate setae on each side of body; 2 pairs of cisanal setae, short, about 18 μ long. Quinquelocular pores absent. Trilocular pores along body margin, in spiracular atrium, absent from head. Multilocular pores present on head and thorax near legs and spiracles and along body margin of abdomen. Discoidal pores inconspicuous, 1 longitudinal line on submargin of body. Oral-collar tubular ducts present near body margin.

Material examined.—This description is based on 1 specimen with same data as holotype (IMLA).

Description.—*Second-instar female* ? (Fig. 6): Same as adult female except as follows: Slide-mounted specimens elongate oval; length 1.0–1.1(1.1) mm long, 0.3–0.4(0.4) mm wide, posterior abdominal segment with sclerotization and slightly protruding anal lobes. Antenna 6-segmented, 150–162(157) μ long. Legs well developed, without translucent pores; hind trochanter+femur 90–92(91) μ long; tibia 58–61(60) μ long; tarsus 50–58(54) μ long; tibia+tarsus 105–112(110) μ long; tibia/tarsus 1.0–1.2(1.1); tarsal digitules very different in size, 1 conspicuous and extending beyond tip of claw with small apical club, other setose without club not reaching tip of claw; claw digitules unequal or equal depending on specimen, with apical club. Mouth parts well developed, labium short and broad, with 3 segments, 45–48(47) μ long; clypeolabral shield 115–125(119) μ long. With posterior and anterior pairs of ostioles, without pores or setae on posterior ostioles, anterior ostioles with 1 seta on posterior lip. Anal ring slightly invaginated, apical; diameter 32–35(33) μ; with 2 row of pores; anal ring setae with blunt apices, longest seta 35–41(38) μ long. Spiracles with slightly enlarged peritreme, with at least 1 trilocular pore in peritreme sclerotization.

Cerarii present from segments I or II to VIII; on segments I to VI each represented by 1 slightly enlarged seta, 1 widely spaced slender seta and 1 associated trilocular pore, no basal sclerotization; on segments VII with 2 closely associated setae and 1 trilocular pore, no basal sclerotization; on segment VIII with 2 closely associated setae, 1 trilocular pore, and basal sclerotization dispersed beyond base of cerarian setae. Anal lobes slightly protruding, sclerotization more broadly dispersed, ventral surface with 1 small seta, with elongate anal-lobe

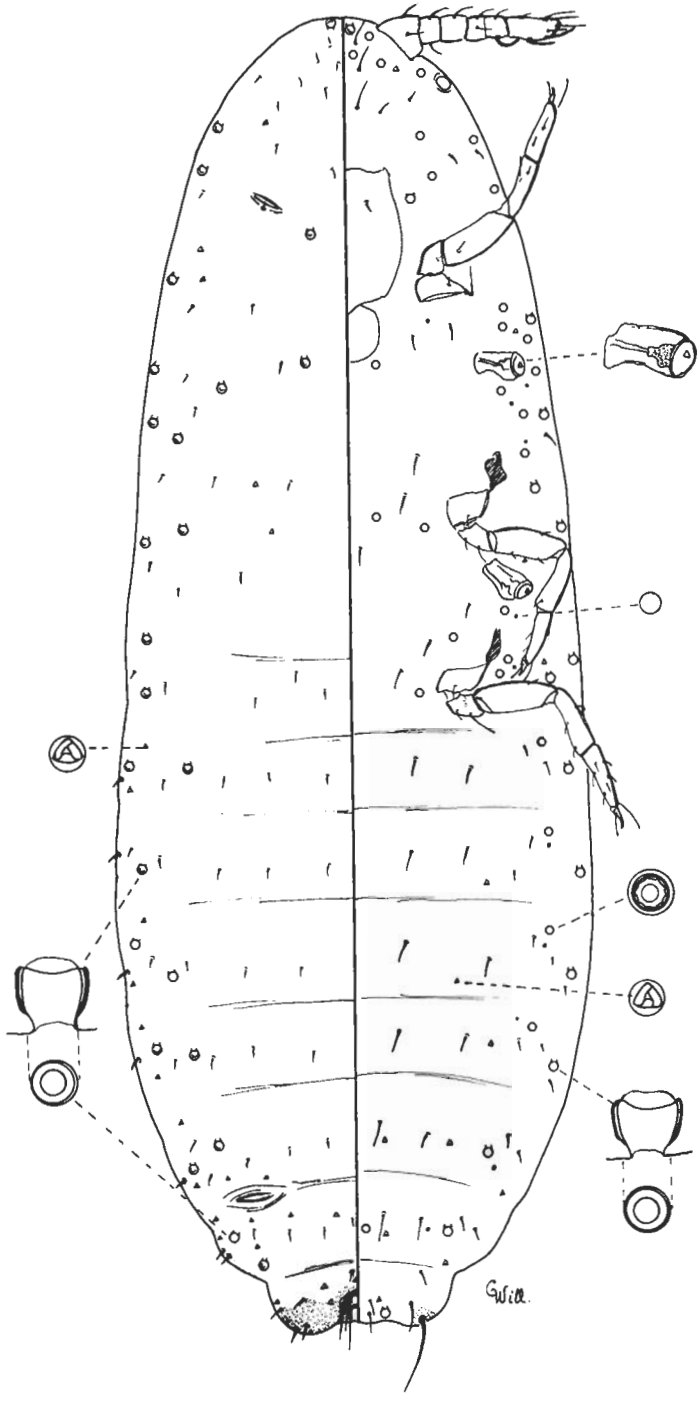

Fig. 6. *Pseudantonina vernacula,* second-instar female ?.

seta 55–78(68) μ long, and with 1 trilocular pore.

Dorsal surface: With 3 longitudinal lines of flagellate setae on each side of abdomen excluding cerariian setae; trilocular pores primarily along body margin. Setae and trilocular pores more abundant on thorax and head. Tubular ducts marginal.

Ventral surface: With 3 to 5 longitudinal lines of flagellate setae on each side of body; 2 pairs of cisanal setae, short about 18 μ long. Quinquelocular pores absent. Trilocular pores along body margin, in spiracular atrium. Multilocular pores present on head and thorax near legs and spiracles and along body margin of abdomen. Discoidal pore forming 1 longitudinal line on submargin of body. Oral-collar tubular ducts present near body margin.

Material examined.—This description is based on 3 specimens with same data as holotype (IMLA).

Description.—*First instar* (Fig. 7): Same as adult female except as follows: Slide-mounted specimens elongate oval; length 0.7–0.9(0.8) mm long, 0.2–0.5(0.4) mm wide, posterior abdominal segment with slight sclerotization; without protruding anal lobes. Antenna 6-segmented, 140–168(160) μ long. Eye present near base of antenna. Legs well developed, without translucent pores; hind trochanter+femur 92–102(96) μ long; tibia 58–65(63) μ long; tarsus 52–65(61) μ long; tibia+tarsus 115–125(121) μ long; tibia/tarsus 1.0–1.2(1.0); tarsal digitules very different in size, 1 conspicuous and extending beyond tip of claw with small apical club, other setose without club not reaching tip of claw; claw digitules unequal or equal depending on specimen, 1 thicker than other, with apical club. Mouth parts well developed, labium short and broad, with 3 segments, 32–45(40) μ long; clypeolabral shield 90–110(104) μ long. With posterior and anterior pairs of ostioles, with 0–1(1) trilocular pore on posterior lip of each ostiole, without setae. Anal ring not invaginated, apical; diameter 28–31(30) μ; with 2 rows of pores; anal ring setae with blunt apices, longest seta 28–35(30) μ long. Spiracles without enlarged peritreme, without pores in peritreme sclerotization.

Cerarii present from segments I or II to VIII; on segments I to V each represented by 1 slightly enlarged seta, 1 widely spaced slender seta and 1 associated trilocular pore, no basal sclerotization; on segments VI and VII with 2 closely associated setae and 1 trilocular pore, no basal sclerotization; on segment VIII with 2 closely associated setae, 1 trilocular pore, and basal sclerotization restricted to area near base of cerarian setae. Anal lobes not protruding, sclerotization confined to cerarius, ventral surface with 1 small seta, with elongate anal-lobe seta 80–115(103) μ long, and without trilocular pores.

Dorsal surface: With 2 longitudinal lines of flagellate setae on each side of abdomen excluding cerariian setae and 1 longitudinal line of trilocular pores on each side of abdomen excluding pore loosely associated with cerarii. Setae and trilocular pores more abundant on thorax and head. Tubular ducts and discoidal pores absent.

Ventral surface: With 3 longitudinal lines of flagellate setae on each side of body; 2 pairs of cisanal setae, short, 18–24(21) μ long. Quinquelocular pores in submarginal longitudinal line on abdomen, also present medially on thorax and head. Trilocular pores rare, present near spiracles. Multilocular pores present on head and thorax near legs and spiracles. Discoidal pore forming 1 longitudinal line on each submargin of body. Oral-collar tubular ducts present near body margin.

Material examined.—This description is based on 10 specimens that are in reasonable condition with same data as holotype (IMLA).

Discussion

One of the more interesting findings while preparing this paper was the discovery of additional setae on the basal segment of the labium and on the clypeolabral shield. According to Koteja (1974) all

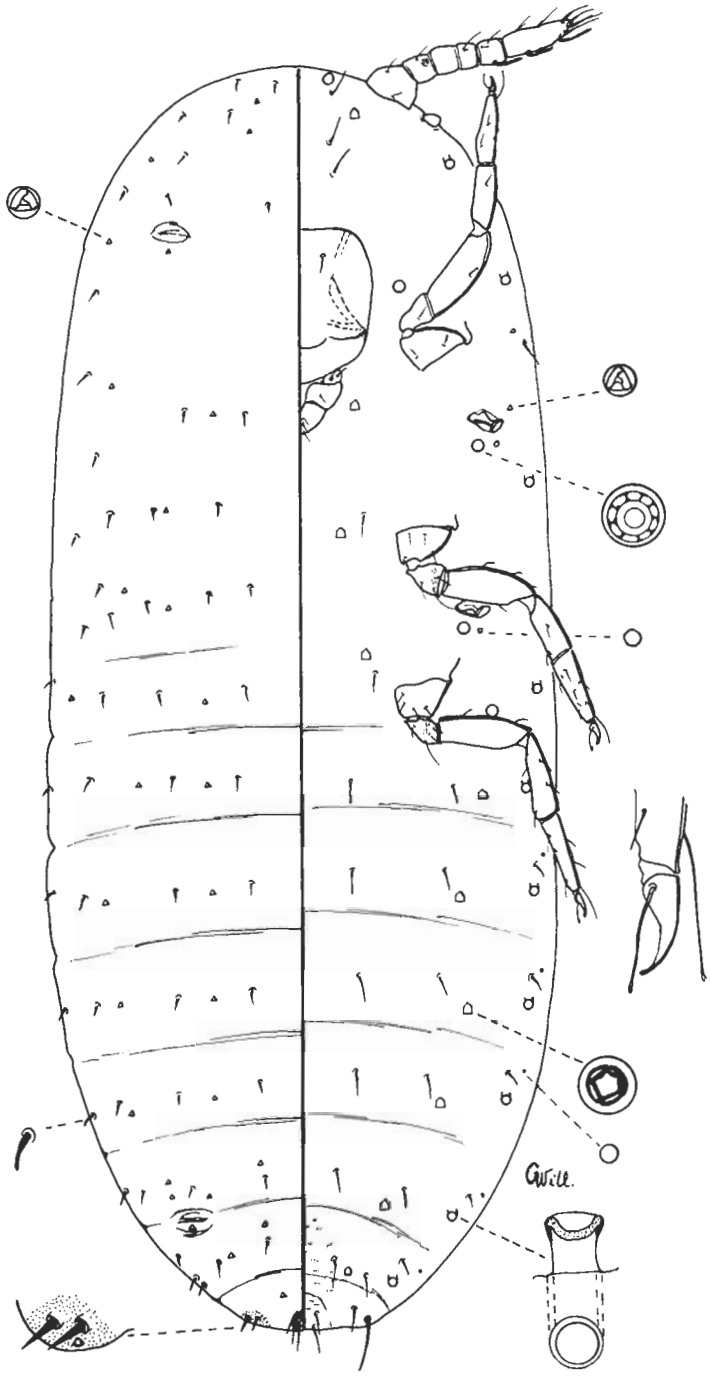

Fig. 7. *Pseudantonina vernacula*, first instar (sex undetermined).

mealybugs have 3 setae on each side of the basal segment of the labium. In *E. chubutensis* there clearly are 4 in all instars examined. Although we have looked at hundreds of illustrations, descriptions, and specimens of a diverse array of mealybugs, we have not located other species with 4 setae on the basal segment of the labium but feel certain that they exist. We have, however, discovered two species that are exceptional in that they have only 2 setae on each side of the basal labial segment, i.e., *Plotococcus minutus* Williams and Granara de Willink (Williams and Granara de Willink 1992) and *Macrocepicoccus loranthi* Morrison (Miller and Denno 1977). Unfortunately, the number and distribution of setae on the mouthparts were not considered important until the work of Koteja (1974), and many descriptions and illustrations either do not show them at all, or depict them inaccurately.

Further, most mealybug species that we have examined have a total of 2 setae on the clypeolabral shield. The few exceptions found are in the so called anomalous mealybugs such as *Allomyrmococcus acariformis* Takahashi (with more than 30 clypeolabral setae), *Xenococcus annandalei* Silvestri (with 4 such setae) (Williams 1978), and several species of *Eumyrmococcus* (with 4 setae) (Williams 1998). In *E. chubutensis* there may be from 7 to 14 setae on the clypeolabral shield in the adult female and at least 6 in the immatures. It will be interesting to see if more species of South American mealybugs have this unusual characteristic.

The invaginated pocket posterior of the vulva on *Eurycoccus chubutensis* is another structure not commonly reported in the mealybug literature. Similar structures were illustrated in *Rhizoecus* by Williams (1996).

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