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SYSTEMATIC ANALYSIS OF THE MEALYBUGS IN THE *PSEUDOCOCCUS MARITIMUS* COMPLEX (HOMOPTERA: PSEUDOCOCCIDAE)

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CONTENTS

ABSTRACT

A systematic revision of the mealybugs in the *Pseudococcus maritimus* complex is presented. Thirty-one species are treated including 16 that are new to science: *P. acirculus, P. apomicrocirculus, P. bermudensis, P. bryberia, P. dasyliriae, P. dolichomelos, P. donrileyi, P. dysmicus, P. jackbeardsleyi, P. nakaharai, P. neomicrocirculus, P. pithecellobii, P. puertoricensis, P. schusteri, P. solenedyos,* and *P. spanocera.* The 15 previously described species are: *P. elisae* Borchsenius, *P. eriocerei* Williams, *P. galapagoensis* Morrison, *P. importatus* McKenzie, *P. insularis* Morrison, *P. landoi* (Balachowsky), *P. mandio* Williams, *P. maritimus* (Ehrhorn), *P. microcirculus* McKenzie, *P. neomaritimus* Beardsley, *P. peregrinabundus* Borchsenius, *P. pertusus* McKenzie, *P. sociabilis* Hambleton, and *P. sorghiellus* (Forbes), *P. viburni* (Signoret). Adult females of all 31 species are described and illustrated and a key for their identification is given.

Eighteen of the species in the complex are pests of houseplants, ornamentals or agricultural crops including: soybeans, table beans, tomatoes, potatoes, peppers, fruit trees, berries, sorghum, citrus, subtropical fruits, orchids and cactus. Several species both new and redescribed are of interest to U.S. quarantine programs because they do not occur in the U.S. One new species has been collected in southern Texas on citrus where it may have been introduced from Mexico.

A key and descriptions are provided for recognition of third instar females of nine species.

Lectotypes are designated for *P. elisae* and *P. sociabilis. Pseudococcus colombianus* is a new subjective junior synonym of *P. peregrinabundus.*

New characters were discovered in the distribution and number of oral-collar and oral-rim tubular ducts, lengths of various setae, number of setae on the hind tibiae, and composition of the cerarii.

Cryptic species were characterized that previously were considered to be the same as *P. microcirculus* and *P. sorghiellus.* These complexes are of importance as pests of orchids and leguminous crops respectively and their proper identification is important to U.S. agriculture.

INTRODUCTION

Approximately 1,950 species of mealybugs in over 280 genera comprise the family Pseudococcidae (Ben-Dov, 1994). The genus *Pseudococcus* has been a "mixing pot" since 1840 when Westwood first used the name "Pseudo-coccus" to refer to the cochineal insect of Mexico. The name *Pseudococcus* has been applied by most taxonomists to a genus of mealybugs, even though, Cockerell (1893) rightly pointed out that it should be the name of the cochineal insect.

Over the years, easily characterized, apparently monophyletic components of *"Pseudococcus"* have been described and removed as distinct genera. *Pseudococcus* has persisted as a valid mealybug name containing a heterogeneous assemblage of apparently unrelated groups.

Miller (1974) formally petitioned the International Commission on Zoological Nomenclature to use its plenary powers to conserve the name *Pseudococcus* and this body ruled affirmatively (Melville 1983).

Mealybugs in the *Pseudococcus maritimus* complex are species of the genus *Pseudococcus* that are characterized by having at least one discoidal pore associated with the eye.

Mealybugs are common hitchhikers on plant material such as nursery stock and fruits and are routinely intercepted by Plant Protection and Quarantine officers at various ports of entry throughout the world. It is important to know the identity of species that have been intercepted or collected in order to make rational regulatory and/or pest control decisions.

No previous comprehensive study of the *P. maritimus* complex has been undertaken. The most recent study was by McKenzie (1967) as part of a larger study of the mealybugs of California. Other workers, such as Beardsley (1966), Borchsenius (1948), Miller et. al. (1984), Wilkey and McKenzie (1962), and Williams and Granara de Willink (1992) have provided information useful in the identification of certain species of the *P. maritimus* complex and certain related species. With the collection of several new species and the presence of several unresolved problems, the previously published keys, diagnostic characters, and descriptions are inadequate or superficial. Accordingly, port identifiers and other taxonomists who attempt to identify mealybugs of this complex are forced to make incomplete or incorrect identifications.

The primary objective of this paper is to deescribe the adult females of the 15 previously described species, and to describe 16 species that are new to science. Illustrations and a key are provided for their identification. Further, third instar females of nine species are described and illustrated for the first time and a key is provided for their identification.

LITERATURE REVIEW

Taxonomic problems within the *Pseudococcus maritimus* complex centered around the general confusion regarding the identification of *Pseudococcus maritimus* (Ehrhorn) and *P. obscurus* Essig (a junior synonym of *P. viburni* [Signoret]).

The first species described in the complex was *Dactylopius viburni* (=*P. viburni)* described by Signoret (1875). Maskell (1894) described *Dactylopius affinis* a junior synonym of *P. viburni.* Six years later, Ehrhorn (1900) described *Dactylopius maritimus* (=*P. maritimus*). *Pseudococcus obscurus* was described by Essig in 1909. In subsequent years, Essig (1910), Brain (1912), Green (1917), Hollinger (1917), and Ferris (1950) described other species later shown to be junior synonyms of *P. viburni* or *P. maritimus.*

Early workers used the antennae as primary characters to separate species (e.g. Essig 1909, Hollinger 1917, Maskell 1894, and Smith 1911). The overall length of the antennae, as well as the lengths of the individual segments, were examined in detail by numerous workers until considered to be unreliable by Ferris (1918).

The search for useful taxonomic characters has been ongoing since the turn of the century. Ehrhorn (1900) used the length of the longest trochanter seta; Smith (1911) compared lengths of anal-lobe and anal-ring setae, and examined various leg measurements. In 1918, Ferris discussed the usefulness of many characters including; cerarii, pores, ducts, and setae. Hough (1925) examined the arrangement of trilocular pores located in cerarius 1, and Hambleton (1935) considered the degree of sclerotization of cerarius 1 vs. cerarius 2. Borchsenius (1949) offered a rather comprehensive treatment of characters and presented several new ones, such as the stoutness of legs, antennae, and mouthparts; lengths of certain setae; distribution of ducts and pores including those associated with the eyes.

Ferris (1950) placed a number of species of *Pseudococcus* in a new genus, *Dysmicoccus* that reduced the number of species in the genus *Pseudococcus* but did not solve the problems associated with the *P. maritimus* complex. Additional new species were added to the *P. maritimus* complex in 1960 by McKenzie (1960).

Wilkey and McKenzie (1962) examined the "*maritimus-malacearum*" complex (=*P. maritimus* complex in part) and used the translucent pores on the hind legs to separate species. Their study showed *P. capensis* Brain, *P. longispinus* var. *latipes* Green, and *P. malacearum* Ferris to be junior synonyms of *P. maritimus* and also provided several new characters useful in distinguishing between *P. comstocki* (Kuwana), *P. maritimus,* and *P. obscurus.*

Other major works that have contributed to the understanding of the *P. maritimus* complex include Beardsley (1966) and McKenzie (1962, 1964, and 1967).

Unfortunately, scale taxonomists have continued to experience problems identifying *P. viburni* (DeLotto 1967, 1969; McKenzie 1964).

MATERIAL AND METHODS

Responsibility for this work is shared by both authors equally. Although portions of the paper served as the basis of a dissertation by the first author, new material was added by the second author after completion of the dissertation in 1983 to the extent that the paper is truly coauthored.

Approximately 1,900 slides, bearing about 4,000 specimens were examined using a Zeiss, phase contrast compound microscope during the course of this study. The material is deposited in the following collections: Australian National Insect Collection, Canberra (ANIC); Auburn University, Auburn, Alabama (AUA); Bishop Museum, Honolulu, Hawaii (BM); The Natural History Museum, London (BMNH); California Academy of Sciences, San Francisco (CAS); California Department of Food and Agriculture, Sacramento (CDAS); Florida State Collection of Arthropods, Gainesville, (FSCA); Institute of Entomology, Academia Sinica, Shanghai (IES); Institute of Zoology, Academia Sinica, Beijing (IZAS); Museo de Historia Natural de la Ciudad de Mexico, Mexico City (MCM); Maryland Department of Agriculture, Annapolis (MDA); Museum National d'Historie Natural, Paris (MNHP); Tokyo Agricultural Experiment Station (TAES); University of California at Davis (UCD); University of Georgia, Griffin (UG); University of Hawaii, Manoa (UH); Museum of Natural History, Entomological Collection, Beltsville, Maryland (USNM); Virginia Polytechnic Institute and State University, Blacksburg (VPI); Zoological Institute, Academy of Sciences of USSR, Leningrad (ZIL). Institution abbreviations are those of Heppner and Lamas (1982).

Type data are indicated in the "TYPE DATA" section of the species treatments. For each species, verbatim slide label data are given for the primary type in this section. Data for paratypes of new species are included in the "SPECIMENS EXAMINED" section and all specimens are considered paratypes unless otherwise indicated. Specimen label data are given in detail for each new species and for each species of limited distribution; widespread taxa are summarized by state or country and host.

Measurements and counts: Measurements were made using a Zeiss eyepiece micrometer at magnifications of 160, 400, 800, 1,000, and 2,000x. When possible, 10 specimens from as many different hosts and localities as available were used. All measurements are of slide mounted specimens. Measurements and counts are given in the following format: Average (lower extreme - upper extreme). Measurements are accompanied by a symbol for microns (μ) or millimeters (mm) whereas counts are without symbols, e.g., 13(9-16)μ is a measurement and 13(9-16) is a count. The measurement of length and width of specimens was rounded to the nearest tenth of a millimeter. All other measurements and counts are rounded to the nearest whole number.

The following procedure was used to determine various measurements.

Setae: The setae were measured from the apex of the seta to the base of the seta, not including the setal socket. When possible, straight setae were used to determine lengths. When bent setae were used, the eyepiece micrometer was rotated so the curved seta could be measured in straight sections. Long setae, particularly interantennal, trochanter, and those associated with coxae have a very fine apex which often is broken off. Measurements of these structures may be inaccurate in some cases.

Discoidal Pores: The greatest diameter was measured including the sclerotized margin.

Anal-ring: The greatest width was measured and reported as the diameter.

Antennae: The greatest length was measured from the base of segment 1 to the apex of the terminal segment (not including the setae). Curved or bent antennae were measured in sections by rotating the eyepiece micrometer. Measurements of antennae that were distorted in the mounting process were avoided when possible. Measurements of individual segments were made of the greatest length of the sclerotized portion of the segment and did not include the membranous portion between segments.

Labium: The greatest length was measured from the proximal end of segment I to the distal end of segment III. Because segment I is cryptic, it is important to find its proximal limits before taking a measurement.

Spiracles: The greatest length of the sclerotized portion of the spiracle was measured.

Legs: The femur, tibia and tarsus of the hind leg were measured. In each case the longest dimension possible is recorded. In the case of the tibia, this means that the measurement is started anteriorly on the "outer" margin of the leg and is completed posteriorly on the inner tibia margin. The tarsal measurement does not include the claw.

An illustration is provided for each species as the insect appears when mounted on a slide. Each illustration is divided longitudinally, with the left half representing the dorsum and the right half the venter. Structural details are shown as enlargements near the margin of the illustration, and are not drawn to scale.

Terminology: We have followed the numbering system used by Beardsley (1965) and Miller (1983) for segmentation. Thus, the first visible abdominal segment is number I and not II as would be the case if we had followed Ferris (1950) or Ezzat and McConnell (1956). Cerarii have been numbered after DeLotto (1977) with cerarius 1 being on segment VIII, cerarius 12 on the mesothorax laterad and posterior of the anterior spiracles, and cerarius 17 being on the head anterior of the antenna. We have not used DeLotto's cerarian names, e.g. "anal", "preanal", but have used the term "frontal cerarius" to refer to cerarius 17. The term cisanal setae refers to all ventral setae on segment IX (Miller 1983). The term cisvulvar setae refers to those ventral setae in submesal clusters on segment VIII posterior of the lateral margin of the vulva. Interantennal

setae are those on the venter of the head anterior of the clypeus. The remaining terminology follows Miller (1975).

MORPHOLOGY

Live adult females of species in the *P. maritimus* complex have a thin layer of powdery wax covering the body. Wax filaments originating from the cerarii, protrude from the margin of the body. Generally, filaments on the posterior portion of the head are shortest, those in the anal area are longest. The color of the powdery wax filaments is whitish; however, depending on the species the powdery wax often appears darker, an illusion created by the body color beneath the wax.

The body color generally is pinkish. The adult female is oval in outline, when viewed dorsally. In lateral view the body is dorsoventrally compressed.

The segmentation of the body is clear on abdominal segments I-VIII on the dorsum and segments II-IX on the venter. Thoracic segments are partially evident on young adult females.

The circulus, when present, is a simple circular structure on the venter situated mesally on segment III or positioned between segments III and IV. The placement of the circulus on segment III is a useful specific character. The circulus is usually wider than long and the width/length ratio also is useful in separating several species. Because the circulus frequently is divided and folded by the intersegmental line, measurements of the length sometimes are difficult. We have found the absolute value of the width to be a useful and easily obtained taxonomic character.

The mouthparts are located between, and slightly anterior of, the procoxae. The obvious parts include the internal tentorium and the bases of the mandibles and maxillae. Externally, the clypeolabral shield, with 2 setae, is the anterior portion of the mouthparts. The labium is 3-segmented, with 3 setae on each side of segment I, 2 setae on segment II, and 18 setae on segment III. With the exception of the measurement of the greatest length of the labium, which is a useful taxonomic character, the mouthparts appear to be similar in all species.

There are 4 dorsal ostioles. One pair is located on the submargin of the prothorax and 1 pair is located on the submargin of segment VI. The slit-like opening of each ostiole is bounded by an anterior and posterior swelling and by two lips. Each swelling possesses varying numbers of trilocular pores and setae. The number of setae associated with each cerarius is thought to have some taxonomic merit. However, the boundary of the ostioles is difficult to discern and often is obscured by the legs. Therefore, the ostioles have not been included as a taxonomic character in this study.

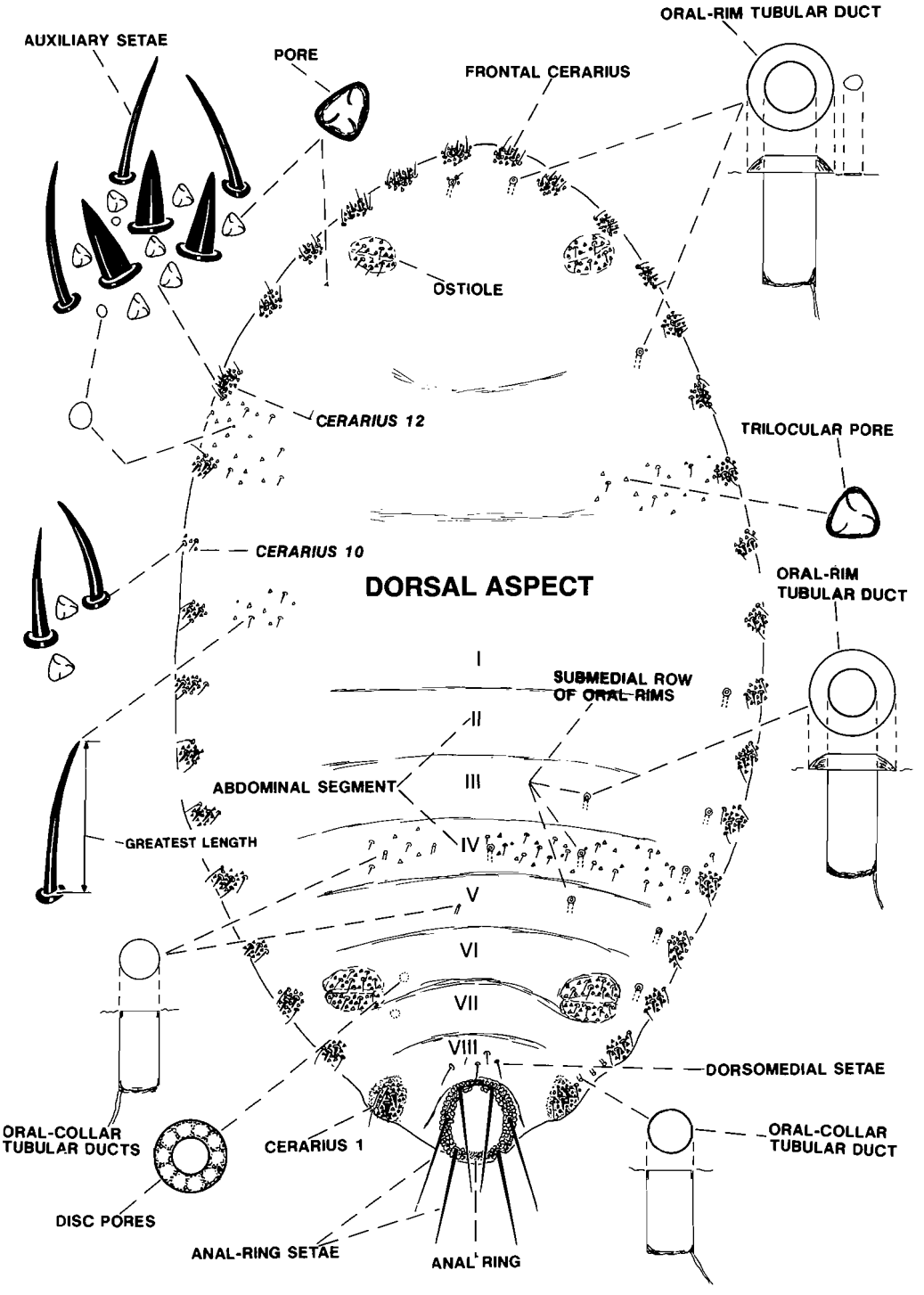

Figure 1. Composite illustration, dorsum of adult female *Pseudococcus maritimus* complex.

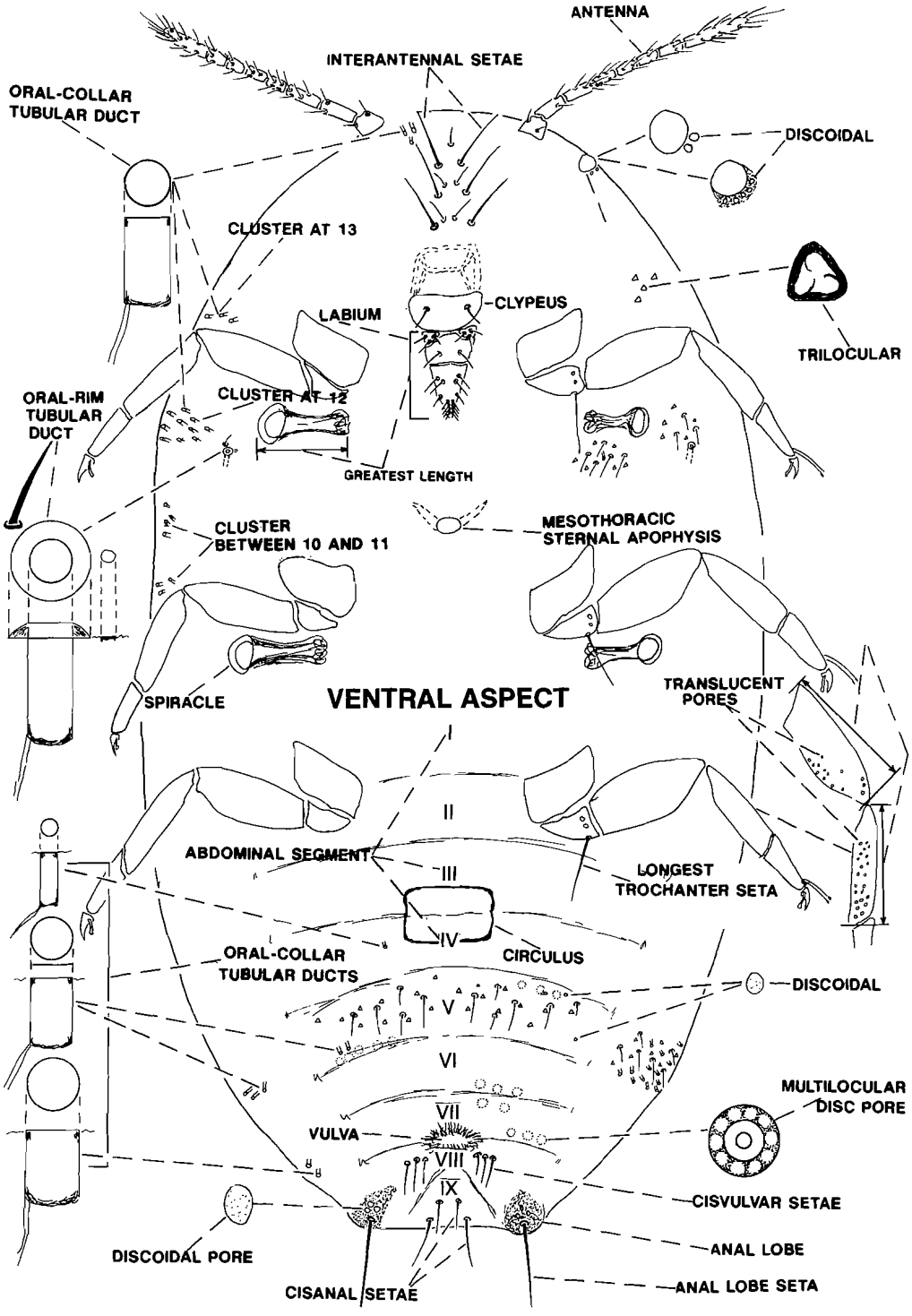

Figure 2. Composite illustration, venter of adult female *Pseudococcus maritimus* complex.

The anal ring is apical, or is on the dorsal margin, of segment VIII. It is typical of the family Pseudococcidae with 6 long setae and 2 rows of pores; the inner row is more heavily sclerotized than the outer row. The ratio of the length of the anal-ring setae and the greatest width of the anal ring is a useful character in separating several species.

The legs are well-developed. Each coxa has one or two ventral setae on the rim near the pleural vestige. Normally the middle and hind legs have 2 coxal-rim setae, the front coxae have 1 which may not always be evident. The length of the coxal-rim setae may be a useful taxonomic character and should be considered further. The hind coxa may have translucent pores on the dorsal surface. Each trochanter has 2 sensory pores on each lateral surface and 1 long seta on the ventral surface which is referred to as the "longest trochanter seta". A few species have translucent pores on this leg segment. The femur is the longest segment in some species and may or may not have translucent pores on the dorsal surface. In most species the tibia is the longest segment, and it always has translucent pores on the dorsal surface. The number of setae on the hind tibia is a useful character in separating species. The value of the tibia length divided by tarsus length is larger in adult females than in third instar females and is a useful taxonomic character. The tarsus is shorter than the femur and tibia. The apex of each tarsus has 2 dorsal digitules that have expanded or setose apices and extend beyond the length of the claw. Each claw has 2 digitules, 1 arising from each lateroproximal margin. The apices of the digitules are expanded and are about equal in size and shape in all species of the *P. maritimus* complex. Claw denticles are absent.

The antennae are well-developed, normally 8-, rarely 7-segmented, with 1 sensory pore distally on segment II. The terminal segment is the longest and usually shows a sign of partial division. The length of the terminal segment divided by the length of segments II or III (e.g., segment VIII/segment III) is of some taxonomic value in separating species. The setal pattern including the enlarged, fleshy, sensory setae, is similar for all species.

Cerarii are composed of clusters of trilocular pores, 2(1-5) centrally located conical setae, several bristle-shaped auxiliary setae, and several discoidal pores. The cerarii are situated on the dorsal margin around the body perimeter. There is some difficulty in establishing definition criteria for cerarii. On many species of the complex, 1 or more "cerarii" are reduced to 1 or 2 slender setae and less than 5 trilocular pores. We have arbitrarily decided that, for the purposes of this paper, cerarii must have at least 1 conical seta regardless of the presence of slender setae or the number of basal trilocular pores. The number of associated trilocular pores and auxiliary setae in cerarii are useful taxonomic characters. They also serve as important reference points for the location of other characters. The *P. maritimus* complex has 17 cerarian positions, number one being on segment VIII laterad of the anal ring, number 17 being on the head mesad and anterior of the antennae. Accordingly, cerarius 8 is on abdominal segment I, 9 and 10 are on the metathorax, 11-13 are on the mesothorax, 14 and 15 are on the prothorax and 16 and 17 are on the head. Cerarius 10 commonly has a reduced number of pores and setae, at times being absent en-

tirely. Several species have 1 or more other cerarii with slender setae and reduced numbers of pores.

Eyes appear on the posterolateral margin of the head as sclerotized, oval to round processes. The eyes are of little taxonomic importance themselves, but the presence or absence of a sclerotized rim around the eye, and the number, size, and placement of associated discoidal pores is one of the more important taxonomic characters in the complex.

Anal lobes are the terminal area of segment VIII. Cerarius I is situated on the dorsal aspect and the long anal-lobe seta arises from the terminal portion of the ventral aspect.

The vulva is on the venter located mesally between segment VII and VIII and occurs on the adult female only. The vulva is useful as a landmark to locate the mid line of the body and other characters such as the cisvulvar setae.

Spiracles are present on the thorax only. One pair is laterad and slightly posterior of the procoxae. The second pair lies in a similar position posterior of the mesocoxae. They are heavily sclerotized in all species examined. The greatest length of the hind spiracle is of some value in separating species.

Spinules are small, sclerotized, teeth-like evaginations on the venter. These structures occur ventrally from segment IX anteriorly to the mesothoracic sternal apophysis and dorsally from segment VIII anteriorly to segment IV or V and are concentrated on the mesal portion of the body. Spinules are present on all adult females of the *P. maritimus* complex and are of no apparent taxonomic value.

Two types of tubular ducts occur in the *P. maritimus* complex. Oral-collar tubular ducts are cylindrical tubes with a simple slightly sclerotized dermal orifice at one end and a short, indefinite membranous filament at the other. Oral collars may be 1-4 times as long as the diameter of the orifice of the duct. Small sized oral collars are associated with setae in the mesal portion of the ventral abdominal segments of all species. Medium-sized oral collars occur on the dorsal abdominal segments of two species, and on all species ventrally, associated with multilocular disc pores on the abdomen, with clusters of setae on the thorax and head and on the submargin. Large-sized oral collars usually occur near the body margin. The number of oral collars on the submargin associated with certain cerarii is a very useful taxonomic character. Oral-rim tubular ducts are similar to oral collars, but generally are larger and have an expanded, slightly sclerotized rim surrounding the dermal orifice giving the appearance of a mushroom. Oral rims may or may not have discoidal pores and setae associated with the rim. Dorsal oral rims generally are larger than ventral ones. The presence of dorsal oral rims near the frontal cerarii and between cerarii 15 and 16 are useful taxonomic characters. The number and placement of oral rims generally are very useful taxonomic characters.

There are four distinct types of pores, several of which have important taxonomic value at the specific level. With the exception of *P. sorghiellus* which has translucent pores on the mid and hind leg, translucent pores occur only on the hind pair of legs of adult females. Translucent pores have simple openings and

occur on the dorsal surface of any or all of the following segments: Coxae, trochanters, femora, or tibiae. The presence or absence, size, number and placement of translucent pores are very useful characters in separating species. Discoidal pores are simple, circular or subcircular and occur on the dorsum and venter. Several pores may be set in a sclerotized or membranous rim on the posterior or lateral margin of each eye and may also occur on the ventral aspect of the anal lobes. The size and number of discoidals, especially those associated with eyes, are useful in separating species. Trilocular pores are roughly triangular in shape with heavily sclerotized rims and occur over most of the dorsum and venter. The number of these pores is useful in separating species. To measure this character we have counted the number of trilocular pores on the venter of segment VI. Multilocular disc pores are circular, have a heavily sclerotized rim, and typically have 10 locules. These pores occur on the dorsum of three species and on the venter of all species. The placement and, to a limited extent, the number of pores are useful taxonomic characters.

There are three distinct types of setae; conical, bristle-shaped, and fleshy. The comparative length and number of particular setae is quite useful in separating species in the *P. maritimus* complex. Conical setae occur in varying numbers (1-5) in the cerarii. The largest conical setae occur in cerarius 1, those in 16 are at times more slender than others, and those in 10 are, in several species, reduced to a thin or bristle-shaped seta. The number of conical setae vary in several species but are of little taxonomic importance. The absence of conical setae at a particular cerarian position is a useful taxonomic character. Bristle-shaped setae occur in groups, clusters, or rows on the dorsum and venter. There are six long anal-ring setae on all species. The overall length and ratio of these setae compared with the diameter of the anal ring is a useful taxonomic character. Fleshy setae occur on antennal segments VII and VIII, and rarely on segment VI. Fleshy setae have not been used as a diagnostic character. Anal-lobe setae arise from the ventral apex of the anal lobe. Usually there is one long seta on each lobe but several species have a second slightly shorter seta. Usually, there are several short setae associated with the anal-lobe seta. Cisvulvar setae occur on segment VIII of the venter just posterior of the lateral margin of the vulva. The number varies from 1-11 on each side of the body depending on the species. The number and length of these setae are useful characters. Cisanal setae occur on segment IX of the venter. Typically there are four, an anterior and posterior pair. Occasionally a fifth cisanal seta will be present mesad and anterior of the anterior pair. The length and number of setae are useful taxonomic characters. Auxiliary setae are bristle-shaped setae associated with the cerarii. They are longer than the conical setae and may be present or absent. These structures occasionally are useful in separating species. Body setae occur in transverse bands on each abdominal segment and clusters or bands on the thorax and head. Dorsal body setae are usually of 2 lengths, referred to as "short" and "long". Those situated on the mesal area of segment VIII usually are the longest. Dorsal body setae are associated with the rim of the oral-rim tubular ducts in several species, and occur in varying numbers on the ostioles. Ventral body setae are quite variable in length and are usually longer than the longest dorsal ones. The shortest ventral setae occur in

transverse bands on the abdomen and with longer setae in clusters associated with the coxae, spiracles or those on the body margin. Setae grouped as medium length are associated with the short setae. The longest setae occur mesally on the anterior abdominal segments in clusters associated with the coxae, spiracles, and head. The longest mesal setae on the head anterior of the mouth parts are referred to as interantennal setae.

The configuration, distribution and abundance of the discoidal pores associated with the eyes characterize the *P. maritimus* complex.

Distinguishing Among Instars

In order to distinguish third and fourth instar females from other life stages, we have provided the following key. It is interesting that the characters used to recognize various instars in the *Pseudococcus maritimus* complex are somewhat different from those used to distinguish among instars of other mealybug genera (Miller 1975, 1983).

Key to Stages and Instars

1. Wings or wing buds present 2
-- Wings or wing buds absent 4
2 (1). Tail-forming pore clusters present on segment IX; wings fully developed; aedeagus present; thorax heavily sclerotized; antennae well-developed ..... fifth-instar male (adult)
-- Tail-forming pore clusters absent from segment IX; wings in form of wing buds, not well-developed; aedeagus absent; thorax not sclerotized; antennae not well-developed 3
3 (2). Postocular ridges present; hamulohaltera wing shaped, protruding from body margin ..... fourth instar male (pupa)
-- Postocular ridges absent; hamulohaltera not evident, not wing shaped or protruding from body margin .... third instar male (prepupa)
4 (1). Vulva present; more than 10 multilocular disc pores present on venter, numerous; hind tibiae with translucent pores ..... fourth instar female (adult)
-- Vulva absent; multilocular disc pores usually absent, when present with less than 10; hind tibiae without translucent pores 5
5 (4) With 7-, rarely 6, segmented antennae; 15 or more trilocular pores on segment VI of venter 6
-- With 6-segmented antennae; 10 or fewer trilocular pores on segment VI of venter 7
6 (5). Dorsal oral-collar tubular ducts absent ..... third instar female
-- Dorsal oral-collar tubular ducts present ..... second instar male
7 (5). Submesal setae on segments IV-VI with associated trilocular pore; marginal setae on segment IV-VII of venter without closely associated discoidal pore; with 6 or more trilocular pores on segment VI of venter ..... second instar female
-- Submesal setae on segment IV-VI without associated trilocular pore; marginal setae on segment IV-VII of venter with closely associated

discoidal pore; with fewer than 5 trilocular pores on segment VI of venter.....first instar (sexes indistinguishable)

KEY TO THE ADULT FEMALES OF THE *PSEUDOCOCCUS MARITIMUS COMPLEX*

1. Circulus present 2
-- Circulus absent ..... *acirculus* n.sp.
2 (1) Translucent pores absent from hind coxa and trochanter 7
Translucent pores present on hind coxa and trochanter 3
3 (2). With fewer than 17 pairs of distinct cerarii; cerarius 12 with 10 or fewer trilocular pores 5
-- With 17 pairs of distinct cerarii; cerarius 12 usually with more than 10 trilocular pores 4
4 (3). Sum of lengths of hind femur, tibia, and tarsus less than 485μ; antennae less than 365μ long; with 3 or fewer oral collars associated with cerari i 10 and 11 ..... *sorghiellus* (Forbes)
-- Sum of lengths of hind femur, tibia, and tarsus more than 485μ; antennae more than 365μ long; usually with more than 3 oral collars associated with cerarii 10 and 11 ..... *dolichomelos* n.sp.
5 (3). Less than 45 oral-rim tubular ducts on dorsal abdomen; oral-rim tubular duct absent on venter near frontal cerarius 6
-- More than 45 oral-rim tubular ducts on dorsal abdomen; oral-rim tubular duct present on venter near frontal cerarius .....*bermudensis* n.sp.
6 (5). More than 15 oral-rim tubular ducts on dorsal abdomen; antennae usually 8-segmented; hind tibia 165μ or longer ..... *dysmicus* n.sp.
-- Fewer than 15 oral-rim tubular ducts on dorsal abdomen; antennae 7-segmented; hind tibia less than 165μ long ..... *spanocera* n.sp.
7 (2). Discoidal pores associated with eyes not set in a sclerotized rim..... 16
-- Discoidal pores associated with eyes set in a sclerotized rim 8
8 (7). Translucent pores on hind tibia and femur 12
-- Translucent pores restricted to hind tibia 9
9 (8). Oral-rim tubular ducts present on dorsum posterior of frontal cerarii; less than 6 discoidal pores associated with eyes 10
-- Oral-rim tubular ducts absent from dorsum posterior of frontal cerarii; 6 or more discoidal pores associated with eyes .....*landoi* (Balachowsky)
10(9). Less than 16 oral-rim tubular ducts on ventral submargin from segment II to cerarius 13; ventral oral-rims absent from submargin on segments III-VI; hind tibiae with more than 35 setae 11
-- More than 16 oral-rim tubular ducts on ventral submargin from segment II to cerarius 13; ventral oral rims present on submargin on segments III-VI; hind tibiae with fewer than 35 setae .....
..... *galapagoensis* Morrison

11(10) Anal-lobe seta more than 133μ long; hind tibia 357(319-405)μ long ..... *solenedyos* n.sp. (in part)

-- Anal-lobe seta less than 133μ long; hind tibia 313(277-333)μ long ..... *donrileyi* n.sp.

12(8) Fewer than 30 multilocular disc pores on head and thorax; longest dorsal body setae on abdomen, excluding segment VIII, less than 25μ long; fewer than 27 dorsal oral-rim tubular ducts on abdomen 13

-- More than 35 multilocular disc pores on head and thorax; longest dorsal body setae on abdomen, excluding segment VIII, more than 25μ long; more than 30 dorsal oral-rim tubular ducts on abdomen ..... *puertoricensis* n.sp.

13(12) Cerarii 8 and 10 often weak or partially developed; at least one frontal cerarius without associated dorsal oral-rim tubular duct 14

-- Cerarii 8 and 10 well developed; frontal cerarii with associated dorsal oral-rim tubular duct 15

14(13) Cerarius 12 with more than 20 trilocular pores; interantennal setae less than 110μ long; antennae less than 550μ long..... *schusteri* n.sp.

-- Cerarius 12 with less than 20 trilocular pores; interantennal setae more than 110μ long; antennae more than 550μ long ..... *insularis* Morrison

15(14) Abdomen with 5(3-8) dorsal oral-rim tubular ducts; without lateral oral rims on segment VII; more than 20 multilocular disk pores on abdominal segment III..... *elisae* Borchsenius

-- Abdomen with 21(14-27) dorsal oral-rim tubular ducts; often with lateral oral rims on segment VII; less than 15 multilocular disk pores on abdominal segment III ..... *jackbeardsleyi* n. sp.

16(7) Multilocular disc pores absent from dorsum 19

-- Multilocular disc pores on present on dorsum at least on segments VI and/or VII 17

17(16) Dosal ultiloculars scarce, restricted to segments V-VII; fewer than 10 ventral multiloculars on head and thorax 18

-- Dorsal multiloculars numerous on segments III-VIII; more than 20 ventral multiloculars on head and thorax ..... *peregrinabundus* Borchsenius

18(17) More than 50 translucent pores on hind tibia; 3(1-6) large discoidal pores associated with each eye; 230(137-258) trilocular pores on segment VI of venter..... *nakaharai* n.sp. (in part)

-- Fewer than 20 translucent pores on hind tibia; 1(0-2) small discoidal pores associated with each eye; 48(42-54) trilocular pores on segment VI of venter..... *dasyliriae* n.sp.

19(16) Translucent pores on tibia and femur of hind leg 28

-- Translucent pores restricted to tibia of hind leg 20

20(19) With more than 27 setae on hind tibia; circulus usually wider than 75μ, divided; legs long, hind tibia usually longer than 230μ 23

-- With less than 27 setae on hind tibia; circulus usually narrower than 75μ, undivided; legs short, hind tibia usually shorter than 230μ 21

21(20) With less than 12 oral-rim tubular ducts on dorsal abdomen; width of largest discoidal pore near eye 5μ or larger; oral-rim tubular ducts usually absent from near one or both frontal cerarii 22
-- With more than 12 oral-rim tubular ducts on dorsal abdomen; width of largest discoidal pore near eye 3μ or smaller; oral-rim tubular ducts present near both frontal cerarii ..... *apomicrocirculus* n.sp.
22(21) Multilocular pores absent from posterior and anterior margins of segment V or rarely with 1 or 2 pores; longest interantennal seta greater than 50 long ..... *microcirculus* McKenzie
-- Multilocular pores present in band on posterior and anterior margins of segment V or rarely with 1 or 2 pores; longest interantennal seta usually less than 50μ long ..... *neomicrocirculus* n.sp.
23(20) Circulus less than 140μ wide 26
-- Circulus greater than 140μ wide 24
24(23) Dorsal oral collars absent 25
-- Dorsal oral collars present on abdomen ..... *nakaharai* n.sp. (in part)
25(24) Oral-rim tubular ducts present on submargin between cerarii 15 and 16; with more than 20 oral rims on dorsal abdomen; with more than 40 setae on hind tibia; 0(0-3) oral-collar tubular ducts associated with cerarius 12 ..... *solenedyos* n.sp. (in part)
-- Oral-rim tubular ducts absent from submargin between cerarii 15 and 16; with less than 20 oral rims on dorsal abdomen; with less than 40 setae on hind tibia; 7(3-11) oral-collar tubular ducts associated with cerarius 12 ..... *pithecellobii* n.sp.
26(23) With oral-collar tubular ducts associated with cerarius 12; more than 2 oral collars associated with cerarius 10 and 11 27
-- Without oral-collar tubular ducts associated with cerarius 12; less than 2 oral collars associated with cerarius 10 and 11 ..... *neomaritimus* Beardsley
27(26) Hind tibia 378(341-420)μ long; tibia/tarsus 3.1(2.9-3.3); not found on orchids ..... *sociabilis* Hambleton
-- Hind tibia 278(232-322)μ long; tibia/tarsus 2.7(2.2-3.1); found on orchids ..... *importatus* McKenzie
28(19) Less than 30 ventral oral-collar tubular ducts in cluster mesad of cerarius 12; less than 20 ventral oral collars associated with cerarii 10 and 11 29
-- More than 30 ventral oral-collar tubular ducts in cluster mesad of cerarius 12; more than 22 ventral oral collars associated with cerarii 10 and 11 ..... *pertusus* McKenzie
29(28) Less than 30 multilocular disc pores on ventral thorax; longest dorsal bodysetae from segment VII to thorax less than 25μ long 30
-- More than 35 multilocular disc pores on ventral thorax; longest dorsal body setae from segment VII to thorax greater than 30μ long ..... *puertoricensis* n.sp. (in part)
30(29) Without dorsal oral collars except on margin; with more than 8 oral rims on dorsal abdomen 31

-- With 1-3 dorsal oral collars in submarginal area mesad of most cerarii, especially numbers 4-6; with less than 8 oral rims on dorsal abdomen ..... *mandio* Williams

31(30) Labium greater than 145μ long; tibia/tarsus 2.8(2.2-3.6) 32

-- Labium less than 145μ long; tibia/tarsus 2.1(1.8-2.5) ..... *bryberia* n.sp.

32(31) With less than 5 oral-collar tubular ducts associated with cerarii 10 and 11; without oral rim on dorsal submargin between cerarii 15 and 16; longest anal-lobe setae less than 136μ long; with less than 20 oral-rim tubular ducts on dorsal abdomen 33

-- With more than 5 oral-collar tubular ducts associated with cerarii 10 and 11; with oral rim on dorsal submargin between cerarii 15 and 16; longest anal-lobe setae longer than 136μ long; with more than 20 oral-rim tubular ducts on dorsal abdomen ..... *maritimus* (Ehrhorn)

33(32) Cerarius 12 with less than 15 trilocular pores; cerarius 12 with less than 7 associated oral-collar tubular ducts; femur less than 265μ long ..... *eriocerei* Williams

-- Cerarius 12 with 15 or more trilocular pores; cerarius 12 with more than 7 associated oral-collar tubular ducts; femur more than 265μ long ..... *viburni* (Signoret)

TAXONOMY

Pseudococcus acirculus Gimpel and Miller, new species (Figure 3)

SUGGESTED COMMON NAME: Gila Bend mealybug.

DIAGNOSIS: Circulus absent; 80(70-87) setae on hind tibia; oral-rim tubular ducts absent from posterior of frontal cerarii; 20(18-27) oral rims on ventral submargin from segment II to cerarius 13; with dorsal oral-collar tubular ducts; 37(30-45) oral-collar tubular ducts associated with cerarius 12.

TYPE DATA: Adult female holotype is on a slide labeled: "*Pseudococcus* / *acirculus* / Holotype / 30 mi. E. Gila Bend / Maricopa Co. ARIZONA / 22-III-1968 / Franseria deltoides / Coll. D R Miller / ENTOMOLOGY / U. C., Davis, Calif. / 1140" (UCD). There are 5 adult female paratypes on 3 slides. Paratypes are deposited in the BMNH, UCD and USNM.

The species epithet *acirculus* is from the Greek noun kirkos meaning "circle" and refers to the lack of the circulus from the abdomen.

FIELD CHARACTERS: No available information.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 2.3 mm, width 1.2 mm. Paratypes 2.3(2.1-2.8) mm long, 1.2 (1.0-1.5) mm wide.

DORSUM: With 15 and 16 cerarii, paratypes 15 (13-16), cerarian formula as follows: Left side, 1-7 (2), 8 (3), 9 (2), 10 absent, 11-14 (2), 15 absent, 16-17 (3), right side, 1-9 (2), 10 absent, 11-15 (2), 16 (3), 17 (2), paratypes with 1-9 (2), 10

(0 or 1), 11 (1 or 2), 12 (2), 13 (1-3), 14 (0-2), 15 (0-3), 16 (2-4), 17 (0-3). Cerarius 12 (left side) with 2 auxiliary setae, paratypes with 3 (3 or 4), 12 trilocular pores, paratypes with 12 (9-20), discoidal pores absent, paratypes with 1 (0-2). Cerarius 1 with slight basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 1 size, about same size as small size on venter, scarce. Oral-rim tubular ducts with 1 discoidal pore, without setae associated with rim, oral rims scarce, absent posterior of frontal cerarii , left side, 1 mesad of cerarius 9, 1 mesad of cerarius 13, paratypes 0 or 1 mesad of each of cerarii 8, 9 and 13, without oral rims on abdomen, paratypes 0(0 or 1); oral-collar tubular ducts scattered over dorsum, more numerous on submargin. Body setae of 2 sizes, longest seta on abdomen, excluding segment VIII, 17μ long, paratypes 16(15-17)μ long; 4 dorsomedial setae on segment VIII, paratypes with 6(5-6), longest 32μ long, paratypes 37 (33-39)μ long.

Anal-ring setae 154μ long, paratypes 149(117-166)μ long; 1.7(1.6-1.8) times as long as greatest diameter of ring, paratypes 1.5(1.3-1.9).

VENTER: Multilocular disc pores in posterior and anterior bands on segments V-VII, few on segment IV, scattered on segments VIII and IX, absent from head and thorax, paratypes occasionally with several on segment III. Trilocular pores scattered over venter, about 51 on segment VI, paratypes 47(23-71). Discoidal pores of 2 sizes, large size about 2μ in diameter, few on posterior abdominal segments, 1 on anal-lobe sclerotization, paratypes 1(0-2); small size about 1μ in diameter, 1 in membranous rim around each eye, paratypes 1(0-3), sparsely scattered over remainder of venter. Oral-rim tubular ducts rarely with 1 discoidal pore and no setae associated with rim, right side with 24 on submargin from segment II to cerarius 13, paratypes 20(18-27), without duct near frontal cerarii; oral-collar tubular ducts in transverse band on segments III-VII, abundant on submargin of abdomen and thorax, scarce on head and mesal portion of venter, with 45 in cluster mesad of cerarius 12, paratypes 37(30-45), 118 associated with cerarii 10 and 11, paratypes 88(55-143), 29 posterior of eye, paratypes 22(14-29), 10 or 12 ducts on each side of head, paratypes 13(8-19). Setae as follows: 4 cisanal, 49μ long, paratypes 46 (36-58)μ long; 4 cisvulvar on left side, 3 on right side, paratypes 3 (2-4), 37μ long, paratypes 34(24-41)μ long; longest anal-lobe seta 117μ long, paratypes 117(98-136)μ long; body setae of 3 lengths, longest 63μ long, paratypes 53(48-63)μ long; longest interantennal seta 80μ long, paratypes 78(73-83)μ long; longest seta on trochanter of hind leg 64μ long, paratypes 70(59-89)μ long.

Circulus absent. Labium 185μ long, paratypes 197(173-223)μ long. Posterior spiracle greatest length 78μ long, paratypes 69 (63-78)μ long. Antennae 8-segmented, right antenna 458μ long, lengths of each segment as follows: I 68μ, II 60μ, III 78μ, IV 41μ, V 68μ, VI 36μ, VII 39μ, VIII 80μ long; paratypes 473(385-531)μ long, length of each segment as follows: I 66(54-85)μ, II 63(54-68)μ, III 80(54-95)μ, IV 47(29-56)μ, V 60(49-68)μ, VI 38(29-44)μ, VII 42(37-49)μ, VIII 77(71-83)μ long. Length of antennal segment VIII / segment II 1.3, paratypes 1.2(1.0-1.4), antennal segment VIII / segment III 1.0, paratypes 1.0(0.7-1.4).

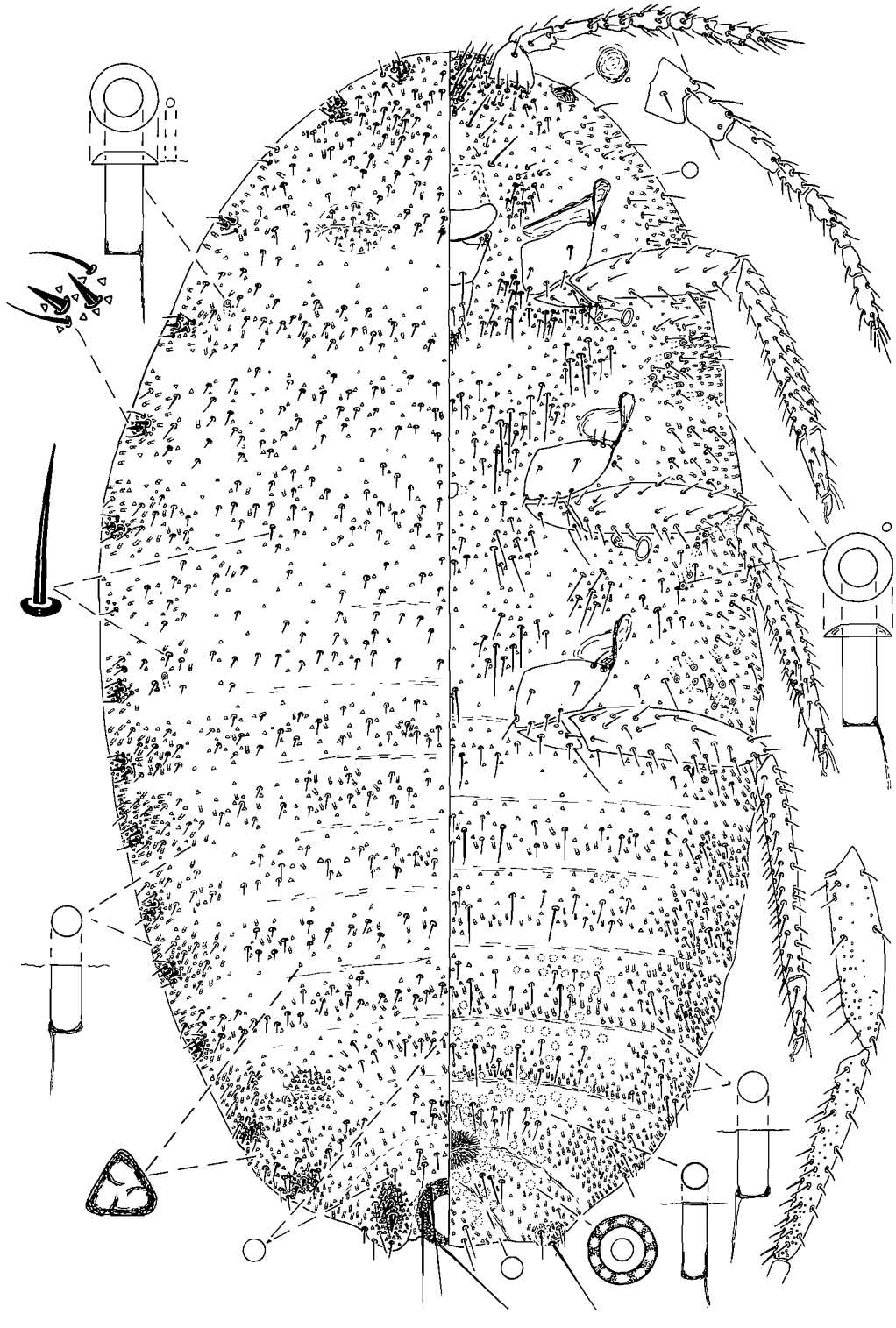

Figure 3. Adult female, *P. acirculus,* Gila Bend, Arizona, III-22-1968, on *Ambrosia deltoides.*

Legs with 38 inconspicuous translucent pores on dorsal surface of hind tibia, paratypes 34(26-45), 50 translucent pores on hind femur, paratypes 45(33-57), absent from remaining segments. Femur 298μ long, paratypes 298(261-324)μ long, shorter than tibia; tibia 359μ long, paratypes 340(302-378)μ long; tarsus 98μ long, paratypes 98(95-100)μ long. Tibia/tarsus 3.7, paratypes 3.6(3.2-3.9). Hind tibia with 80 setae, paratypes 80 (70-87).

UNUSUAL VARIATION: The number of conical setae is quite variable in cerarii 8-17, even on opposite sides of the same specimen. Cerarius 10 is represented by 1 conical seta on the left side of 1 paratype and is absent in all others.

U.S. SPECIMENS EXAMINED: Arizona: Maricopa Co., 30 mi. east of Gila Bend (22-III-1968, *Ambrosia deltoides*, D.R. Miller), 2 slides, 2 specimens (UCD), 1 slide, 2 specimens (BMNH), 1 slide, 2 specimens (USNM).

OTHER SPECIMENS EXAMINED: None.

HOSTS AND DISTRIBUTION: This species is known only from the type locality and host. It is likely that it occurs in other southwestern states and northern Mexico in similar habitats.

DISCUSSION: *Pseudococcus acirculus* is different from all other species of the *P. maritimus* group. The following combination of characters immediately separates it: Without a circulus; with dorsal oral-collar tubular ducts; 20(18-27) oral-rim tubular ducts on ventral submargin between segment II and cerarius 13; 37(30-45) oral collars in cluster mesad of cerarius 12; hind tibia 340(302-378)μ long; 0(0-1) oral rims on dorsum of abdomen; without oral rims near frontal cerarii; with 80(70-87) setae on hind tibia.

Pseudococcus apomicrocirculus Gimpel and Miller, new species (Figure 4)

SUGGESTED COMMON NAME: Mexican orchid mealybug.

DIAGNOSIS: Circulus small, located on segment III; translucent pores restricted to hind tibiae; without oral collars mesad of cerarius 12 or 10 and 11; 20(13-28) dorsal oral rims on abdomen; ventral multilocular pores on segments IV, V, or VI-VIII; discoidal pore near eye small, about 3μ in width; legs short, femur 205(170-227)μ long.

TYPE DATA: Adult female holotype is single specimen on slide labeled as follows: Right label "*Pseudococcus* / *apomicrocirculus* / Gimpel and / Miller / HOLOTYPE" left label "*Pseudococcus* / on Epidendrum vitellinium / ex Mexico at Brownsville / Oct. 31, '46 / Alexander / Br.#62906 / 47-763" (USNM). There are 40 paratypes on 18 slides deposited in BMNH, CDAS, FSCA, MCM, MNHP, UCD, USNM, ZIL.

The species epithet is derived from the Greek words *apo*, *mikros*, and *kirkos* meaning "separate", "little", and "circle" and refers to the fact that this species is different from *Pseudococcus microcirculus*.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 2.2 mm, width 1.2 mm. Paratypes 2.0(1.5-2.7) mm long, 1.2(0.7-1.7) mm wide.

DORSUM: With 16 pairs of cerarii, paratypes 16(16-17), cerarian formula as follows: Left side, 1-7(2), 8(0-3), 9(2), 10(0-2), 11(2), 12(2-3), 13-14(2), 15(3), 16-17(2-4). Cerarius 12 (left side) with 2 auxiliary setae, paratypes 3(0-5), 9 trilocular pores, paratypes 11(7-15), 0 discoidal pores, paratypes 1(0-2). Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered; discoidal pores of 1 variable size, most abundant along body margin and on thorax and head. Oral-rim tubular ducts with 1(0-2) associated discoidal pores, with 1(0-2) associated seta, oral rims present near frontal cerarius, present on submargin between cerarii 15 and 16, present on submargin, submedian, and median areas of body with 22 oral rims on abdomen, paratypes with 20(13-28); oral-collar tubular ducts absent except between cerarii. Body setae of two sizes, longest body seta on abdomen, excluding segment VIII, 21μ long, paratypes 21(15-25)μ long; 5 dorsomedial setae on segment VIII, paratypes 5(4-7), longest seta 21μ long, paratypes 21(16-25)μ long.

Anal-ring seta 118μ long, paratypes 121(111-138)μ long, 1.7 times as long as greatest diameter of ring, paratypes 1.7(1.6-1.9).

VENTER: Multilocular disc pores in posterior and anterior bands on segment V-VII, with 2 or 3 pores on segment IV, paratypes with pores in anterior and posterior bands on segments IV, V, or VI-VII, without pores on thorax, paratypes with 0-15(4) pores on thorax. Trilocular pores scattered, 82 on segment VI, paratypes 82(64-98). Discoidal pores of 1 variable size, 3μ in diameter, paratypes 3(2-4)μ, 2 or 3 set in membranous rim around eye, paratypes 2(0-3), 3 or 4 on anal-lobe sclerotization, paratypes 4(1-5). Oral-rim tubular ducts with 1(0-2) discoidal pores and 0(0-1) seta associated with rim, 3 or 5 on submargin from segment II to cerarius 13, paratypes 4(2-7), without duct near frontal cerarius; oral-collar tubular ducts in transverse bands on segments VII or VI-IV or III, associated with posterior bands of multilocular disc pores on segment IV, V, or VI, few on thorax and head, without ducts mesad of cerarius 12, without ducts associated with cerarii 10 and 11, with 1 or 2 ducts posterior of eye, paratypes 2(0-3), without ducts on each side of head. Setae as follows: 4 cisanal, longest 25μ long, paratypes 27(22-31)μ long; 2 or 3 cisvulvar on each side of body, longest 22μ, paratypes 28(22-37)μ long; longest anal-lobe seta 79μ long, paratypes 91(77-106)μ long; longest body seta on abdomen 44μ long, paratypes 44(35-52)μ long; longest interantennal seta 67μ long, paratypes 66(54-77)μ long; longest seta on trochanter of hind leg 99μ long, paratypes 94(74-104)μ long.

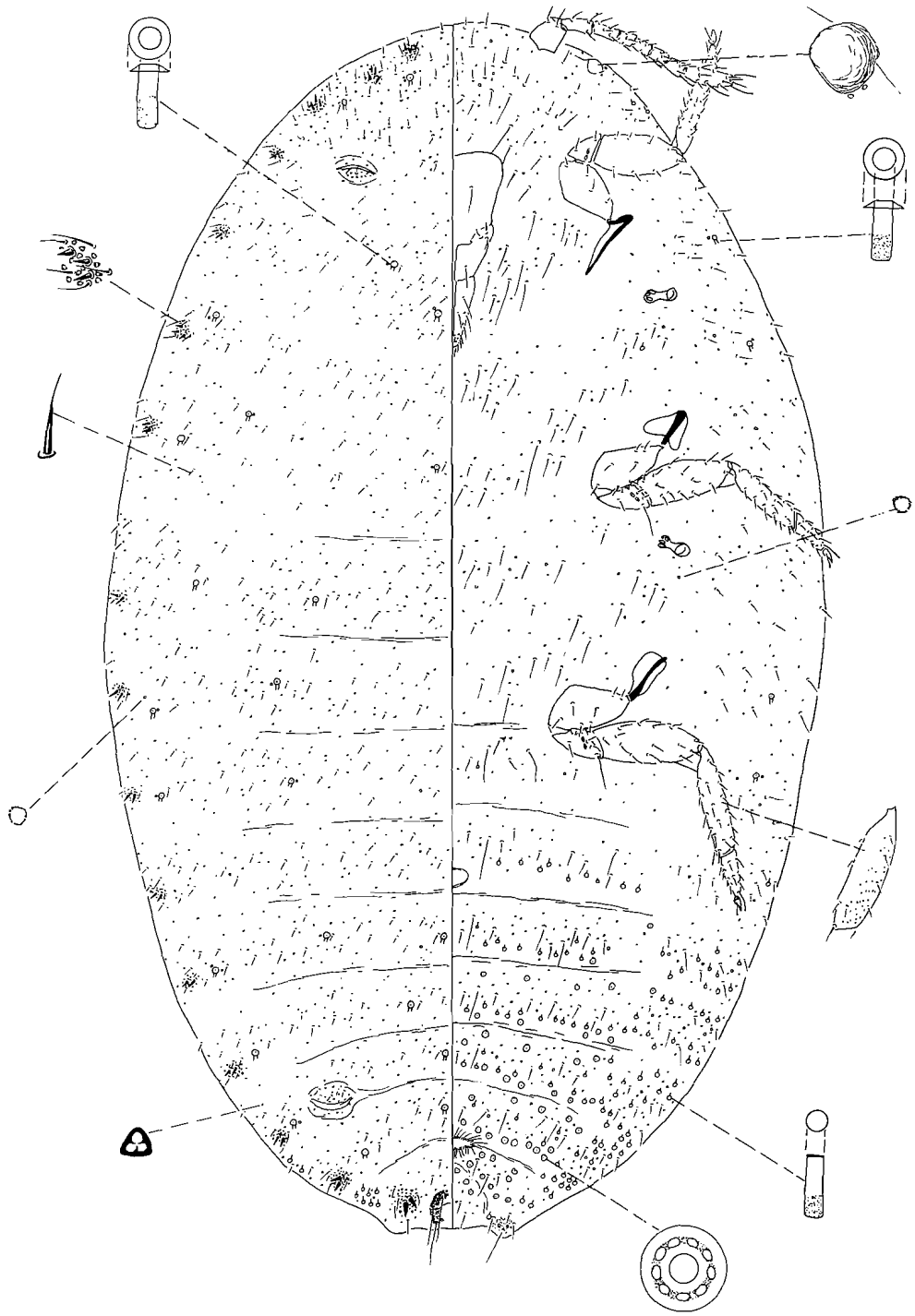

Figure 4. Adult female, *P. apomicrocirculus*, Mexico, X-31-1946, on *Epidendrum vitellinium*.

Circulus 1.7 times as wide as long, paratypes 1.6(1.3-1.8), width 57μ, paratypes 49(30-62)μ, not divided by segmental fold of segment III and IV. Labium 118μ long, paratypes 132(124-148)μ long. Posterior spiracle greatest length 59μ, paratypes 62(54-67)μ. Antennae 8 - segmented, right antenna 384μ long, length of each segment as follows: I 54μ, II 54μ, III 52μ, IV 25μ, V 35μ, VI 27μ, VII 40μ, VIII 87μ, paratypes 392(353-434)μ long, length of each segment as follows: I 54(44-59)μ, II 59(49-69)μ, III 48(37-57)μ, IV 25(22-30)μ, V 32(25-40)μ, VI 27(27-30)μ, VII 35(32-40)μ, VIII 89(84-96)μ long. Length of antennal segment VIII / segment II 1.6, paratypes 1.5(1.3-1.7); antennal segment VIII / segment III 1.7, paratypes 1.9(1.6-2.3).

Legs with 37 conspicuous translucent pores on hind tibia, paratypes 42(32-53), absent from remaining segments. Femur 205μ long, paratypes 205(170-227)μ long; tibia 212μ long, paratypes 207(170-232)μ long; tarsus 90μ long, paratypes 89(80-99)μ long. Tibia / tarsus 2.4, paratypes 2.3(1.9-2.9). Hind tibia with 23 setae, paratypes 24(22-27).

UNUSUAL VARIATION: This species has an unusual amount of variation in the distribution of the multilocular pores. On *Pseudococcus microcirculus* and *P. neomicrocirculus* the multiloculars are relatively constant in their placement, but *P. apomicrocirculus* possesses multilocular distribution patterns that are as variable as occurs between *P. microcirculus* and *P. neomicrocirculus* combined.

U.S. SPECIMENS EXAMINED: None

OTHER SPECIMENS EXAMINED:
Guatemala: (24-V-1947, orchid, collector unknown, at Brownsville) 1 slide, 1 specimen (USNM).
Mexico: Locality unknown (31-X-1946, *Epidendrum vitellinum*, Alexander, at Brownsville) 1 slide, 1 specimens (USNM), (17-V-1947, *Laelia* sp., Williamson and Smith, at Brownsville) 1 slide, 1 specimen (slide also contains specimens of *P. microcirculus* and *P. importatus*) (USNM), (5-XII-1949, orchid, Lewis, at Laredo) 1 slide, 2 specimens (BMNH), (29-XII-1950, orchid, collector unknown, at Brownsville) 1 slide, 4 specimens (CDAS), (18-VII-1950, *Epidendrum ocracenum*, S. Namiki, at Honolulu), 1 slide, 1 specimen, (MCM), (15-VI-1950, orchid, B. P. Stewart, at Miami) 1 slide, 2 specimens (UCD), (1-VI-1950, orchid, collector unknown, at Brownsville) 1 slide, 1 specimen (ZIL), (17-VII-1950, *Leochilus* sp., S. Namiki, at Honolulu), 1 slide, 2 specimens (VPI), (2-IX-1951, orchid, L.O. Fink, at Brownsville) 1 slide, 3 specimens (FSCA), (11-VI-1951, orchid, collector unknown, at Brownsville) 1 slide, 2 specimens (USNM), (26-IV-1952, orchid, Williamson, at Brownsville) 1 slide, 2 specimens (MNHP), (16-VI-1952, orchid, collector unknown, at Brownsville) 1 slide, 4 specimens (USNM), (26-IV-1952, orchid, collector unknown, at Brownsville) 1 slide, 5 specimens (USNM), (26-VII-1954, *Epidendrum cochleatum*, L.F. Byars, at Honolulu) 1 slide, 1 specimen (USNM), (23-V-1955, *Laelia autumnalis*, J.T. Watt, at Laredo) 1 slide, 4 specimens (USNM), (17-VIII-1956, *Epidendrum villellianum*, J. Uyeda, at Honolulu) 1 slide, 1 specimen (USNM), (19-VII-1957, orchid, Williamson, at Brownsville) 1 slide, 2

specimens (USNM), (19-VII-1957, *Laelia gouldiana*, Babb, at Laredo) 1 slide, 1 specimen (USNM).

HOSTS AND DISTRIBUTION: *Pseudococcus apomicrocirculus* predominately has been taken in quarantine from Mexico. The species is known only from three genera of orchids, but probably has a much broader host range in the Orchidaceae.

DISCUSSION: *Pseudococcus apomicrocirculus* has been confused with *P. microcirculus* but can be separated by having: Oral-rim tubular ducts present near each frontal cerarius; 20(13-28) oral rims on dorsal abdomen; discoidal pores near eye small 3(2-4)μ in diameter; 4(2-7) oral rims on ventral submargin between segment II and ceararius 13; 42(32-53) translucent pores on hind tibia; anal-ring seta 121(111-138)μ long. *Pseudococcus microcirculus* has: Oral-rim tubular ducts usually absent from near 1 or both frontal cerarii, 5(0-11) oral rims on dorsal abdomen; discoidal pores near eye large 6(3-8)μ in diameter; 1(0-5) oral rims on ventral submargin between segment II and cerarius 13; 29(19-46) translucent pores on hind tibia; anal-ring setae 104(79-118)μ long. *Pseudococcus apomicrocirculus* also is similar to *P. neomicrocirculus* but can be separated by having: 3(0-5) auxiliary setae in cerarius 12; 11(7-15) trilocular pores in cerarius 12; oral-rim tubular ducts near frontal cerarii; anal-ring setae 121(111-138)μ long; 42(32-53) translucent pores on hind tibia; 20(13-28) dorsal oral rims on abdomen; 4(2-7) oral rims on ventral submargin between abdominal segment II and cerarius 13; longest ventral seta on abdomen 44(35-52)μ long; longest interantennal seta 66(54-77)μ long. *Pseudococcus neomicrocirculus* differs by having: 5(3-6) auxiliary setae in cerarius 12; 22(17-30) trilocular pores in cerarius 12; oral-rim tubular ducts absent from near frontal cerarii; anal-ring setae 106(94-126)μ long; 32(27-37) translucent pores on hind tibia; without dorsal oral rims on abdomen; 0(0-2) oral rims on ventral submargin between abdominal segment II and cerarius 13; longest ventral seta on abdomen 25(20-35)μ long; longest interantennal seta 42(35-54)μ long.

Pseudococcus bermudensis Gimpel and Miller, new species (Figure 5)

SUGGESTED COMMON NAME: Bermuda Mealybug.

DIAGNOSIS: Translucent pores on all segments of hind leg except tarsus; 64(50-74) dorsal oral-rim tubular ducts on abdomen; anal-lobe setae 77(67-90)μ long; without oral-collar tubular ducts associated with cerarius 12; ventral oral-rim tubular duct near frontal cerarius.

SYNONYMY: *Pseudococcus* sp. Hodgson and Hilburn, 1991: 145.

TYPE DATA: Adult female holotype is on a slide labeled as follows: "HOLOTYPE / *Pseudococcus* / *bermudensis* / on Juniperus / bermudiana / Apr. 25, 1951 / Bermuda / F.D. Bennett / 51723 (USNM)". There are 7 adult female paratypes on 7 slides. Paratypes are deposited in BMNH and USNM.

The species epithet is formed from the Latin suffix *-ensis* meaning "place" or "location" and is named after the locality from which it was collected.

FIELD CHARACTERS: Occurring on the foliage of the host

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 2.2 mm, width 1.2 mm. Paratypes 1.9(1.5-2.2) mm long, 1.0(0.7-1.2) mm wide.

DORSUM: With 17 and 13 cerarii, paratypes 13(8-17), cerarian formula as follows: Left side 1-7 (2), 8 (1), 9-11 (2), 12 (3), 13-14 (2), 15 (3), 16 (4), 17 (3), right side 1-4 (2), 5 (0), 6 (2), 7-8 (1), 9 (0), 10 (2), 11 (0), 12-14 (2), 15 (3), 16 (4), 17 (3), paratypes 1-4 (2), 5-11 (0-2), 12 (2-3), 13 (1-2), 14 (0-2), 15 (1-3), 16 (1-5), 17 (2-3). Cerarius 12 (left side) with 2 auxiliary setae, paratypes 2 (1-4), 7 trilocular pores, paratypes 5(2-8), discoidal pores absent, paratypes 0(0-1). Cerarius 1 with moderate basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 1 size, about same size as small size on venter, sparse. Oral-rim tubular ducts rarely with 1 discoidal pore and 1 seta associated with rim, oral rims numerous, present posterior of frontal cerarii, present on submargin between cerarii 15 and 16, present on each thoracic segment, abdominal segments I-VII, with 64(50-74) on abdomen; oral-collar tubular ducts scarce, confined to submargin of segments II-VIII. Body setae of 2 sizes, longest seta on abdomen, excluding segment VIII, 14μ long, paratypes 14(12-15)μ long; 4 dorsomedial setae on segment VIII, paratypes 4, longest 20μ long, paratypes 16(12-18)μ long.

Anal-ring setae 180μ long, paratypes 163(128-183)μ long, 2.0 times as long as greatest diameter of ring, paratypes 2.0(1.9-2.1).

VENTER: Multilocular disc pores in posterior and anterior bands on segments V-VII, occasionally a few on segment IV, scattered on segments VIII and IX, absent from head and thorax, paratypes with 1 or 2 on segments II and III, 2(1-3) mesally on mesothorax. Trilocular pores scattered over venter, 47 on segment VI, paratypes 46(36-54). Discoidal pores of 1 size, about 2μ in diameter on posterior abdominal segments, apparently absent from anterior abdominal segments, absent from anal-lobe sclerotization; 1 in membranous rim around each eye, paratypes 1(0-2), absent from remainder of venter. Oral-rim tubular ducts without discoidal pores and setae associated with rim, right side, about 22 on submargin from segment II to cerarius 13, paratypes 19(8-27), with duct near frontal cerarius; oral-collar tubular ducts in transverse bands on segments III-VII, few on submargin of abdomen, scarce on thorax and head, absent mesad of cerarius 12, paratypes also absent, absent from area associated with cerarii 10 and 11, without ducts posterior of eye and on head except 1 paratype with 1 duct. Setae as follows: 4 cisanal, 27μ long, paratypes 24(18-27)μ long; 2 cisvulvar on each side, paratypes with 2(1-2), 37μ long, paratypes 32(20-40)μ long; longest anal-lobe seta 80μ long, paratypes 77(67-90)μ long; longest body seta on abdomen 43μ long, paratypes 41(27-54)μ long; longest interantennal setae broken, paratypes 63(58-78)μ long; longest seta on trochanter of hind leg 99μ long, paratypes 85(71-94)μ long.

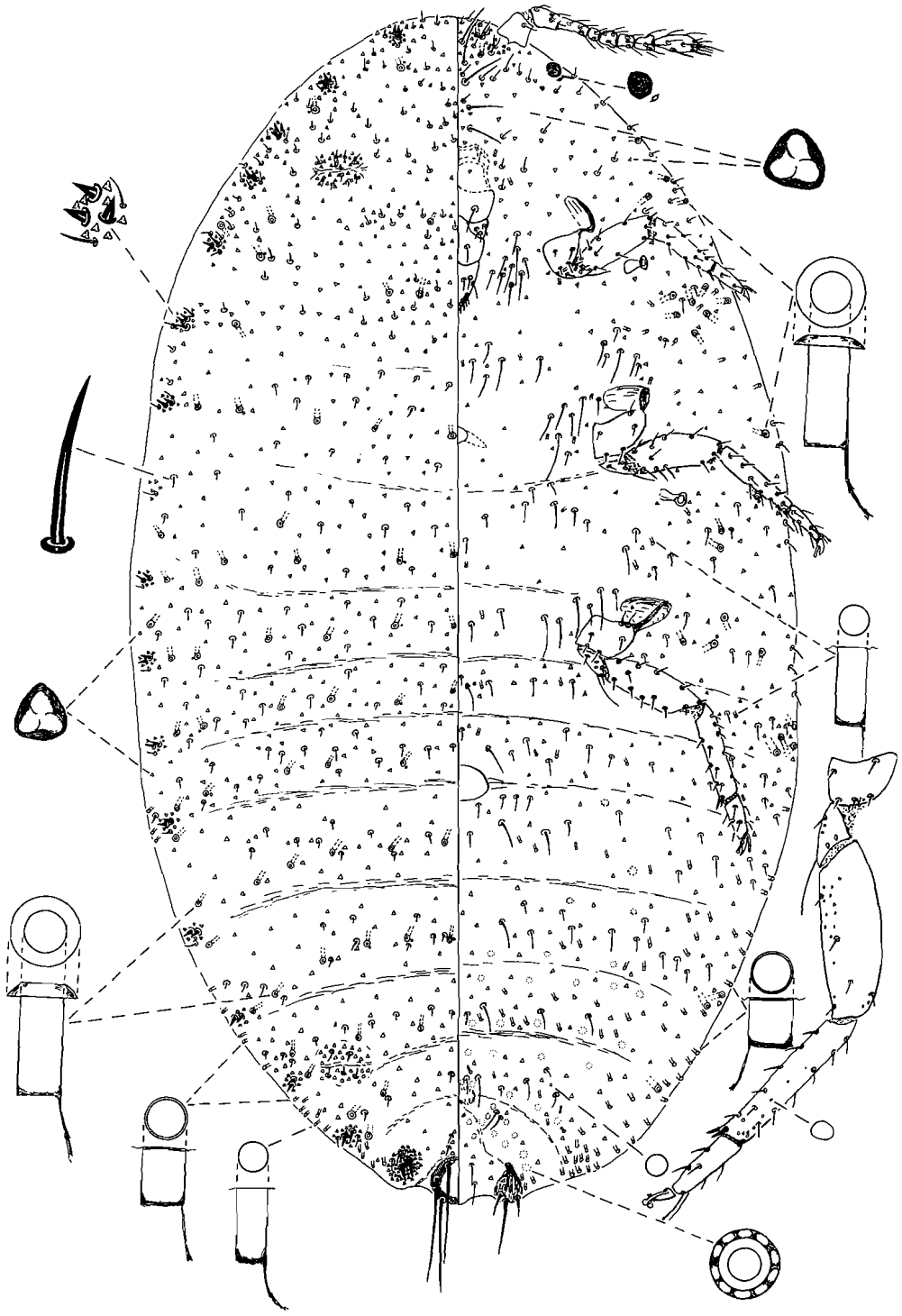

Figure 5. Adult female, *P. bermudensis*, Bermuda, IV-25-1951, on *Juniperus bermudiana*.

Circulus 1.5 times as wide as long, paratypes 1.3(1.2-1.3), width 89μ, paratypes 81(62-91)μ, divided by segmental fold of segments III and IV. Labium 134μ long, paratypes 124(104-141)μ long. Posterior spiracle greatest length 61μ, paratypes 48(42-63)μ long. Antennae 8-segmented, right antenna 378μ long, lengths of each segment as follows: I 49μ, II 51μ, III 59μ, IV 32μ, V 34μ, VI 39μ, VII 37μ, VIII 85μ long. Paratypes, 1 with 7-segmented antennae, remaining 8-segmented, 336(285-378)μ long, segments: I 44(35-61)μ, II 47(41-54)μ, III 50(44-59)μ, IV 28(22-32)μ, V 27(17-37)μ, VI 29(25-39)μ, VII 33(29-37)μ, VIII 80(74-85)μ long. Length of antennal segment VIII / segment II 1.7, paratypes 1.7(1.7-1.8), length of antennal segment VIII / segment III 1.5, paratypes 1.7(1.6-1.8).

Legs with 18 inconspicuous translucent pores on dorsal surface of hind tibia, paratypes 15(10-20), 13 translucent pores on hind femur, paratypes 17(10-22), 2 translucent pores on trochanter, paratypes 4(0-8), 3 translucent pores on coxa, paratypes 8(2-11). Femur 217μ long, paratypes 184(146-217)μ long, about equal to tibia; tibia 224μ long, paratypes 191(144-224)μ long; tarsus 98μ long, paratypes 93(85-98)μ long. Tibia/tarsus 2.3, paratypes 2.1(1.7-2.3). Hind tibia with 23 setae, paratypes with 20(18-23).

UNUSUAL VARIATION: As with *P. acirculus*, the number of conical setae in corresponding cerarii is quite variable, especially in cerarii 6-11. In many instances a cerarius is readily apparent from the cluster of 2 or 3 trilocular pores, but the associated setae are not conical.

U.S. SPECIMENS EXAMINED: None
OTHER SPECIMENS EXAMINED: Bermuda: Location unknown (25-IV-1951, *Juniperus bermudiana*, F. D. Bennett), 3 slides, 3 specimens (BMNH, USNM); Southampton, St. Annes's Road, west of Gibb's Hill Lighthouse (29-XII-1983, *Juniperus bermudiana*, W. F. Gimpel) 3 slides, 3 specimens (USNM); Middle Road, Heron Bay School (1-V-1990, *Juniperus bermudiana*, D.J. Williams and K. Monkman) 2 slides, 2 specimens (USNM, BM).

HOSTS AND DISTRIBUTION: This species is known only from Bermuda on *Juniperus bermudiana*. Hodgson and Hilburn (1991) state "This mealybug off *Juniperus* has yet to be described. It was last collected in the early 1980's in the Warwick/Southhampton area, but was not found during the current survey despite a concentrated search." Subsequently, this species has been collected on Bermuda (Hodgson, personal communication).

DISCUSSION: *Pseudococcus bermudensis* shares many characteristics with *P. sorghiellus*, *P. dysmicus*, and *P. spanocera* such as translucent pores on hind coxa, trochanter, femur and tibia; short legs (femur less than 220μ long); short antennae (less than 400μ long); small number of setae on hind tibia (about 23); high value of length of antennal segment of VIII (or VII) / length of segment III (about 1.7). *Pseudococcus bermudensis* can be distinguished by having: 19(8-27) oral rims on the ventral submargin between abdominal segment II and cerarius 13; no oral collars on submarginal area of head, posterior of eye, associated with

cerarius 12, between cerarii 10 and 11; ventral oral rim associated with frontal cerarius; anal-ring setae 163(128-183)μ long; anal-lobe seta 77(67-90)μ long; 64(50-74) oral-rims on dorsal surface of abdomen. *Pseudococcus sorghiellus*, *P. dysmicus*, and *P. spanocera* have about 2(0-4) oral rims on the ventral submargin between abdominal segment II and cerarius 13; oral collars present on submarginal areas of head, posterior of eye, near cerarius 12, or between cerarii 10 and 11; ventral oral rim absent near frontal cerarius; anal-ring setae 120(101-143)μ long; anal-lobe seta 108(90-143)μ long; 14(0-31) oral rims on dorsal surface of abdomen.

For a comparison of *P. bermudensis* with *P. dasyliriae* see the discussion section of the latter species.

Pseudococcus bryberia Gimpel and Miller, new species (Figure 6)

SUGGESTED COMMON NAME: Spanish moss mealybug.

DIAGNOSIS: Translucent pores on hind femur and tibia; labium 133(124-143)μ long; 1(0-1) discoidal pores associated with eye; 24(19-27) setae on hind tibia; length of hind tibia 216(190-267)μ.

TYPE DATA: The adult female holotype is the only specimen on a slide labeled as follows: Left label: "Pseudococcus / bryberia / Gimpel & Miller / HOLOTYPE"; right label "Pseudococcus / sp. nr. /maritimus / Ehrhorn / Osaabow Island, / Georgia VI-21-69 / *Tillandsia* sp. / G. Childs / 69-12425 7" (USNM). There are 10 paratypes on 9 slides that are deposited in BMNH, UG, FSCA, UCD, USNM.

The species epithet is a combination of the Greek nouns *bryon* meaning "moss" and *iberia* meaning "Spain" or "Spanish" and refers to the common name of the host of this species.

FIELD CHARACTERS: The species occurs on the narrow leaves of Spanish moss.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 1.7 mm, width 0.9 mm. Paratypes 1.5(0.8-2.4) mm long, 0.9(0.5-1.6) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: Left side, 1-3(2), 4-7(1-2), 8(2), 9(1-2), 10(1-3), 11(2), 12(3), 13(2-3), 14(2), 15(2-3), 16(3-4), 17(2-3). Cerarius 12 (right side) with 3 auxiliary setae, paratypes 3(2-5), 12 trilocular pores, paratypes 16(12-18), 0 discoidal pores, paratypes 2(0-3). Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 1 variable size, rare on dorsum, associated with oral-rim tubular ducts, 2μ in diameter, scattered sparsely. Oral-rim tubular ducts with 1(1-3) discoidal pores and 1(0-2) setae associated with rim, oral rims present posterior of frontal cerarii, present on submargin between cerarii 15 and 16, present on submarginal, submedial and median areas of body, usually associated with cerarii 2, 4, 6, and 8 on submarginal area of abdomen, with 12 oral rims on abdomen, paratypes with 14(10-20), oral-collar tubular ducts only on submar-

gin between posterior cerarii. Body setae of 2 sizes, longest seta on abdomen, excluding segment VIII, 12μ long, paratypes 14(12-22)μ long; 4 dorsomedial setae on segment VIII, paratypes 4(4-5), longest seta 15μ long, paratypes 17(15-20)μ long.

Anal-ring seta 121μ long, paratypes 134(119-153)μ long; 1.7 times as long as greatest diameter of ring, paratypes 1.9(1.7-2.3).

VENTER: Multilocular disc pores in posterior and anterior bands on segments V-VII, scattered on segments IV, VIII, and IX, paratypes with anterior and posterior bands on segments IV or V-VII, with 1 pore on thorax, paratypes with 2(1-7) pores on thorax. Trilocular pores scattered, 42 on segment VI, paratypes 62(36-88). Discoidal pores of 1 size, 3μ in diameter, paratypes 2(2-3)μ, 1 in membranous rim around each eye, paratypes 1(0-1) pores, 2 on basal sclerotization of anal lobe, paratypes 2(1-3) pores. Oral-rim tubular ducts with 1(0-2) discoidal pores and 0(0-1) seta associated with rim, with 4 ducts on submargin from segment II to cerarius 13, paratypes with 3(1-4) ducts, without duct near frontal cerarii; oral-collar tubular ducts in segmental band on segments VII-IV or III, associated with posterior band of multilocular disc pores, few on thorax and head, 2 mesad of cerarius 12, paratypes with 4(2-11) ducts, 0 associated with cerarii 10 and 11, paratypes 2(0-9) ducts, 0 between posterior edge of eye and cerarius 15, paratypes 1(0-2), with 1 duct on each side of head, paratypes 1(0-2). Setae as follows: 3 cisanal, paratypes 3(2-4), longest 27μ long, paratypes 35(27-42)μ long; 2 or 1 cisvulvar on each side, paratypes 2(1-3), 42μ long, paratypes 45(40-49)μ long; longest anal-lobe seta 99μ long, paratypes 98(69-118)μ long; longest body seta on abdomen 57μ long, paratypes 64(57-74)μ long; longest interantennal seta 91μ long, paratypes 97(89-109)μ long; longest seta on trochanter of hind leg 94μ long, paratypes 104(94-123)μ long.

Circulus of holotype highly convoluted, paratype circuli 1.6(1.3-2.0) times wider than long, width 93μ, paratypes 93(71-131)μ, divided by intersegmental fold. Labium 126μ long, paratypes 133(124-143)μ long. Posterior spiracle greatest length 52μ, paratypes 59(52-69)μ. Antennae 7 and 8-segmented, paratypes with 7 segments about 30% of time, 360μ long, length of each segment as follows: I 47μ, II 49μ, III 52μ, IV 27μ, V 34μ, VI 27μ, VII 37μ, VIII 82μ; paratypes 386 (360-446)μ long, length of each segment as follows: I 47(42-52)μ, II 51(44-64)μ, III 48(44-62)μ, IV 31(25-42)μ, V 36(24-47)μ, VI 32(27-37)μ, VII 38(32-44)μ, VIII 85(79-91)μ long. Length of antennal segment VIII / segment II 1.7, paratypes 1.7(1.4-2.0), antennal segment VIII / segment III 1.6, paratypes 1.8(1.5-2.2).

Legs with 20 translucent pores on dorsal surface of hind tibia, paratypes 23(14-39); 13 pores on hind femur, paratypes 16(5-28); absent from remaining segments. Femur 185μ long, paratypes 204(180-242)μ long, shorter than tibia; tibia 203μ long, paratypes 216(190-267)μ long; tarsus 104μ long, paratypes 104(99-109)μ long. Tibia / tarsus 2.0, paratypes 2.1(1.8-2.5). Hind tibia with 26 setae, paratypes 24(19-27) setae.

UNUSUAL VARIATION: Two specimens have 1-5 multilocular pores laterad of the anterior spiracles.

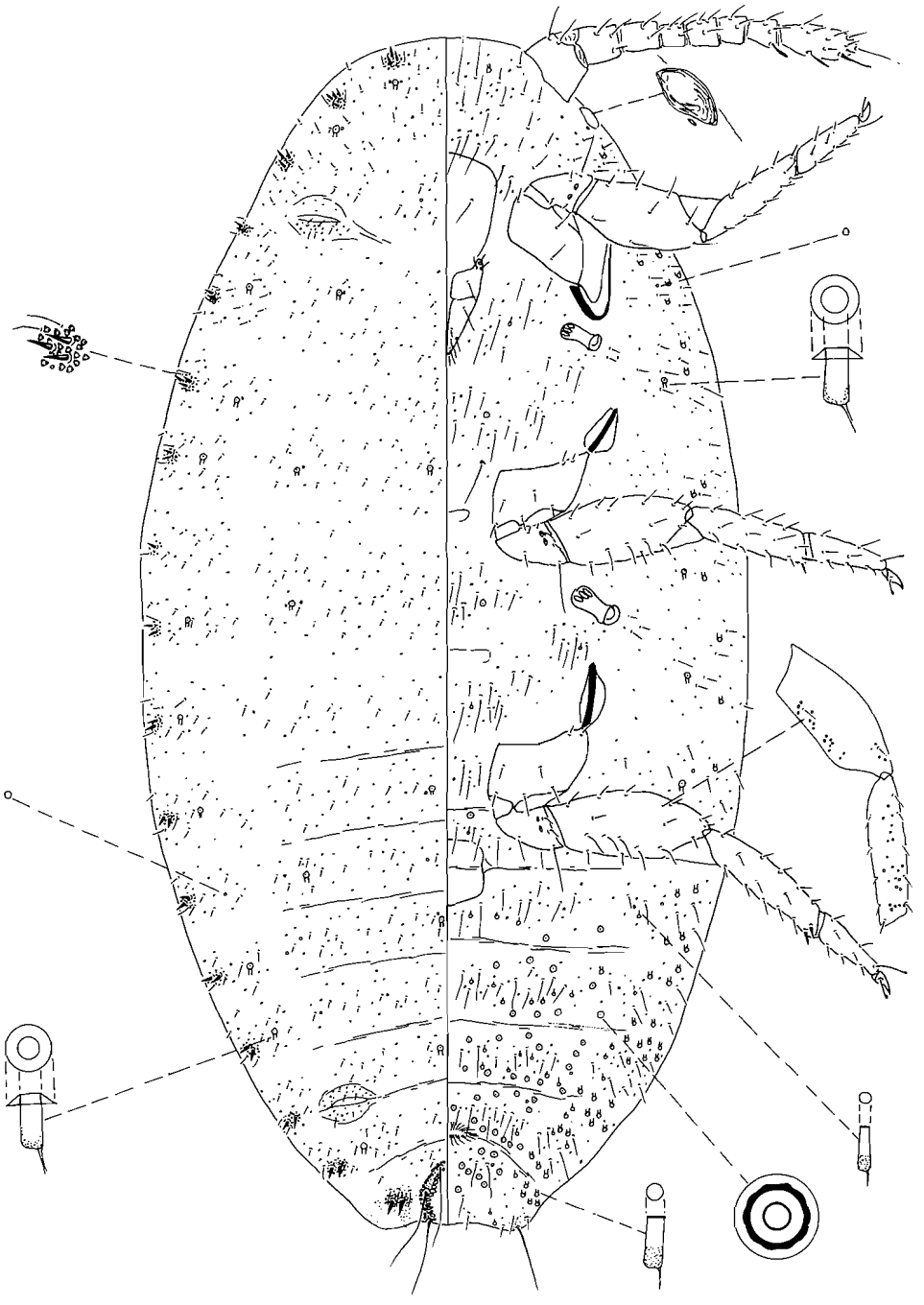

Figure 6.. Adult female, *P. bryberia,* Osaabow Island, Georgia VI-21-1969, on *Tillandsia* sp.

U.S. SPECIMENS EXAMINED: Florida: Polk Co., near Frostproof (10-XII-1970, *Tillandsia usneoides*, S. Nakahara), 1 slide, 1 specimen (FSCA).
Georgia: Camden Co., Cumberland Island (20-III-1971, *Tillandsia* sp., R. Beshear), 2 slides, 2 specimens (UG, USNM); Chatham Co., Ossabaw Island (21-VI-1969, *Tillandsia* sp., G. Childs), 5 slides, 5 specimens (BMNH, UCD, USNM); Echols Co., locality unknown (18-V-1968, *Tillandsia usneoides*, R. Beshear) 1 slide, 1 specimen (USNM).
Virginia: Princes Anne Co., Seashore State Park, Bald Cypress Trail (8-V-1971, *Tillandsia* sp., D.R. Miller, W. F. Gimpel, D. Pollet), 1 slide, 2 specimens (USNM).

OTHER SPECIMENS EXAMINED: None

HOSTS AND DISTRIBUTION: This species probably occurs in the eastern United States wherever Spanish moss is found.
DISCUSSION: *Pseudococcus bryberia* is similar to *P. eriocerei* but differs by having: 1 (0-1) discoidal pores associated with eye; labium 133(124-143)μ long; 24(19-27) setae on hind tibia; 23(14-39) translucent pores on hind tibia; 16(12-18) trilocular pores in cerarius 12; 3(2-4) auxiliary setae in cerarius 12; tibia 216(190-267)μ long; tibia/tarsus 2.1(1.8-2.5); interantennal setae 97(89-109)μ long. *Pseudococcus eriocerei* has: 2(0-4) discoidal pores associated with eye; labium 175(168-180)μ long; 31(26-38) setae on hind tibia; 52(28-92) translucent pores on hind tibia; 10(5-15) trilocular pores in cerarius 12; 1(0-3) auxiliary setae in cerarius 12; tibia 265(237-284)μ long; tibia/tarsus 2.8(2.4-3.1); interantennal setae 77(49-99)μ long.

Pseudococcus dasyliriae Gimpel and Miller, new species (Figure 7)

SUGGESTED COMMON NAME: Sotol mealybug

DIAGNOSIS: Cerarii poorly developed, normally fewer than 12 cerarii with conical setae; dorsal multilocular disc pores on segments VI and VII; cerarius 12 normally without conical setae, but with 1 or 2 bristle-shaped setae; anal-ring setae 92 (88-98)μ long; no oral-rim tubular ducts on ventral submargin between segment II and cerarius 13.

TYPE DATA: Adult female holotype is on a slide labeled: "*Pseudococcus* / *dasyliriae* / Holotype / On Sotol / Ft. Stockton, Texas / July 2, 1970 / C.W. Neeb colr. / 70-12054 (USNM)". There are 4 adult female paratypes on 2 slides. Two paratypes are deposited in each of the BMNH and USNM.

The species epithet is formed from the generic epithet of the host.

FIELD CHARACTERS: No available information.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 2.2 mm, width 1.1 mm. Paratypes 1.8(1.5-2.4) mm long, 0.8(0.6-1.1) mm wide.

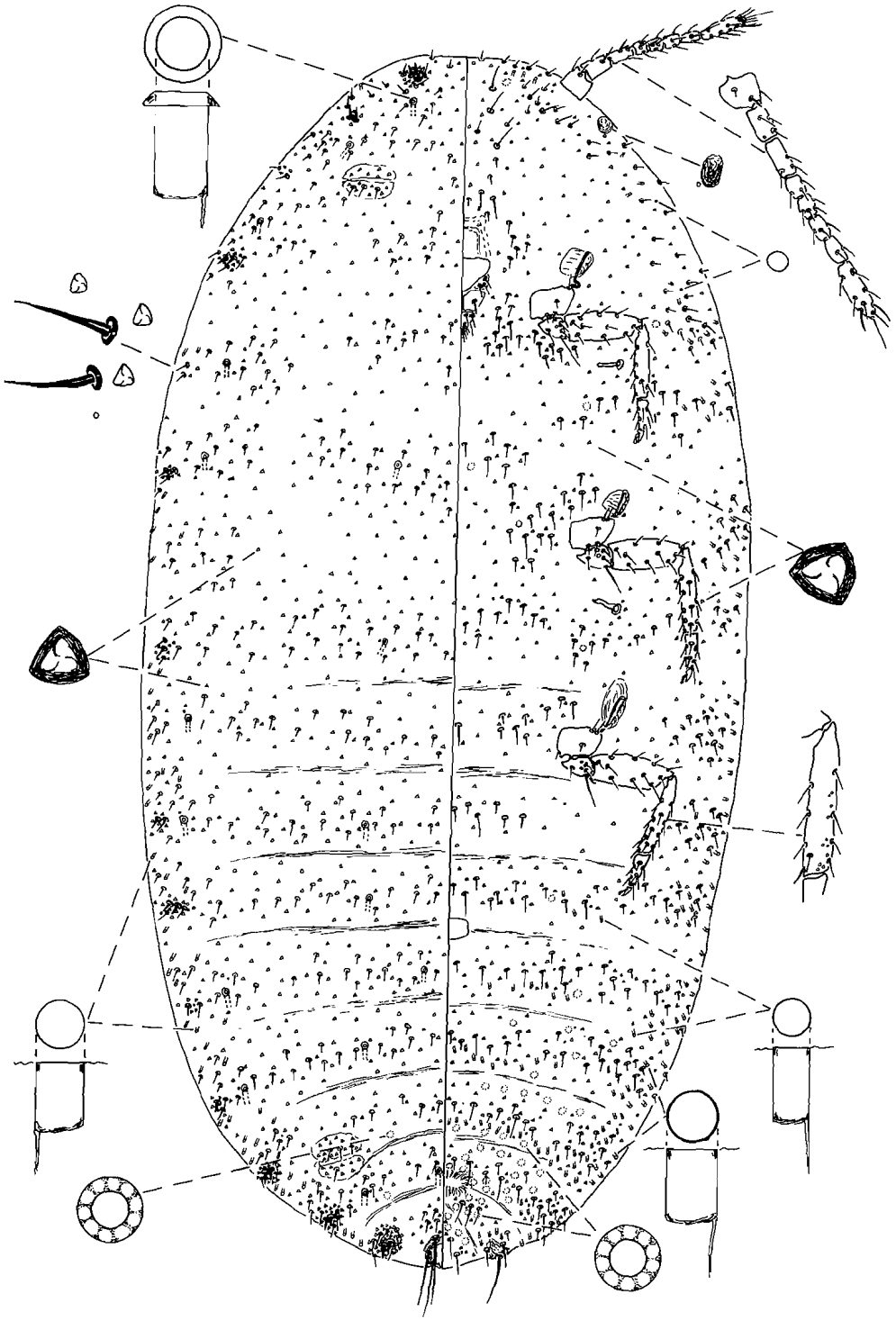

Figure 7. Adult female, *P. dasyliriae,* Ft. Stockton, Texas, VII-2-1970, on sotol.

DORSUM: With 11 and 10 cerarii, paratypes 8(5-10), cerarian formula as follows: left side, 1-3 (2), 4 (1), 5 (0), 6 (2), 7 (1), 8 (0), 9 (1), 10 (0), 11 (2), 12 (0), 13 (2), 14 and 15 (0), 16 (2), 17 (3), right side, 1-6 (2), 7-10 (0), 11 (1), 12 and 13 (2), 14-16 absent, 17 (2), paratypes 1-2 (2), 3 (1-2), 4-6 (0-2), 7 (0-1), 8 (0), 9 (0-2), 10 (0), 11 and 12 (0-1), 13 (0-2), 14 and 15 (0), 16 (0-2), 17 (1-3). Cerarius 12 (left side) with 2 slender setae, paratypes with 3(2-3), 1 trilocular pore, paratypes with 4 (1-6), 1 discoidal pore, paratypes with 1(0-1). Cerarius 1 with slight basal sclerotization. Multilocular disc pores on each side of body with 1 on each posterior submargin of segments VI and VII, paratypes with 1 (0-3) on segments VI and VII, 1(0-1) on segment V; trilocular pores scattered evenly; discoidal pores of 1 size, about same diameter as small size on venter, scarce. Oral-rim tubular ducts with or without 1 small discoidal pore and 1 seta associated with rim, oral rims numerous, present posterior of frontal cerarii, left side, 1 mesad of cerarii 2, 4, 5, 7, 8, 11, 12, 13, 15, several on thorax, 1 mesally or submesally on segments II-V and VII, with 21 on abdomen, paratypes with 13(4-18); oral-collar tubular ducts on submargin mesad of cerarii on segments II-VII. Body setae of 2 sizes, longest seta on abdomen, excluding segment VIII, 13μ long, paratypes 13(12-17)μ long; 7 dorsomedial setae on segment VIII, paratypes with 6(5-7), longest 17μ long, paratypes 16(12-22)μ long.

Anal-ring setae 98μ long, paratypes 92(88-98)μ long, 1.5 times as long as greatest diameter of ring, paratypes 1.4(1.3-1.5).

VENTER: Multilocular disc pores in anterior and posterior bands on segments VI and VII, anterior band on segment V, 1 on segment IV, scattered on segments VIII and IX, few on thorax, 1 on head between antennae, paratypes also with 1 or 2 on segments II and III. Trilocular pores scattered over venter, 66 on segment VI, paratypes 48(42-54). Discoidal pores of 2 sizes, large size about 4μ in diameter, 1 on anal lobe, paratypes 1(0-3), small size about 2μ in diameter, 1 in membranous rim around each eye, paratypes 1(0-2), sparsely scattered over remainder of venter. Oral-rim tubular ducts absent; oral-collar tubular ducts in transverse band on posterior portion of segments IV-VI, scattered on submargin of abdomen and thorax, few on head, with 5 in cluster mesad of cerarius 12, paratypes 5(3-9), 9 associated with position of cerarii 10 and 11, paratypes 8(7-9), 2 or 4 posterior of eye, paratypes 3(2-5), with 1 or 2 on each side of head, paratypes 2(0-4). Setae as follows: 4 cisanal, 27μ long, paratypes 33(24-46)μ long; 3 cisvulvar on each side, paratypes 4(2-4), 28μ long, paratypes 25(15-37)μ long; longest anal-lobe seta broken on holotype, paratypes 96(90-100)μ long; body setae of 2 lengths, longest 33μ long, paratypes 34(24-49)μ long; longest interantennal seta 59μ long, paratypes 39(37-44)μ long; longest seta on trochanter of hind leg 70μ long, paratypes 62(54-68)μ long.

Circulus 1.6 times as wide as long, paratypes 1.5(1.3-1.7), width 62μ, paratypes 65(57-74)μ, divided by intersegmental fold. Labium 101μ long, paratypes 103(96-109)μ long. Posterior spiracle greatest length 54μ long, paratypes 52(46-56)μ long. Antennae 8-segmented, right antenna 329μ long, length of each segment as follows: I 44μ, II 44μ, III 41μ, IV 20μ, V 29μ, VI 29μ, VII 29μ, VIII 76μ long, paratypes 314(298-341)μ long, length of each segment as follows: I

40(36-44)μ, II 42(36-49)μ, III 40(32-49)μ, IV 23(20-27)μ, V 24(20-32)μ, VI 24(17-29)μ, VII 33(32-37)μ, VIII 76(73-78)μ long. Length of antennal segment VIII / segment II 1.8, paratypes 1.7(1.6-1.9), antennal segment VIII / segment III 1.7, paratypes 1.8(1.6-1.9).

Legs with 12 translucent pores on dorsal surface of hind tibia, paratypes 10(6-14), absent from remaining segments. Femur 178μ long, paratypes 173(163-183)μ long, longer than tibia; tibia 151μ long, paratypes 141(129-151)μ long; tarsus 78μ long, paratypes 77(76-80)μ long. Tibia/tarsus 1.9, paratypes 1.8(1.7-2.0). Hind tibia with 20 setae, paratypes 19(18-29).

UNUSUAL VARIATION: One specimen has only 4 dorsal oral-rim tubular ducts on the abdomen; the other specimens have 17(13-21).

U.S. SPECIMENS EXAMINED: Texas: Pecos Co., Ft. Stockton (2-VII-1970, *Dasylirion* sp., C.W. Neeb) 3 slides, 5 specimens (BMNH) (USNM).

OTHER SPECIMENS EXAMINED: Not known to occur outside of the U.S.

HOSTS AND DISTRIBUTION: This species is only known from the type locality and host. Because *Dasylirion* occurs throughout much of the southwestern United States and into Mexico, it is possible that this mealybug occurs in other states and in Mexico.

DISCUSSION: *Pseudococcus dasyliriae* is most similar to *P. bermudensis*. Both usually have fewer than 17 pairs of cerarii (about 8-13), few trilocular pores in cerarius 12 (about 6), a short labium (about 103-134μ long), a short posterior spiracle (about 51μ long), short antennae (about 314-375μ long), large value for length of antennal segment VIII / length of segment II (about 1.7), few translucent pores on the hind tibiae (about 12), short hind femur (about 173-204μ long), short hind tibia / tarsus length (about 2.0), few tibial setae (about 20), short anal-lobe setae (about 85-96μ long). *Pseudococcus dasyliriae* differs by having: Dorsal multilocular disc pores, 6(5-7) dorsal setae on segment VIII, anal-ring setae 92(88-98)μ long, anal-ring seta length / anal ring diameter 1.4(1.3-1.5), no oral rims on venter from segment II to cerarius 13, no translucent pores on hind coxa, trochanter, or femur, hind tibia shorter than hind femur. *Pseudococcus bermudensis* has no dorsal multilocular pores, 4 dorsal setae on segment VIII, anal-ring setae 163(128-183)μ long, anal-ring seta length / anal ring diameter 2.0(1.9-2.1), 19(16-27) oral rims on venter from segment II to cerarius 13, translucent pores on hind coxa, trochanter, and femur, hind tibia longer than hind femur.

Pseudococcus dolichomelos Gimpel and Miller, new species (Figure 8)

SUGGESTED COMMON NAME: False trochanter mealybug

DIAGNOSIS: Translucent pores on all segments of hind leg except tarsus; legs long, tibia about 240μ long; circulus small, but larger than in *P. sorghiellus*, width around 90μ;.with about 7 oral collars associated with cerarius 12.

TYPE MATERIAL: The adult female holotype is mounted on a slide with 2 other specimens and is the right-hand specimen; the slide is labeled as follows: Left label "Pseudococcus/ Cameron Co., nr./Brownsville, Texas/ ex composite root/ V-22-78 crown/ N-78-72/ S. Nakahara/ Balsam", right label "Pseudococcus/ dolichomelos / Gimpel & Miller / HOLOTYPE" and a map giving location of holotype (USNM). There are 108 paratypes on 43 slides deposited in: BMNH, CDAS, FSCA, IES, IZAS, MCM, MNHP, TAES, UCD, UH, USNM, VPI, ZIL.

The species epithet is derived from the Greek adjective *dolichos* meaning "long" and the Greek noun *melos* meaning "limb" and refers to the unusually long legs of this species compared to other members of the *P. sorghiellus* complex.

FIELD CHARACTERS: There is no available information except that this species is a subterranean species occurring on the roots and crown of the host.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 2.3 mm, width 1.2 mm. Paratypes 2.4(1.4-3.5) mm long, 1.4(0.8-2.2) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: Left side, 1-11 (2), 12 (3), 13-14 (2), 15-17 (3), paratypes 1-9 (2), 10 (1-2), 11 (2), 12 (2-3), 13 (2), 14 (2-3), 15 (3), 16 (2-4), 17 (3). Cerarius 12 (right side) with 4 auxiliary setae, paratype 3(2-4), 19 trilocular pores, paratypes 20(11-28), 3 discoidal pores, paratypes 2(1-4). Cerarius 1 with basal sclerotization, paratypes with sclerotization on 1-4 posterior cerarii. Multilocular disc pores absent. Oral-rim tubular ducts with 1(0-2) discoidal pores and 1(0-2) setae associated with rim, oral rims present posterior of frontal cerarii, on submargin between cerarii 15 and 16, on each thoracic segment, on most abdominal segments, with 19 on abdomen, paratypes 24(19-34); oral-collar tubular duct absent except near body margin. Longest body setae on abdomen, excluding segment VIII, 21μ long, paratypes 20(15-27)μ long; 4 dorsomedial setae on segment VIII, paratypes 5(4-7), longest seta 27μ long, paratypes 23(17-35)μ long.

Anal-ring setae 160μ long, paratypes 143(106-168)μ long, 2.2 times as long as greatest diameter of ring, paratypes 1.8(1.4-2.4).

VENTER: Multilocular disc pores in posterior and anterior bands on segments V-VIII, with few scattered on segments IV and IX, paratypes with pores sometimes present on segments III and/or II, with 4 pores on thorax and head, paratypes with 6(0-29) multilocular pores on thorax and head. Trilocular pores scattered, 88 on segment VI, paratypes 111(82-194). Discoidal pores of 1 variable size, 3μ in diameter, paratypes 3(2-4)μ, 1 or 2 set in membranous rim around eye, paratypes 1(0-3), 2 on anal-lobe sclerotization, paratypes 2(0-4). Oral-rim tubular ducts with 1(0-2) discoidal pores and no setae associated with rim, with 4 ducts on submargin from segment II to cerarius 13, paratypes with 4(1-10) ducts; oral-collar tubular ducts in transverse band on segments VII-IV or III, associated with posterior band of multilocular disc pores, few on thorax and head, 9 ducts mesad of cerarius 12, paratypes with 9(3-13) ducts, 9 ducts associated with cerarii 10 and 11, paratypes 7(1-17), 8 ducts posterior of eye, paratypes 8(3-15), 7 ducts on each side of head, paratypes with 6(1-10). Setae as follow: 4 cisanal, longest

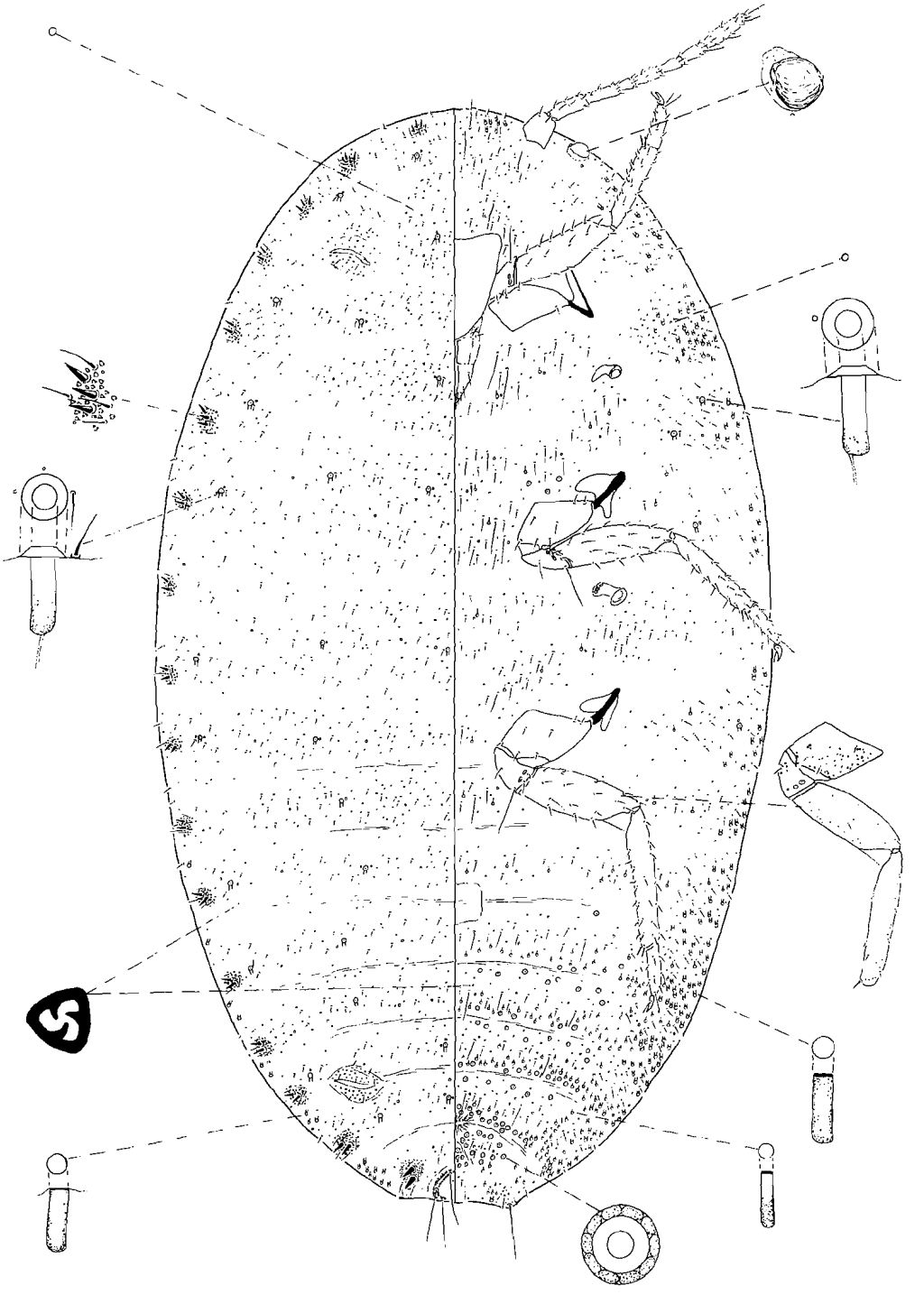

Figure 8. Adult female, *P. dolichomelos,* near Brownsville, Cameron Co., Texas, V-22-1978, on composite.

37μ long, paratypes 33(22-38) μ long; 4 cisvulvar on each side of body, paratypes 3(1-4), longest 49μ long, paratypes 37(27-54)μ long; longest anal-lobe seta 131μ long, paratypes 111(89-131)μ long; longest body seta on abdomen 69μ long, paratypes 63(42-89)μ long; longest interantennal seta 109μ long, paratypes 87(46-114)μ long; longest seta on trochanter of hind leg 111μ long, paratypes 105(79-128)μ long.

Circulus 1.2 times as wide as long, paratypes 1.4(1.2-1.8); width 96μ, paratypes 91(59-111)μ, divided by segmental fold, paratypes with circulus usually divided. Labium 131μ long, paratypes 145(131-161)μ long. Posterior spiracle greatest length 67μ, paratypes 73(64-82)μ. Antennae 8-segmented, right antenna 477μ long, length of each segment as follows: I 62μ, II 71μ, III 64μ, IV 25μ, V 47μ, VI 44μ, VII 49μ, VIII 94μ, paratypes 422(360-490)μ long, length of each segment as follows: I 59(49-74)μ, II 64(52-76)μ, III 57(36-77)μ, IV 28(20-37)μ, V 41(30-52)μ, VI 33(27-44)μ, VII 40(35-49)μ, VIII 88(82-94)μ long. Length of antennal segment VIII / segment II 1.3, paratypes 1.4(1.2-1.6), antennal segment VIII / segment III 1.5, paratypes 1.7(1.3-2.4).

Legs with 24 conspicuous translucent pores on hind tibia, paratypes 21(11-31); 26 pores on hind femur, paratypes 27(12-56); 8 pores on hind trochanter, paratypes 8(0-18); 52 pores on hind coxa, paratypes 38(12-53). Femur 259μ long, paratypes 240(198-291)μ long, slightly shorter than tibia; tibia 267μ long, paratypes 244(195-299)μ long; tarsus 109μ long, paratypes 101(94-109)μ long. Tibia/ tarsus 2.4, paratypes 2.4(2.0-2.8). Hind tibia with 28 setae, paratypes 27(22-31) setae.

UNUSUAL VARIATION: None

U.S. SPECIMENS EXAMINED: District of Columbia: (8-IX-1948, *Narcissus* sp., F.P. Hubert), 1 slide, 3 specimens (USNM); (18-X-1948 *Narcissus* sp., J.T. Bigham), 1 slide, 1 specimen.
Florida: (28-X-1947, *Narcissus* sp., F.P. Hubert) 1 slide, 3 specimens (USNM); Citrus Co.: Withlacooche State Forest (13-IV-1974, *Lupinus* sp., R.F. Denno, D.R. Miller), 3 slides, 6 specimens (BMNH, CDAS, USNM); Collier Co: 5 mi. N. Marco (30-IV-1975), *Euphorbia* sp., R.F. Denno, J. A. Davidson, D.R. Miller), 3 slides, 5 specimens (FSCA, UCD, USNM); Duval Co.: Jacksonville (15-XI-1949, *Narcissus* sp., F.P. Hubert), 1 slide, 5 specimens (USNM); Hernando Co.: Weeki Wachee (27-IV-1975, Compositae, R.F. Denno, J.A. Davidson, D.R. Miller), 1 slide, 1 specimen (USNM); Indian River Co.: 1 mi. S. Sebastian (2-IV-1974, Gramineae, D.R. Miller, R.F. Denno), 2 slides, 3 specimens (MNHP, USNM); Gulf Co: Indian Pass Beach (12-V-1975, *Oenothera* sp., R.F. Denno, J.A. Davidson, D.R. Miller) 1 slide, 1 specimen (USNM); Palm Beach Co.: West Palm Beach (7-IV-1944, *Lycopersicon lycopersicum*, Linduska) 1 slide, 3 specimens (USNM); Sumter Co.: 4 mi. S.E. Floral City (27-IV-1975, *Euphorbia* sp., R.F. Denno, J.A. Davidson, D.R. Miller) 4 slides, 6 specimens (USNM, VPI).
Hawaii: (6-I-1983 *Zingiber officinalis*, D. Van Epp, at Santa Barbara, California), 2 slides, 3 specimens (CDAS, USNM). Louisiana: Jefferson Parrish (28-III-1945, *Vicia faba*, G. Rau, 1 slide, 1 specimen (USNM).

Maryland: Charles Co.: Newport (13-VIII-1941, *Boehmeria cylindrica*, H.S. McConnell) 3 slides, 4 specimens (MCM, USNM, ZIL); Prince George's Co.: Beltsville (3-VIII-1959, *Prunus persica*, H. Baker) 1 slide, 3 specimens (USNM); Wicomico Co.: Wicomico, *Hypericum virginicum*, H.S. McConnel) 1 slide, 1 specimen (USNM).
Michigan: Branch Co.: Gilead (25-VII-1959), *Trifolium pratense*, H.D. Niemczy) 1 slide, 5 specimens (USNM).
New York: New York (4-XI-1937, *Narcissus* sp., G.M. Repetti) 1 slide, 4 specimens (USNM).
North Carolina: Carteret Co.: 3 mi. s. Morehead City (23-IV-1975, *Polygonum* sp., D.R. Miller, R.F. Denno, J.A. Davidson) 1 slide, 2 specimens (USNM); Surry Co.: Locality unknown (21-1-1958, on *Narcissus* sp., M.H. Farrier) 1 slide, 6 specimens (USNM).
South Carolina: Charleston Co.: Charleston (17-XI-1944, *Taraxicum offinale*, Mallia) 1 slide, 3 specimens (USNM).
Texas: Cameron Co.: near Brownsville (22-V-1978, Compositae, S. Nakahara) 1 slide, 3 specimens (USNM), State Highway 675 (26-V-1978, host unknown, S. Nakahara) 1 slide, 1 specimen (USNM); Hidalgo Co.: McAllen (28-V-1977, *Rumex* sp., D.R. Riley) 6 slides, 24 specimens (IES, IZAS, TAES, VH, USNM)
West Virginia: Kanawha Co.: Charlestown (10-VIII-1943, *Trifolium pratense*, G.H. Geissler) 2 slides, 7 specimens (USNM), Pikeside (15-IX-1944, *Trifolium pratense*, D.W. Clancy) 1 slide, 3 specimens (USNM).

HOSTS AND DISTRIBUTION: *Pseudococcus dolichomelos* predominates in the southeastern U.S. but also has been collected in New York, Michigan and West Virginia. It has been recorded on a spectrum of host plants including over 10 different families.

DISCUSSION: *Pseudococcus dolichomelos* has been confused with *P. sorghiellus*. It can be separated from the latter by having: Tibia 244(195-299)μ long; femur 240(198-291)μ long; tibia length/tarsus length 2.4(2.0-2.8); 7(1-17) oral-collar tubular ducts associated with cerarii 10 and 11; 8(3-15) oral collars near eye; antenna 422(360-490)μ long; antennal segment III 57(36-77)μ long; circulus width 91(59-111), usually partially divided by intersegmental line; longest anal-ring seta 143(106-168)μ long. *Pseudococcus sorghiellus* has: Tibia 173(125-198)μ long; femur 179 (136-198)μ long; tibia length/tarsus length 1.9(1.5-2.3); 1(0-3) oral-collar tubular ducts associated with cerarii 10 and 11; 2(0-6) oral collars associated with eye; antenna 329(254-366)μ long; antennal segment III 39(25-49)μ long; circulus width 52(31-87)μ, usually undivided; longest anal-ring seta 117(104-128)μ long.

No single character can be used to distinguish these species. The combination of long legs, long antenna, long setae, and more abundant oral collars on thorax and head of *P. dolichomelos* compared with *P. sorghiellus* have convinced us that these species are distinct.

Pseudococcus donrileyi Gimpel and Miller, new species (Figure 9)

SUGGESTED COMMON NAME: Riley citrus mealybug.

DIAGNOSIS: Translucent pores restricted to hind tibia; narrow sclerotized rim present around eye with 4(2-6) discoidal pores; ventral oral rim associated with frontal cerarius; cerarius 12 with 3(1-5) associated oral collars.

TYPE DATA: The adult female holotype is mounted alone on a slide labeled as follows: Left label "Mercedes, Tex. / VIII-3-77' / on *Citrus* sp. / site #250 / D.R.R-38-77 / 3 / Balsa D. Riley"; right label "Pseudococcus / donrileyi / Gimpel & Miller / HOLOTYPE". There are 15 paratypes on 10 slides that are deposited in BMNH, FSCA, CDAS, UCD, USNM. Three slides also contain paratypes of *P. pithecellobii*

The species epithet is given to honor Donald R. Riley, Port Identifier, Animal Plant Health Inspection Service, Brownsville, Texas. He is a diligent collector of scale insects and is to be complimented for his broad knowledge and keen interest in coccidology.

FIELD CHARACTERS: On above ground portions of the host.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 2.2 mm, width 1.3 mm. Paratypes 2.8(1.5-4.3) mm long, 1.5(0.8-2.6) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: Left side, 1-9 (2), 10 (1-2), 11 (2), 12 (3-4), 13-14 (2), 15 (3), 16 (3-5), 17 (3). Cerarius 12 (right side) with 4 auxiliary setae, paratypes 4(2-5), 33 trilocular pores, paratypes 27(17-33), 3 discoidal pores, paratypes 2(0-4). Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 1 variable size, scattered over dorsum, associated with oral-rim tubular ducts, 3μ in diameter, scattered sparsely. Oral-rim tubular ducts with 1(0-3) discoidal pores and 1(0-2) setae associated with rim, oral rims present posterior of frontal cerarii, present on submargin between cerarii 15 and 16, present on submarginal, submedian, and median areas of body, with 24 oral rims on abdomen, paratypes with 26(22-29), oral-collar tubular ducts only on submargin between posterior cerarii. Body setae of 2 sizes, longest seta on abdomen, excluding segment VIII, 22 long, paratypes 20(18-25)μ long; 4 dorsomedial setae on segment VIII, paratypes 5(4-7), longest seta 22μ long, paratypes 23(17-27)μ long.

Anal-ring seta 173μ long, paratypes 185(141-200)μ long; 1.6 times as long as greatest diameter of ring, paratypes 1.8(1.4-2.2).

VENTER: Multilocular disc pores in posterior and anterior bands on segments V-VII, in posterior band on segment IV, scattered in segments III, VIII and IX, paratypes with anterior and posterior bands on segments V-VII, with several pores in posterior area of IV, with 1 pore on thorax, paratypes with 1(0-1) pores on thorax. Trilocular pores scattered, 114 on segment VI, paratypes 94(60-118).

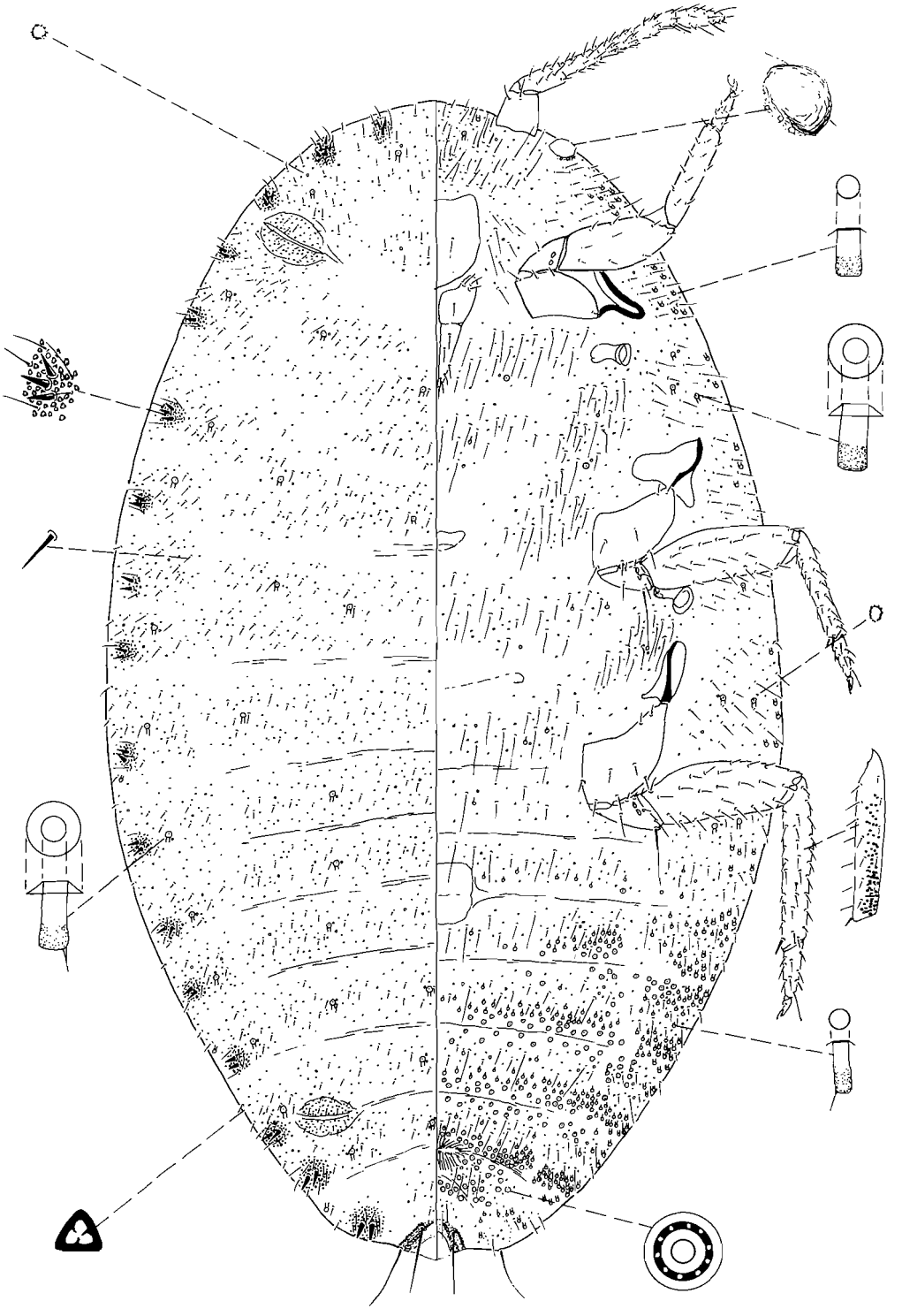

Figure 9. Adult female, *P. donrileyi,* Mercedes, Texas, VIII-3-1977, on *Citrus* sp.

Discoidal pores of 1 size, 3μ in diameter, paratypes 3(2-4)μ, 3 in narrow sclerotized rim around each eye, paratypes 4(2-6) pores, 2 or 3 on basal sclerotization of anal lobe, paratypes 3(1-4) pores. Oral-rim tubular ducts with 1(0-3) discoidal pores and 0(0-2) seta associated with rim, with 8 ducts on submargin from segment II to cerarius 13, paratypes with 10(7-12) ducts, with duct near frontal cerarius; oral-collar tubular ducts, in segmental band on segments VII-IV or III, associated with posterior band of multilocular disc pores, few on thorax and head, 4 mesad of cerarius 12, paratypes with 3(1-5) ducts, 3 associated with cerarii 10 and 11, paratypes 3(1-4) ducts, 6 posterior of eye, paratypes 8(5-13), with 1 duct on each side of head, paratypes 1(0-3). Setae as follows: 4 cisanal, longest 42μ long, paratypes 42(37-47)μ long; 3 or 4 cisvulvar on each side, paratypes 4(2-5), 40 μ long, paratypes 46(40-57)μ long; longest anal-lobe seta 111μ long, paratypes 117(96-133)μ long; longest body seta on abdomen 99μ long, paratypes 95(84-104)μ long; longest interantennal seta 126μ long, paratypes 121(104-141)μ long; longest seta on trochanter of hind leg 143μ long, paratypes 138(133-146)μ long.

Circulus 1.3 times wider than long, paratypes 1.3(1.0-1.9) times, width 163μ, paratypes 184(116-259)μ, divided by intersegmental fold. Labium 185μ long, paratypes 177(131-192)μ long. Posterior spiracle greatest length 82μ, paratypes 84(67-91). Antennae 8-segmented, 508μ long, lengths of each segment as follows: I 77μ, II 83μ, III 82μ, IV 37μ, V 47μ, VI 42μ, VII 42μ, VIII 91μ; paratypes 497(422-533)μ long, length of each segment as follows: I 72 (59-82)μ, II 77 (62-83)μ, III 76(52-86)μ, IV 37(30-42)μ, V 45(32-52)μ, VI 43(37-49)μ, VII 41(37-44)μ, VIII 91(86-94)μ long. Length of antennal segment VIII / segment II 1.1, paratypes 1.2(1.0-1.4), antennal segment VIII / segment III 1.1, paratypes 1.2(1.0-1.7).

Legs with 75 conspicuous translucent pores on dorsal surface of hind tibia, paratypes 73(49-108); without pores on other leg segments. Femur 299μ long, paratypes 294(254-321)μ long, shorter than tibia; tibia 331μ long, paratypes 313(277-333)μ long; tarsus 109μ long, paratypes 109(101-114)μ long. Tibia / tarsus 3.0, paratypes 2.9(2.7-3.0). Hind tibia with 44 setae, paratypes 46(38-54) setae.

UNUSUAL VARIATION: None

U.S. SPECIMENS EXAMINED:

Texas: Hidalgo Co., Intersection of State Highway 499 and 374 (31-V-1978, *Pithocellobium flexicaule*, S. Nakahara), 2 slides, 2 specimens (USNM); Alamo (27-VII-1977, *Pithecellobium flexicaule*, D.R. Riley), 1 slide, 1 specimen (USNM); McAllen (7-VII-1973, *Citrus sinensis* and *C. paradisi*, H. Kamasaki), 3 slides, 6 specimens (BMNH, FSCA, USNM); McAllen, laboratory reared (VII-26-1973, *Citrus* sp., W.G. Hart), 2 slides, 3 specimens (CDAS, USNM); Mercedes (3-VIII-1977, *Citrus* sp., D.R. Riley), 1 slide, 1 specimen (USNM).

OTHER SPECIMENS EXAMINED: Mexico: locality unknown (7-XII-1983, *Citrus paradisi*, R. Narkaus), 1 slide, 1 specimen (USNM).

HOSTS AND DISTRIBUTION: Known only from *Pithecellobium* and *Citrus*. The species probably is native to Mexico and southern Texas.

DISCUSSION: *Pseudococcus donrileyi* is very similar to *P. solenedyos*. For a comparison see the "Discussion" section of the latter.

Pseudococcus dysmicus Gimpel and Miller, new species (Figure 10)
Pseudococcus sorghiellus (Forbes): McKenzie 1964: 264 Misidentification (in part).

SUGGESTED COMMON NAME: Western trochanter mealybug.

DIAGNOSIS: Translucent pores usually present on hind tibia, femur, trochanter, and coxa; circulus usually not divided by intersegmental line, small; cerarii number 14 (12-15) on each side of body; 20 (16-23) dorsal oral rims on abdomen.

TYPE DATA: The adult female holotype is the right-hand specimen of 3 on a slide labeled as follows: Left label "*Pseudococcus* / *dysmicus* / Gimpel & Miller / HOLOTYPE ", right label, "Cle Elum, Wash.(Kittitas Co.) / Centaurea sp roots / 12-V1-66 / S. Nakahara / W-12 / AF-ERY-Balsam" (USNM). There are 28 paratypes on 23 slides that are deposited in BMNH, UCD, USNM.

The species epithet is derived from the Greek adjective *dysmikos* meaning "western" and refers to the distribution of this species in the western United States.

FIELD CHARACTERS: According to McKenzie (1967) the body is covered lightly by a smooth layer of white wax. The body fluid of adult females appears pinkish in color. Wax filaments, extending from the cerarii, are equal in length except the cephalic pair which is longer than the lateral ones and the caudal pair which is longer yet. The female produces an ovisac up to five times the length of her body. This species generally is taken from roots.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 2.1 mm, width 1.1 mm. Paratypes 2.0(1.3-2.8) mm long, 1.2(0.7-1.6) mm wide.

DORSUM: With 15 pairs of cerarii, paratypes 14(12-15), cerarian formula as follows: Left side: 1(2), 2(1-2), 3-5(2), 6(1-2), 7(0-2), 8(0), 9(0-2), 10(0), 11(0-2), 12(1-3), 13-14(0-2), 15(0-3), 16(3-5), 17(2-3). Cerarius 12 (right side) with 1 auxiliary seta, paratypes 2(0-3), 7 trilocular pores, paratypes 8(3-10), 1 discoidal pore, paratypes 1(0-2). Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 1 variable size, scattered over dorsum, associated with oral-rim tubular ducts, 3μ in diameter, scattered sparsely, more numerous on submargin. Oral-rim tubular ducts with 1(0-3) discoidal pores and 1(0-2) setae associated with rim, oral rims present posterior of frontal cerarii about 95% of time, present on submargin between cerarii 15 and 16 about 50% of time, present on submarginal, submedian, and median areas of body, with 20 oral rims on abdomen, paratypes with 20(16-23), oral-collar tubular ducts only on submargin between posterior cerarii. Body setae of 2 sizes, longest seta on abdomen, excluding segment VIII, 15μ long, paratypes 18(15-25)μ long; 5 dorsomedial setae on segment VIII, paratypes 6(4-8), longest seta 17μ long, paratypes 20(17-25)μ long.

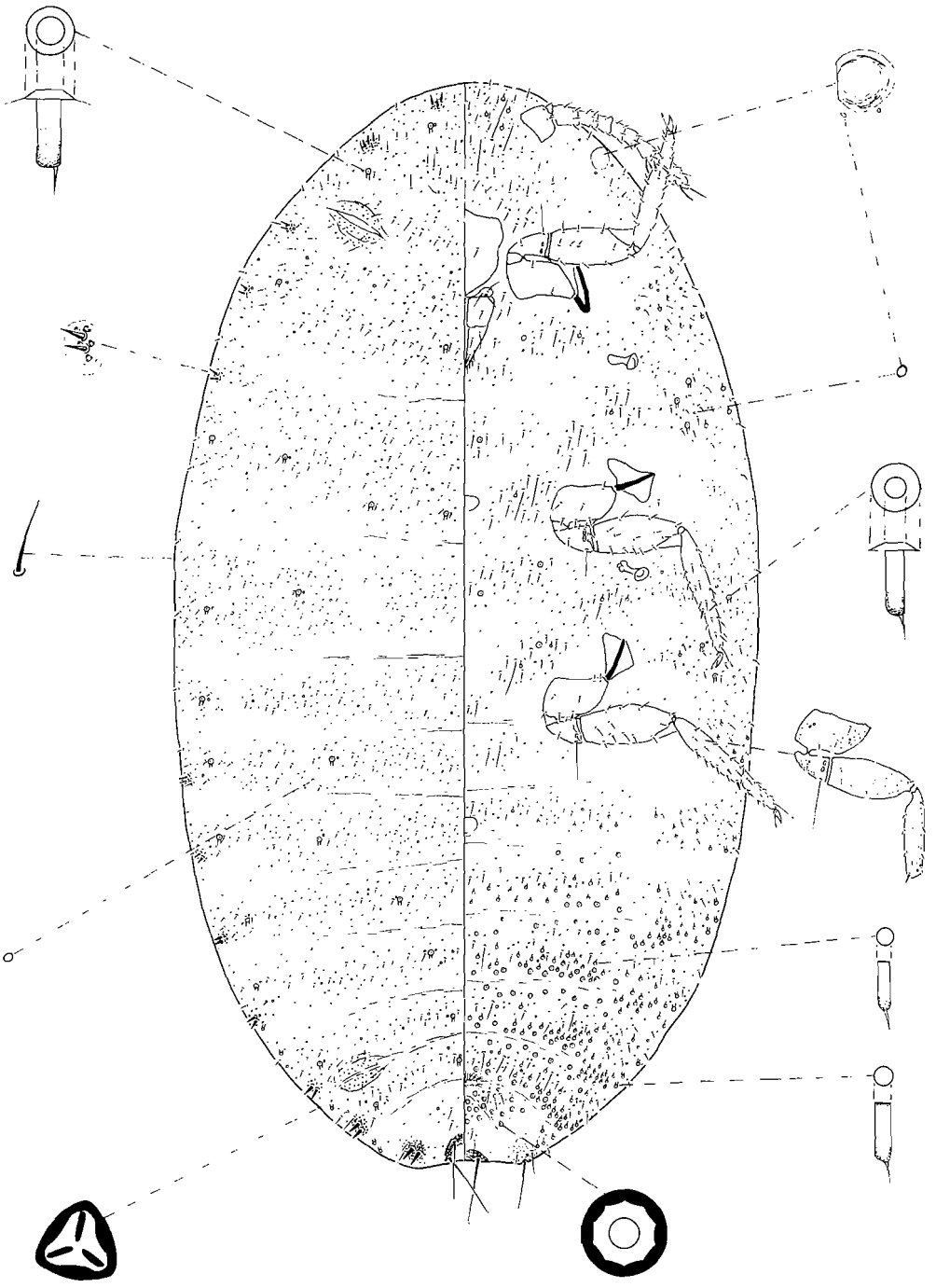

Figure 10. Adult female, *P. dysmicus*, Cle Elum, Kittitas Co., Washington, VI-12-1966, on *Centaurea* sp.

Anal-ring seta 131μ long, paratypes 124(111-131)μ long; 2.0 times as long as greatest diameter of ring, paratypes 1.7(1.5-2.0).

VENTER: Multilocular disc pores in posterior and anterior bands on segments IV-VII, scattered on segments III, VIII, and IX, paratypes with anterior and posterior bands on segments IV or V-VII, without pores on thorax, paratypes with 1(0-4) pores on thorax. Trilocular pores scattered, 94 on segment VI, paratypes 80(52-120). Discoidal pores of 1 size, 3μ in diameter, paratypes 3(2-3)μ, 0 or 1 in membranous rim around each eye, paratypes 1(0-2) pores, 1 or 2 on basal sclerotization of anal lobe, paratypes 2(1-4) pores. Oral-rim tubular ducts with 1(0-2) discoidal pores and 1(0 or 1) seta associated with rim, without ducts on submargin from segment II to cerarius 13, paratypes with 2(0-4) ducts, without ducts near frontal cerarii; oral-collar tubular ducts in segmental band on segments VII-IV or III, associated with posterior band of multilocular disc pores, few on thorax and head, 4 mesad of cerarius 12, paratypes with 3(0-6) ducts, 1 associated with cerarii 10 and 11, paratypes 0(0-1) ducts, 3 posterior of eye, paratypes 3(0-7), without ducts on each side of head, paratypes 2(0-7). Setae as follows: 4 cisanal, longest 32μ long, paratypes 33(22-40)μ long; 3 or 5 cisvulvar on each side, paratypes 3(1-5), 32μ long, paratypes 39(25-47)μ long; longest anal-lobe seta 143μ long, paratypes 114(96-143)μ long; longest body seta on abdomen 54μ long, paratypes 62(40-89)μ long; longest interantennal seta 96μ long, paratypes 94(86-121)μ long; longest seta on trochanter of hind leg 99μ long, paratypes 98(79-109)μ long.

Circulus 2.0 times wider than long, paratypes 1.6(1.3-2.0) times, width 54μ, paratypes 62(40-96)μ, occasionally with weak indication of intersegmental fold. Labium 124μ long, paratypes 133(121-143)μ long. Posterior spiracle greatest length 59μ, paratypes 68(59-74)μ. Antennae 7 and 8-segmented, paratypes with 7 segments about 25% of time, 341μ long, lengths of each segment as follows: I 49μ, II 47μ, III 37μ, IV 20μ, V 27μ, VI 27μ, VII 37μ, VIII 86μ; paratypes 362(322-391)μ long, length of each segment as follows: I 49(37-57)μ, II 51(42-57)μ, III 41(37-44)μ, IV 23(19-27)μ, V 26(17-35)μ, VI 30(27-35)μ, VII 37(30-40)μ, VIII 87(79-91)μ long. Length of antennal segment VIII / segment II 1.8, paratypes 1.7(1.6-1.9), antennal segment VIII / segment III 2.3, paratypes 2.1(1.8-2.9).

Legs with 26 conspicuous translucent pores on dorsal surface of hind tibia, paratypes 22(12-42); 35 pores on hind femur, paratypes 28(12-43); 13 pores on hind trochanter, paratypes 8(1-13); 24 on hind coxa, paratypes 22(18-41) pores. Femur 188μ long, paratypes 192(173-216)μ long, about equal in length to tibia; tibia 175μ long, paratypes 188(165-217)μ long; tarsus 96μ long, paratypes 100(87-109)μ long. Tibia / tarsus 1.8, paratypes 1.8(1.2-2.1). Hind tibia with 22 setae, paratypes 25(18-34) setae.

UNUSUAL VARIATION: The circulus generally is small and is situated on segment III but it often shows signs of partial division and is not perfectly oval but has an irregular margin.

U.S. SPECIMENS EXAMINED:
California: Lassen Co., 8 mi. W. Susanville (8-VIII-1964, *Artemisia* sp., D. R. Miller), 1 slide, 1 specimen (UCD); Plumas Co., 2 mi. N. Almanor (9-VII-1964, *Madia gracilis*, D. R. Miller), 3 slides, 3 specimens (UCD), (9-VII-1964, *Erigeron* sp., D. R. Miller), 4 slides, 4 specimens (UCD), 3 mi. N. Almanor (17-VII-1966, *Madia* sp., D. R. Miller), 1 slide, 1 specimen (UCD).
Kansas: Brown Co. (1-VIII-1971, *Glycine max*, H. L. Brooks), 2 slides, 2 specimens (BMNH, USNM).
North Dakota: Cass Co. (19-VIII-1937, host unknown, C. Schonberger), 1 slide, 1 specimen (USNM).
Oregon: Hood River Co., Viento State Park, Viento (13-VI-1962, *Trifolium* sp., R. F. Wilkey), 1 slide, 1 specimen (UCD); Lane Co., 4 mi. W. Notiz (5-VIII-1968, *Rubus* sp., D. R. Miller and R. F. Denno), 2 slides, 4 specimens (UCD); Washington Co., Forest Grove (15-IX-1917, *Trifolium* sp., M. N. Reeker), 5 slides, 5 specimens (UCD).
Utah: County unknown, Toquerville (19-VII-1937, in soil from peach orchard, L. D. Christenson), 2 slides, 4 specimens (USNM).
Washington: Kittitas Co., Cle Elum (12-VI-1966. on *Centaurea* sp., S Nakahara), 1 slide, 3 specimens (USNM).

HOSTS AND DISTRIBUTION: *Pseudococcus dysmicus* is restricted to the western portion of the United States and occurs on hosts in the Compositae, Leguminosae and Rosaceae.

DISCUSSION: *Pseudococcus dysmicus* has been confused with *P. sorghiellus*. McKenzie (1964) first reported the species from the western U.S. and even though he noted several morphological differences, he did not consider them significant enough to warrant species status. *Pseudococcus dysmicus* can be separated from *P. sorghiellus* by having: 14(12-15) pairs of cerarii, cerarius 12 usually with 1 or 2 conical setae, rarely 3; cerarius 12 with 8(3-10) trilocular pores; longest ventral body seta on abdomen 62(40-89)μ long; longest interantennal seta 94(86-121)μ long; antenna 362(322-391)μ long; 22(12-42) translucent pores on hind tibia. *Pseudococcus sorghiellus* has: 17, rarely 16, pairs of cerarii; cerarius 12 usually with 3 conical setae; cerarius 12 with 15(9-21) trilocular pores; longest ventral body seta on abdomen 40(32-49)μ long; longest interantennal seta 74(49-89)μ long; antenna 329(254-366)μ long; 13(8-21) translucent pores on hind tibia.

Pseudococcus elisae Borchsenius (Figure 11)
Pseudococcus elisae Borchsenius 1947: 2110.

Although Borchsenius (1948) treated the *P. elisae* description published in 1948 as the original description, inclusion of descriptive characters and the name of the species in his key published in 1947 fulfills the requirements of the International Code of Zoological Nomenclature for describing new species at that date.

SUGGESTED COMMON NAME: Banana mealybug.

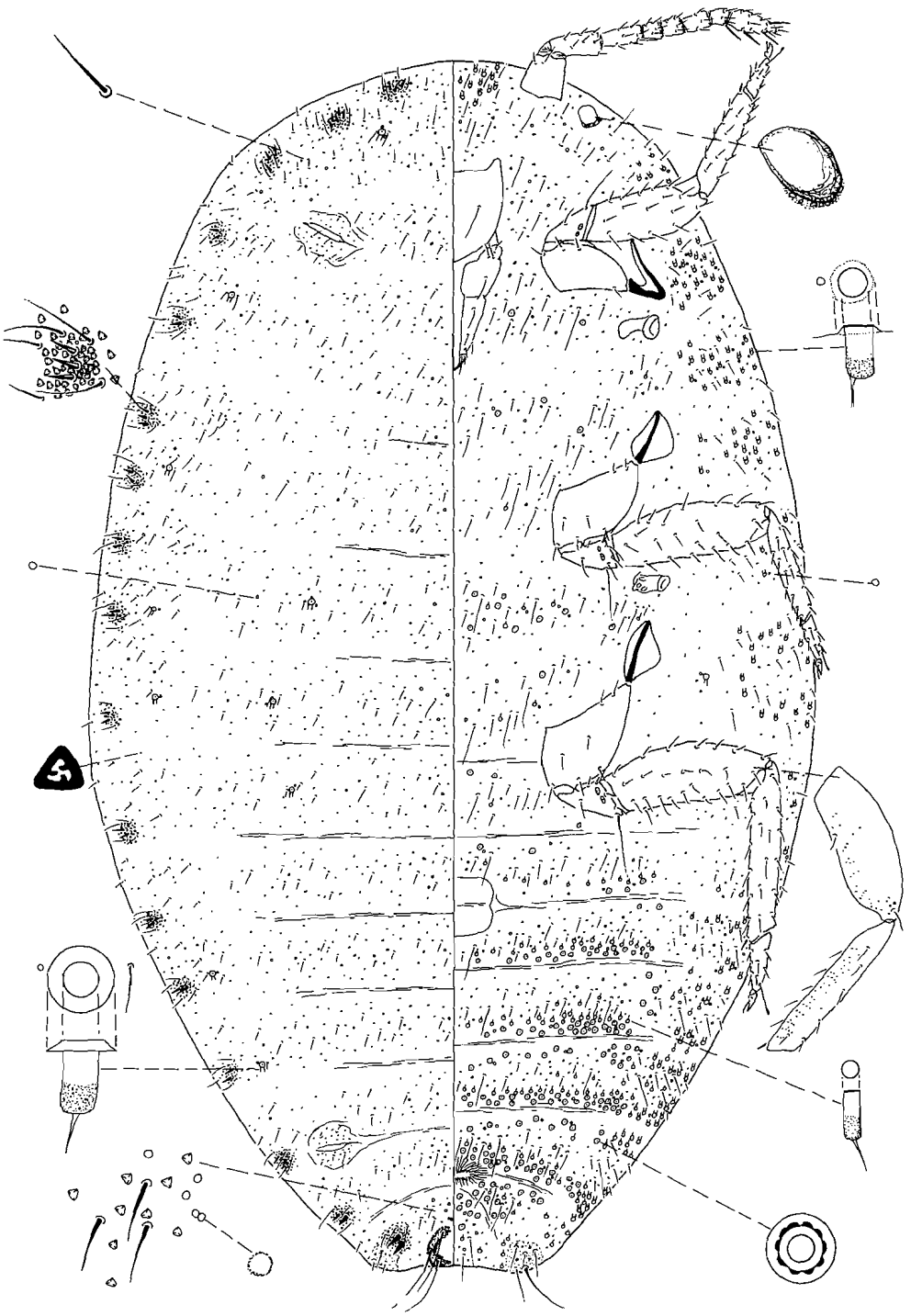

Figure 11. Adult female, *P. elisae*, Coyoles, Honduras, on *Musa* sp., IX-4-81, J. Mirenda.

DIAGNOSIS: With discoidal pores associated with eye in sclerotized rim; marginal oral collars with small rim; with 8(1-13) oral-rim tubular ducts on abdomen; with 1(0-2) oral rims on venter between cerarius 13 and segment II; without lateral oral rim on segment VII; tibia usually slightly shorter or equal to length of femur; with more than 20 multilocular pores on segment IV; with 10(2-19) multilocular pores on segment III; translucent pores on hind femur and tibia.

TYPE DATA: We have examined 2 adult female specimens on one slide translitterated as follows: 39 Pseudococcus elisae Bochs. type T 1 on fruits *Musa* sp. Colombia. Leningrad 29. iii. 39. 66. Borchsenius (1948) states that the species was collected on fruit spurs of bananas sent to Leningrad from Colombia on 23 March 1939. We cannot explain the discrepancy between the dates of 23 and 29 March but feel that the 2 specimens on the slide are syntypes. We here designate as lectotype the top specimen on the slide; the bottom specimen is a paralectotype (ZIL). A label on the reverse side of the slide gives a map of the position of the lectotype and the paralectotype and states "LECTOTYPE / Paralectotype / designated by / Gimpel & Miller".

We have been unable to find the derivation of the species epithet. It apparently is named in honor of Elisa.

FIELD CHARACTERS: The following was provided by Gary V. Manley, Standard Fruit Co. San Jose, Costa Rica, who has studied the species in Guayas, Ecuador. The species has 17, rarely 16, pairs of thin waxy filaments that are short on the head and long on the anal lobe. The length of the body is 2.6(1.7-1.8) mm long; body length / caudal filament is 2.1(0.9-1.8). The body is lightly dusted with a white wax that does not completely conceal the pale orange body; the crushed body of the adult female is reddish brown. An ovisac is produced that is longer than or equal to the length of the body of the adult female and encloses the eggs.

The species occurs on the foliage and the fruit of the host.

SLIDE MOUNTED CHARACTERS: Mounted 2.8(2.0-3.6) mm long, 1.7(1.2-2.3) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: 1-11 (2), 12 (3), 13-14 (2), 15 (3), 16 (2-4), 17 (3). Cerarius 12 (left side) with 4(2-6) auxiliary setae, 24(17-30) trilocular pores, 3(2-5) discoidal pores. Cerarii 1 and 2 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered, most abundant in middle of body; discoidal pores of 2 sizes larger size predominant posteriorly, with cluster of 6(2-10) in dorsomedial area of segment VIII, smaller size scattered over surface, associated with oral-rim tubular ducts. Oral-rim tubular ducts with 2(1-3) discoidal pores, 1(0-3) setae associated with rim, oral rims present posterior of frontal cerarii, absent from submargin between cerarii 15 and 16, usually present on prothorax and mesothorax laterally, rarely present medially or mediolaterally, on metathorax usually present mediolaterally, rarely present laterally, abdomen with pores present laterally on segments I, IV, and V, rarely on segments III and VI, present mediolaterally on segment II, rarely on segment I, rarely present medially on segments V, VI, and VII, with 8(1-

13) on abdomen; oral-collar tubular ducts usually absent, rarely present on submargin between cerarii. Body setae of 2 variable sizes, longest seta on abdomen, excluding segment VIII, 31(27-35)μ long; 6(5-6) dorsomedial setae on segment VIII, longest seta 36(23-42)μ long .

Anal-ring setae 151(131-180)μ long, 1.5(1.3-1.9) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in posterior and anterior bands on segments III or IV-VII, scattered on segments II and/or III, also on VIII and IX, usually in medial cluster between posterior spiracles, with 9(2-21) on thorax, 5(3-10) on segment III, 44(26-68) on segment IV. Trilocular pores scattered over venter, 100(58-128) on segment VI. Discoidal pores of 2 sizes, larger size 3(2-4)μ in diameter, 8(4-16) set in sclerotized rim around each eye, 4(2-6) on each anal lobe, associated with bands of multilocular disc pores on posterior abdominal segments, with oral-rim tubular ducts, with oral-collar tubular ducts on submargin, scattered over remainder of venter. Oral-rim tubular ducts usually absent or with 1 associated with anterior spiracle, 1(0-2) from segment II to cerarius 13, without duct near frontal cerarius; oral-collar tubular ducts associated with posterior band of multilocular disc pores on segments III or IV-VIII, numerous on submargin, with 14(5-25) in cluster mesad of cerarius 12, 19(10-30) associated with cerarii 10 and 11, 8(4-13) on each side of head. Setae as follows: 4 cisanal, 72(62-79)μ long; 4(3-6) cisvulvar on each side, 56(40-64)μ long; longest anal-lobe seta 142(123-161)μ long; body setae of 3 lengths, longest on abdomen 76(62-91)μ long, longest interantennal seta 124(111-148)μ long, longest seta on trochanter of hind leg 147(112-173)μ long.

Circulus 1.2(1.0-1.6) times as wide as long, width 160(109-198)μ, divided by segmental fold between segments III and IV. Labium 191(173-203)μ long. Posterior spiracle greatest length 79(67-86)μ long. Antennae 8-segmented, 518(453-570)μ long, lengths of each segment as follows: I 77(61-98)μ, II 75(54-86)μ, III 77(62-91)μ, IV 46(35-52)μ, V 52(40-59)μ, VI 46(37-52)μ, VII 45 (38- 53)μ, VIII 100(93-109)μ. Length of antennal segment VIII / segment II 1.4(1.2-1.7), antennal segment VIII / segment III 1.3(1.2-1.5).

Legs with 32(14-55) conspicuous translucent pores on dorsal surface of hind tibia, 27(7-58) translucent pores on dorsal surface of hind femur, absent from remaining segments. Femur 304(236-347)μ long, about same length as tibia; tibia 303(217-357)μ long; tarsus 115(104-124)μ long. Tibia/tarsus 2.7(2.3-3.0). Hind tibia with 33(23-44) setae. Ventral marginal oral-collar tubular ducts with indistinct rim.

UNUSUAL VARIATION: Specimens from Colombia on coffee and Costa Rica on *Aglaonema* lack multilocular pores on thorax or have only 1 or 2 and have 1 or more ventral oral collar tubular ducts on the thorax and anterior abdominal segments. We have tentatively included these specimens in *P. elisae*, but suspect that may belong to another species in the complex.

U.S. SPECIMENS EXAMINED: None.

OTHER SPECIMENS EXAMINED: 61 slides, 140 specimens as follows:
Colombia: *Annona squamosa, Coffeae arabica, Dieffenbachia, Musa* sp.
Costa Rica: *Aglaonema* sp.
Ecuador: *Citrus aurantifolia, Musa* sp.
Guatemala: *Musa sapientum.*
Honduras: *Dieffenbachia* sp., *Musa* sp.
Panama: *Musa* sp.

HOSTS AND DISTRIBUTION: *Pseudococcus elisae* with few exceptions is known from banana and is restricted to the area of northern South America and Central America.

DISCUSSION: *Pseudococcus elisae* has been confused with *P. jackbeardsleyi* because of the presence of a large number of discoidal pores near the eyes which are present on a sclerotized rim and the presence of translucent pores on the femur and tibia. *Pseudococcus elisae* differs by having: Small rim associated with many marginal oral collars, especially on thorax; 8(1-13) dorsal oral rims on abdomen; 1(0-2) oral rims on each side of body between cerarius 13 and segment II; without lateral oral rim on abdominal segment VII; tibia usually shorter or equal to femur, femur/tibia 1.02(0.96-1.09); more than 20 multilocular pores on segment IV, 44(26-68); and 10(2-19) multilocular pores on segment III. *Pseudococcus jackbeardsleyi* has: No rim associated with marginal oral collars; 21(14-27) dorsal oral rims on abdomen; 5(3-8) oral rims on each side of body between cerarius 13 and segment II; usually with at least 1 lateral oral rim on abdominal segment VII; tibia usually longer than femur, femur/tibia 0.91(0.87-0.99); less than 15 multilocular pores on segment IV, 4(0-10); and usually without multilocular pores on segment III. *Pseudococcus elisae* also has been confused with *P. landoi. Pseudococcus elisae* differs by having: 1 oral rim posterior of each frontal cerarius; dorsal oral-rim tubular ducts; 14(5-25) oral collars in cluster mesad of cerarius 12; longest ventral body setae 76(62-91)μ long; labium 191(173-203)μ long; translucent pores on hind femur. *Pseudococcus landoi* has: No oral rims posterior of frontal cerarii; no dorsal oral-rim tubular ducts; 43(28-51) oral collars in cluster mesad of cerarius 12; longest ventral body seta 55(24-73)μ long; labium 219(185-293)μ long; no translucent pores on hind femur.

Pseudococcus eriocerei Williams (Figure 12)
Pseudococcus eriocerei Williams 1973: 565.

SUGGESTED COMMON NAME: Eriocereus mealybug.

DIAGNOSIS: With 19(0-42) translucent pores on hind femur; 2(1-4) oral-collar tubular ducts mesad of cerarius 12; 2(0-5) oral collars associated with cerarii 10 and 11; 1(0-3) auxiliary setae and 10(5-15) trilocular pores in cerarius 12; antennae 411(341-452)μ long; femur 239(217-267)μ long.

TYPE DATA: The adult female holotype is mounted on a slide by itself with the following: Left label, "ARGENTINA / Formosa State / 20 km E. Laguna Yema / F.D.Bennett 16.iii 1972 / Eriocereus bonplandii / 60 / C.I.E. A 5500 / B.M 196 60", right label "Pseudococcus / eriocerei / Williams / Holotype." (BMNH). We also have examined 1 paratype (BMNH).

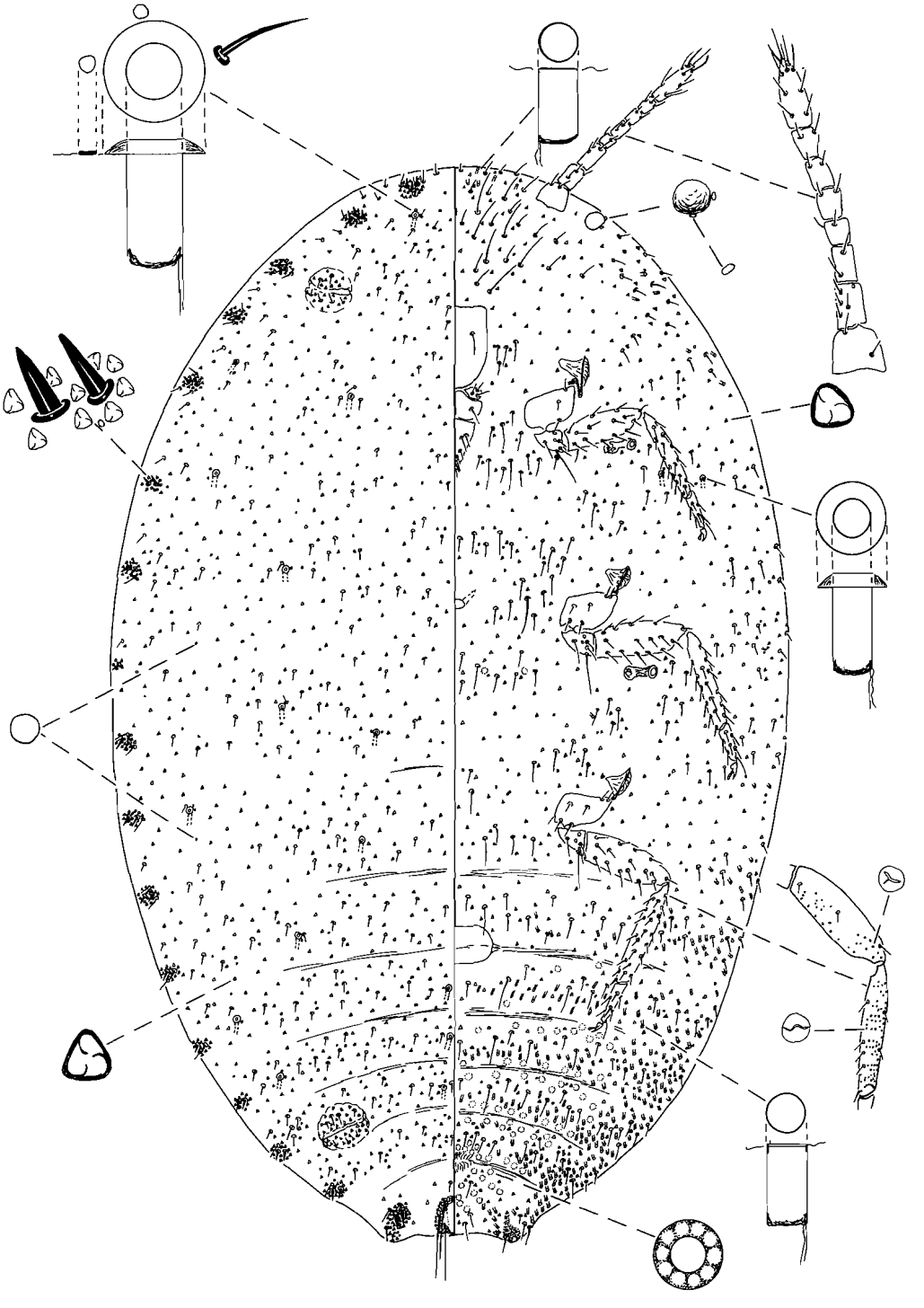

Figure 12. Adult female, *P. eriocerei*, 20 Km. E. Laguna Yema, Argentina, III-16-1972, on *Eriocereus bonplandii*.

The species epithet is based on the generic epithet of the host.

FIELD CHARACTERS: This species feeds on the roots of its host (Williams 1973).

SLIDE MOUNTED CHARACTERS: Mounted 2.2(1.8-3.3) mm long, 1.6 (0.9-2.1) mm wide.

DORSUM: With 17(16-17) pairs of cerarii, cerarian formula as follows: 1(1-2), 2 (1-2), 3-4 (2), 5 (1-2), 6-7 (2), 8 (0-2), 9 (2), 10 (0-3), 11 (2), 12 (0-3), 13-14 (2), 15 (0-3), 16 (1-4), 17 (2-3). Cerarius 12 with 1(0-3) auxiliary setae, 10 (5-15) trilocular pores, 1(0-3) discoidal pore. Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 1 size, about equal to small size on venter, numerous, scattered over dorsum. Oral-rim tubular ducts usually with 1(1-2) discoidal pore and 1(0-1) seta associated with rim, oral rims present posterior of frontal cerarii, absent from submargin between cerarii 15 and 16, on each thoracic segment, abdominal segments II-VI, present or absent submedially on segment IV, absent submedially on segments V-VII, with 16(9-22) on abdomen. Oral-collar tubular ducts only on submargin between cerarii. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 12(10-17)μ long; 4(3-6) dorsomedial setae on segment VIII, longest 22(15-24)μ long.

Anal-ring setae 123(104-136)μ long, 1.5(1.2-1.8) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in posterior and anterior bands on segments V-VII, scattered on segments III, IV, VIII and IX, occasionally with several pores on thorax. Trilocular pores scattered over venter, 66(42-84) on segment VI. Discoidal pores of 1 variable size, 4(3-6)μ in diameter, 2(0-4) set in membranous rim around each eye, numerous on ventral submargin, 2(1-4) on anal-lobe sclerotization, associated with oral collars on ventral submargin, scattered over remainder of venter. Oral-rim tubular ducts with 1(1-2) small discoidal pores and 1(0-1) seta associated with rim, 3(1-4) on submargin from segment II to cerarius 13, absent from near frontal cerarii; oral-collar tubular ducts associated with posterior band of multilocular disc pores on segments V-VII, in transverse band on mid section of segments III-VII, moderate number on submargin, becoming less numerous anteriorly to segment III, few on thorax and head, with 2(1-4) mesad of cerarius 12, with 2(0-5) associated with cerarii 10 and 11, 3(2-4) posterior of eye, 3(1-5) on each side of head. Setae as follows: 4 cisanal, 35(22-42)μ long; 2(1-3) cisvulvar on each side, 37(24-49)μ long; longest anal-lobe setae 109(101-119)μ long; body setae of 3 lengths, longest on abdomen 54(40-79)μ long; longest interantennal setae 77(40-99)μ long; longest seta on trochanter of hind leg 99(82-114)μ long.

Circulus 1.4(1.2-1.6) times as wide as long, width 45(32-60)μ divided by fold between segments III and IV. Labium 175(168-180)μ long. Posterior spiracle greatest length 69(49-86)μ long. Antennae 8-segmented, 411(341-452)μ long,

lengths of each segment as follows: I 54(49-62)μ, II 62(49-74)μ, III 54(42-79)μ, IV 35(22-49)μ, V 42(32-52)μ, VI 35(32-42)μ, VII 42(35-49)μ, VIII 89(79-101)μ long. Length of antennal segment VIII / segment II 1.5(1.3-1.8), antennal segment VIII / segment III 1.7(1.3-1.9).

Legs with inconspicuous translucent pores, with 52(28-92) translucent pores on dorsal surface of hind tibia, 19(0-42) translucent pores on dorsal surface of hind femur, absent from remaining segments. Femur 239(217-267)μ long, slightly shorter than tibia; tibia 265(237-284)μ long; tarsus 93(79-104)μ long. Tibia / tarsus 2.8(2.4-3.1). Hind tibia with 31(26-38) setae.

UNUSUAL VARIATION: A single specimen reared on ginger root in the laboratory lacks translucent pores on the hind femur.

U.S. SPECIMENS EXAMINED: Not known from the U.S.

OTHER SPECIMENS EXAMINED: Argentina: 20 Km. E. Laguna Yema, Formosa (16-III-1972, *Eriocereus bonplandii*, F.D. Bennett), 2 slides, 2 specimens (BMNH); Vipos, Tucuman (1974, *Cleistocactus leaumanni*, R.E. Cruttwell), 2 slides, 2 specimens (BMNH); Reared in laboratory at Tucuman (VI-1975, *Zingiber officinalis*, 2 slides, 5 specimens (BMNH).

HOSTS AND DISTRIBUTION: This species is known only from Argentina on *Eriocereus* and *Cleistocactus*.

DISCUSSION: *Pseudococcus eriocerei* is similar to *P. viburni* but differs by having: 66(42-84) trilocular pores on venter of segment VI; 2(1-4) ventral oral-collar tubular ducts mesad of cerarius 12; 2(0-5) ventral oral collars associated with cerarii 10 and 11; 2(1-3) cisvulvar setae; longest interantennal seta 77(40-99)μ long; antennae 411(341-452)μ long; cerarius 12 with 1 (0-3) auxiliary setae and 10(5-15) trilocular pores; 19(0-42) translucent pores on hind femur; tarsus 93(79-104)μ long; longest seta on hind trochanter 99(82-114)μ long. *Pseudococcus viburni* has: 154(132-200) trilocular pores on the venter of segment VI; 10(8-16) ventral oral collars mesad of cerarius 12; 1(0-2) oral collars associated with cerarii 10 and 11; 4(3-5) cisvulvar setae; longest interantennal seta 102(73-134)μ long; antennae 509(456-585)μ long; cerarius 12 with 3(2-4) auxiliary setae and 19(15-23) trilocular pores; 65(15-150) translucent pores on the hind femur; tarsus 122(114-142)μ long; longest seta on hind trochanter 144(108-157)μ long.

Pseudococcus galapagoensis Morrison (Figure 13)

Pseudococcus galapagoensis Morrison 1924: 148.

SUGGESTED COMMON NAME: Galapagos mealybug.

DIAGNOSIS: Many multilocular disc pores with 7 or 8 locules; 22(17-25) oral-rim tubular ducts on ventral submargin between segment II and cerarius 13; oral-rim tubular ducts on ventral submargin of segments II-VI; translucent pores restricted to hind tibiae.

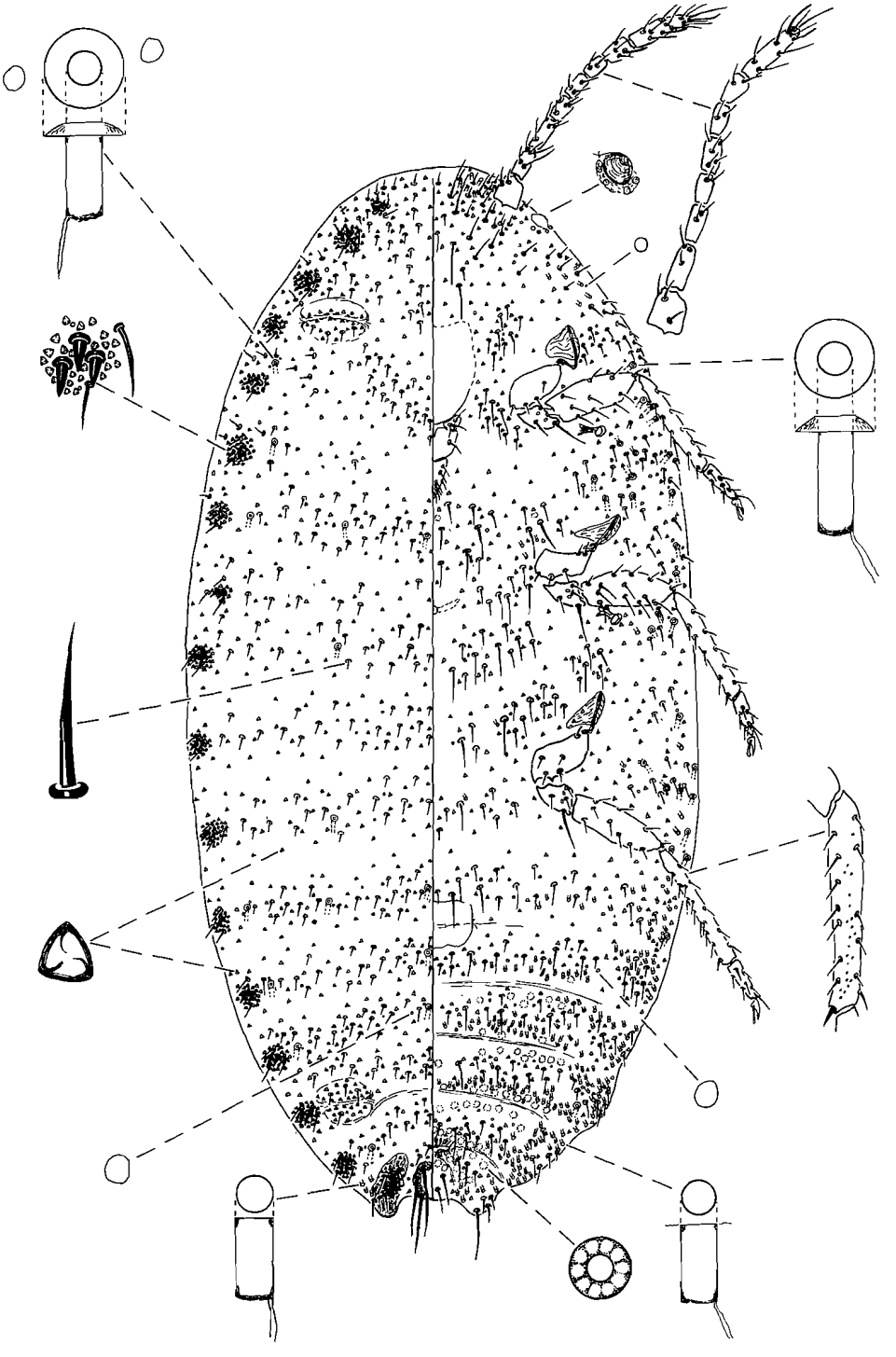

Figure 13. Adult female, *P. galapagoensis,* Eden Island, Galapagos Islands, IV-8-1923, on "yellow-plumed" ground plant.

TYPE DATA: Adult female holotype is mounted on a slide by itself with the following label: "*Pseudococcus* / *galapagoensis* / Morr. n. sp. / On roots of yellow / plumed ground plant. / Eden Island, N.W. coast / of Indefatigable, Galap. Is. / Wm. Beebe coll. / Apr 8, 1923 / Invert # 2204." (USNM). The original species description was based on a unique, slide-mounted specimen. A second specimen that was stored in an alcohol vial in the USNM dry collection was mounted in 1982. It has the same label data as the holotype.

The species epithet is formed from the Latin suffix *-ensis* denoting " place, or location " and refers to the Galapagos Islands where this taxon was collected.

FIELD CHARACTERS: No available information.

SLIDE MOUNTED CHARACTERS: Mounted 3.0(2.1 3.8) mm long, 1.7(1.1 -2.2) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: 1-5 (2), 6 (1-2), 7-11 (2), 12 (2-3), 13 (2), 14 (1-2), 15-16 (2-3), 17 (3). Cerarius 12 with 3(2-3) auxiliary setae, 19(15-23) trilocular pores, 2(2-3) discoidal pores. Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores evenly distributed; discoidal pores of 1 size, about 2μ in diameter, smaller than small size on venter, scarce. Oral-rim tubular ducts usually with 1(0-2) discoidal pore and 1(0-1) seta associated with rim, oral rims present posterior of frontal cerarius, absent from submarginal area between cerarii 15 and 16, on each thoracic segment, abdominal segments I-VII, usually absent submedially on segments IV-VII, with 15 on abdomen. Oral-collar tubular ducts only on submargin between posterior cerarii. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 14(10-18)μ long, 3 or 4 dorsomedial setae on segment VIII, (all missing except 1) 22μ long.

Anal-ring setae 137(117-146)μ long, 1.6(1.4-1.8) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in posterior and anterior bands on segments V VII, few in posterior band on segment IV, scattered on segments VIII and IX, 1 or 2 on mesothorax posterior of labium. Trilocular pores scattered over venter, 63(50-88) on segment VI. Discoidal pores of 3 sizes, large size about 5μ in diameter, 4(3-5) set in lightly sclerotized rim around each eye, few on head and thorax, 4(1-5) on anal-lobe sclerotization, associated with some oral-rim tubular ducts, scattered on venter, associated with anterior band of multilocular disc pores on segments V-VII. Oral-rim tubular ducts with 2(0-2) discoidal pores and 0(0-1) seta associated with rim, 22(17-25) from segment II to cerarius 13, also present near cerarii on segments III-VI, present near frontal cerarius, usually as many as 5 ducts on each side of head, with weakly developed rim; oral-collar tubular ducts associated with posterior band of multilocular disc pores on segments IV-VII, numerous on submargin anterior of segment III, few on head and thorax, with 3(2-5) mesad of cerarius 12, 3(2-5) associated with cerarii 10 and 11, 1(0-1) on each side of head, 6(4-8) posterior of eye. Setae as follows: 4 cisanal, 49(39-54)μ long; 3 cisvulvar setae on each side, 30(24-37)μ long; longest anal-lobe

seta 122μ long, all others broken; body setae of 3 lengths, longest on abdomen 49(46-97)μ long; longest interantennal setae 85(78-105)μ long; longest seta on trochanter of hind leg 127(122-132)μ long.

Circulus 1.2(1.2-1.3) times as wide as long, width 150(131-170)μ, divided by fold between segments III and IV. Labium 179(176-183)μ long. Posterior spiracle greatest length 77(68-83)μ long. Antennae 8-segmented, 500(493-505)μ long, length of each segment as follows: I 76(66-85)μ, II 78(76-78)μ, III 73(70-74)μ, IV 44(41-44)μ, V 51(49-51)μ, VI 44(41-46)μ, VII 43(41-46)μ, VIII 95(93-98)μ long. Length of antennal segment VIII / segment II 1.2(1.2-1.3), antennal segment VIII / segment III 1.3.

Legs with 50(44-55) translucent pores on dorsal surface of hind tibia, absent from remaining segments. Femur 273(256-288)μ long, slightly shorter than tibia; tibia 322(302-341)μ long; tarsus 116(110-122)μ long. Tibia/tarsus 2.8(2.7-2.8). Hind tibia with 32(30-32) setae.

UNUSUAL VARIATION: Ventral oral-collar tubular ducts posterior of the frontal cerarii are replaced by oral-rim tubular ducts. Dorsal oral-rim tubular ducts on the abdomen vary in number in the submedial area.

U.S. SPECIMENS EXAMINED: None.

OTHER SPECIMENS EXAMINED:
Galapagos: Eden Island (9-IV-1923, roots of yellow plumed ground plant, W. Beebe), 2 slides, 2 specimens (USNM).

HOSTS AND DISTRIBUTION: This species is known only from the type locality and host.

DISCUSSION: *Pseudococcus galapagoensis* is similar to *P. jackbeardsleyi* by having a sclerotized rim around the eye, several discoidal pores near each eye, and more than 10 oral rims on the ventral submargin between segment II and cerarius 13. *Pseudococcus galapagoensis* differs by having: Multilocular disc pores often with less than 10 loculi; translucent pores absent from hind femur; several ventral oral rims near frontal cerarius; 3(2-5) oral collars in cluster mesad of cerarius 12; 3(2-5) oral collars associated with cerarii 10 and 11; longest interantennal seta length 85 (78-105)μ long. *Pseudococcus jackbeardsleyi* has: Multilocular disc pores usually with 10 or 12 loculi; translucent pores on hind femur; no ventral oral rims near frontal cerarius; 9(4-20) oral collars in cluster mesad of cerarius 12; 8(2-15) oral collars associated with cerarii 10 and 11; longest interantennal seta length 116(102-129)μ long. For a comparison of *P. galapagoensis* and *P. neomaritimus* see the discussion section of the latter.

Pseudococcus importatus McKenzie (Figure 14)
Pseudococcus importatus McKenzie 1960: 725.

SUGGESTED COMMON NAME: Imported mealybug.

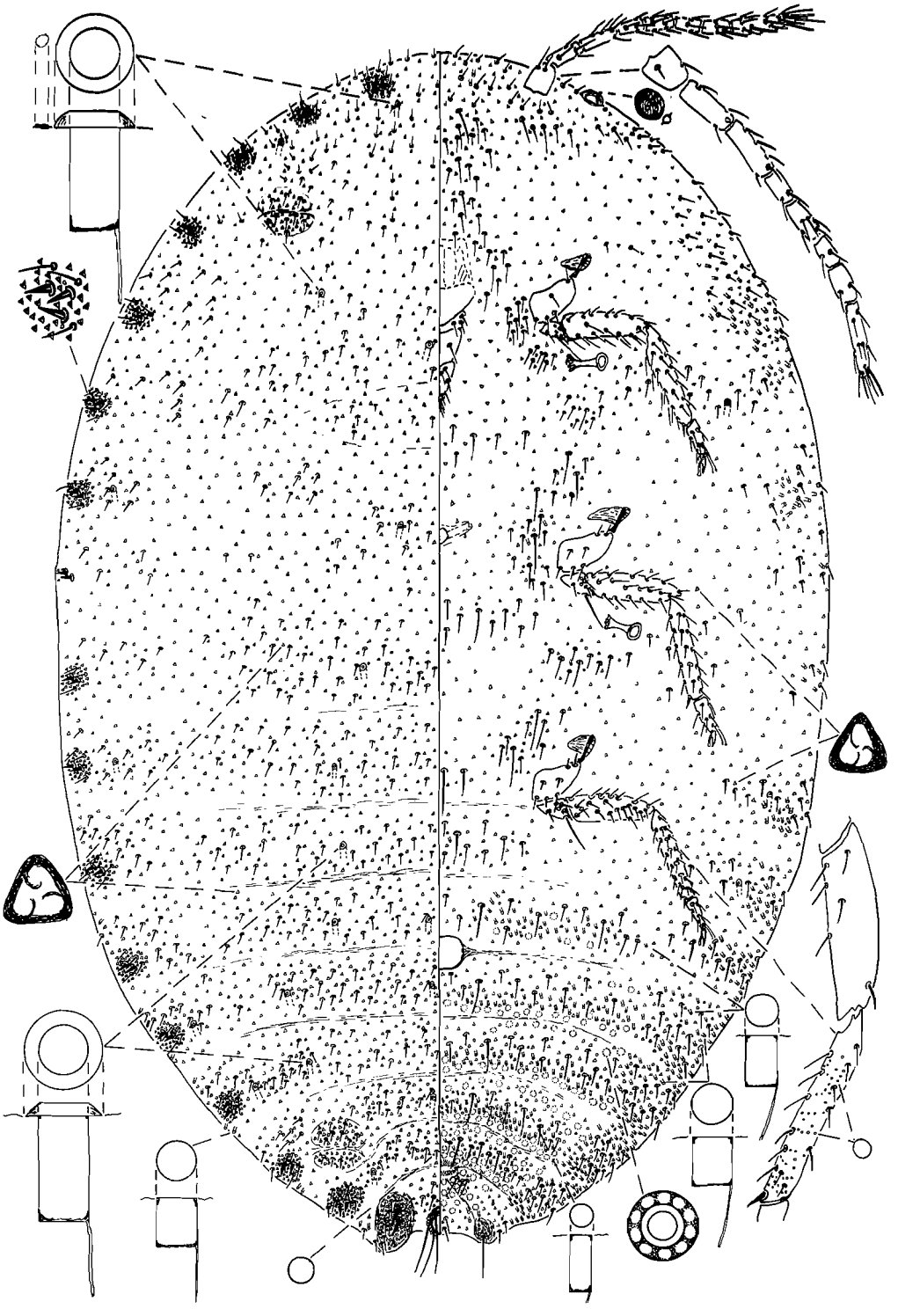

Figure 14. Adult female, *P. importatus*, Guatemala, VIII-2-1958, on *Oncidium* sp.

DIAGNOSIS: Translucent pores restricted to hind tibiae; 13(1-23) dorsal oral-rim tubular ducts on abdomen; 1(0-3) oral rims on ventral submargin from segment II to cerarius 13; 10(4-21) oral-collar tubular ducts in cluster mesad of cerarius 12; 1(0-3) oral-collars posterior of eye; circulus 97(75-126)μ wide, usually divided by intersegmental line.

TYPE DATA: We have examined the holotype which is mounted on a slide by itself and is labeled as follows: Left label in red "TYPE", right label "*Pseudococcus* / importatus / McKenzie / On Vanda plant / California: at Honolulu / W.K. Wong colr. / Nov. 5 1949 / Honolulu 36, 851 / 50-1726" (USNM). The remainder of the type series is a single paratype that is from the same quarantine lot (UCD).

The species epithet is formed from the Latin importo which means "bring in" and refers to McKenzie's belief that the species was imported into California.

FIELD CHARACTERS: With 16 or 17 pairs of thin waxy filaments; those on head slightly shorter than others, posterior pair longest, nearly as long as body. Body covered with white waxy secretion. Occurring on foliage of host.

SLIDE MOUNTED CHARACTERS: Mounted 2.1(1.4-3.5) mm long, 1.2(0.8-2.0) mm wide.

DORSUM: With 17(16-17) pairs of cerarii, cerarian formula as follows: 1-9 (2), 10 (0-3), 11 (2), 12 (3), 13-14 (2), 15 (3), 16 (3-5), 17 (3). Cerarius 12 with 3(2-5) auxiliary setae, 25(19-33) trilocular pores, and 2(1-3) discoidal pores. Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 1 size, about equal to small size on venter, scattered sparsely over dorsum and associated with oral-rim tubular ducts. Oral-rim tubular ducts with 1(0-3) small discoidal pores and 1(0-2) seta associated with rim, oral rims present posterior of frontal cerarii, present or absent on submargin between cerarii 15 and 16, on thorax and abdomen, with 13(1-23) on abdomen. Oral-collar tubular ducts restricted to submargin between cerarii. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 15 (12-19)μ long, 6(4-8) dorsomedial setae on segment VIII, longest setae 22 (17-25)μ long.

Anal-ring setae 132(111-145)μ long, 1.7(1.5-2.0) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in anterior and posterior band on segments V VII, with posterior band and partial anterior band on segment IV, scattered on segments VIII and IX, occasionally several on segment III, 2(0-10) on thorax. Trilocular pores scattered over venter, 77(32-100) on segment VI. Discoidal pores of 2 sizes, large size about 5μ in diameter, 3(2-5) on basal sclerotization of anal lobe; 2(0-5) in membranous rim around each eye, associated with multilocular disc pores, scattered on remainder of venter. Oral-rim tubular ducts usually with discoidal pore and seta associated with rim, 1(0-3) on submargin from segment II to cerarius 13, without duct near frontal cerarius; oral-collar tubular ducts associated with posterior band of multilocular disc pores on segments III or

IV-VII, numerous on submargin of thorax, and on head, with 10(4-21) in cluster mesad of cerarius 12, 11(4-21) associated with cerarii 10 and 11, 1(0-3) posterior of eye, 5(2-9) on each side of head. Setae as follows: 4 cisanal, 32(25-40)μ long; 3(2-5) cisvulvar on each side, 34(19-44)μ long; longest anal-lobe seta 102 (84-121)μ long; body setae of 3 lengths, longest seta on abdomen 68(44-98)μ long; longest interantennal setae 96(70-130)μ long; longest seta on trochanter of hind leg 133(114-161)μ long.

Circulus 1.8(1.3-2.5) times wider than long, width 97(75-126)μ, usually divided by segmental fold of segments III and IV. Labium 182(168-203)μ long. Posterior spiracle greatest length 74(59-93)μ long. Antennae 8-segmented, 523(434-600)μ long, lengths of each segment as follows: I 77(61-85)μ, II 74(61-85)μ, III 74(56-85)μ, IV 46(34-56)μ, V 52(39-63)μ, VI 42(37-54)μ, VII 51(44-56)μ, VIII 101(90-112)μ long. Length of antennal segment VIII / segment II 1.4(1.2-1.7), antennal segment VIII / segment III 1.4(1.2-2.0).

Legs with 52(30-110) translucent pores on dorsal surface of hind tibia, absent from remaining segments. Femur 265(229-302)μ long, slightly shorter than tibia; tibia 278(232-322)μ long; tarsus 102(95-110)μ long. Tibia / tarsus 2.7(2.2-3.1). Hind tibia with 32(28-38) setae.

UNUSUAL VARIATION: There is an unusually large amount of variation in the distribution of the oral rims. About 2/3 of the specimens from Brazil have fewer than 15 oral rims on the dorsal abdomen; these specimens usually lack a submarginal oral rim between cerarii 15 and 16 and are without dorsomedial oral rims on segments III-VI. Similar material has also been collected in Mexico, England, and the eastern U.S.. Specimens from other parts of the world generally have more than 15 dorsal oral rims, at least one side of body with an oral rim between cerarii 15 and 16, and several dorsomedial oral rims on segment III-VI.

U.S. SPECIMENS EXAMINED: 73 slides, 145 specimens as follows: California: *Cattleya* sp., *Dendrobium* sp., *Odontoglossum* sp., *Oncidium* sp.
Florida: *Epidendrum tampense, Dodonaea jamaicensis.*
New Jersey: *Cattleya dolosa, Odontoglossum* sp., *Oncidium.*

OTHER SPECIMENS EXAMINED: 207 slides, 420 specimens as follows:
Australia: *Oncidium.*
Brazil: *Bifrenaria harrisoniae, Brassavola perrinii,* Bromeliaceae, *Catasetum* sp., *Cattleya bicolor, C. forbesii,* C. *harrisoniae, C. schillerianae, Epidendrum* sp., *Laelia crispa, L. purpurata, Lycaste* sp., *Mittonia candida, M. flavescens, Odontoglossum* sp., *Oncidium crispum, O. marshallianum, O. ninitum, O. trulliferum, O. varicosum, O.* 'Rogersii', *Rodriguezia* sp., *Saphrenites grandiflora, Zygopetalum mackeyii.*
Canada: Orchidaceae.
Colombia: Orchidaceae
Costa Rica: *Brassavola nodosa, Comparettia* sp., *Epidendrum atropurpureum, E. fragrans, E. spondiala, E. stamfordianum, Oncidium splendidum.*

England: *Cattleya* sp., *Cyrtopodium punctatissium*, *Dendrobium* sp., *Epidendrum* sp., *Laelia cattleya*, *Oncidium incurvum*, *O. jonesianum*, *O. vericosum* 'Rogersii', *Oncidium* sp.
Guatemala: *Barkeria* sp., *Brassia* sp., *Cattleya gigas*, *C. skinnerii*, *Epidendrum* sp., *Miltonia maculata*, *Odontoglossum grande*, *O. pulchellum*, *O. skinnerii*, *O. stellatum*, *O. victoriensis*, *Oncidium bicallosum*, *O. cartagineosi*, *O. cavendishianum*, *O. cyboletta*, *O. splendidum*, *O. wentworthianum*, *Stanhopia* sp.
Jamaica: *Brassia caudata*, *Cattleya* sp., *Dendrobium* sp., *Epidendrum prismatocarpum*, *Oncidium* sp., *Schomburghkia lyonsii*, *Zygopetalum cochleare*.
Madagascar: *Angraecum* sp.
Mexico: *Brassovola* sp., *Cattleya skinneri*, *Epidendrum faleatum*, *Laelia superbians*, *Odontoglossum aperum*, *O. cervantesii*, *O. citrosnum*, *Oncidium retemeyerianum*.
Panama: Orchidaceae.
Paraguay: Orchidaceae
Peru: *Mormodes* sp.
Philippines: *Melicocca bijugatus*.
Trinadad: Orchidaceae.
Union of South Africa: Orchidaceae.
Venezuela: *Cattleya* sp.

HOSTS AND DISTRIBUTION: *Pseudococcus importatus* was first collected in the U.S. by J.W. Bulger in Summit, New Jersey on *Oncidium* sp. in 1941 and by H.S. McConnell in College Park, Maryland on an *Epidendrum tampese* plant from Florida in the same year. Six months later, in June, 1942, Mr. Bulger collected 3 additional specimens of *P. importatus* on *Odontoglossum* sp. at Summit, N.J. *Pseudococcus importatus* was intercepted in Hawaii on *Vanda* sp. shipped from California in 1949 (type material) and collected on various orchids in California between 1961 and 1964 (Johnston 1964).

Outside the U.S. *P. importatus* has been collected extensively from Mexico, Guatemala, Costa Rica, Colombia, and Brazil. It is likely that records from the U.S., Australia, Africa, England, and Philippines are the result of introductions from Central and South America.

The host list includes 18 genera of Orchidaceae and 2 records from *Dodonaea* and *Melicocca* (Sapindaceae).

DISCUSSION: *Pseudococcus importatus* is very similar to *P. sociabilis* in having small size discoidal pores near eyes, no rim around eye, translucent pores restricted to hind tibia, and several oral collars near cerarii 12, 11, and 10. *Pseudococcus importatus* differs by having: Longest dorsal body setae 22(17-25)μ long; anal-ring setae 132(111-145)μ long; longest ventral body setae 68(44-98)μ long; longest interantennal setae 96(70-130)μ long; hind tarsus 102(95-110)μ long; 13(1-23) dorsal oral rims on abdomen. *Pseudococcus sociabilis* has: Longest dorsal body seta 11(10-15)μ long; anal-ring seta 174(146-190)μ long; longest ventral body seta 100(73-110)μ long; longest interantennal seta 130(98-166)μ long; hind tarsus 122(117-134)μ long; 22(18-25) dorsal oral rims on abdomen.

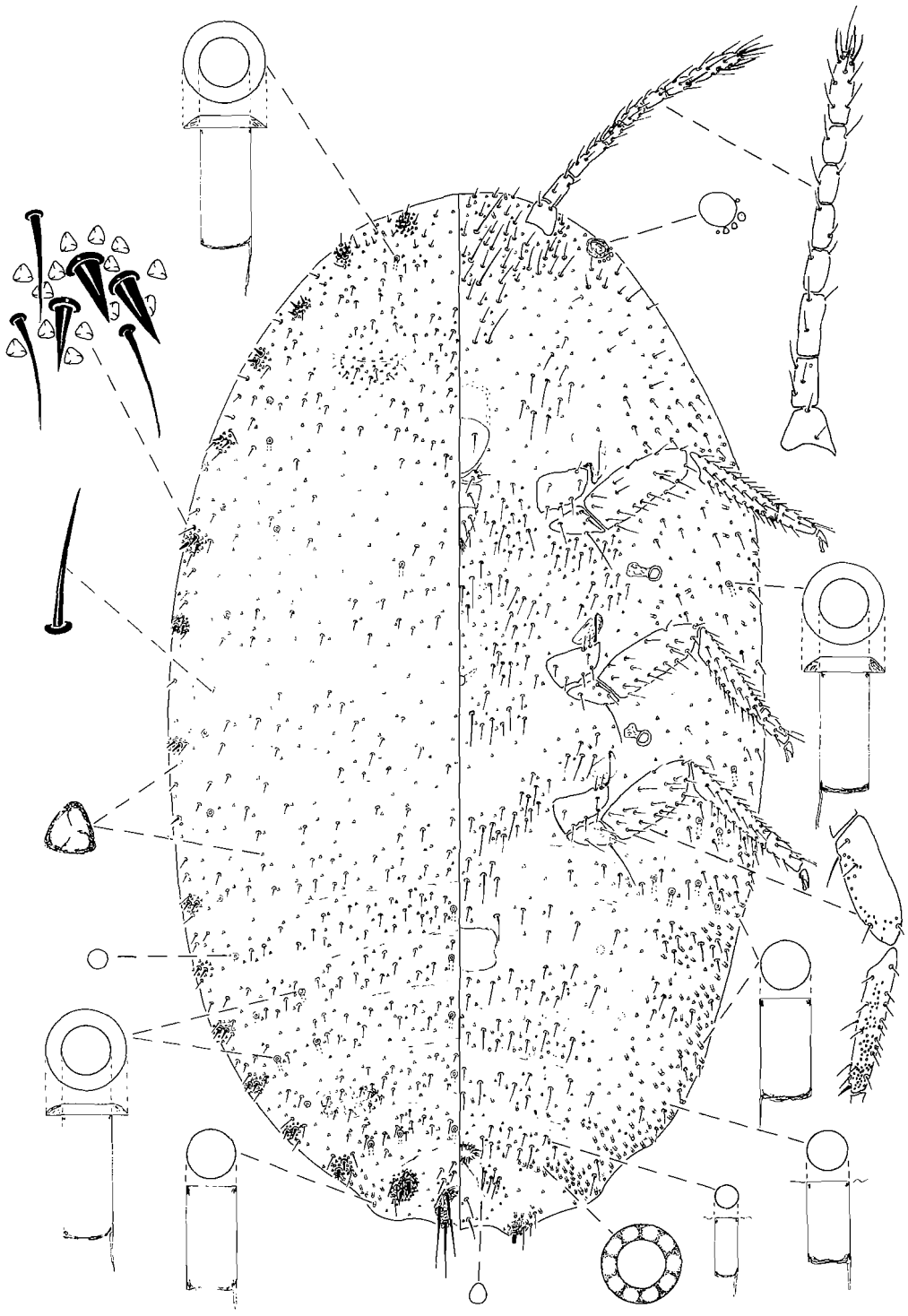

Figure 15. Adult female, *P. insularis*, South Seymour Island, Galapagos Islands, IV-20-1923, under rock.

Pseudococcus insularis Morrison (Figure 15)
Pseudococcus insularis Morrison 1924: 150.

SUGGESTED COMMON NAME: Island mealybug.

DIAGNOSIS: Translucent pores on hind femur and tibia; 3 or 4 discoidal pores on lightly sclerotized rim near each eye; cerarius 8 and 10 absent or reduced; 5 oral-collar tubular ducts near cerarius 12; antenna about 578μ long.

TYPE DATA: Morrison described this species from a single specimen which we have examined. The slide with the adult female holotype is labeled as follows: left label "312 / Re'mtd 1981 Balsam GW.", right label, "*Pseudococcus* / *insularis* / Morr. n. sp. / under stone near / brackish water pool. / South Seymour, / Galapagos Is. / Wm. Beebe, Coll. / Apr. 20, 1923 / Invert #2272" (USNM).

The species epithet is formed from the Latin *insularis* which means "of an island" and refers to the fact that the species was collected on an island.

FIELD CHARACTERS: No available information.

SLIDE MOUNTED CHARACTERS: Mounted 3.9 mm long, 2.3 mm wide.

DORSUM: With 15 pairs of cerarii, cerarian formula as follows: 1-7 (2), 8 (0), 9 (1-2), 10 (0), 11 (2), 12 (2-3), 13-14 (2), 15-17 (3). Cerarius 12 with 2-3 auxiliary setae, 12 (10-15) trilocular pores, 0-1 discoidal pore. Cerarius 1 with light basal sclerotization. Multilocular disc pores absent; trilocular pores evenly distributed; discoidal pores of 2 sizes, large about 4μ in diameter, few on posterior abdominal segments. Oral-rim tubular ducts with 0(0-1) discoidal pores and 0(0-1) seta associated with rim, oral rims present posterior of frontal cerarii on 1 side, absent from submargin between cerarii 15 and 16, on thorax and abdomen, submedial row displaced laterally, with 20 on abdomen. Oral-collar tubular ducts restricted to submargin between cerarii. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 22μ long, 7 dorsomedial setae on segment VIII, longest 24μ long.

Anal-ring setae 159μ long, 1.7 times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in anterior and posterior band on segments V-VIII, few on posterior submargin of segment III and IV, scattered on segment IX, 4 on thorax. Trilocular pores scattered over venter, 62 on segment VI. Discoidal pores of 2 sizes, largest about 4μ in diameter, with 3 or 4 pores in faintly sclerotized rim around each eye; 2(2-3) on anal-lobe sclerotization, few on posterior abdominal segments. Oral-rim tubular ducts without discoidal pore and seta associated with rim, 7 on submargin from segment II to cerarius 13, absent from near frontal cerarius; oral-collar tubular ducts associated with posterior band of multilocular disc pores on segments V-VII numerous on submargin of abdomen, few on thorax and head, with 5 in cluster mesad of cerarius 12, 4 associated with cerarii 10 and 11, without ducts posterior of eye, with 3 on each side of head, 2 near or in frontal cerarius. Setae as follows: 4 cisanal, 41μ long, 4(3-5)

cisvulvar on each side, 42μ long, anal-lobe seta broken; body setae of 3 lengths, longest 102μ long; longest interantennal setae 139μ long; longest seta on trochanter of hind leg 117μ long.

Circulus 1.1 times wider than long, width 166μ, divided by segmental fold of segments III and IV. Labium 195μ long. Posterior spiracle greatest length 73μ long. Antennae 8-segmented, 578μ long, lengths of each segment as follows: I 67μ, II 85μ, III 93μ, IV 56μ, V 66μ, VI 54μ, VII 54μ, VIII 110μ long. Length of antennal segment VIII / segment II 1.3, antennal segment VIII / segment III 1.2.

Legs with 66 translucent pores on dorsal surface of hind tibia, 22 on dorsal surface of hind femur, absent from remaining segments. Femur 329μ long, shorter than tibia; tibia 373μ long; tarsus 110μ long. Tibia / tarsus 3.4. Hind tibia with 42 setae.

U.S. SPECIMENS EXAMINED: None

OTHER SPECIMENS EXAMINED:
Galapagos: South Seymour Island (20-IV-1923, under stone, W. Beebe) 1 slide, 1 specimen (USNM).

HOSTS AND DISTRIBUTION: This species is known only from the original collection.

DISCUSSION: *Pseudococcus insularis* is similar to *Pseudococcus jackbeardsleyi* but differs by having: cerarii 8 and/or 10 absent; submedial oral-rims closer to sublateral oral rims than to medial ducts; cerarius 12 with fewer than 18 trilocular pores; with 3 oral collars on each side of head. *Pseudococcus jackbeardsleyi* has: cerarii 8 and 10 present; submedial oral rims evenly spread between those in sublateral and medial areas; cerarius 12 with 17 or more trilocular pores; with 10(5-19) oral collars on each side of head.

For a comparison of *P. insularis* with *P. schusteri* see the discussion section of the latter.

Pseudococcus jackbeardsleyi Gimpel and Miller, new species (Figure 16)

Pseudococcus elisae Borchsenius; Beardsley 1986: 31; Williams 1988: 123; Williams and Watson 1988; Williams and Granara de Willink 1992: 440 Misidentification.

SUGGESTED COMMON NAME: Jack Beardsley mealybug

DIAGNOSIS: With discoidal pores associated with eye in sclerotized rim; marginal oral collars without small rim; with 21(14-27) oral-rim tubular ducts on abdomen; with 5(3-8) oral rims on venter between cerarius 13 and segment II; with lateral oral rim on at least 1 side of segment VII; tibia usually longer than femur; with less than 15 multilocular pores on segment IV; usually without multilocular pores on segment III; translucent pores on hind femur and tibia.

TYPE DATA: Adult female holotype is on a slide labeled as follows: Left label "Pseudococcus /elisae Borchsenius/V77/Chiapas, Mexico/ex Musa sp. fruit/II-9-77/El Paso 7472/C. Sperka/ Balsam"; right label " *Pseudococcus /jackbeardsleyi*

Gimpel / and Miller/ HOLOTYPE" (USNM). There are 81 paratypes on 53 slides. Paratypes are deposited in ANIC, AUA, BM, BMNH, CAS, CDAS, FSCA, MCM, MNHP, UCD, USNM, and ZIL.

This species is named in honor of John (Jack) W. Beardsley, who not only discovered that this species is different from *P. elisae* but has also contributed in many ways to understanding the systematics of the Coccoidea.

FIELD CHARACTERS: Occurring on the fruit, leaves, and stems of the host.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 3.2 mm, width 1.8 mm. Paratypes 2.5(1.9-3.6) mm long, 2.3(0.9-2.1) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: Left side, 1-11 (2), 12 (3), 13-14 (2), 15 (3), 16 (4), 17 (3), paratypes 1-11 (2), 12 (3), 13 (2), 14 (1-2), 15 (3), 16 (3-5), 17(3-4). Cerarius 12 (left side) with 4 auxiliary setae, paratypes with 4(3-6), 19 trilocular pores, paratypes 25(17-34), 2 discoidal pores, paratypes 3(3-6). Cerarii 1 and 2 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered, most abundant in middle of body; discoidal pores of 1 size, with 1 discoidal in dorsomedial area of segment VIII, paratypes with 2(1-5), discoidals associated with oral-rim tubular ducts. Oral-rim tubular ducts with 2(1-3) discoidal pores, 1(0-4) setae associated with rim, oral rims present posterior of frontal cerarii, absent from submargin between cerarii 15 and 16, usually present on prothorax and mesothorax laterally, medially, and mediolaterally, on metathorax usually present medially and mediolaterally, rarely present laterally; abdomen with oral rims usually present laterally on segments I, III-V, and VII, sometimes on II, rarely on segment VI, usually present mediolaterally on segment II-V, rarely on segment I, usually present medially on segments IV, V, and VI, sometimes on VII, and rarely on II and III, with 20 on abdomen, paratypes with 21(14-27); oral-collar tubular ducts usually absent, rarely present on submargin between cerarii. Body setae of 2 variable sizes, longest seta on abdomen, excluding segment VIII, 37μ long, paratypes 24(20-37)μ long; 7 dorsomedial setae on segment VIII, paratypes with 6(4-9), longest seta 17μ long, paratypes 24(17-32)μ long.

Anal-ring setae 153 μ long, paratypes 165(141-180)μ long, 1.4 times as long as greatest diameter of ring, paratypes 1.6(1.4-1.9).

VENTER: Multilocular disc pores in posterior and anterior bands on segment V-VII, scattered on segments VIII and IX, paratypes sometimes with incomplete bands on IV and 1 or 2 pores on segment III, usually without medial cluster between posterior spiracles, with 5 pores on thorax, paratypes with 1(0-5) pores, without pores on segment III, with 3 on segment IV, paratypes with 4(0-10) pores. Trilocular pores scattered over venter, 84 trilocular pores on segment VI, paratypes with 104(80-132) pores. Discoidal pores of 2 sizes, larger size 3(2-4)μ in diameter, 6 set in sclerotized rim around each eye, paratypes with 7(4-9), with 3 on each anal lobe, 4(1-6), associated with bands of multilocular disc pores on abdominal segments, with oral-rim tubular ducts, with oral-collar tubular ducts on submargin, and scattered over remainder of venter. Oral-rim tubular

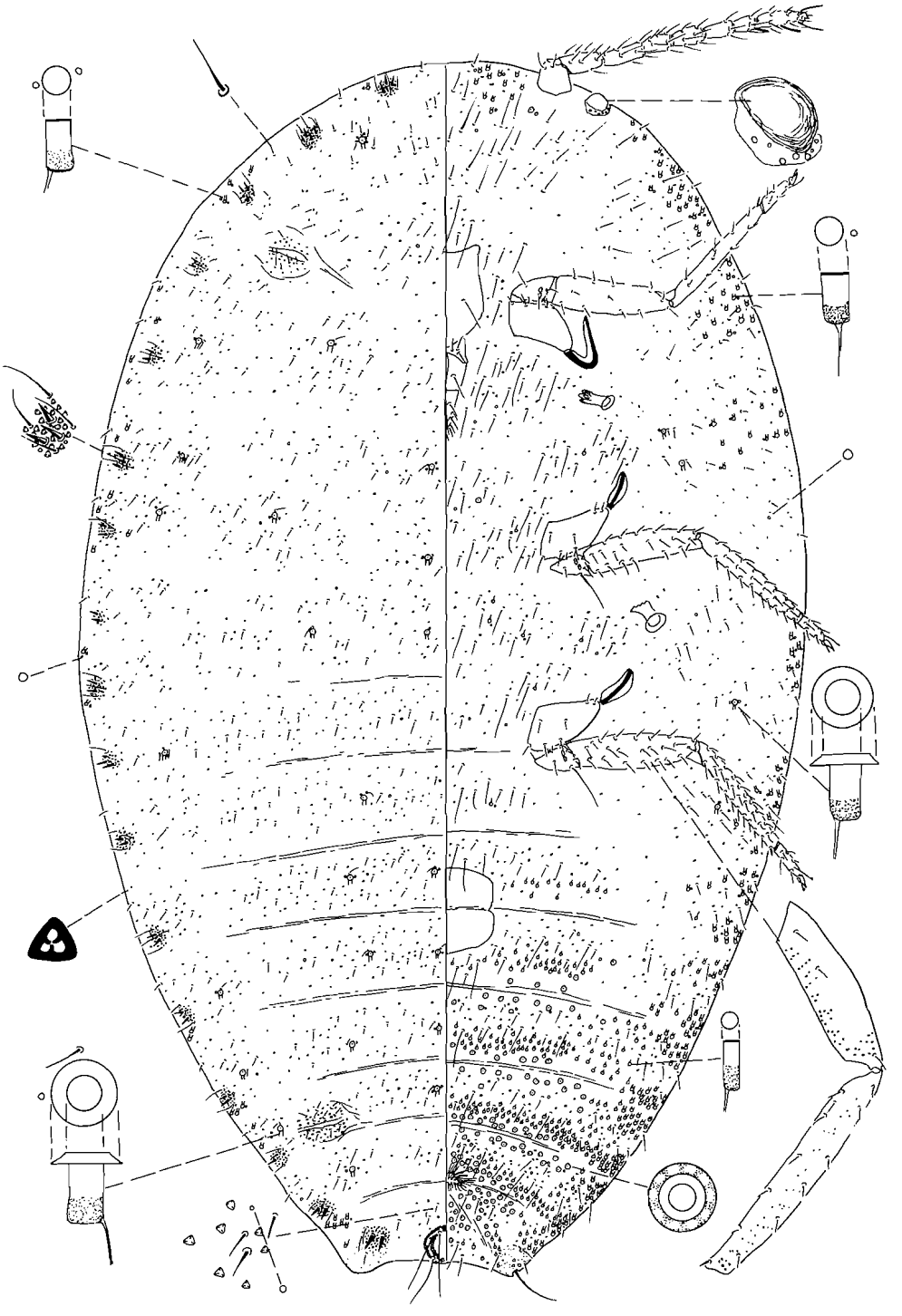

Figure 16. Adult female, *P. jackbeardsleyi,* Chiapas, Mexico, on *Musa* sp, fruit, I-9-77, C. Sperka.

ducts usually present, with 5 present from segment II to cerarius 13, paratypes with 5(3-8), without duct near frontal cerarius; oral-collar tubular ducts associated with posterior band of multilocular disc pores on segments V-VIII, numerous on submargin, with 11 in cluster mesad of cerarius 12, paratypes with 9(4-20) ducts, with 15 associated with cerarii 10 and 11, 8(2-15) ducts, with 11 on each side of head, paratypes with 10(5-19) . Setae as follows: 4 cisanal, 42 μ long, paratypes 50(42-77)μ long; 3 cisvulvar on each side, paratypes with 3(2-5) setae, 47μ long, paratypes 47(30-57)μ long; longest anal-lobe seta 111 μ long, paratypes 108(79-131)μ long; body setae of 3 lengths, longest on abdomen 57μ long, paratypes 70(52-84)μ long, longest interantennal seta 131 μ long, paratypes 128(94-146)μ long, longest seta on trochanter of hind leg 148μ long, paratypes 139(126-151)μ long.

Circulus 1.1 times as wide as long, paratypes 1.2(0.8-1.6), width 175μ, paratypes 146(111-198)μ, divided by segmental fold between segments III and IV. Labium 183μ long, paratypes 156(143-200)μ long. Posterior spiracle greatest length 77μ long, paratypes 81(67-91)μ long. Antennae 8-segmented, 546μ long, paratypes 518(471-626)μ long, lengths of each segment as follows: I 72μ, paratypes 77(59-84)μ, II 84, 80(67-91)μ, III 93, paratypes 84(72-99)μ, IV 49μ, paratypes 57(47-69)μ, V 53μ, paratypes 58(52-67)μ, VI 44μ, paratypes 47(32-54)μ, VII 52μ, paratypes 52(47-54)μ, VIII 101μ, 104(96-110)μ. Length of antennal segment VIII / segment II 1.2, paratypes 1.3(1.2-1.5), antennal segment VIII / segment III 1.1, paratypes 1.3(1.1-1.5).

Legs with 48 translucent pores on dorsal surface of hind tibia, paratypes with 55(30-86) pores, 49 translucent pores on dorsal surface of hind femur, paratypes with 41(21-69), absent from remaining segments. Femur 304μ long, paratypes 298(220-353)μ long, shorter than tibia; tibia 332μ long, paratypes 326(251-378)μ long; tarsus 112μ long, paratypes 115(102-121)μ long. Tibia/tarsus 3.0, paratypes 3.0(2.7-3.2). Hind tibia with 32 setae, paratypes with 40(30-44) setae. Ventral marginal oral-collar tubular ducts without rim.

UNUSUAL VARIATION: Specimens from Texas on fern have as few as 3 oral-collar tubular ducts mesad of cerarius 12.

U.S. SPECIMENS EXAMINED: Paratypes: 8 slides, 15 specimens-
Florida: Monroe Co., Boca Chica Key (4-V-1975, *Concarpus erectus*, R. F. Denno, J. A. Davidson, and D. R. Miller), 1 slide, 1 specimens (USNM); Dade Co., Marathon, (7-IV-1944, *Ipomoea batatas*, Williamson), 1 slide, 1 specimen (USNM).
Texas: Hidalgo Co., (1-VI-1978, *Salvia* sp., S. Nakahara), 4 slides, 10 specimens (BMNH, USNM).
Hawaii: Hawaii, (2-VII-1959, *Gardenia jasminoides*, H. A. Wollford), 1 slide, 1 specimen (USNM); Kailua-Kona, Ono Nursery (25-IX-1990, *Dendrobium* sp. A Hara), 1 slide, 3 specimens (BM).

U.S. SPECIMENS EXAMINED: Not Paratypes: 20 slides, 44 specimens-
Florida: *Gossypium* sp., *Ficus* sp., *Ipomoea*, *Lantana camara*

Hawaii: *Alpinia purpurata, Coccinia grandis, Dendrobium* sp., *Ocimum* sp., *Plumeria* sp., *Solanum* sp.
Texas: *Aglaonema simplex,* fern, *Salvia* sp.

OTHER SPECIMENS EXAMINED: Paratypes: 45 slides, 66 specimens-
Bahamas: (4-III-1985, *Lycopersicon esculentum*, R. Morris) 1 slide, 1 specimen (USNM).
Barbados: Content (24-VII-1984, *Cordia curassavica*, M. M. Alam) 3 slide, 3 specimen (ANIC, USNM).
Belize: (24-VIII-1978, *Dieffenbachia* sp., R. Stewart) 1 slide, 1 specimen (USNM).
Canal Zone: Locality unknown (8-XI-1955, *Cycnoches* sp., R. Stewart) 1 slide, 1 specimen (USNM).
Caroline Islands: Ponape (IV-1989, *Piper nigrum*, N. Esquerra) 2 slides, 8 specimens (BM).
Colombia: (29-X-1985, *Musa* sp., D. Christopher) 1 slide, 1 specimens (AUA).
Costa Rica: (27-VII-1983, *Musa* sp., F. Thomas) 1 slide, 1 specimen (BMNH), (31-VII-1980, *Ficus tricolor,* J. Torres) 1 slide, 1 specimen (CAS).
Cuba: Santiago de los Vegas (10-XI-1951, *Hibiscus cannabinus*) 1 slide, 1 specimen (CDAS); locality unknown (15-I-1941, *Lycopersicum* sp., Hodson) 1 slide, 1 specimen (USNM), (18-IV-1946, *Lycopersicum* sp., Shermin) 1 slide, 1 specimen (USNM), (23-III-1948, *Lycopersicum* sp., Hidalgo and Stewart) 1 slide, 2 specimens (USNM), (11-VII-1968, *Nerium oleander*, J. S. Eddy) 1 slide, 1 specimen (USNM).
El Salvador: (24-IX-1983, *Annona cherimola,* D. Bickell) 1 slide, 1 specimen (USNM), (29-III-1985, *Annona* sp., S. Ishikawa) 1 slide, 1 specimen (FSCA).
Guatemala: Locality unknown (3-XI-1983, *Musa* sp., J. Aalbu) 1 slide, 2 specimens (UCD), (10-XI-1983, *Musa* sp., L. Krekorian) 1 slide, 1 specimen (MNHP).
Haiti: Locality unknown (1-VI-1981, *Annona* sp., L. Gary) 1 slide, 1 specimen (ZIL).
Honduras: Guaymas(1-VI-1951, *Abaca* sp., C. H. Batchelder) 1 slide, 4 specimens (USNM); locality unknown (19-VIII-1970, *Codiaeum* sp., J. C. Buff) 1 slide, 1 specimen (USNM), (30-VI-1970, *Codiaeum* sp., J. C. Buff) 1 slide, 2 specimens (USNM)(17-IV-1973, *Phicus* sp., R. W. Foster) 1 slide, 2 specimens (USNM), (19-VI-1974, *Yucca* sp., A. Boston) 1 slide, 2 specimens (USNM).
Jamaica: Kingston (27-VI-1962, *Mangifera indica,* S. W. Brown) 1 slide, 1 specimen (UCD); Palasades, near Kingston (30-VI-1962, *Acacia* sp., S. W. Brown) 6 slides, 6 specimens (UCD, USNM); locality unknown (24-VI-1975, *Aralia* sp., R. Stewart) 1 slide, 1 specimen (BMNH).
Mexico: Chiapas (6-XII-1978, *Musa* sp., C. Jewett) 1 slide, 3 specimens (USNM), (2-I-1979, *Musa* sp., M. Aronson) 1 slide, 1 specimen (MCM); Tapachula (22-XI-1976, *Musa* sp., R. M. Alvarez) 1 slide, 1 specimen (USNM), (28-X-1978, *Musa* sp, R. M. Alvarez) 1 slide, 1 specimen (USNM), (2-XI-1978, *Musa* sp., E. L. Montoya) 1 slide, 2 specimens (USNM); Tecoma (22-II-1978, *Musa* sp., E. Montoya) 1 slide, 1 specimen (USNM); locality unknown (27-VII-1984, *Vitis* sp., P. Whitby) 1 slide, 3 specimens (USNM).
Panama: Locality unknown (31-V-1994, *Musa* sp., P. Fitterer) 1 slide, 1 specimen (USNM).

Puerto Rico: Locality unknown (28-II-1947, *Cajanus cajan*, P. Ortiz, E. A. Prentiss) 1 slide, 1 specimen (USNM),(12-VI-1958, *Sechium edule*, J. M. Van Valkenburgh) 1 slide, 1 specimen (USNM).
Venezuela: Locality unknown (26-III-1992, *Musa paradisiaca*, D. Milicia) 1 slide, 1 specimen (USNM).
Virgin Islands: St. Thomas (8-VI-1948, *Hibiscus* sp., Oakley and Mills) 1 slide, 2 specimens (USNM).

OTHER SPECIMENS EXAMINED: Not Paratypes: 289 slides, 548 specimens as follows:
Aruba: *Psidium* sp.
Bahamas: *Annona* sp., *Aralia* sp., *Coleus* sp., *Croton* sp., *Hibiscus* sp., *Ipomoea batatas, Lycopersicon esculentum, Morus* sp., *Nerium oleander.*
Barbados: *Aeschynomene americana, Alpinia purpurata, Alpinia* sp., *Codiaeum, Gossypium barbadense*
Berlize: *Cocos* sp., *Heliconia* sp.
Brazil: *Dendrobium* sp., *Mentha* sp.
Canada: *Rhipsalis mesembrianthemoides.*
Canal Zone: *Ficus* sp., Orchidaceae
Colombia: *Carica papaya, Cattleya* sp., *Begonia* sp., *Musa* sp., *Pueraria javanica.*
Costa Rica: *Ananas comosus, Aralia* sp., *Dracaena* sp., *Ficus* sp., *Macadamia* sp., *Musa* sp., Orchidaceae, *Phaeomeria* sp., *Sechium edule, Zingiber* sp.
Cuba: *Acalypha wilkesiana, Ananas comosus,* Cactaceae, *Capsicum fructescens, Carica papaya, Cereus peruvianus, Chamaesyce* sp., *Citrus aurantiifolia, C. paradisi, Coryphantha cubensis, Croton* sp., *Cucurbita pepo, Hibiscus exculentus, Ipomoea batatas, Jatropha* sp., *Lycopersicon esculentum, Melocactus* sp., *Phaseolus limensis, Sechium edule, Solanum melongena, S. tuberosum.*
Dominican Republic: *Agave* sp., *Ananas comosus, Annona muricata, Annona* sp., *Apium graveolens, Cereus sp., Citrus* sp., Cucurbitaceae, *Gossypium* sp., *Hoya carnosa, Hura crepitans, Ipomoea batatas, Jatropha curca, Lycopersicon esculentum, Mentha* sp., *Nerium oleander, Pelargonium* sp., *Psidium guajava, Sechium edule, Tamarindus indica.*
El Salvador: *Acanthocereus* sp., *Codiaeum* sp., *Fernaldia* sp.,
Grenada: *Lycopersicon esculentum.*
Guatemala: *Aralia* sp., *Fernaldia, Iris* sp., *Musa sapientum, Musa* sp., *Zingiber* sp.
Haiti: *Annona* sp., *Coffea arabica, Punica granatum*
Honduras: *Aglaonema* sp., *Annona squamosa, Capsicum* sp., *Codiaeum* sp., *Croton* sp., *Dracaena* sp., *Ficus decora, Musa* sp., *Physalis pubescens.*
Jamaica: *Acacia* sp., *Alpinia* sp., *Annona cherimola, A. muricata, A. squamosa, Aralia* sp., *Blighia sapida, Cajanus cajan, Carica papaya, Codiaeum* sp., *Croton* sp., *Mentha* sp., *Mormordica balsamina, Musa* sp., *Persea* sp., *Punica granatum, Sechium edule, Rumex* sp., *Yucca* sp.
Martinque: *Alpinia* sp., *Heliconia* sp.
Mexico: *Cucumis melo, Heliconia* sp., *Musa paradisiaca, Musa* sp., *Physalis peruviana, Zea mays, Zingiber* sp.
Panama: *Lantana camara, Litchi chinensis, Musa* sp.

Philippines: *Chrysophyllum cainito, Manihot esculenta, Moringa oleifera, Nephelium lappaceum, Nephelium* sp., Orchidaceae, *Spondias* sp.
Puerto Rico: *Aglaonema commutatum, Aglaonema* sp., *Annanas comosus, Bidens bipinnata, Cajanus indicus, Codaeium* sp., *Ipomoea batatas, Lantana camara, Melochia tomentosa, Mucuna* sp., *Musa* sp., *Punica granatum, Sechium edule, Tamarindus* sp.
Singapore: *Aglaonema* sp.
St. Martin: *Alpinia* sp.
Taiwan: Host unknown.
Thailand: *Citrus* sp., *Cymbopogon citratus, Dendrobium tortile, Nephelium lappaceum, Paphiopedilum* sp., *Psidium guajava.*
Trinidad Tobago: *Anthurium* sp., *Eugenia* sp., *Hibiscus* sp., *Haematoxylum campechianum, Manihot esculentum, Theobroma cacao.*
Turks and Caicos Islands: Cactaceae.
Venezuela: *Anthurium* sp., *Cucurbita* sp.
Virgin Islands: *Cucurbita* sp., *Gossypium* sp.

HOSTS AND DISTRIBUTION: *Pseudococcus jackbeardsleyi* was first collected in the U. S. in Florida on *Ficus* sp. at Key West in 1921. In subsequent years this species was collected from several other locations in Florida. *Pseudococcus jackbeardsleyi* probably is native to the Caribbean where it has been collected frequently. Early collections are from the Bahamas, Colombia, Costa Rica, Dominican Republic, Guatemala, Mexico, and Venezuela. The species has most commonly been collected on banana, tomato, potato, pepper, and hibiscus.

DISCUSSION: *Pseudococcus jackbeardsleyi is most commonly confused with P. elisae* and *P. landoi* since each has a sclerotized rim around the eye and several large discoidal pores in the rim. *Pseudococcus jackbeardleyi* differs from *P. landoi* by having: 1 oral rim posterior of each frontal cerarius; dorsal oral-rim tubular ducts; 9(4-20) oral collars in cluster mesad of cerarius 12; cisanal setae 39(29-49)μ long; longest ventral body setae 71(44-117)μ long; labium 173(146-195)μ long; translucent pores on hind femur. *Pseudococcus landoi* has: No oral rims posterior of frontal cerarii; no dorsal oral-rim tubular ducts; 43(28-51) oral collars in cluster mesad of cerarius 12; cisanal setae 91(73-146)μ long; longest ventral body seta 55(24-73)μ long; labium 219(185-293)μ long; no translucent pores on hind femur.

For a comparison of *P. jackbeardsleyi* with *P. elisae* and *P. galapagoensis* see the discussion section of the latter 2 species.

Pseudococcus landoi (Balachowsky) (Figure 17)

Paracoccus landoi Balachowsky 1959: 345.
Paracoccus landoi (Balachowsky), Williams and Granara de Willink 1992: 449.

SUGGESTED COMMON NAME: Lando mealybug.

DIAGNOSIS: Translucent pores restricted to hind tibiae; 8(6-11) discoidal pores associated with eye in sclerotized rim; oral-rim tubular ducts usually restricted to venter, absent posterior of frontal cerarius; 43(28-51) oral-collar tubular ducts associated with cerarius 12; cisanal setae 91(73-147)μ long; interantennal setae 140(122-176)μ long.

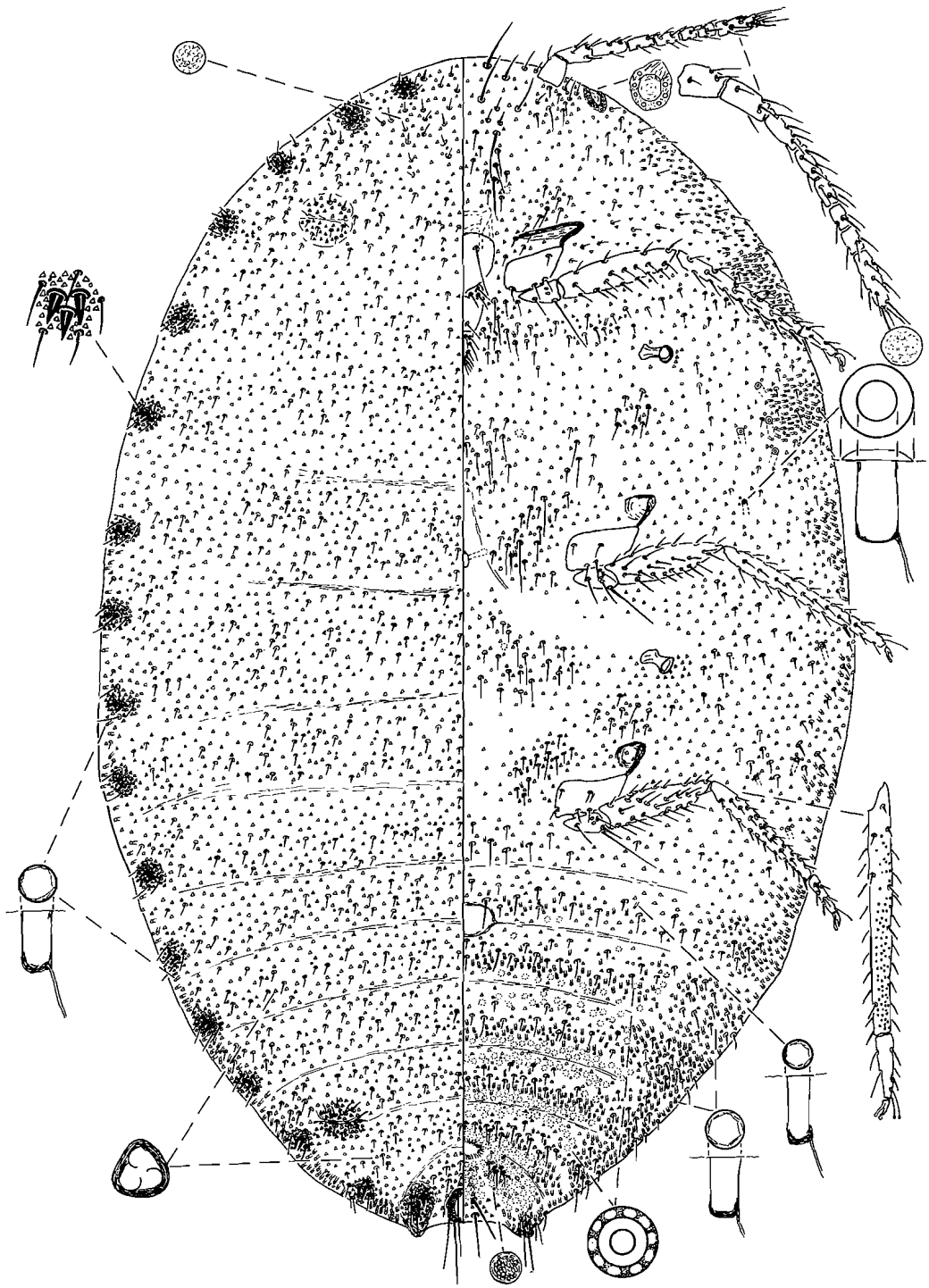

Figure 17. Adult female, *P. landoi,* Colombia, I-26-1957, host unknown.

TYPE DATA: We have examined a paratype from the USNM labeled as follows: left label (ink on slide) "Haut Sinu colombie 2617 A. Balachowsky coll. 20.26. I. 57". The right label (ink on slide) "Landoi Balachw. #1O6 PARATYPE indet". The type locality is Colombia 4 kms downstream from Takura. The type host was an undetermined vine thought to be *Passiflora* sp. The holotype is deposited in MNHP.

The species epithet was formed in honor of Simon Lando who was a Cultural Assistant in the French Embassy, at Bogata, Colombia when Balachowsky visited in 1957.

FIELD CHARACTERS: Normally occurs on the foliage of the host.

SLIDE MOUNTED CHARACTERS: Mounted 2.6(2.2-3.6) mm long, 1.4 (1.1-2.0) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: 1-11 (2), 12 (3), 13-14 (2), 15 (3), 16 (3-4), 17 (3). Cerarius 12 with 5(4-5) auxiliary setae, 33(25-48) trilocular pores, 3(2-4) discoidal pores. Cerarii 1 and 2 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered, less numerous toward submargin; discoidal pores of 1 size, slightly smaller than small size on venter, scattered sparsely over dorsum. Oral-rim tubular ducts usually absent, rarely with 1 or 2 on submargin; oral-collar tubular ducts only on submargin between cerarii. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 19(18-22)μ long; 6(5-8) dorsomedial setae on segment VIII, longest 25 (21-29)μ long.

Anal-ring setae 157(131-180)μ long, 1.5(1.2-1.7) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in posterior and anterior bands on segments V-VII, in posterior band on segment IV, scattered on segments III, VIII, and IX, with 4(0-12) on thorax and head. Trilocular pores scattered over venter, 107(84-138) on segment VI. Discoidal pores of 2 sizes, large 5(4-6)μ in diameter, 8(6-11) set in sclerotized rim around each eye, 2(1-4) on dorsal or ventral submargin, 4(2-6) laterad of each spiracle, 4(2-6) on anal-lobe sclerotization, occasionally scattered on remainder of venter, associated with anterior band of multilocular disc pores on segments V-VII. Oral-rim tubular ducts with 2(1-3) discoidal pores and 0(0-1) seta associated with rim, 10(2-17) on submargin from segment II to cerarius 13, with duct near frontal cerarius; oral-collar tubular ducts associated with posterior band of multilocular disc pores on segments V-VII, abundant on submargin, becoming less numerous anteriorly, with 43(28-51) in cluster mesad of cerarius 12, 15(3-43) associated with cerarii 10 and 11, 0(0-3) posterior of eye, 7(3-12) on each side of head. Setae as follows: 4 cisanal, 91(73-147)μ long; 5(3-6) cisvulvar on each side, 40(29-73)μ long; longest anal-lobe seta 114(82-148)μ long; body setae of 3 lengths, longest on abdomen 55(24-73)μ long; longest interantennal seta 140(122-176)μ long; longest seta on trochanter of hind leg 139(110-173)μ long.

Circulus 1.2(0.9-1.6) times as wide as long, width 138(86-173)μ, divided by segmental fold between segments III and IV. Labium 219(185-293)μ long. Posterior spiracle greatest length 97(80-127)μ long. Antennae 8-segmented, 623(578-658)μ long, length of each segment as follows: I 90(80-100)μ, II 91(84-100)μ, III 95(85-105)μ, IV 55(46-62)μ, V 61(44-70)μ, VI 53(48-57)μ, VII 52(42-62)μ, VIII 108(103-115)μ long. Length of antennal segment VIII / segment II 1.2(1.0-1.4), antennal segment VIII / segment III 1.3(1.0-1.3).

Legs with 60(33-126) translucent pores on dorsal surface of hind tibia, absent from remaining segments. Femur 354(280-395)μ long, slightly shorter than tibia; tibia 402(292-443)μ long; tarsus 129(126-134)μ long. Tibia/tarsus 3.1(2.2-3.4). Hind tibia with 45(36-50) setae.

UNUSUAL VARIATION: Occasionally cerarii 10 and 11 had 3 conical setae, one specimen had 2 conical setae on the right side in cerarius 12, 1 specimen had 6 conical setae on one side in cerarius 12. Oral-collar tubular ducts on some specimens appear to have discoidal pores associated with them.

U.S. SPECIMENS EXAMINED: Florida: Orange Co., Apopka (14-V-1984, *Yucca elephantipes*, Gibson, Henderson) 1 slide, 1 specimen (FSCA).

OTHER SPECIMENS EXAMINED: 47 slides, 90 specimens as follows:
Barbados: *Alpina purpurea*
Brazil: *Phaseolus lunatus, Schinus terebinthifolius*
Colombia: *Artocarpus altilis, Codiaeum* sp., *Coffea arabica, Heliconia* sp., *Theobroma cacao*
Costa Rica: *Anthurium* sp., *Diffenbachia* sp., *Heliconia* sp., *Musa* sp., Orchidaceae, *Philodendron* sp.
Cuba: *Abelmoschus esculentus*
Ecuador: *Anthurium* sp.
Guatemala: Coffee roots, *Zingiber* sp.
Guyana: Orchidaceae
Honduras: *Musa* sp.
Mexico *Musa* sp., *Philodendron* sp.
Nicaragua: *Musa* sp.
Panama: *Musa* sp., palm.

HOSTS AND DISTRIBUTION: *Pseudococcus landoi* has been collected in the U.S. only once and establishment at that Florida location is unconfirmed. The earliest collection record outside of the U.S. is 1929 from Brazil on *Phaseolus lunatus*. *Pseudococcus landoi* is probably native to Central America where it has been most commonly collected on banana.

DISCUSSION: *Pseudococcus landoi* is similar to *P. elisae*. For a comparison see the discussion section of the latter.

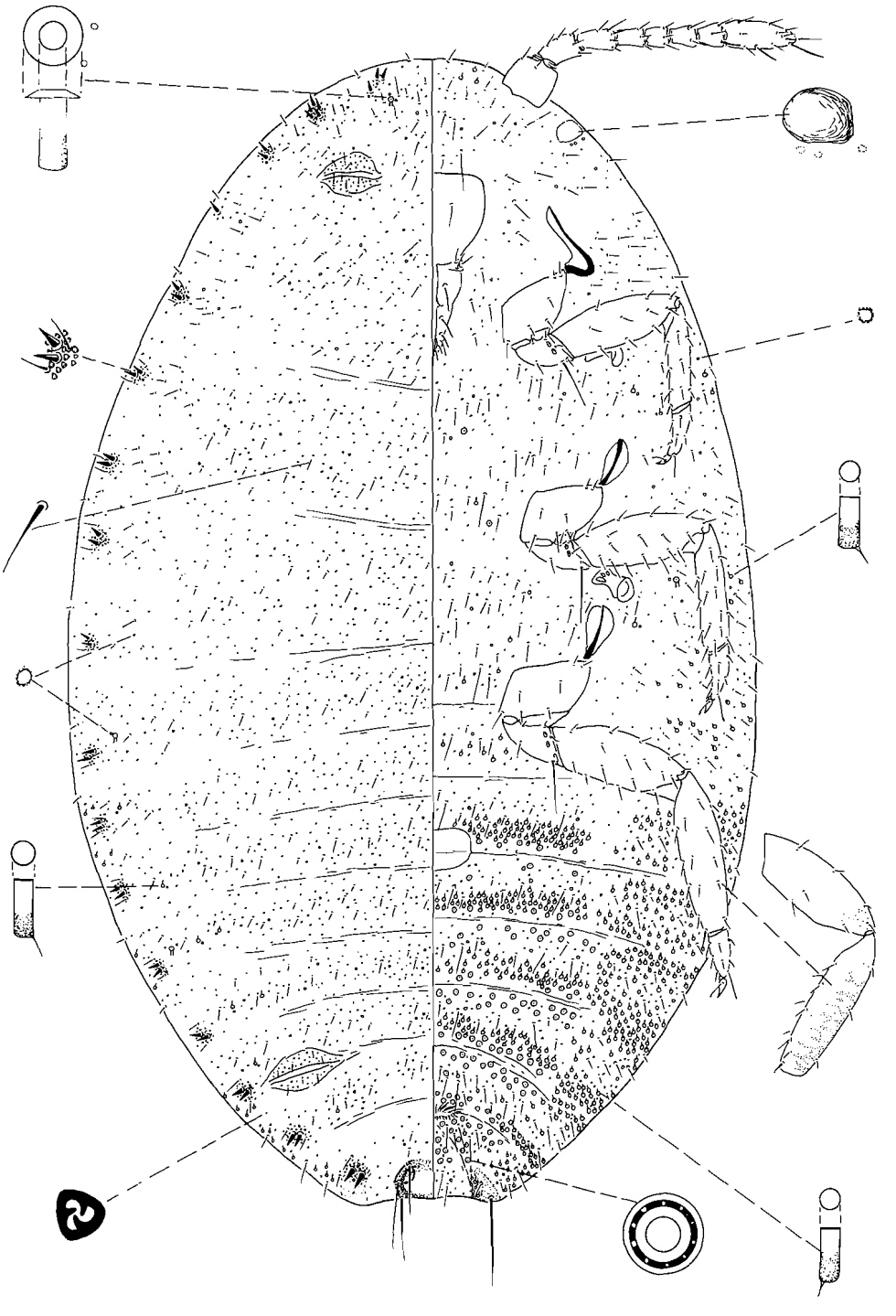

Figure 18. Adult female, *P. mandio*, Fulgencio-Yegros, Paraguay, IX-28-1981, on *Manihot esculenta*.

Pseudococcus mandio Williams (Figure 18)

Pseudococcus mandio Williams 1985: 595.

SUGGESTED COMMON NAME: Mandio mealybug.

DIAGNOSIS: Oral rims reduced in number, 2(0-4) on dorsum of abdomen, restricted to submarginal areas; oral rim near frontal cerarius usually absent; dorsal oral collars associated with most abdominal cerarii on submargin; ventral oral rims usually absent; cerarius 12 with 3(0-7) associated oral collars; translucent pores on hind femur and tibia.

TYPE DATA: We have studied 6 paratypes from the following: "PARAGUAY / Fulgencio-Yegros / subterranean stem of / Cassava / M. Yaseen / 28.ix.1981 / C.I.E. A13676," right label, "Pseudococcus / mandio / Williams / PARATYPE" (1 slide); same data except B. Lahr, 17.xi.1982 on cassava shoots, C.I.E. A14619 (2 slides); same data except 16.ii.1982 on cassava tuber (3 slides) (BMNH).

The species epithet is derived from the Guarani word *mandio* meaning "cassava" and refers to the host of this mealybug.

FIELD CHARACTERS: According to Williams (1985) "... the mealybugs observed were all collected on the roots, except one collection on the subterranean stem, it seems possible that specimens may be able to migrate above ground to stems and leaves".

SLIDE MOUNTED CHARACTERS: Mounted 2.4(1.7-3.3) mm long, 1.4(0.9-2.3) mm wide.

DORSUM: With 17 (16-17) pairs of cerarii, cerarian formula as follows: 1-11 (2), 12 (2-3), 13 (1-2), 14 (0-2), 15 (1-3), 16 (3-5), 17 (2-4). Cerarius 12 with 3(1-3) auxiliary setae, 21(13-26) trilocular pores, 4(1-5) discoidal pores. Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of variable size, large pores in medial area of segment VIII and near oral rims, scattered over dorsum. Oral-rim tubular ducts with 1(1-2) discoidal pore and no setae associated with rim, 0(0-2) oral rims present posterior of frontal cerarii, rare on thorax, restricted to submargin, with 0(0-1) on segment I, 0(0-1) on segment II, 1(0-1) on segment III, 0(0-2) on segment IV, 0(0-1) on segment V, 0(0-1) on segment VI, 0(0-1) on segment VII, with 2(0-4) on abdomen. Oral-collar tubular ducts on submargin of abdomen only, with 0(1-0) on segment II, 1(0-3) on segment III, 2(0-3) on segment IV, 3(1-3) on segment V, 0(0-1) on segment VI, 1(0-2) on segment VII. Body setae of 2 sizes, longest body seta on abdomen, excluding segment VIII, 22(20-25)μ long; 6 (5-7) dorsomedial setae on segment VIII, longest seta 18(17-27)μ long.

Anal-ring setae 145(133-156)μ long, 1-5(1.1-1.7) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in posterior and anterior band on segments IV or V-VII, scattered on segments IV, VIII, and IX, sometimes present on

segment III, absent from thorax. Trilocular pores scattered over venter, 132(106-164) on segment VI. Discoidal pores of 1 variable size, 4(3-5)μ in diameter, 2(1-3) set in membranous rim around each eye, numerous on ventral submargin, 3(2-4) on anal-lobe sclerotization, occasionally associated with large oral collars on ventral submargin of thorax, scattered over remainder of surface. Oral-rim tubular ducts absent; oral-collar tubular ducts associated with posterior band of multilocular disc pores on segments IV or V-VII, in transverse band on mid section of segments III-VII, abundant on submargin, becoming less numerous anteriorly to segment I, 3(0-7) mesad of cerarius 12, with 1(0-6) associated with cerarii 10 and 11, without ducts posterior of eye, 3(1-5) on each side of head. Setae as follows: 4 cisanal, 42(34-49)μ long; 3(2-5) cisvulvar on each side, 53(42-62)μ long; anal-lobe setae 126(111-168)μ long; body setae of 3 lengths, longest 50(47-67)μ long, longest interantennal setae 76(67-102)μ long; longest seta on trochanter of hind leg 100(87-109)μ long.

Circulus usually convoluted in segmental fold, when undistorted 1.6(1.2-1.8) times as wide as long, divided by segmental fold between segments III and IV. Labium 191(183-200)μ long. Posterior spiracle greatest length 88(79-106)μ long. Antennae 8-segmented, 493(465-527)μ long, lengths of each segment as follows: I 72(62-79)μ, II 65(54-74)μ, III 63(49-74)μ, IV 31(29-37)μ, V 45(40-49)μ, VI 40(32-49)μ, VII 45(39-52)μ, VIII 107(94-114)μ long. Length of antennal segment VIII/segment II 1.6(1.5-2.0), antennal segment VIII/segment III 1.7(1.5-2.1).

Legs with inconspicuous translucent pores, with 125(73-185) translucent pores on dorsal surface of hind tibia, 14(3-24) translucent pores on dorsal surface of hind femur, absent from remaining segments. Femur 272(247-301)μ long, shorter than tibia; tibia 319(279-358)μ long, tarsus 103(89-114)μ long. Tibia/tarsus 3.1(2.7-3.5). Hind tibia with 29(26-33)setae.

UNUSUAL VARIATION: A single specimen possesses each of the following. A ventral oral-rim tubular duct on 1 side of the ventral submarginal thorax; 2 multilocular pores near the mouth parts; lacks oral rims; 7-segmented antenna on 1 side of body.

U.S. SPECIMENS EXAMINED: None.

OTHER SPECIMENS EXAMINED:
Brazil: Matto Grosso do Sul, Bandeirantes (4-III-1982, *Manihot esculenta*, M. Yaseen) 2 slides, 2 specimens (BMNH),
Paraguay: Fulgencio-Yegros/28-1X-1981, *Manihot esculenta*, M. Yaseen) 1 slide, 1 specimen (BMNH), (16-II-1982, *Manihot esculenta*, M. Yaseen) 3 slides, 3 specimens (BMNH), (17-XI-1982, *Manihot esculenta*, B. Lohr) 2 slides, 2 specimens (BMNH), La Colmena (18-X-1983, *Manihot esculenta*, M. Yaseen) 1 slide, 1 specimen (BMNH).

HOSTS AND DISTRIBUTION: This species is known from Bolivia, Brazil, and Paraguay on cassava.

DISCUSSION: *Pseudococcus mandio* is similar to *P. viburni* by possessing large numbers of translucent pores on hind femur, numerous trilocular pores on segment VI, and numerous dorsomedial setae on segment VIII. The former differs by having: 2(0-4) oral rims on dorsum of abdomen; dorsal submarginal oral collars associated with most or all of cerarii 2-6; frontal oral rims normally absent; oral rims on ventral submargin from segment II to cerarius 13 absent; longest dorsal body setae 22(20-25)μ long; 14(3-24) translucent pores on femur; hind tarsus 103(89-114)μ long; longest seta on hind trochanter 100(87-109)μ long; and 3(0-7) oral collars near cerarius 12. *Pseudococcus viburni* has: 13(10-18) oral rims on dorsum of abdomen; dorsal submarginal oral collars absent or strictly marginal; frontal oral rims normally present; 3(1-5) oral rims on ventral submargin from segment II to cerarius 13; longest dorsal body setae 15(10-20)μ long; 65(15-150) translucent pores on hind femur; hind tarsus 122(114-142)μ long; longest setae on hind trochanter 144(108-157)μ long; and 10(8-16) oral collars near cerarius 12.

Pseudococcus maritimus (Ehrhorn) (Figure 19)

Dactylopius maritimus Ehrhorn 1900: 316.
Pseudococcus bakeri Essig 1910: 339.
Pseudococcus omniverae Hollinger 1917: 271.
Pseudococcus maritimus (Ehrhorn): Ferris 1918: 48.

ESA APPROVED COMMON NAME: Grape mealybug.

DIAGNOSIS: Hind tibia with 26(15-64) translucent pores; hind femur with 18(8-51) translucent pores; 27(19-35) oral-rim tubular ducts on dorsum of abdomen; 0(0-3) discoidal pores near edge of each eye; 13(10-25) oral-collar tubular ducts in cluster mesad of cerarius 12; 14(6-20) oral collars associated with cerarii 10 and 11; longest seta on hind trochanter 145(121-156)μ long; cisanal setae 63(44-68)μ long.

TYPE DATA: We have examined the lectotype of *Dactylopius maritimus* and 5 paralectotypes (USNM), the lectotype of *Pseudococcus bakeri* and 3 paralectotypes (CAS), and the lectotype of *Pseudococcus omniverae* (UCD).

The species epithet is derived from the Latin *maritimus* meaning "of the sea" and refers to the fact that Ehrhorn first collected the species on the cliffs of Santa Cruz overlooking the ocean.

FIELD CHARACTERS: This species has 16 or 17 pairs of thin, waxy filaments that are short on the head and long on the anal lobes. The length of the caudal pair usually does not exceed one half or three quarters of the length of the body. The body is lightly dusted with a white wax that is thinnest in the dorsomedial portion of the abdomen producing an inconspicuous band. The body is dark orange, and the ostiole fluid is light orange. A loose ovisac is produced that encloses the eggs. This species occurs on all parts of the host including the primary root system.

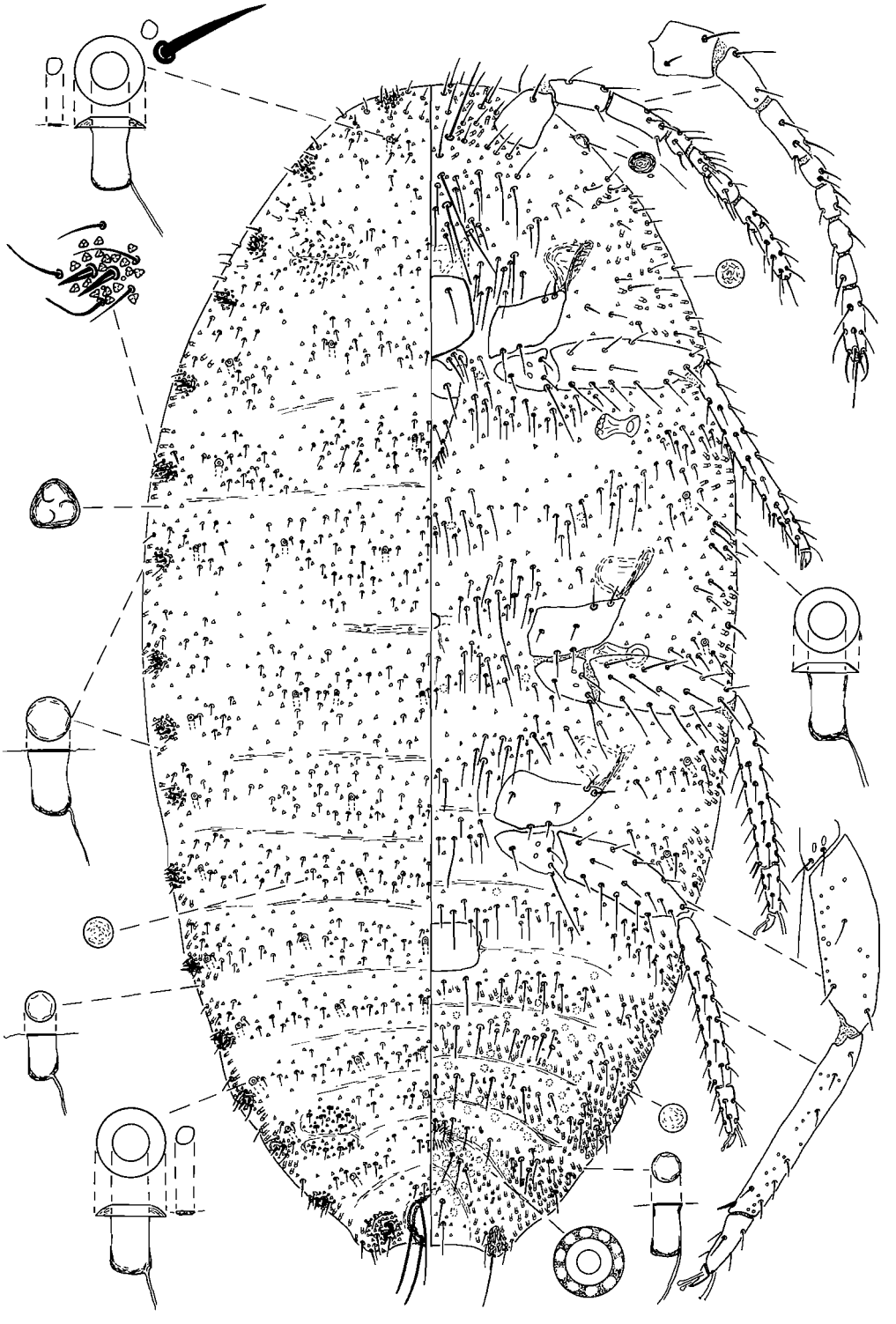

Figure 19. Adult female, *P. maritimus*, Santa Cruz, California, VII-1899, on *Eriogonum* sp.

SLIDE MOUNTED CHARACTERS: Mounted 1.9(1.4-3.2) mm long, 1.0(0.9-1.7) mm wide.

DORSUM: With 16(16-17) pairs of cerarii, cerarian formula as follows: 1-9 (2), 10 (0-2), 11 (2), 12 (2-3), 13-14 (2), 15 (2-3), 16 (4-5), 17 (3). Cerarius 12 with 4(2-5) auxiliary setae, 15(12-24) trilocular pores, 1(0-3) discoidal pores. Cerarius 1 with slight basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 1 size, about equal to small size on venter, scarce, associated with oral-rim tubular ducts. Oral-rim tubular ducts with 1(0-3) small discoidal pores and 0(0-1) small seta associated with rim, oral rims present posterior of frontal cerarii, associated with most other cerarii, in medial and submedial areas of thorax and abdomen, with 27(19-35) on abdomen; oral-collar tubular ducts restricted to marginal area between cerarii 1-7. Body setae of 2 sizes, longest on abdomen, excluding those on segment VIII, 17(10-24)μ long; 5(3-6) dorsomedial setae on segment VIII, longest 32(22-42)μ long.

Anal-ring setae 163(139-207)μ long, 1.8(1.7-2.0) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in posterior and anterior band on segments V-VII, usually with posterior band on segment IV, scattered on segment VIII and IX, occasionally 1-3 on segment III, 9(3-25) on thorax. Trilocular pores scattered over venter, 92(40-133) on segment VI. Discoidal pores of 2 sizes, large size about 7μ in diameter, 3(2-4) on anal lobe, 0(0-3) in membranous rim around each eye, few on posterior abdominal segments, scarce elsewhere. Oral-rim tubular ducts with 0(0-2) small discoidal pores and 0(0-1) seta associated with rim, 4(2-6) from segment II to cerarius 13, without duct near frontal cerarius; oral-collar tubular ducts associated with mesal setae on abdomen, posterior band of multilocular disc pores on segments IV-VII, on submargin and on margin of body, 13(10-25) in cluster mesad of cerarius 12, 14(6-20) associated with cerarii 10 and 11, 0(0-1) posterior of eye, 9(3-25) on each side of head. Setae as follows: 4 cisanal, 44(29-63)μ long; 4(3-6) cisvulvar on each side, 63(44-68)μ long; longest anal-lobe seta 151 (136-168)μ long; body setae of 3 lengths, longest on abdomen 76(61-90)μ long, longest interantennal seta 124(105-149)μ long; longest seta on trochanter of hind leg 145(121-156)μ
long.

Circulus 1.0(0.8-1.1) times as wide as long, divided by segmental fold between segments III and IV, width 120(98-220)μ. Labium 166(154-207)μ long. Posterior spiracle greatest length 73(61-98)μ long. Antennae 8-segmented, 512(424-723)μ long, lengths of each segment as follows: I 71 (54-98)μ, II 73 (61-105)μ, III 80(61-122)μ, IV 46(29-73)μ, V 54(41-95)μ, VI 46(41-61)μ, VII 46(41-59)μ, VIII 100(88-122)μ long. Length of antennal segment VIII / segment II 1.3(1.2-1.6), antennal segment VIII / segment III 1.3(1.0-1.5).

Legs with 26(15-64) translucent pores on dorsal surface of hind tibia, 18(8-51) on dorsal surface of hind femur, absent from remaining segments. Femur 285(239-395)μ long, slightly shorter than tibia; tibia 329(261-473)μ long; tar-

sus 115(100-132)μ long. Tibia / tarsus 2.9(2.2-3.6). Hind tibia with 38(23-56) setae.

UNUSUAL VARIATION: This species is unusually variable in the numbers of trilocular pores on the venter of segment VI and the numbers of translucent pores on the hind tibia and femur.

U.S. SPECIMENS EXAMINED: 102 slides, 207 specimens as follows:
Arkansas: *Vitis* sp.
California: *Astragalus* sp., *Eriogonum* sp., *E. latifolium*, *Pyrus communis*, *Sambucus* sp., *Vitis* sp.
Connecticut: *Vitis* sp.
District of Columbia: Rotten wood.
Florida: Cedar, *Diospyros* sp., *Eugenia* sp. *Fraxinus caroliniana*, *Ilex vomitoria*, *Liquidambar styraciflua*.
Georgia: *Persea* sp.
Illinois: *Taxus* sp., *Vitis* sp.
Indiana: *Cotoneaster* sp., *Sassafras* sp., *Ulmus* sp.
Iowa: *Robinia* sp.
Maryland: *Cornus florida*, *Liquidambar styraciflora*, *Polygonum* sp., *Prunus tomentosa*, *Tilia americana*, *Vitis* sp.
Massachusetts: *Berberis compacta gracilis*, *Juniperus maritima*, *Thuja* sp.
Michigan: *Vaccinium* sp.
Missouri: *Acer* sp., *Vitis* sp.
New Hampshire: *Ostrya virginiana*.
New Jersey: *Platanus* sp., *Taxus baccata*, *T. adpressa*.
New York: *Cydonia* sp., *Narcissus* sp.
Ohio: *Acer* sp., *A. saccharinum*, *Cornus florida*, *Corylus americana*, *Maclura* sp., *Platanus* sp., *Prunus* sp., *Rhododendron maximum*, *Taxus* sp., *Vitis* sp.
Pennsylvania: Host unknown.
Rhode Island: *Ulmus* sp.
Tennessee: *Celtis occidentalis*.
Texas: *Eustoma russellianum*.
Vermont: Fern.
Virginia: *Acer* sp., *Carya* sp., *Malus* sp., *Prunus* sp., *Rhododendron* sp.
Washington: *Malus* sp., *Pyrus* sp.
West Virginia: *Sassafras* sp., *Taxus* sp., *Trifolium* sp.

OTHER SPECIMENS EXAMINED: 3 slides, 4 specimens as follows:
Chile: *Vitis* sp.
Mexico: *Chysis aurea*, *Cydonia* sp.

HOSTS AND DISTRIBUTION: *Pseudococcus maritimus* was first collected in the U.S. in California on *Eriogonum latifolium* at Santa Cruz in 1899. The species apparently is native to the United States. Only 3 collections outside the country have been authenticated. Hosts from which the species is most commonly collected are grapes, fruit trees, yew, maples, and sycamore.

DISCUSSION: *Pseudococcus maritimus* has frequently been confused with *P. viburni*. For a comparison of these species see the discussion section of the latter.

Pseudococcus microcirculus McKenzie (Figure 20)
Pseudococcus microcirculus McKenzie 1960: 729.

SUGGESTED COMMON NAME: Orchid Mealybug.

DIAGNOSIS: Circulus small, located on segment III, not divided by segmental fold of segments III and IV; translucent pores restricted to hind tibiae; multilocular pore bands on anterior and posterior margins of segments VI-VII; hind tibia length / hind femur length 1.0 (0.9-1.1); hind femur 198(154-232)μ long; 0(0-3) oral-collar tubular ducts in cluster mesad of cerarius 12.

TYPE DATA: The adult female holotype is mounted on a slide by itself and is labeled as follows: Left label "Pseudococcus / microcirculus / McKenzie / DRAWN / Det. by TYPE / UCD TYPE #691", right label "No. 54J389 Cal. Dept. Agr. / Loc. Lafayette, Calif. / Contra Costa County / October 18-1954 / ex. orchid (orchidaceae) / D. J. Bingham & / J. Simmen coll" (UCD). We also have examined 4 paratypes on 2 slides. There is confusion concerning the extent of the type series of this species. McKenzie (1960) stated under "Hosts and distributions" that the species is known only from Lafayette. Under "Type material" in the next paragraph he stated that the holotype is deposited in the USNM. He continues by indicating that additional paratypes have been collected at 6 other nurseries in California.

Under a separate "Type material" heading he indicates that the holotype is deposited in the collection at the University of California at Davis. In reality, the type series is composed of specimens from 7 localities, and the holotype is in the collection at Davis. The species epithet is derived from the Greek adjective *mikros* meaning "small" and the Latin noun *kirkos* meaning "circle" and refers to the small circular structure on ventral abdominal segment III.

FIELD CHARACTERS: The following is adapted from McKenzie (1967). This species has 17 pairs of curved waxy filaments that are short on the head and longest posteriorly. The body is lightly dusted with a thin, powdery wax that does not completely conceal the pink body. A loose ovisac is produced that encloses the yellow eggs. The species occurs on the roots and foliage of the host.

SLIDE MOUNTED CHARACTERS: Mounted 1.7 (1.1-2.8) mm long, 1.1 (0.6-1.6) mm wide.

DORSUM: With 17(15-17) pairs of cerarii, cerarian formula as follows: 1-4 (2), 5 (0-2), 6-8 (1 or 2), 9 (2), 10-11 (1 or 2), 12 (3), 13-14 (2), 15 (1-3), 16 (2-4), 17 (2 or 3). Cerarius 12 with 3 (1-4) auxiliary setae, 16 (8-24) trilocular pores, 2 (0-4) discoidal pores. Cerarii 1 and 2 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 1 variable size, scattered over dorsum, associated with oral-rim tubular ducts, 5(4-6)μ in diameter scattered sparsely, more numerous on submargin. Oral-rim tubular ducts

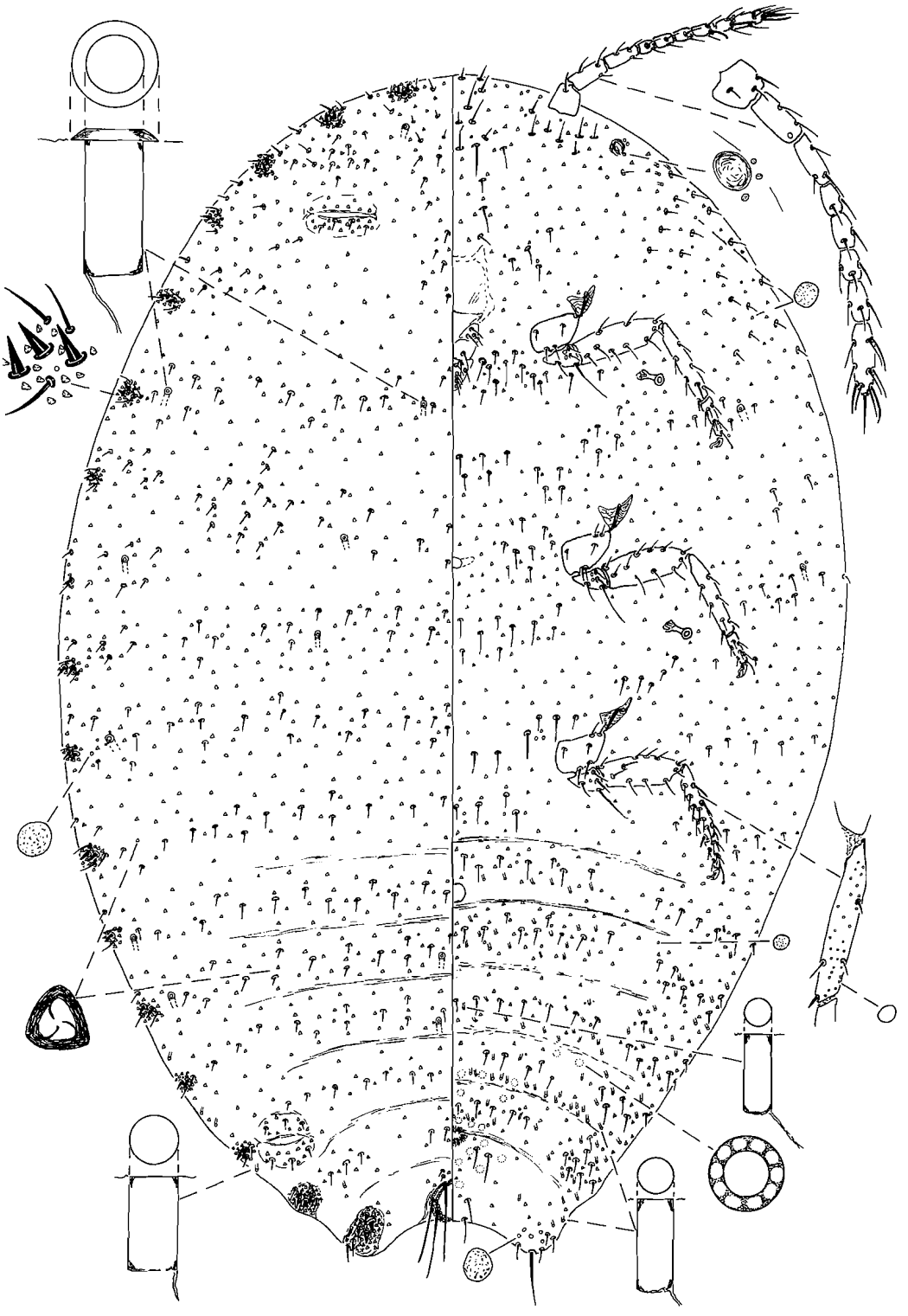

Figure 20. Adult female, *P. microcirculus*, Mill Valley, California, III-10-1958, on *Dendrobium* sp.

with 1(0-3) large or small discoidal pores and 0(0-2) setae associated with rim, oral rims present posterior of frontal cerarii about 50% of the time, absent between cerarii 15 and 16, sometimes present mesad of cerarius 12, occasionally mesad of cerarii 2-11, 1 or 2 mesally on thorax and segment III-VII, absent submedially except on segments II or III, with 5(0-11) on abdomen; oral-collar tubular ducts only on submargin between posterior cerarii. Body setae of 2 sizes, longest seta on abdomen, excluding segment VIII, 19(17-25)μ long; 4 (3-5) dorsomedial setae on segment VIII, longest seta 19(15-22)μ long.

Anal-ring setae 104(79-118)μ long, 1.6 (1.3-2.4) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in posterior and anterior bands on segments VI and VII, scattered on segments VIII and IX, occasionally on segments IV, V, thorax. Trilocular pores scattered over venter, 86(54-118) on segment VI. Discoidal pores of 1 variable size, largest 6(3-8)μ in width, 3(0-5) in membranous rim around each eye, on ventral submargin of head, occasionally few scattered on remainder of venter, 5(2-7) on basal sclerotization of anal lobe. Oral-rim tubular ducts with 2(0-3) discoidal pores and 1(0-1) seta associated with rim, 1(0-5) on submargin from segment II to cerarius 13, without duct near frontal cerarii; oral-collar tubular ducts in segmental band on segments VII-IV or III, associated with posterior band of multilocular disc pores on segments VI and VII, few on thorax and head, 0(0-3) mesad of cerarius 12, 0(0-1) associated with cerarii 10 and 11, with 2(0-3) posterior of eye, without ducts on head. Setae as follows: 4 cisanal, 27(20-37)μ long; 2(1-3) cisvulvar on each side, 29(20-40)μ long; longest anal-lobe seta 81(67-91)μ long; longest body seta on abdomen 39(30-47)μ long; longest interantennal seta 63(49-77)μ long; longest seta on trochanter of hind leg 90(77-106)μ long.

Circulus 1.7 (1.2-2.6) times wider than long, width 43(22-74)μ, on segment III, not divided by segmental fold of segments III and IV. Labium 130(116-146)μ long. Posterior spiracle greatest length 62(44-69)μ long. Antennae 8-segmented, 376 (309-439)μ long, lengths of each segment as follows: I 51(37-73)μ, II 59(41-73)μ, III 51(39-61)μ, IV 29(22-37)μ, V 34(29-49)μ, VI 27(24-34)μ, VII 39(29-44)μ, VIII 85(78-95)μ long. Length of antennal segment VIII / segment II 1.5(1.3-1.8), antennal segment VIII / segment III 1.7(1.3-2.2).

Legs with 29(19-46) conspicuous translucent pores on dorsal surface of hind tibia, usually absent from remaining segments. Femur 198 (154-232)μ long, about equal in length to tibia; tibia 198(146-234)μ long; tarsus 88(79-98)μ long. Tibia / tarsus 2.3(1.6-2.7). Hind tibia with 21(14-26) setae.

UNUSUAL VARIATION: Rarely specimens may have 1-3 translucent pores on the hind femur.

U.S. SPECIMENS EXAMINED: 13 slides, 19 specimens as follows:
California: *Cattleya* sp., *Dendrobium* sp., *Epidendrum alatum*, Orchidaceae.
Florida: *Cattleya nigritian*.

Maryland: *Calanthe vestita, Coelogyne* sp.

OTHER SPECIMENS EXAMINED: 180 slides, 269 specimens as follows:
Antigua: Orchidaceae.
Barbados: Orchidaceae, *Phalaenopsis* sp.
Belgium: *Cattleya* sp.
Belize: *Brassovola* sp., Orchidaceae.
Brazil: Cactaceae, *Catasetum* sp., *Cattleya amethytoglossa, C. intermedia, C. laelia, C. schillerana, C. velutina, Cattleya* sp., *Epidendrum variegatum, Epidendrum* sp., *Gomeza* sp., *Laelia sinaovana, Laelia* sp., *Oncidium* sp., Orchidaceae, *Schomburgkia* sp., *Sobrelia maculata*
British West Indies: *Broughtonia sanguinea, Cattleya* sp., *Oncidium sprucei.*
Canal Zone: *Catasetum* sp., *Cattleya gigas, C. skinneri autumalis, Cattleya* sp., *Epidendrum atropurpureum, Epidendrum* sp., Orchidaceae, *Phalaenopsis* sp.
Colombia: *Oncidium* sp.
Costa Rica: *Cattleya* sp., *Oncidium* sp., Orchidaceae.
Cuba: *Epidendrum* sp., *Oncidium* sp.
Dominican Republic: *Cyrtopodium punctatum, Lycaste barringtoniae, Oncidium* sp., Orchidaceae.
England: *Oncidium* sp.
Guatemala: *Brassavola nodosa, Cattleya skinneri, Laelia rubescens, Lycaste* sp., *Odontoglossum grande, Oncidium cavendishianum, Oncidium splendidum, Oncidium* sp., Orchidaceae, *Philodendron* sp.
Haiti: Orchidaceae.
Honduras: *Oncidium* sp., Orchidaceae.
Jamaica: *Brassia maculata, Broughtonia* sp., *Oncidium luridum, O. triquetrum, Oncidium* sp., Orchidaceae, *Schomburgkia lyonsii.*
Mexico: Cactaceae, *Cattleya* sp., *Dendrobium* sp., *Epidendrum ocvacenum, E. vitellinum, Epidendrum* sp., *Laelia anceps, L. gouldiana, L. majalis, Laelia* sp., *Odontoglossum* sp., *Persea* sp., *Tillandsia* sp.
Panama: Orchidaceae.
Trinidad: *Diacrum bicornatum, Gongora maculata, Oncidium lanceanum,* Orchidaceae, *Stanhopea grandiflora, Vanda* sp.
Venezuela: *Cattleya* sp., Orchidaceae.

HOSTS AND DISTRIBUTION: *Pseudococcus microcirculus* was first collected in the U.S. in October, 1954, in a nursery in Larkspur, California. Within the U.S. the species also has been reported from Florida and Maryland and probably occurs elsewhere in greenhouses with orchids.

Outside of the U.S. the species has been collected most commonly from Brazil, Guatemala, Mexico and undoubtedly is native to the New World Tropics. It is reported on 16 genera of orchids and is known only from *Persea, Tillandsia, Philodendron,* and Cactaceae outside of the Orchidaceae.

DISCUSSION: *Pseudococcus microcirculus* is similar to *P. sorgiellus* by having: Longest dorsal body setae short (about 19μ long); 0(0-3) oral collars in cluster mesad of cerarius 12; short antennae 376(309-439)μ long; short labium 130(116-

146)μ long; large value of length of antennal segment VIII / segment III (about 1.7); short legs (hind femur about 198μ long); small number of setae on hind tibiae 21(14-26); longest trochanter seta short (about 90μ long). *Pseudococcus microcirculus* differs by having: Translucent pores limited to hind tibia; circulus situated on segment III, undivided; 3(0-5) discoidal pores near each eye; greatest length of posterior spiracle 62(44-69)μ long; 5(0-11) dorsal oral rims on abdomen. *Pseudococcus sorghiellus* has: Translucent pores on hind coxa, trochanter, femur, and tibia; circulus situated between segments III and IV, divided by segmental line of III and IV; 1(0-2) discoidal pores near each eye; greatest length of posterior spiracle 66(51-79)μ long; 19(3-31) dorsal oral rims on abdomen.

For a comparison of *Pseudococcus microcirculus* with *P. apomicrocirculus* and *P. neomicrocirculus* see the discussion section of these species.

Pseudococcus nakaharai Gimpel and Miller, new species (Figure 21)

SUGGESTED COMMON NAME: Nakahara mealybug.

DIAGNOSIS: Translucent pores restricted to hind tibiae; hind tibiae swollen mesally; oral-collar tubular ducts present on posterior abdominal segments of dorsum; multilocular disc pores usually present dorsally on mediolateral area of segment VII; 7(6-11) cisvulvar setae on each side; labium 248(219-297)μ long.

TYPE DATA: The adult female holotype is mounted alone on a slide labeled as follows: Left label "*Pseudococcus* / on *Echinocactus* / *Durango* 129 / San Luis Pot. Mex. at / D.P. Limber, coll. D.C./ Aug.27, 1937 / E.Q.-A421803"; right label "*Pseudococcus* / *nakaharai* / Gimpel and Miller / HOLOTYPE" (USNM). There are 195 adult female paratypes on 75 slides that are deposited in ANIC, BMNH, CDAS, FSCA, IES, IZAS, MCM, MNHP, NZAC, TAES, UCD, UH, USNM, VPI, ZIL.

The species epithet is formed in honor of Mr. Sueo Nakahara, Systematic Entomology Laboratory, Agricultural Research Service, USDA, who has contributed so much to the field of coccidology including first drawing our attention to this unusual species.

FIELD CHARACTERS: Normally found on the roots of barrel and columnar cacti.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 3.5 mm, width 2.0 mm. Paratypes 3.4(1.8-4.2) mm long, 2.3(1.2-3.1) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: Left side, 1-9 (2), 10 (3), 11 (2), 12 (3), 13-14 (2), 15-17 (3), paratypes 1-7 (2), 8 (2-3), 9 (1-2), 10 (1-3), 11 (1-2), 12 (2-3), 13 (2), 14-15 (2-3), 16 (2-4), 17(2-3). Cerarius 12 (left side) with 2 auxiliary setae, paratypes with 3(2-4), 36 trilocular pores, paratypes 33(28-36), 6 discoidal pores, paratypes 4 (3-6). Cerarius 1 with slight basal sclerotization. Multilocular disc pores present, 3 or 2 on each mediolateral area of segment VII, paratypes with pores present or absent, 2(0-5) sometimes present on segment V; trilocular pores scattered evenly; discoidal pores of 1 size, about same

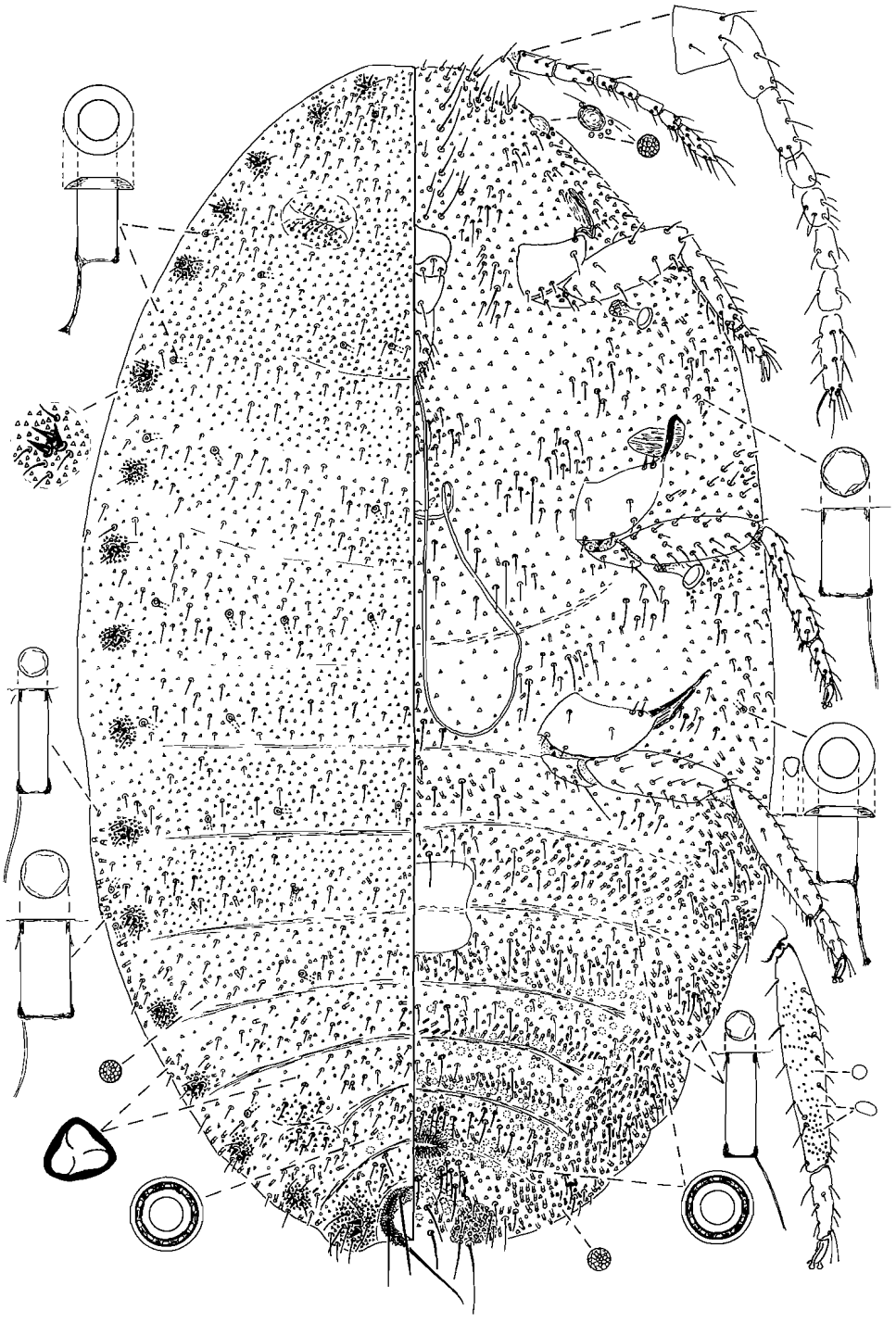

Figure 21. Adult female, *P. nakaharai,* Romoland, California, XI-7-1973, on *Leuchtenbergia principes.*

diameter as small size on venter, scattered sparsely. Oral-rim tubular ducts with 0(0-1) discoidal pore and 0(0-1) seta associated with rim, oral rims present posterior of frontal cerarii, with oral rims present near cerarii 12-13, and 17, paratypes with 1 or more of these absent, with 8 on abdomen, paratypes 8(6-11); oral-collar tubular ducts on segments II or III-VIII. Body setae of 3 sizes, longest on abdomen, excluding segment VIII, 25μ long, paratypes 24(21-34)μ; 10 dorsomedial setae on segment VIII, paratypes 8(6-10), longest 37μ long, paratypes 35(32-37)μ long.

Anal-ring setae 163μ long, paratypes 160(145-175)μ long, 1.3 times as long as greatest diameter of ring, paratypes 1.2(1.0-1.5).

VENTER: Multilocular disc pores in posterior and anterior bands on segments V-VII, scattered on segments III, IV, VIII and IX, with 2 on thorax, paratypes 4(0-14) pores. Trilocular pores scattered over venter, 152 on segment VI, paratypes 230(137-258). Discoidal pores of 2 sizes, large size 5μ in diameter, paratypes 5(3-6)μ, 3 or 5 set in membranous rim around each eye, paratypes 3(1-6), 3 or 4 on anal-lobe sclerotization, paratypes 4(2-5), several laterad of each spiracle, scattered on remainder of venter. Oral-rim tubular ducts with 1(0-1) discoidal pore and 0(0-1) seta associated with rim, absent from submargin from segment II to cerarius 13, paratypes 3(0-5), without duct near frontal cerarius; oral-collar tubular ducts in transverse band on segments II-VII, abundant on submargin of abdomen, less numerous anteriorly, with 6 on longitudinal line mesad of cerarius 12, paratypes 7 (5-13) in line or cluster, 1 associated with cerarii 10 and 11, paratypes with 0(0-2), 2 posterior of eye, paratypes with 2(0-4), 1 or 2 on each side of head, paratypes with 1(0-2). Setae as follows: 4 cisanal, paratypes 5(4-6), 74μ long, paratypes 58(37-85)μ long; 8 cisvulvar on left side, 6 on right side, paratypes 7(6-11) on each side, 72μ long, paratypes 60(36-73)μ long; longest anal-lobe seta 131μ long, paratypes 157(131-178)μ long; body setae of 3 lengths, longest on abdomen 79μ long, paratypes 54(49-82)μ long; longest interantennal seta 74μ long, paratypes 77(61-98)μ long; longest seta on trochanter of hind leg broken, paratypes 121(110-134)μ long.

Circulus 1.1 times as wide as long, paratypes 1.0(0.9-1.2), width 180μ, paratypes 199(148-232)μ, divided by segmental fold of segments III and IV. Labium 245μ long, paratypes 248(219-297)μ long. Posterior spiracle greatest length 111μ, paratypes 102(87-115)μ. Antennae 8-segmented, right antenna 452μ long, length of each segment as follows: I 74μ, II 74μ, III 76μ, IV 31μ, V 40μ, VI 45μ, VII 45μ, VIII 104μ long, paratypes 517(429-614)μ long, length of each segment as follows: I 78(71-85)μ, II 72 (56-81)μ, III 76(66-93)μ, IV 45(34-61)μ, V 49(37-68)μ, VI 49(37-61)μ, VII 47(37-59)μ, VIII 102(93-107)μ long. Length of antennal segment VIII / segment II 1.4, paratypes 1.4(1.3-1.7), antennal segment VIII / segment III 1.4, paratypes 1.3(1.2-1.4).

Legs with 92 conspicuous translucent pores on dorsal surface of hind tibia, paratypes 83(52-112), absent from remaining segments. Femur 309μ long, paratypes 305(260-331)μ long, slightly shorter than tibia; tibia 336μ long, paratypes

321(268-368)μ long; tarsus 117μ long, paratypes 117(109-122)μ long. Tibia/tarsus 2.8, paratypes 2.8(2.4-3.0). Hind tibia with 44 setae, paratypes 42(35-46) setae.

UNUSUAL VARIATION: Cerarii 8, 9, or 10 rarely have 1 or 3 conical setae.

U.S. SPECIMENS EXAMINED: Paratypes-
California: Riverside Co., Romoland (29-X-1973, *Leuchtenbergia principis*, G. Foster), 1 slide, 2 specimens (BMNH), (7-XI-1973), 1 slide, 2 specimens (VPI), 1 slide, 2 specimens (UH), 1 slide, 2 specimens (USNM); San Benito Co., Salinas (24-IV-1972, cactus, D. Williams), 1 slide, 1 specimen (CDAS).
Washington, D.C.: (15-XI-1923, cactus, H. Morrison), 2 slides, 6 specimens (ANIC, USNM).

U.S. SPECIMENS EXAMINED: Not Paratypes-
Florida, Orange Co., Venice (2-X-1987, *Cereus* sp., K.E. Jenkins) 3 slides, 3 specimens (FSCA); Venice (16-XII-1987, *Opuntia microdasys*, K.E. Jenkins) 3 slides, 3 specimens (FSCA).
Texas: (7-VIII-1984, *Astrophytum* sp., *Cereus* sp., *Glandulicatus unicinatus*, A. Newitt, C. Phelps) 4 slides, 4 specimens (FSCA, UNSM).
Washington D.C.: (4-XI-1890, host unknown, collector unknown), 4 slides, 12 specimens (USNM); U.S. Department of Agriculture greenhouse (7-X-1908, cactus, J.G. Saunders), 2 slides, 18 specimens (USNM); Cactus greenhouse, U.S. Department of Agriculture (25-VII-1921, cactus, H.Y. Gouldman), 1 slide, 2 specimens (USNM).

OTHER SPECIMENS EXAMINED: Paratypes-
Mexico: Cadereyta (19-VI-1940, *Acanthocereus* sp., D.P. Limber, at District of Columbia), 1 slide, 2 specimens (UCD), (19-VI-1940, cactus, D.P. Limber, at District of Columbia), 1 slide, 1 specimen (USNM), Cadereyta (9-XI-1937, *Coryphantha elephantidens*, H.R. Cary, at Laredo), 1 slide, 2 specimens (USNM), (27-III-1944, *Mammillaria bicornuta*, E.P. Reagan, at Laredo), 1 slide, 4 specimens (USNM), (11-VI-1947, cactus, J.B. Leary, at Laredo), 1 slide, 3 specimens (IES), (29-IX-1947, cactus, R.M. Fouts, at Laredo), 1 slide, 1 specimen (USNM), (30-VI-1948, cactus, R.M. Fouts, at Laredo) 1 slide, 1 specimen (USNM), (16-IX-1948, cactus, Lewis, at Laredo), 1 slide, 1 specimen (USNM), (2-VIII-1950, cactus, Lewis and R.M. Fouts, at Laredo) 1 slide, 3 specimens (USNM), (17-X-1950, *Lemaireocereus pruinosus*, R.M. Fouts, at Laredo), 1 slide, 5 specimens (IZAS), (17-V-1956, *Cephalocereus senilis*, Lewis, at Laredo), 1 slide, 1 specimen (USNM), (24-V-1961, *Notocactus leninghausii*, J.T. Watt, at Laredo), 1 slide, 1 specimen (USNM), (13-V-1970, cactus, R.L. Hodgdon, at Laredo), 1 slide, 1 specimen (USNM), Huizache, San Luis Potosi (22-VIII-1976, *Stenocactus* sp., collector unknown, at El Paso), 1 slide, 3 specimens (USNM), (23-VIII-1976, *Ariocarpus retusus*, L. Holquin and J. Kline), 1 slide, 3 specimens (USNM), San Luis (27-VIII-1937, *Corypantha durangensis*, D.P. Limber, at
District of Columbia), 1 slide, 1 specimen (USNM), San Luis Potosi (2-VI-1939, *Cephalocereus senilis*, B.C. House, at Laredo), 1 slide, 2 specimens (USNM), (11-V-1942, *Cephalocereus senilis*, H.R. Cary, at Laredo) 1 slide, 2 specimens

(USNM), (12-VI-1942, *Cephalocereus polylophus*, H.R. Cary, at Laredo), 1 slide, 4 specimens (USNM), (19-VIII-1948, cactus, R.M. Fouts, at Laredo), 1 slide, 1 specimen (USNM), (8-X-1954, *Mammillaria marginatus*, H.R. Cary, at Laredo), 1 slide, 8 specimens (USNM), Cordoba, Vera Cruz, (31-I-1968, cactus, R.H. Guerra) 4 slides, 11 specimens (USNM), location unknown (21-I-1968, *Cephalocereus senilis*, Eads, Karpate, Virgil, at El Paso), 1 slide, 2 specimens (USNM), (11-XI-1935, cactus, D.P. Limber, at District of Columbia), 1 slide, 2 specimens (USNM), (2-VII-1936, cactus, J. B. Leary, at Laredo), 1 slide, 1 specimen (FSCA), (23-IX-1936, cactus, B.C. House, at Laredo), 1 slide, 1 specimen (USNM), (2-X-1936, cactus, B.C. House, at Laredo), 1 slide, 3 specimens (USNM), (7-X-1936, cactus, J.B. Leary and B.C. House, at Laredo), 1 slide, 3 specimens (ZIL), (20-X-1936, cactus, B.C. House, at Laredo), 1 slide, 3 specimens (NZAC), (20-X-1936, cactus, H.R. Carey, at Laredo), 1 slide, 1 specimen (MNHP), (26-X-1936, cactus, H.R. Leary, at Laredo), 1 slide, 3 specimens (MCM), (8-VIII-1939, *Echinocactus* sp., H.R. Carey, at Laredo), 1 slide, 3 specimens (USNM), (6-VII-1940, cactus, C.F. Hailer, at El Paso), 1 slide, 1 specimen (USNM), (20-VII-1940, *Astrophytum ornatum*, J.B. Leary), 1 slide, 1 specimen (USNM), (15-VI-1945, cactus, H.R. Carey, at Laredo), 1 slide, 1 specimen (USNM), (10-VI-1949, cactus, E.W. Jackson, at Laredo), 1 slide, 3 specimens (USNM), (16-VIII-1949, cactus, H.R. Cary, at Laredo), 1 slide,1 specimen (USNM), (8-VIII-1950, cactus, Lewis and E.W. Jackson, at Laredo), 1 slide, 1 specimen (USNM), (23-VIII-1950, cactus, H.R. Cary, at Laredo), 1 slide, 2 specimens (USNM), (7-IX-1950, cactus, R.M. Fouts, at Laredo), 1 slide, 1 specimen (USNM), (9-V-1951, *Mammillaria bertrandis*, R.M. Fouts, at Laredo), 1 slide, 1 specimen (TAES), (21-V-1951, *Echinocactus grussonii*, R.M. Fouts, at Laredo), 1 slide, 1 specimen (USNM), (14-V-1952, cactus, collector unknown, at Brownsville), 1 slide, 4 specimens (USNM), (24-VI-1952, *Cephalocereus senilis*, H.R. Cary, Lewis, and R.M. Fouts, at Laredo), 1 slide, 4 specimens (USNM), (27-VI-1952, cactus, H.R. Cary, at Laredo), 1 slide, 3 specimens (USNM), (2-VII-1952, cactus, Weedmark, at Laredo), 1 slide, 5 specimens (USNM), (21-VII-1952, *Cephalocereus senilis*, R.M. Fouts, at Laredo), 1 slide, 2 specimens (USNM), (5-IX-1952, *Philodendron* sp., Heinrich, Coleman and R.M. Fouts, at Laredo), 1 slide, 10 specimens (USNM), (5-IX-1952, *Cephalocereus senilis*, Weedmark and Coleman, at Laredo), 1 slide, 4 specimens (USNM), (30-IX-1952, *Cephalocereus senilis*, H.R. Leary, Lewis and R.M. Fouts, at Laredo), 1 slide, 4 specimens (USNM), (24-IV-1953, *Ferocactus* sp., R.M. Fouts, at Laredo), 1 slide, 3 specimens (USNM), (28-VIII-1953, *Ferocactus glaucescens*, R.M. Fouts, at Laredo), 1 slide, 7 specimens (USNM), (4-I-1954, cactus, H.R. Cary, at Laredo), 1 slide, 1 specimen (USNM), (2-V-1954, cactus, Averill, at Laredo), 1 slide, 2 specimens (USNM), (3-VI-1957, cactus, J.T. Watt, at Laredo), 1 slide, 6 specimens (USNM), (11-VII-1972, *Cephalocereus senilis*, T.E. Johnson, at Laredo), 1 slide, 2 specimens (USNM), (17-VIII-1972, cactus, K.C. Parker, at San Francisco), 1 slide, 4 specimens (USNM), Vera Cruz (23-XI-1973, *Fouqueria fasciculata*, Ridlehuber and Holquin, at El Paso), 1 slide, 1 specimen (USNM), Huizache, San Luis Potosi (23-VIII-1976, *Thelocactus conothelos*, J. Kline, at El Paso), 1 slide, 1 specimen (USNM), San Luis Potosi (30-VI-1980, *Wilcoxia schimolli*, F. Davis, at El Paso), 1 slide, 1 specimen (USNM), location unknown (16-III-1981, corn, D. Riley, at

Brownsville) 1 slide, 1 specimen (USNM), Oaxaca (16-IV-1981, *Mammillaria* sp., D.A. Olsen, at Laredo) 1 slide, 1 specimen (USNM), Guadalajara (18-IV-1981, *Echeveria* sp., D.A. Olsen, at Laredo) 2 slides, 2 specimens (USNM).
Peru: (19-III-1975, cactus, E.B. Lee, at Miami), 1 slide, 3 specimens (USNM), (7-V-1980, cactus, J. Torres, at Miami), 1 slide, 1 specimen (USNM), (9-IX-1981, cactus, H.O. Hannagan, at Miami) 2 slides, 5 specimens (USNM).

OTHER SPECIMENS EXAMINED: Not paratypes-
Guatemala: Cactaceae roots
Japan: *Cereus* sp.
Mexico: *Ariocarpus trigonus, Astrophytum myriostigina, Carnegiea gigantea, Cephalocereus columna-trajani, C. palmeri, Corypantha asterias, Lemaireocereus marginatus, Lophophora williamsii, Mammillaria calacantha, M. candida, M. parkinsonii, Obregonia denegrii, Thelocactus bicolor*

HOSTS AND DISTRIBUTION: *Pseudococcus nakaharai* was first collected on cactus in the USDA greenhouse in the District of Columbia in 1890. In the U.S. it is recorded from California, Florida, Texas, and the District of Columbia. Outside of the U.S. it is known from Japan, Guatemala, Mexico and Peru. This species is probably native to Mexico, and it is likely that records from the District of Columbia are from cactus imported from Mexico.

The host list is nearly limited to the barrel or columnar cacti: *Acanthocereus, Ariocarpus, Astrophytum, Carnegia, Cephalocereus, Coryphantha, Echinocactus, Ferocactus, Glandulicactus, Lemaireocereus, Leuchtenbergia, Lophophora, Mammillaria, Notocactus, Opuntia, Obregonia, Stenocactus,* and *Thelocactus.* There are single questionable records from *Philodendron* sp., and corn. It also has been collected on *Fouqueria* (Fouqueriaceae) and *Echeveria* (Crassulaceae).

DISCUSSION: *Pseudococcus nakaharai* is strikingly different from all other members of the *P. maritim*us group. It superficially resembles *P. viburni* by having: Swollen hind tibiae with numerous translucent pores; several discoidal pores near each eye; several oral collars near cerarius 12, few or no oral collars associated with cerarii 10 and 11. *Pseudococcus nakaharai* differs by having: 33(28-36) trilocular pores and 4(3-6) discoidal pores associated with cerarius 12; dorsal oral-collar tubular ducts; dorsal multilocular disc pores; longest dorsal body seta 24(21-34)µ long; longest dorsal seta on segment VIII 35(32-37)µ long; length of anal-ring seta / greatest diameter of ring 1.2(1.0-1.5); 230(137-258) trilocular pores on venter of segment VI; cisanal setae 58(37-85)µ long; 7(6-11) cisvulvar setae on each side of body; labium 248(219-297)µ long; greatest length of posterior spiracle 102(87-115)µ long; no translucent pores on hind femur. *Pseudococcus viburni* has: 19(15-23) trilocular pores and 2(1-3) discoidal pores associated with cerarius 12; no dorsal oral collars except marginal ones; no dorsal multilocular disc pores; longest dorsal body seta 15(10-20)µ long; longest dorsal seta on segment VIII 20(17-24)µ long; length of anal-ring seta / greatest diameter of ring 1.7(1.5-2.0); 154(132-200) trilocular pores on venter of segment VI; cisanal setae 35(19-49)µ long; 4(3-5) cisvulvar setae on each side of body; labium 175(146-207)µ

long; greatest length of posterior spiracle 73(53-85)μ long; translucent pores on hind femur.

Pseudococcus neomaritimus Beardsley (Figure 22)
Pseudococcus neomaritimus Beardsley 1966: 454.

SUGGESTED COMMON NAME: New sea mealybug.

DIAGNOSIS: Translucent pores restricted to hind tibia; 4(2-6) discoidal pores associated with eye; without sclerotized rim around eye; 6(5-7) oral rims on ventral submargin from segment II to cerarius 13; 5(4-6) cisvulvar setae on each side; oral-collar tubular ducts absent mesad of cerarius 12 and near cerarii 10 and 11; circulus 104(74-133)μ wide; oral rims absent from dorsal submargin between cerarius 15 and 16.

TYPE DATA: We have examined the holotype, which is mounted on a slide by itself and is labeled as follows: Left label "neomaritimus / type / On *Crotalaria incana* / Yap Id., Caroline Id. / Aug. 24, 1950 / R. J. Goss," right label "Pseudococcus / neomaritimus / Beardsley / Holotype" (USNM). We also have examined 16 paratypes on 6 slides from 6 localities (USNM).

The species epithet was formed from the Greek *neos* meaning "new" and the Latin *maritimus* meaning "of the sea". The name is an adjective and refers to the similarity between *P. maritimus* and *P. neomaritimus*.

FIELD CHARACTERS: No available information.

SLIDE MOUNTED CHARACTERS: Mounted 2.5(1.7 3.4) mm long, 1.4(0.8-2.0) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: 1-9 (2), 10 (1-2), 11 (2), 12 (3), 13-14 (2), 15 (3), 16 (3-4), 17 (3). Cerarius 12 with 4(3-4) auxiliary setae, 21(18-27) trilocular pores, 3(3-4) discoidal pores. Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered, becoming less numerous toward submargin; discoidal pores of 1 size, about same size as small size on venter, scattered sparsely over dorsum, associated with oral-rim tubular ducts but not associated with oral-collar tubular ducts. Oral-rim tubular ducts with 1(0-3) small discoidal pores and 0(0-1) seta associated with rim, oral rims present posterior of frontal cerarii, absent from submargin between cerarius 15 and 16, on some thoracic segments, abdominal segments I-VII, usually present submedially on segments IV-VII, with 23(20-28) on abdomen. Oral-collar tubular ducts restricted to submargin between cerarii. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 17(15-20)μ long; 4(3-6) dorsomedial setae on segment VIII, longest 20(17-24) μ long.

Anal-ring setae 144(134-154)μ long, 1.6(1.4-1.7) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in posterior and anterior bands on segments V-VII, posterior band on segment IV, scattered on segments VIII and IX,

with 2(0-3) on thorax. Trilocular pores scattered over venter, 81(55-104) on segment VI. Discoidal pores of 2 sizes, large size about 3μ in diameter, 4(2-6) in membranous rim around eye, 3(2-5) on anal-lobe sclerotization, associated with anterior band of multilocular disc pores on segments VI-VII, 1(0-3) associated with oral-rim tubular ducts, scattered over remainder of venter. Oral-rim tubular ducts with 2(0-3) discoidal pores and 1(0-1) seta associated with rim, 6(5-7) on submargin from segment II to cerarius 13, rarely with duct near frontal cerarius; oral-collar tubular ducts associated with posterior band of multilocular disc pores on segments IV VII, numerous on submargin of segments III-VIII, few on head, prothorax, segment IX, absent mesad of cerarius 12, 0(0-1) associated with cerarii 10 and 11, 1(0-3) posterior of eye, 1(0-2) on each side of head. Setae as follows: 4 cisanal, 44(37-56)μ long; 5(4-6) cisvulvar on each side, 41(24-56)μ long; longest anal-lobe seta 122(90-139)μ long; body setae of 3 lengths, longest on abdomen 80(44-122)μ long; longest interantennal setae 115(97-183)μ long; longest seta on trochanter of hind leg 117(106-131)μ long.

Circulus 1.3(1.0-1.6) times wider than long, width 104(74-133)μ, divided by segmental fold between segments III and IV. Labium 159(139-171)μ long. Posterior spiracle greatest length 79(71-85)μ long. Antennae 8-segmented, 444(407-500)μ long, lengths of each segment as follows: I 61(59-66)μ, II 71(61-78)μ, III 61(54-68)μ, IV37(29-39)μ, V 44(37-51)μ, VI 39(29-46)μ, VII 41(34-44)μ, VIII 95(93-100)μ long. Length of antennal segment VIII / segment II 1.4(1.2-1.6), antennal segment VIII / segment III 1.6(1.4-1.8).

Legs with 27(16-39) translucent pores on dorsal surface of hind tibia, absent from remaining segments. Femur 263(239-305)μ long, slightly shorter than tibia; tibia 293(268-341)μ long; tarsus 105(102-110)μ long. Tibia / tarsus 2.8(2.6-3.1). Hind tibia with 36(30-40) setae.

VARIATION: Cerarius 10 at times with only 1 conical seta. Oral rim on ventral surface of head near frontal cerarius when present, with weakly developed rim.

U.S. SPECIMENS EXAMINED: None

OTHER SPECIMENS EXAMINED:
U. S. Trust Territory, Caroline Islands: Moen, Truk Atoll (24-X-1952, *Acalypha indica*, J.W. Beardsley) 2 slides, 6 specimens (USNM), Yap Island (24-VIII-1950, *Crotalaria incana*, R.J. Goss) 1 slide, 1 specimen (USNM).
Guam: Atao Beach (25-VI-1936, *Gossypium* sp., R.L. Usinger) 1 slide, 3 specimens (USNM), Com. Mar. Hill (28-IV-1948, *Plumeria acutifolia*, K.L. Maehler) 1 slide, 1 specimen (USNM), Mt. Alutom (18-VI-1948, *Blechnum pyramidalum*, H. Townes) 1 slide, 1 specimen (USNM), location unknown (2-I-1954, *P. limensis*, O.N. Liming) 1 slide, 4 specimens (USNM).
Marshall Islands: Majuro Atoll (20-XII-1972, *Ipomoea pescaprae*, D.O. Otobed) 3 slides, 5 specimens (USNM), (*Vigna morinalus*, D.O. Otobed) 3 slides, 6 specimens (USNM), (*Wodibia biflora*, D.O. Otobed) 2 slides, 5 specimens (USNM).
Saipan: (30-VI-1946, host unknown, H. Townes) 1 slide, 2 specimens (USNM).

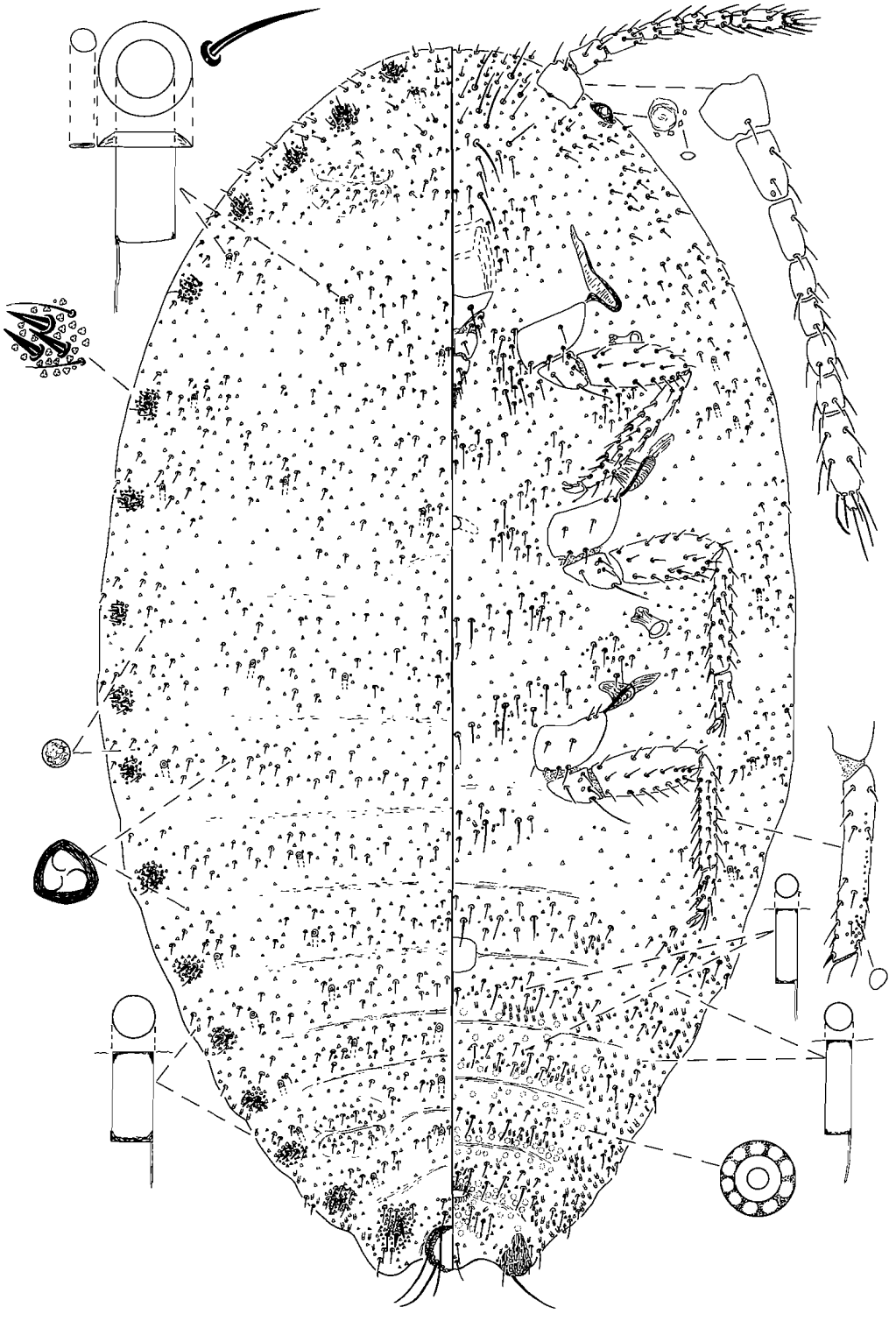

Figure 22. Adult female, *P. neomaritimus,* Yap Islands, VIII-24-1950, on *Crotalaria incana.*

HOSTS AND DISTRIBUTION: This species is known only from a small area of the Micronesia in the vicinity of the 15th parallel. From the limited material available, it is evident that this species is not common and has a limited geographical range. Additional collecting in the Micronesia may extend the range.

DISCUSSION: *Pseudococcus neomaritimus* is similar to *P. galapagoensis* by having: 5 or more oral rims on ventral submargin between segment II and cerarius 13; translucent pores restricted to hind tibia; 5 or fewer oral collars near cerarius 12; and several discoidal pores near each eye. *Pseudococcus neomaritimus* differs by having: Membranous rim around eye; 6(5-7) oral rims on submargin of venter between segment II and cerarius 13; no oral collars near cerarius 12; circulus 104(74-133)μ wide; 1(0-3) oral collar posterior of eye; 5(4-6) cisvulvar setae on each side of body; length of antennal segment VIII / segment III 1.6(1.4-1.8); 23(20-28) dorsal oral rims on abdomen. *Pseudococcus galapagoensis* has: Slightly sclerotized rim around eye; 22(17-25) oral rims on submargin of venter between segment II and cerarius 13; 3(2-5) oral collars near cerarius 12; circulus 150(131-170)μ wide; 6(4-8) oral collars posterior of eye; 3 cisvulvar setae on each side of body; length of antennal segment VIII / segment III 1.3; 15 dorsal oral rims on abdomen.

Pseudococcus neomicrocirculus Gimpel and Miller, new species (Figure 23)

SUGGESTED COMMON NAME: Venezuela orchid mealybug.

DIAGNOSIS: Circulus small, width 59(27-79)μ, located on segment III; translucent pores restricted to hind tibiae; multilocular pores on posterior margin of segment IV; hind tibia / hind femur length 1.0(0.9-1.1); hind femur 208(180-237)μ long.

TYPE DATA: Adult female holotype is right-hand specimen on slide labeled as follows: Right label "Holotype / *Pseudococcus* / *neomicrocirculus* / right-hand specimen"; left label "*Pseudococcus* / On *Cattleya* spp. / La Guayia Venez at / Brownsville / Allen, Colr / July 5, 1947 / Brownsville 64670" (USNM). There are 57 paratypes on 42 slides that are deposited in: ANIC, BMNH, CDAS, FSCA, IES, IZAS, MCM, MNHP, NZAC, TAES, UCD, UH, USNM, VPI, ZIL.

The species epithet is derived from the Greek words *neo*, *mikros*, and *kirkos* meaning "new", "little", and "circle" and refers to the similarity of this species to *Pseudococcus microcirculus*.

FIELD CHARACTERS: No available information except that the species occurs on the leaves of the orchid host.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 2.6 mm, width 1.5 mm. Paratypes 2.1(1.3-2.5) mm long, 1.3(0.7-1.6) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: Left side, 1-9(2), 10-11(1), 12(3), 13-14(2), 15-17(3), paratypes 1-8(2), 9-11(1 - 2), 12(2-3), 13-14(2), 15(2 - 3), 16(2-4), 17(3-4). Cerarius 12 (left side) with 3 auxiliary setae, paratypes 5(3-6), 22 trilocular pores, paratypes 22(17-30), 2 discoidal pores, paratypes 3(1-6). Cerarii 1 and 2 with basal sclerotization. Multilocular disc pores

absent; trilocular pores scattered; discoidal pores of 1 variable size, most abundant along body margin and on thorax and head. Oral-rim tubular ducts with rim indistinct or absent, of 10 paratypes studied in detail, 5 possess oral rims, with 1(0-2) associated discoidal pores 0(0-1) associated seta; oral rims absent near frontal cerarius, and between cerarii 15 and 16, other rims when present located submarginally near cerarii 4, 8, 11 or 12, with 1 oral rim on abdomen, paratypes with 0(0-1); oral-collar tubular ducts absent excluding oral rims lacking definite rim. Body setae of two sizes, longest body setae on abdomen excluding segment VIII 20μ long, paratypes 16(15-20)μ long; 4 dorsomedial setae on segment VIII, paratypes 4(3-6), longest dorsomedial seta 20μ long, paratypes 15(10-20)μ long.

Anal-ring setae 121μ long, paratypes 106(94-126)μ long, 1.7 times as long as greatest diameter of ring, paratypes 1.7(1.4-2.1).

VENTER: Multilocular disc pores in posterior and anterior bands on segments V-VII, with few scattered on segments III, IV, VIII and IX, paratypes with pores sometimes absent from segments III and/or IV, with 1 pore posterior of labium, absent from remainder of head and thorax, paratypes with 0(0-1) multilocular pores on thorax and head. Trilocular pores scattered, 112 on segment VI, paratypes 100(74-132). Discoidal pores of 1 variable size, 5μ in diameter, paratypes 5(4-7)μ, 2 or 4 set in membranous rim around eye, paratypes 3(2-4), 6 on anal-lobe sclerotization, paratypes 6(4-7). Oral-rim tubular ducts absent, paratypes with oral rims modified with rim weakly developed or absent, present on 5 of 10 specimens studied in detail, located near cerarii 13, 12, 10 or 8, absent near frontal cerarii, paratypes with oral rims with 1(0-3) discoidal pores and 0(0-1) seta associated with rim, 0(0-2) on submargin from segment II to cerarius 13; oral-collar tubular ducts in transverse band on segments III or IV-VIII, associated with posterior band of multilocular disc pores on segments V, VI and VII, few on thorax and head, without ducts mesad of cerarius 12, without ducts associated with cerarii 10 and 11, paratypes 0(0-1), without ducts posterior of eye, paratype 1(0-5), without ducts on each side of head. Setae as follows: 4 cisanal, longest 32μ long, paratypes 26(21-32)μ long; 2 cisvulvar on each side of body, paratypes 2(1-3), longest 27μ long, paratypes 22(17-30)μ long; longest anal-lobe seta 77μ long, paratypes 71(59-89)μ long; longest body seta on abdomen 32μ long, paratypes 25(20-35)μ long; longest interantennal seta 54μ long, paratypes 42(35-54)μ long; longest seta on trochanter of hind leg 87μ long, paratypes 89(77-99)μ long.

Circulus 1.8 times as wide as long, paratypes 1.9(1.6-2.4), width 71μ, paratypes 59(27-79)μ, not divided by segmental fold of segment III and IV. Labium 143μ long, paratypes 135(124-151)μ long. Posterior spiracle greatest length 69μ, paratypes 60(52-69)μ. Antennae 8-segmented, right antenna 446μ long, length of each segment as follows: I 54μ, II 64μ, III 49μ, IV 32μ, V 42μ, VI 32μ, VII 42μ, VIII 99μ, paratypes 392(360-446)μ long, length of each segment as follows: I 52(44-59)μ, II 59(51-64)μ, III 46(40-57)μ, IV 28(20-35)μ, V 33(27-42)μ, VI 28(25-32)μ, VII 37(35-42)μ, VIII 87(81-99)μ long. Length of antennal segment VIII / segment II 1.5, paratypes 1.5(1.3-1.6), antennal segment VIII / segment III 2.0, paratypes 1.9(1.4-2.2).

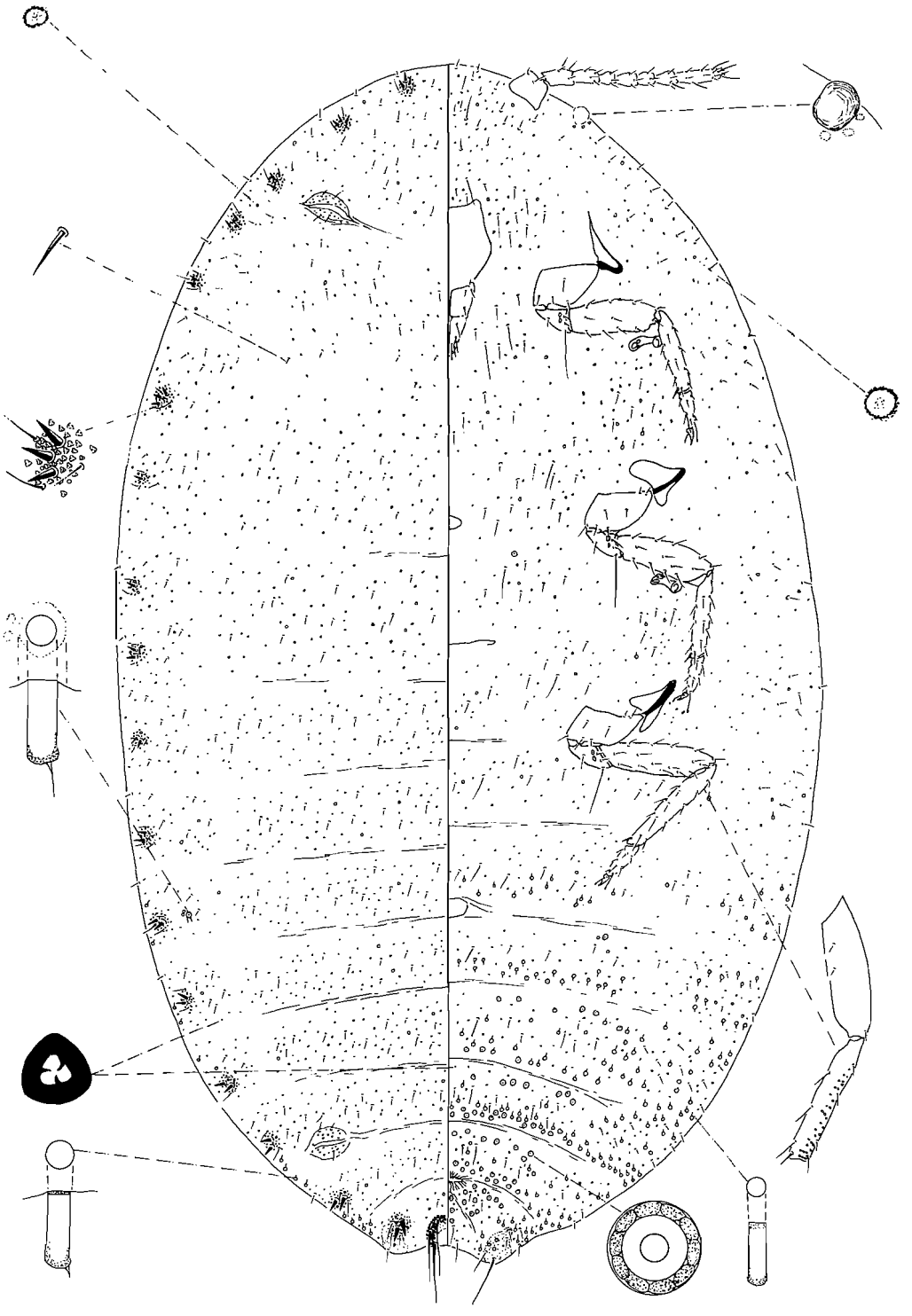

Figure 23.Adult female, *P. neomicrocirculus*, La Guayia, Venezuela, VII-5-1947, on *Cattleya* sp.

Legs with 36 conspicuous translucent pores on hind tibia, paratypes 32(27-37), absent from remaining segments. Femur 237μ long, paratypes 208(180-237)μ long, slightly shorter than tibia, paratypes usually with femur slightly longer than tibia; tibia 245μ long, paratypes 206(173-245)μ long; tarsus 99μ long, paratypes 93(86-99)μ long. Tibia / tarsus 2.5, paratypes 2.2(1.9-2.4). Hind tibia with 21 setae, paratypes 21(17-25) setae.

UNUSUAL VARIATION: One specimen has 11 translucent pores on hind femur. Several specimens have 2 circuli.

U.S. SPECIMENS EXAMINED: None

OTHER SPECIMENS EXAMINED:
Costa Rica: (26-X-1939, *Cattleya* sp., D. P. Limber, at Washington, D. C.) 1 slide, 1 specimen (USNM).
Guatemala: (1-VIII-1938, orchid, R. Buffham, at San Francisco) 1 slide, 1 specimen (USNM).
Venezuela: Caracas (2-XI-1940, *Cattleya speciossisima* pseudobulb, D. P. Limber, at Hoboken) 1 slide, 1 specimen (USNM), Caracas (14-V-1940, *Cattleya* sp., D. P. Limber, at Hoboken) 1 slide, 1 specimen (USNM), Caracas (22-VIII-1944, *Cattleya* sp, D.P. Limber, at Hoboken) 1 slide, 1 specimen (USNM), (21-V-1925), orchid, H.Y. Gouldman, at Washington, D.C.) 1 slide, 1 specimen (USNM), (31-VII-1936), orchid, H.Y. Gouldman, at Washington, D.C.) 1 slide, 3 specimens (USNM), 1-VIII-36, orchid, D.P. Limber, at Washington, D.C.) 1 slide, 3 specimens (USNM), 25-IX-1936, orchid, Owrey and Taylor, at San Juan) 1 slide, 2 specimens (USNM), (15-VII-1937, orchid, H.Y. Gouldman, at Washington, D.C.) 1 slide, 1 specimen (ANIC), (15-VII-1937), wild *Cattleya* sp., Adams, at Washington, D.C.) 1 slide, 1 specimen (USNM), (3-VIII-1938, *Cattleya* sp., H.Y. Gouldman, at Washington, D.C.) 1 slide, 1 specimen (USNM); (28-VIII-1938, *Cattleya* sp., H.L. Sanford and Prince, at Washington D.C.) 1 slide, 3 specimens (BMNH), (17-VIII-1938, *Cattleya* sp., Wood, at Washington, D.C.) 1 slide, 1 specimen (FSCA), (25-VI-1938, wild *Cattleya* sp., Adams, at Washington, D.C.) 2 slides, 2 specimens (CDAS, USNM), (9-VI-1938, wild *Cattleya* sp., Adams, at Washington, D.C.) 1 slide, 1 specimen, (USNM), (26-X-1939, orchid, Smith, at Washington, D.C.) 1 slide, 1 specimen (IES), (24-V-1939, *Cattleya* sp., Spessard, at Washington, D.C.) 1 slide, 1 specimen (USNM), (10-X-1939, *Cattleya* sp., Adams and H. L. Sanford, at Washington D.C.), 1 slide, 1 specimen (USNM), (29-XII-1939, *Cattleya* sp., D.P. Limber, at Washington, D.C.) 1 slide, 2 specimens (IZAS), (4-VI-1939, *Cattleya* sp. leaf, H.L.Sanford, at Washington, D.C.) 1 slide, 1 specimen (MCM), (3-V-1939, *Cattleya* sp., D.P. Limber, at Washington, D.C.) 1 slide, 1 specimen (MNHP), (14-XI-1939, on orchid, Prince, at Washington, D.C.) 1 slide, 1 specimen (USNM), (18-V-1940), *Oncidium* sp., H.Y. Gouldman, at Washington, D.C.) 1 slide, 1 specimen (USNM), (16-V-1940, orchid stem, Fields and Kostal, at New York) 1 slide, 1 specimen (NZAC), (29-IV-1940, *Cattleya* sp., D. P. Limber, at Washington, D.C.) 1 slide, 1 specimen (USNM), (8-VII-1940, *Cattleya* sp., D. P. Limber, at Washington, D.C.) 1 slide, 2 specimens (USNM), (13-II-1940, *Cattleya gaskelliana*, Fields and Crawford, at New York) 1 slide, 1 specimen (TAES), (1-VIII-

1940), orchid leaves, Kostal, at Hoboken) 2 slides, 2 specimens (UCD, USNM), (25-III-1940, *Cattleya* sp., D.P. Limber, at Washington, D.C.) 1 slide, 1 specimen (UCD), (29-V-1941, orchid, Becker, at Hoboken) 1 slide, 1 specimen (USNM), (21-X-1944, *Cattleya* sp. Adams, at Hoboken), 1 slide, 1 specimen (USNM), (19-IV-1944, *Cattleya* sp. leaf, D.P. Limber, at Hoboken) 1 slide, 1 specimen (UH), (30-IX-1944, *Cattleya* sp., Adams, at Hoboken) 1 slide, 2 specimens (VPI), (17-VII-1944, *Cattleya* sp. wild, Adams, at Hoboken) 1 slide, 1 specimen (USNM), (1-VI-1945, *Cattleya* sp., D.P. Limber, at Hoboken) 1 slide, 1 specimen (USNM), (1-VIII-1945, *Cattleya* sp., Adams, at Hoboken) 1 slide, 1 specimen (USNM), (29-V-1945, *Cattleya* sp., Adams, at Hoboken) 1 slide, 1 specimen (ZIL), (2-XI-1945, *Cattleya* sp. leaf, Adams, at Hoboken), 1 slide, 1 specimen (USNM), (7-VIII-1946, *Cattleya* sp, Grayson, at Hoboken) 1 slide, 1 specimen (USNM), (27-IV-1946, *Cattleya* sp., McMaster, at Hoboken) 1 slide, 1 specimen (USNM), (1-III-1946, *Cattleya* sp., Anderson and Richards, at Seattle) 1 slide, 1 specimen (USNM), (6-V-1946, *Cattleya* sp., D.P. Limber, at Hoboken) 1 slide, 1 specimen (USNM), La Guayia (5-VII-1947, *Cattleya* spp., Allen, at Brownsville) 1 slide, 3 specimens (USNM), (22-VII-1947, *Cattleya* sp., D. P. Limber, at Hoboken) 1 slide, 1 specimen (USNM), (4-VI-1951, *Cattleya* sp., F. Perlmutter, at Honolulu) 1 slide, 1 specimen (USNM).

HOSTS AND DISTRIBUTION: *Pseudococcus neomicrocirculus* predominantly has been taken in quarantine from Venezuela. Single records from Guatemala and Costa Rica need to be validated with additional collecting. The limited host range of this species may correctly reflect oligophagy but more likely is correlated with the plant collector's preferences in orchid genera during the 1930's and 1940's.

DISCUSSION: *Pseudococcus neomicrocirculus* has been confused with *P. microcirculus* but can be separated by having: Multilocular pores in a transverse row on posterior margin of segment IV; 5(3-6) auxiliary setae in cerarius 12; 22(17-30) trilocular pores in cerarius 12; longest interantennal seta 42(35-54)μ long; longest ventral seta on abdomen 25(20-35)μ long. *Pseudococcus microcirculus* has: Multilocular pores absent from posterior margin of segment IV; 3(1-4) auxiliary setae in cerarius 12; 16(8-24) trilocular pores in cerarius 12; longest interantennal seta 63(49-77)μ long; longest ventral seta on abdomen 39(30-47)μ long.

Pseudococcus peregrinabundus Borchsenius (Figure 24)

Pseudococcus peregrinabundus Borchsenius 1947: 2110.
Pseudococcus colombianus Borchsenius 1947: 2110, n. syn.
Pseudococcus columbianus: Borchsenius 1948: 420, misspelling.

Although Borchsenius treated the *P. peregrinabundus* and *P. colombianus* descriptions published in 1948 as original descriptions, inclusion of descriptive characters and the name of the species in his key published in 1947 fulfills the requirements of the International Code of Zoological Nomenclature for describing new species.

SUGGESTED COMMON NAME: Foreign mealybug.

DIAGNOSIS: With dorsal multilocular disc pores on segments I-VII; multilocular pores abundant on ventral thorax and head; frontal cerarii without associated dorsal oral-rim tubular ducts; translucent pores on hind tibia and femur; 15(14-17) oral-collar tubular ducts on venter mesad of cerarius 12; without oral-rim on dorsal submargin between cerarii 15 and 16.

TYPE DATA: The holotype of *P. colombianus* has been examined and is believed to be a molting, third instar female of *P. peregrinabundus*. The specimen of *P. colombianus* possesses all the unique features of *P. peregrinabundus*. It differs only by having a few multilocular disc pores on the thorax, a character believed to be within the limits of variation of *P. peregrinabundus*.

TYPE DATA: We have examined 1 adult female specimen on 1 slide labeled as follows: "type / Pseudococcus / peregrinabundus Borchs. / Ha nrodax Musa sp. / Korymdur B / 39 T.3 / x nehuhzpag. / cbud. No. 57 / 22 III. 39" (ZIL). Borchsenius (1948) states that the species was collected on bananas sent to Leningrad from Colombia on 23 March 1939. We cannot explain the discrepancy between the dates of 23 and 22 March but feel that the specimen on the slide is the specimen used by Borchsenius to describe this species. Because the description of the species is based on a single specimen, it is the holotype. We also have examined the holotype third instar female of *P. colombianus*. Label information is as follows: "T.5 TUN a/39 / Pseudococcus / colombianus Borchs / Hanrogax Musa SP. / Korymdur x Nehuhzpag / Cbug. N 57 / 22. III. 39" (ZIL).

The species epithet was formed from the Latin *peregrinus* meaning "traveling about" or "foreign" and the Latin *abundus* meaning "copious". The name refers to the fact that the species is foreign in Russia where it was first collected. The applicability of the "abundant" form of the word is unclear, although it may have been very common when it was collected.

FIELD CHARACTERS: The body is pinkish (Borchsenius 1948).

SLIDE MOUNTED CHARACTERS: Mounted 2.0 mm long, 1.2 mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: 1-11 (2), 12 (2-3), 13 (2-3), 14 (2), 15 (2-3), 16 (2), 17 (3). Cerarius 12 with 3 or 4 auxiliary setae, 26 or 27 trilocular pores, 0 or 1 discoidal pore. Cerarius 1 with basal sclerotization. Multilocular disc pores numerous on segments III-VIII, few on segments I and II; trilocular pores scattered evenly; discoidal pores of 1 size, about same as small size on venter, scarce, associated with oral-rim and oral-collar tubular ducts. Oral-rim tubular ducts with 2(1-3) discoidal pores and 1(0-2) seta associated with rim, oral rims absent posterior of frontal cerarii, absent on submargin between cerarii 15 and 16, on pro- and mesothoracic segments, on abdominal segments VI and VII medially only , with 2 on abdomen; oral-collar tubular ducts on submargin associated with cerarii 3-10. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 23(22-24)μ long; dorsomedial setae on segment VIII unknown (segment missing).

Anal-ring setae and diameter of ring unknown (segment missing).

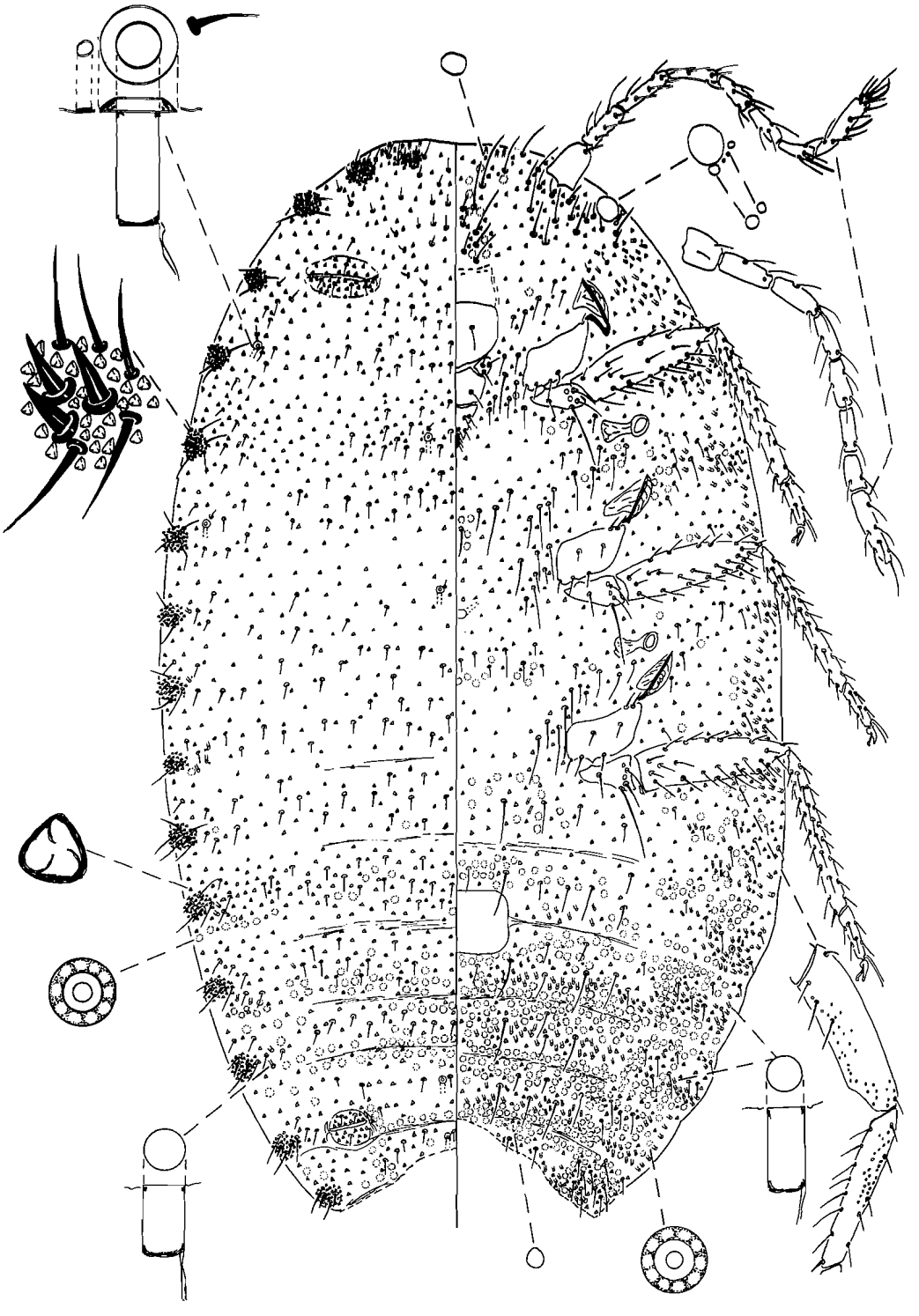

Figure 24. Adult female, *P. peregrinabundus,* Colombia, III-22-1939, on *Musa* sp.

VENTER: Multilocular disc pores in posterior and anterior bands on segments III-VII, scattered on segments I and II, 60 on thorax. Trilocular pores scattered over venter, 113 on segment VI. Discoidal pores of 2 sizes, large size 4μ in diameter, 4 in membranous rim around each eye, associated with multilocular disc pores and oral-collar tubular ducts on submargin, scattered over remainder of venter. Oral-rim tubular ducts absent; oral-collar tubular ducts associated with posterior band of multilocular disc pores on segments III-VII, on submargin of thorax and head, 15(14-17) in cluster mesad of cerarius 12, 23(22-24) associated with cerarii 10 and 11, 9 or 10 posterior of eye, 9 on each side of head. Setae as follows: cisanal, cisvulvar, anal-lobe setae unknown (segment missing); body setae of 3 lengths, longest on abdomen 58(49-98)μ long; longest interantennal seta 122μ long; longest seta on trochanter of hind leg 134μ long.

Circulus 1.1 times as wide as long, width 135μ, divided by segmental fold between segments III and IV. Labium 166μ long. Posterior spiracle greatest length 76μ long. Antennae 8-segmented, 564(503-602)μ long, lengths of each segment as follows: I 80(73-85)μ, II 90(88-93)μ, III 85(80-93)μ, IV 63μ, V 63μ, VI 54μ, VII 49μ, VIII 100(98-102)μ long. Length of antennal segment VIII / segment II 1.1, antennal segment VIII / segment III 1.2(1.1-1.2).

Legs with 29(27-30) translucent pores on dorsal surface of hind tibia, 22(16-27) translucent pores on dorsal surface of hind femur, absent from remaining segments. Femur 325(322-328)μ long, shorter than tibia; tibia 363(360-366)μ long; tarsus 116(112-120)μ long. Tibia/tarsus 3.1. Hind tibia with 38(36-40) setae.

UNUSUAL VARIATION: None

U.S. SPECIMENS EXAMINED: Not known from the U. S.

OTHER SPECIMENS EXAMINED:
Colombia: At Leningrad (22-III-1939, *Musa* sp.) 1 slide, 1 specimen (ZIL).

HOSTS AND DISTRIBUTION: *Pseudococcus peregrinabundus* is known only from the type locality and host.

DISCUSSION: *Pseudococcus peregrinabundus* superficially is similar to *P. puertoricensis* by having: Numerous multilocular disc pores on the ventral thorax; translucent pores on the hind femur and tibia; several oral collars near cerarius 12. *Pseudococcus peregrinabundus* differs by having: Dorsal multilocular disc pores; 2(1-3) discoidal pores associated with rim of dorsal oral rims; no dorsal oral rim associated with frontal cerarii; longest dorsal body seta 23(22-24)μ long; oral rims absent from submargin of venter between segment II and cerarius 13; antennae 564(503-602)μ long; hind tibia 363(360-366)μ long; 2 dorsal oral rims on abdomen. *Pseudococcus puertoricensis* has: No dorsal multilocular disc pores; 1(0-3) discoidal pores associated with rim of dorsal oral rims; 1 dorsal oral rim associated with each frontal cerarius; longest dorsal body seta 40(32-52)μ long; 6(5-8) oral rims on submargin of venter between segment II and cerarius 13; antennae 497(473-509)μ long; hind tibia 289(283-302)μ long; 34(30-38) dorsal oral rims on abdomen.

Pseudococcus pertusus McKenzie (Figure 25)

Pseudococcus pertusus McKenzie 1967: 318.

SUGGESTED COMMON NAME: Perforated mealybug.

DIAGNOSIS: With 42(31-51) oral-collar tubular ducts in cluster mesad of cerarius 12; 36(25-44) oral collars mesad of cerarius 10 and 11; longest dorsomedial setae on segment VIII 48(37-54)μ long; antenna 632(615-660)μ long; hind femur and tibia with translucent pores; 28(25-32) dorsal oral-rim tubular ducts on abdomen.

TYPE DATA: The holotype adult female is mounted on a slide by itself and is labeled as follows: Left label, "U.C.D. TYPE / NUMBER / 692 / TYPE" right label "*Pseudococcus* / *pertusus* McKenzie / 5 mi. N. Smith Flat / El Dorado Co., California / July 11, 1962 / on Unknown / L.A. Stange collector / ENTOMOLOGY / U. C., Davis. Calif." (UCD). We also have seen 2 paratypes on 2 slides (UCD).

The species epithet is from the Latin *pertusus* that means "perforated" and refers to the numerous ventral oral-collar tubular ducts that perforate the derm.

FIELD CHARACTERS: No available information.

SLIDE MOUNTED CHARACTERS: Mounted 1.9(1.8 2.0) mm long, 1.0(0.9-1.1) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: 1-6 (2), 7 (2-3), 8-9 (2), 10 (1-3), 11-12 (2-3), 13-14 (2), 15 (3), 16 (3-4), 17 (3). Cerarius 12 with 4(3-5) auxiliary setae, 22(19-26) trilocular pores, 1(0-1) discoidal pores. Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores evenly scattered, slightly less numerous toward submargin; discoidal pores of 1 size, about same size as small size on venter, scattered sparsely over dorsum and associated with oral-rim tubular ducts. Oral-rim tubular ducts with 2(1-3) discoidal pores and 1(0-1) seta associated with rim, oral rims present posterior of frontal cerarii, present on submargin between cerarii 15 and 16, on each thoracic segment, on abdominal segments I-VII, in submedial area of most abdominal segments, with 28(25-32) on abdomen; oral-collar tubular ducts only on submargin between cerarii. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 37(35-40)μ long; 5(4-6) dorsomedial setae on segment VIII, longest 48(37-54)μ long.

Anal-ring setae 163(151-171)μ long, 1.4(1.3-1.5) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in posterior and anterior bands on segments IV VII, few on segments I, II, III, scattered on segments VIII and IX, 7(7-8) on thorax. Trilocular pores scattered over venter, 95(86-110) on segment VI. Discoidal pores of 2 sizes, large size about 4μ in diameter, 1(1-2) set in membranous rim of each eye, 3(3-4) on anal lobes, associated with anterior band of multilocular disc pores on segments IV-VII, few with oral-collar tubular ducts on submargin, scattered sparsely over remainder of venter. Oral-rim tubular ducts few, with

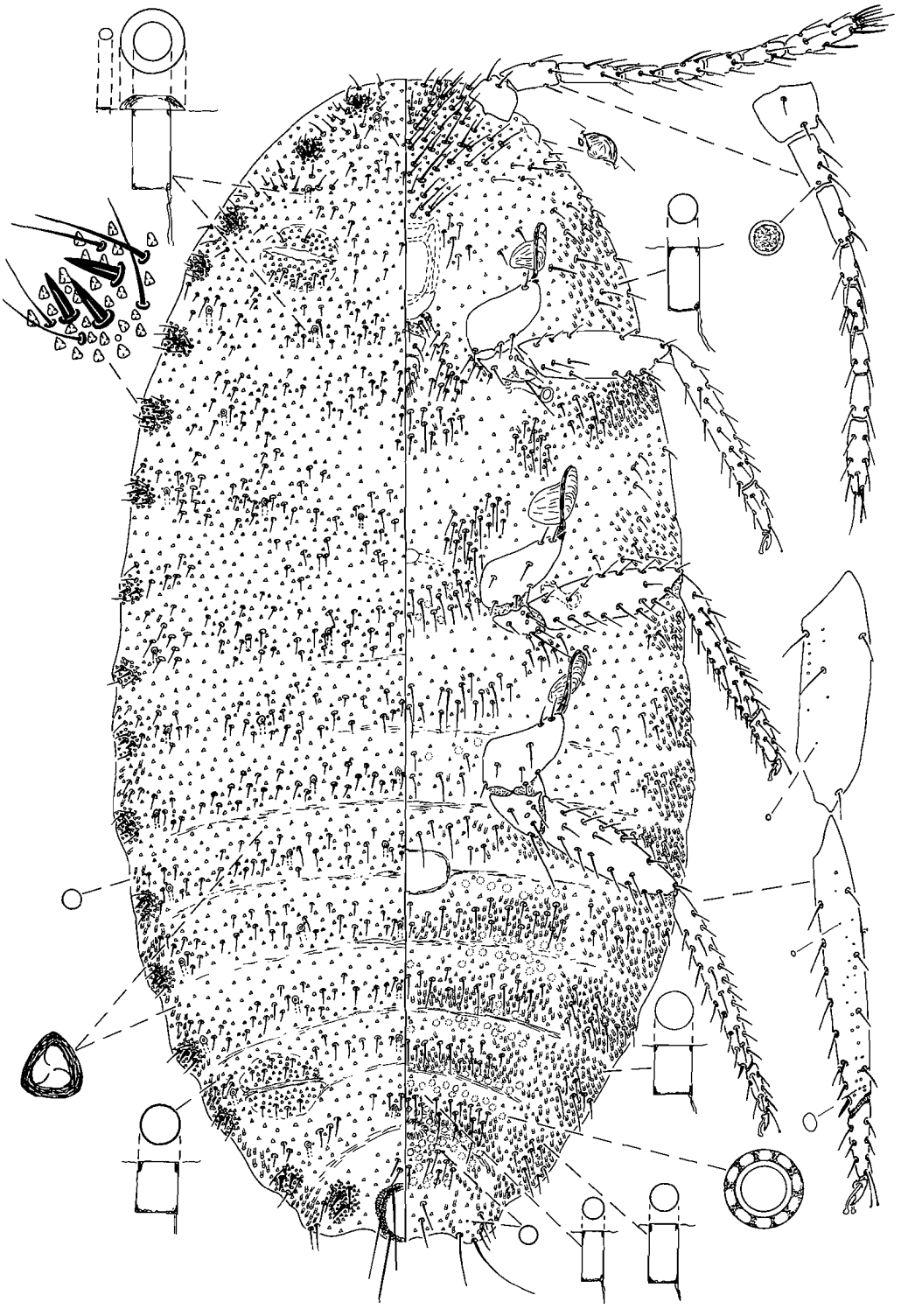

Figure 25. Adult female, *P. pertusus*, 5 mi. N. Smith Flat, California, VII-11-1962, host unknown.

0(0-1) discoidal pore and no seta associated with rim, 2(0-3) on submargin from segment II to cerarius 13, without duct near frontal cerarius; oral-collar tubular ducts numerous, associated with posterior band of multilocular disc pores on segments IV-VII, abundant on segments IV-VIII, numerous on submargin, except mesad of cerarius 11 and 16, with 42(31-51) in cluster mesad of cerarius 12, 36(25-44) associated with cerarii 10 and 11, 3(0-6) posterior of eye, 10(8-12) on each side of head. Setae as follows: 5(4-5) cisanal, 71(52-80)μ long; 5(4-6) cisvulvar on each side, 41(34-51)μ long; longest anal-lobe seta 156(146-163)μ long; body setae of 2 lengths, longest on abdomen 82(61-97)μ long; longest interantennal setae 125(114-132)μ long; longest seta on trochanter of hind leg 124(117-129)μ long.

Circulus 1.3(1.1-1.5) times wider than long, width 140(136-146)μ, divided by segmental fold between segments III and IV. Labium 193(183-200)μ long. Posterior spiracle greatest length 78(73-80)μ long. Antennae 8-segmented, 632(615-660)μ long, lengths of each segment as follows: I 78(73-85)μ, II 86(78-98)μ, III 94(85-98)μ, IV 56(49-61)μ, V 80(78-83)μ, VI 65(59-73)μ, VII 60(56-66)μ, VIII 113(110-115)μ long. Length of antennal segment VIII / segment II 1.3(1.2-1.4), antennal segment VIII / segment III 1.2(1.2-1.3).

Legs with 21(12-28) translucent pores on dorsal surface of hind tibia, distal 6-8 up to 3 times larger than others, 10(7-13) small translucent pores on dorsal surface of hind femur, absent from remaining segments. Femur 327(317-334)μ long, slightly shorter than tibia; tibia 370(366-371)μ long; tarsus 117(112-122)μ long. Tibia/tarsus 3.1(2.8-3.3). Hind tibia with 38(31-44) setae.

UNUSUAL VARIATION: Translucent pores on proximal part of hind tibia and femur usually small, inconspicuous.

SPECIMENS EXAMINED: California: El Dorado Co., 5 mi. N. Smith Flat (11-VII-1962, host unknown, L. A. Stange) 3 slides, 3 specimens (UCD).

HOST AND DISTRIBUTION: Known only from the type locality and host.

DISCUSSION: *Pseudococcus pertusus* is similar to *P. sociabilis* by having: Many marginal oral collars along body margin; few oral rims on venter of submargin between segment II and cerarius 13; long legs (hind tibia about 375μ long). *Pseudococcus pertusus* differs by having: Longest dorsal body seta 37(35-40)μ long; longest seta on dorsum of segment VIII 48(37-54)μ long; length of anal-ring seta / largest diameter of anal ring 1.4(1.3-1.5); 42(31-51) oral collars in cluster mesad of cerarius 12; cisanal setae 71(52-80)μ long; antenna 632(615-660)μ long; hind femur with translucent pores. *Pseudococcus sociabilis* has: Longest dorsal body seta 11(10-15)μ long; longest seta on dorsum of segment VIII 16 (15-19)μ long; length of anal-ring seta / largest

diameter of anal ring 1.9(1.7-2.0); 11(4-18) oral collars in cluster mesad of cerarius 12; cisanal setae 36(29-39)μ long; antenna 575(560-615)μ long; hind femur without translucent pores.

Pseudococcus pithecellobii Gimpel and Miller, new species (Figure 26)

SUGGESTED COMMON NAME: Ebony mealybug.

DIAGNOSIS: Translucent pores restricted to hind tibia; with 9(7-11) oral rims on dorsal surface of abdomen; submarginal oral rim absent from between cerarii 15 and 16; 1(0-2) discoidals near eye; oral collars absent near cerarius 12.

TYPE DATA: The adult female holotype is the right-hand specimen of 3 on a slide labeled as follows: Left label "Pseudococcus / USNM 9 / Hidalgo Co. Texas/ int. Rt. 492-374 / ex Pithecellobium /flexicaule stem / V-31-1978 / N-78-99 / S. Nakahara / Balsam 5 8" (USNM); right label "Pseudococcus / pithecellobii / Gimpel & Miller / HOLOTYPE / PARATYPE". There are 14 paratypes on 8 slides that are deposited in BMNH, UCD, USNM. Three paratype slides also contain paratype specimens of *Pseudococcus donrileyi*.

The species epithet is the genitive form of the host of this species.

FIELD CHARACTERS: The species occurs on the stems of its host.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 2.3 mm, width 1.9 mm. Paratypes 3.0(2.3-4.3) mm long., 1.8(1.3-2.6) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: Left side 1-2 (1-2), 3 (2-3), 4-5 (2), 6 (2-3), 7 (2), 8-9 (2-3), 10-11 (1-3), 12 (3), 13 (2-3), 14 (2), 15 (3), 16-17 (3-4). Cerarius 12 (right side) with 5 auxiliary setae, paratypes 4(2-5), 24 trilocular pores, paratypes 22(18-26), 4 discoidal pores, paratypes 3(1-4). Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 1 variable size, scattered over dorsum, associated with oral-rim tubular ducts, 3(2-3)μ in diameter, scattered sparsely. Oral-rim tubular ducts with 2(1-3) discoidal pores and 1(0-2) setae associated with rim, oral rims present posterior of frontal cerarii about 85% of time, absent from submargin between cerarii 15 and 16, present on submarginal, submedian, and median areas of body, with 10 oral rims on abdomen, paratypes with 9(7-11); oral-collar tubular ducts only an submargin between posterior cerarii. Body setae of 2 sizes, longest seta on abdomen, excluding segment VIII, 23μ long, paratypes 23(17-26)μ long; 5 dorsomedial setae on segment VIII, paratypes 5(4-6), longest seta 19μ long, paratypes 24(17-30)μ long.

Anal-ring seta 173μ long, paratypes 178(168-190)μ long; 1.7 times as long as greatest diameter of ring, paratypes 1.8(1.4-2.2).

VENTER: Multilocular disc pores in posterior and anterior bands on segments V-VII, scattered on segments VIII and IX, paratypes rarely with 1 or 2 pores on segments III or IV, with 5 pores on thorax, paratypes with 3(0-7) pores on thorax. Trilocular pores scattered, 82 on segment VI, paratypes 98(82-114). Discoidal pores of 1 size, 3μ in diameter, paratypes 3(2-3)μ, 1 in membranous rim around each eye, paratypes 1(0-2) pores, 2 or 3 on basal sclerotization of anal lobe, paratypes 2(1-4) pores. Oral-rim tubular ducts with 1(0-2) discoidal pores and

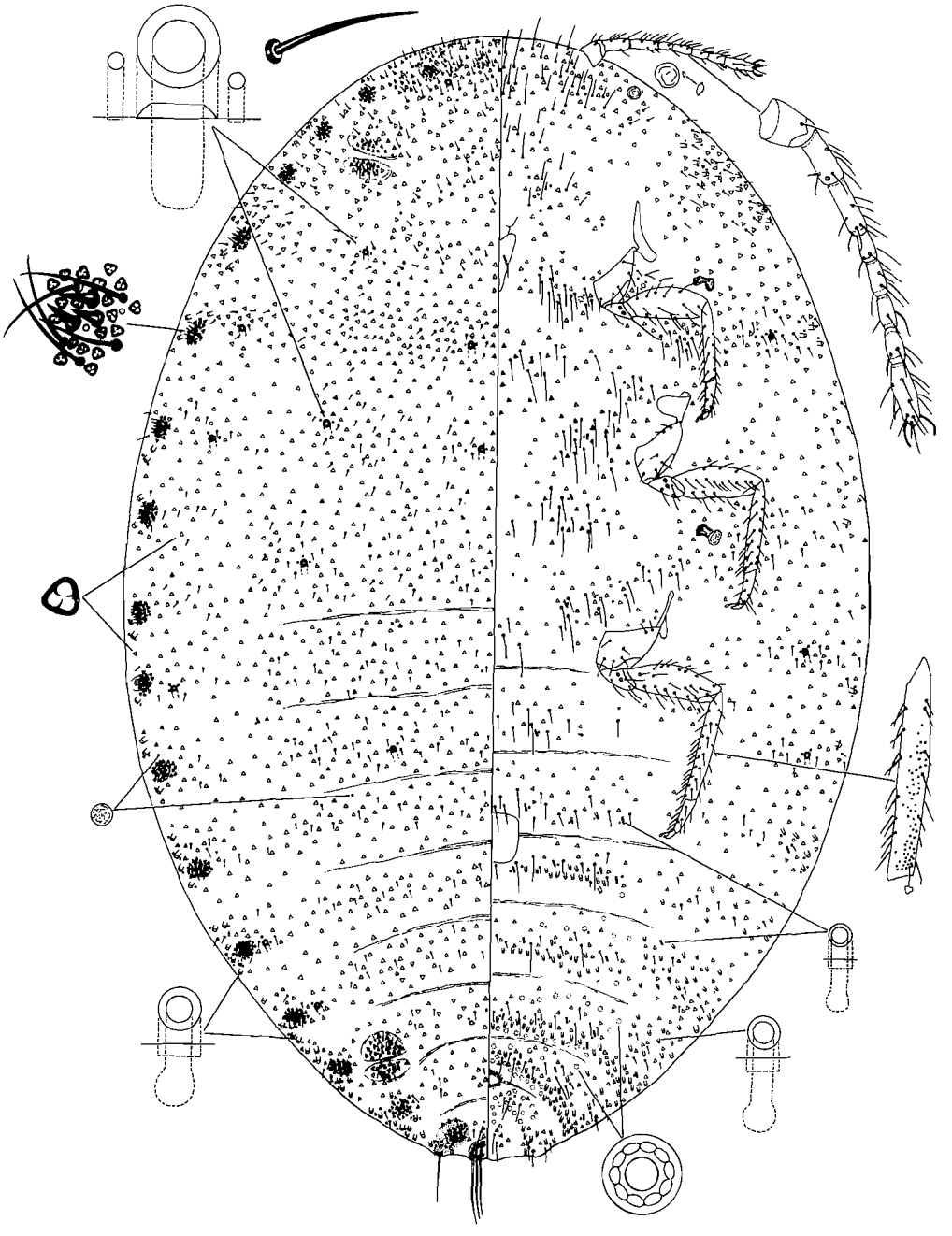

Figure 26. Adult female, *P. pithecellobii,* Intersection of routes 492 and 374, Hildalgo Co., Texas, V-31-1978, on *Pithecellobium flexicaule.*

0(0-1) seta associated with rim, with 3 ducts on submargin from segment II to cerarius 13, paratypes with 4(3-6) ducts, without duct near frontal cerarii; oral-collar tubular ducts on submarginal areas with small rim, in segmental band on segments VII-IV or III, associated with posterior band of multilocular disc pores, few on thorax and head, 8 mesad of cerarius 12, paratypes with 7(3-11) ducts, 6 associated with cerarii 10 and 11, paratypes 6(5-8) ducts, 8 posterior of eye, paratypes 8(5-10), with 6 ducts on each side of head, paratypes 5(2-7). Setae as follow: 4 cisanal, longest 49μ long, paratypes 53(49-56)μ long; cisvulvar on each side, paratypes 3(1-4), 62μ long, paratypes 60(52-67)μ long; longest anal-lobe seta 151μ long, paratypes 142(124-156)μ long; longest seta on abdomen 113μ long, paratypes 106(89-121)μ long; longest interantennal seta 131μ long, paratypes 134(114-163)μ long; longest seta on trochanter of hind leg 141μ long, paratypes 134 (121-146)μ long.

Circulus 2.0 times wider than long, paratypes 1.4(1.2-2.0) times, width 197μ, paratypes 165(143-175)μ, divided by intersegmental fold. Labium 173μ long, paratypes 172(161-185)μ long. Posterior spiracle greater length 82μ long, paratypes 80(74-85)μ long. Antennae 8-segmented, 496μ long, lengths of each segment as follows: I 59μ, II 82μ, III 79μ, IV 37μ, V 52μ, VI 47μ, VII 45μ, VIII 91μ; paratypes 516(459-570)μ long, length of each segment as follows: I 65(59-71)μ, II 80(70-88)μ, III 79(67-89)μ, IV 42(35-52)μ, V 50(42-57)μ, VI 43(35-49)μ, VII 43(40-45)μ, VIII 94(89-99)μ long. Length of antennal segment VIII / segment II 1.2, paratypes 1.2(1.1-1.3), antennal segment VIII / segment III 1.4, paratypes 1.2(1.1-1.4).

Legs with 43 inconspicuous translucent pores on dorsal surface of hind tibia, paratypes 49(43-55); without pores on other leg segments. Femur 277μ long, paratypes 258(252-319)μ long, shorter than tibia; tibia 314μ long, paratypes 324(287-348)μ long; tarsus 106μ long, paratypes 109(102-114)μ long. Tibia / tarsus 3.0, paratypes 3.0(2.6-3.1). Hind tibia with 32 setae, paratypes 32(28-36) setae.

UNUSUAL VARIATION: Cerarii 3, 6, 8-11 and 13 rarely have 3 conical setae. This is unusual since most other species have a few specimens that possess only 1 conical seta in these cerarii, not 3.

U.S. SPECIMENS EXAMINED: Texas: Hidalgo Co., intersection of Route 492 and 374 (31-V-1978, *Pithecellobium flexicaule*, S. Nakahara), 7 slides, 14 specimens (BMNH, UCD, USNM).

OTHER SPECIMENS EXAMINED: None

HOSTS AND DISTRIBUTION: *Pseudococcus pithecellobii* is known only from the original collection.

DISCUSSION: *Pseudococcus pithecellobii* is similar to *P. neomaritimus* but differs by having: 1(0-2) discoidal pores associated with eye; 7(3-11) oral collars near cerarius 12; 6(5-8) oral collars associated with cerarii 10 and 11; 9(7-11) oral rims

on dorsum of abdomen; circulus 165(143-175)μ wide; antennae 516(459-570)μ long; 49(43-55) inconspicuous translucent pores on hind tibiae; longest seta on hind trochanter 134(121-146)μ long; antennal segment VIII / segment III 1.2(1.1-1.4) and anal-ring setae 178(168-190)μ long. *Pseudococcus neomaritimus* has: 4(2-6) discoidal pores near eye; no oral collars near cerarius 12; 0(0-1) near cerarii 10 and 11; 23(20-28) oral rims on dorsum of abdomen; circulus 104(74-133)μ wide; antennae 444(407-500)μ long; 27(16-39) conspicuous translucent pores on hind tibiae; longest seta on trochanter 117(106-131)μ long; antennal segment VIII / segment III 1.6(1.4-1.8); anal-ring setae 144(134-154)μ long.

Pseudococcus puertoricensis Gimpel and Miller, new species (Figure 27)

SUGGESTED COMMON NAME: Puerto Rican mealybug.

DIAGNOSIS: Multilocular disc pores numerous on venter of thorax and head 66(51-86); more than 55 oral-rim tubular ducts on dorsum; fewer than 10 oral-collar tubular ducts associated with cerarius 12; 5(3-7) large discoidal pores associated with each eye, set in slightly sclerotized rim; anal-ring setae only slightly longer than anal-lobe setae; conical setae of cerarius 10 usually longer and more slender than conical setae of other cerarii.

TYPE DATA: The adult female holotype is the right hand specimen of 3 on a slide labeled as follows: "Holotype / *Pseudococcus* / *puertoricensis* / right hand specimen / Puerto Rico / Ex. Cactus leaf / IV-22-77 / San Juan 10773 / L. Roman Balsam / Det. W. F. Gimpel (USNM)". There are 19 adult female paratypes on 15 slides. Paratypes are deposited in ANIC, BMNH, CDAS, FSCA, IZAS, MNM, MNHP, UCD, USNM, VPI, ZIL. The species epithet is from the Latin suffix -ensis meaning "place" or "location" and is named after the locality from which it was collected.

FIELD CHARACTERS No available information.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 2.6 mm, width 1.6 mm. Paratypes 2.8(2.4-3.0) mm long, 1.6(1.0-1.9) mm wide.

DORSUM: With 16 pairs of cerarii, paratypes 16(15-17), cerarian formula as follows: Left side 1-9 (2), 10 (0), 11 (2), 12 (3), 13-14 (2), 15 (1), 16-17 (3), right side 1-9 (2), 10 (1), 11 (2), 12 (3), 13-14 (2), 15 (0), 16 (4), 17 (2), paratypes 1-7 (2), 8 (1-2), 9 (2), 10 (0-2), 11 (2), 12 (3), 13-14 (2), 15 (0-2), 16 (3-6), 17 (2-4). Cerarius 12 (left side) with 3 auxiliary setae, paratypes with 3(3-5), 22 trilocular pores, paratypes 19(15-23), 3 discoidal pores, paratypes 3(1-5). Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 1 size, about same diameter as small size on venter, scattered sparsely over dorsum. Oral-rim tubular ducts with 1(0-3) discoidal pores and 0(0-1) seta associated with rim, oral rims numerous, present posterior of frontal cerarii, paratypes rarely with oral rim absent near frontal cerarius, absent from submargin between cerarius 15 and 16, on each thoracic segment, abdominal

segments I-VII, 35 on abdomen, paratypes 34(30-38); oral-collar tubular ducts only on margin between cerarii. Body setae of 2 sizes, longest on abdomen, excluding those on segment VIII, 40(32-52)μ long, 6 dorsomedial setae on segment VIII, paratypes with 5(4-7), longest 41μ long, paratypes 43(37-54)μ long.

Anal-ring setae 153μ long, paratypes 156(151-161)μ long, 1.7 times as long as greatest diameter of ring, paratypes 1.7(1.5-1.9).

VENTER: Multilocular disc pores in posterior and anterior bands on segments III-VII, scattered on other abdominal segments, thorax and head with 66(51-86). Trilocular pores scattered over venter, 75 on segment VI, paratypes 65(48-94). Discoidal pores of 2 sizes, large size about 4(3-5)μ in diameter, 3 set in lightly sclerotized rim around right eye, 6 around left eye, paratypes with 5(3-7) around each eye, scattered on remainder of venter, 3 on anal-lobe sclerotization, paratypes 2(1-3), scattered over venter. Oral-rim tubular ducts with 1(0-2) discoidal pores and 0(0-1) seta associated with rim, right side, 6 on submargin from segment II to cerarius 13, paratypes 6(5-8), without duct near frontal cerarius; oral-collar tubular ducts in transverse band on segments III-VII, numerous on submargin of abdomen, few on thorax and head, 7 in cluster mesad of cerarius 12, paratypes 6(4-7), absent from area associated with cerarius 10 and 11, absent posterior of eye, 1(0-2) on each side of head. Setae as follows: 4 cisanal, 61μ long, paratypes 59(51-73)μ long; 4 cisvulvar setae on left side, 3 on right side, paratypes 3(2-4) on each side, 59μ long, paratypes 42(29-63)μ long; longest anal-lobe seta 126μ long, paratypes 128(117-137)μ long; body setae of 3 lengths, longest on abdomen 56(44-71)μ long; longest interantennal seta 88μ long, paratypes 105(88-131)μ long; longest seta on trochanter of hind leg 109μ long, paratypes 103(94-119)μ long.

Circulus oval 1.9 times as wide as long, paratypes 1.7(1.3-2.4), width 148(133-170)μ, divided by segmental fold of segments III and IV. Labium 202μ long, paratypes 190(168-217)μ long. Posterior spiracle greatest length 85μ long, paratypes 77(73-85)μ long. Antennae 8-segmented, 498μ long, lengths of each segment as follows: I 73μ, II 88μ, III 68μ, IV 34μ, V 44μ, VI 44μ, VII 44μ, VIII 102μ long. Paratypes 497(473-509)μ long, length of each segment as follows: I 71(68-73)μ, II 85(78-88)μ, III 66(63-73)μ, IV 34(29-39)μ, V 46(41-49)μ, VI 44(39-49)μ, VII 49(44-56)μ, VIII 100(90-107)μ long. Length of antennal segment VIII / segment II 1.2, paratypes 1.2(1.1-1.3), antennal segment VIII / segment III 1.5, paratypes 1.5(1.4-1.7).

Legs with 38 translucent pores on dorsal surface of hind tibia, paratypes 33(26-38), 21 on dorsal surface of hind femur, paratypes 25(15-43), absent from remaining segments. Femur 287μ long, paratypes 293(278-308)μ long, about equal to tibia; tibia 300μ long, paratypes 289(283-302)μ long; tarsus 100μ long, paratypes 108(104-110)μ long. Tibia/tarsus 3.0, paratypes 2.7(2.6-2.8). Hind tibia with 40 setae, paratypes 37(34-39) setae.

UNUSUAL VARIATION: None.

U.S. SPECIMENS EXAMINED: None

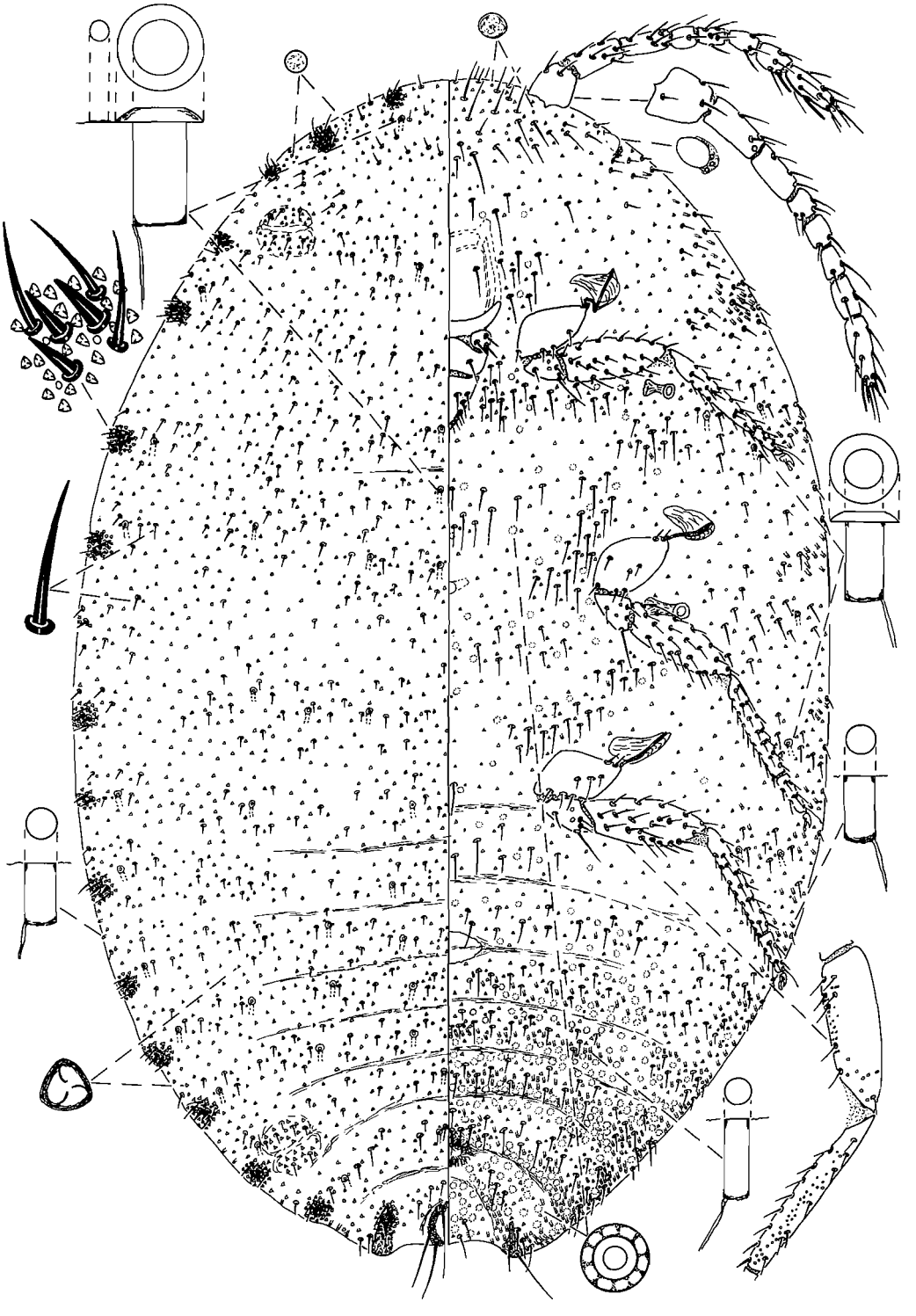

Figure 27. Adult female, *P. puertoricensis,* Puerto Rico, IV-22-1977, on cactus.

OTHER SPECIMENS EXAMINED:
Puerto Rico: (22-IV-1977, cactus, L. Roman) 15 slides, 19 specimens.

HOST AND DISTRIBUTION: Known only from type locality and host.

DISCUSSION: For a comparison of *P. puertoricensis* and *P. peregrinabundus* see the discussion section of the latter.

Pseudococcus schusteri Gimpel and Miller, new species (Figure 28)

Suggested Common Name: Schuster Galapagos mealybug.

DIAGNOSIS: Translucent pores on hind femur and tibia; 5(2-6) discoidal pores on lightly sclerotized rim near each eye; cerarius 8 and/or 10 absent or reduced; 9(4-14) oral-collar tubular ducts near cerarius 12; antenna 504(451-549)μ long.

TYPE DATA: The holotype adult female is mounted on a slide alone and is labeled as follows: Left label "Pseudococcus / schusteri / Gimpel & Miller / HOLOTYPE", right label "Pseudococcus / schusteri / HOLOTYPE / Darwin Res. Station / Santa Cruz Island / 24-I-1964 - Galapagos / ex plant on shore / Coll. R O Schuster / ENTOMOLOGY / U.C., Davis, CALIF #297" (UCD). In addition there are 11 paratype adult females (AU, UCD, USNM).

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 2.5 mm, width 1.5 mm, paratypes 2.2(2.0-2.5) mm long, 1.3(1.0-1.6) mm wide.

DORSUM: With 16(16-17) pairs of cerarii, cerarian formula as follows: 1-7 (2), 8 (1-2), 9 (2), 10 (0-1), 11 (2-3), 12 (2-4), 13 (2), 14 (1-2), 15-17 (3-4). Cerarius 12 with 4 auxiliary setae, paratypes with 5(4-5), 21 trilocular pores, paratypes with 29(21-36), 3 discoidal pores, paratypes with 4(3-4). Cerarius 1 with slight basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 2 sizes, large size about 5μ in diameter, scarce. Oral-rim tubular ducts with 1(1-2) discoidal pores and 0(0-1) associated seta, without oral rim posterior of frontal cerarii, paratypes 0(0-1) without duct on submarginal area between cerarii 15 and 16, present in small numbers on thorax and abdomen, submedial row absent on segments III-VII, paratypes sometimes with submedial row present, with 15(11-19) on abdomen. Oral-collar tubular ducts few on margin between cerarii 1-4. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 20μ long, paratypes 17(12-20)μ long; 5(4-6) dorsomedial setae on segment VIII, longest 34μ long, paratypes 27(24-34)μ long.

Anal ring setae 148μ long, paratypes 153(134-163)μ long, 1.6 times as long as greatest diameter of ring, paratypes 1.7 (1.5-1.9) times.

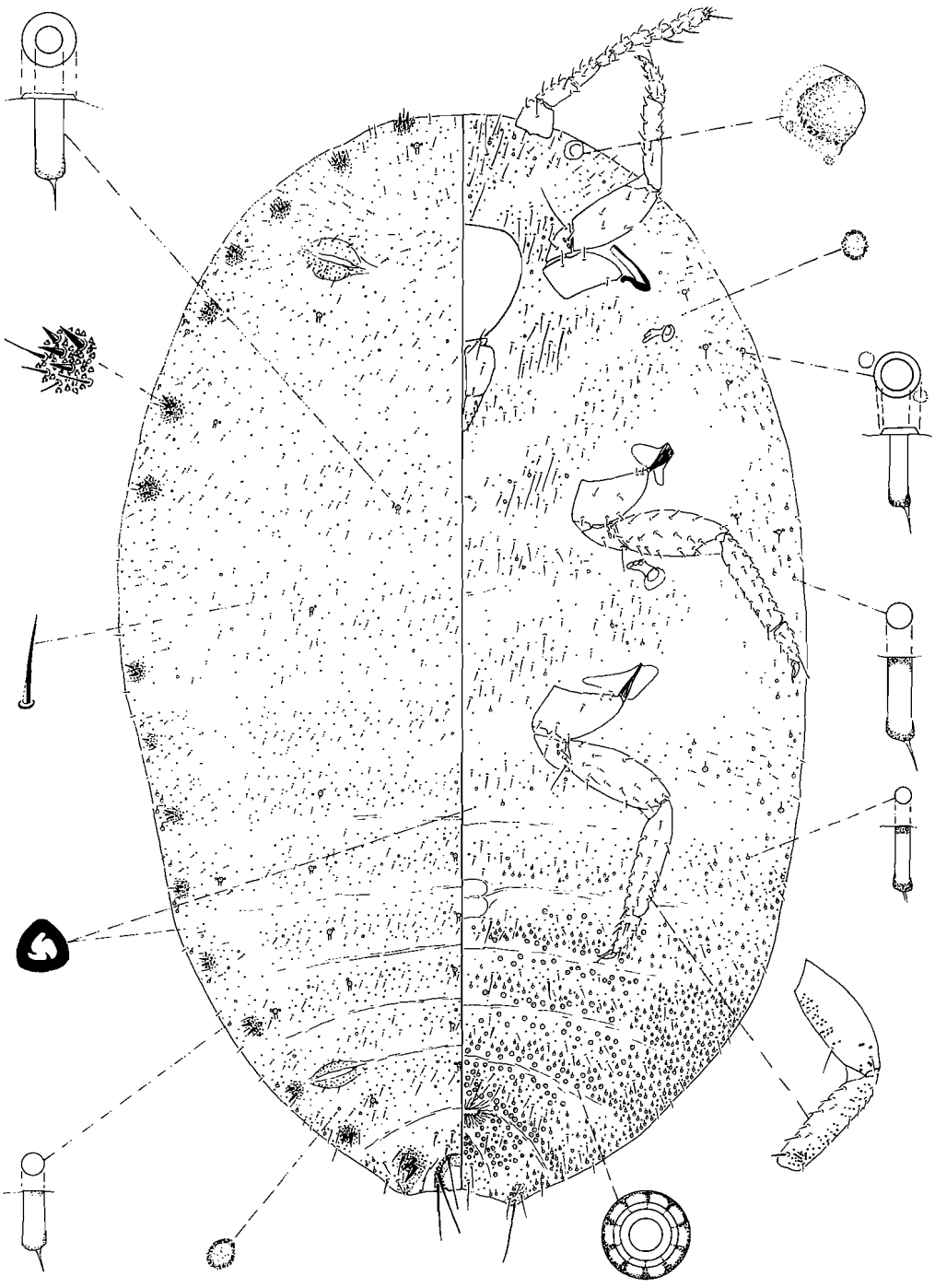

Figure 28. Adult female, *P. schusteri*, Darwin Research Station, Santa Cruz Island, Galapagos, I-24-1964, on "plant on shore".

VENTER: Multilocular disc pores in posterior and anterior bands on segments IV-VII, scattered on segments VIII and IX, absent from head and thorax. Trilocular pores scattered evenly over venter, with 178 on segment VI, paratypes with 154(136-194). Discoidal pores of 2 sizes, large size about 5μ in diameter, few on abdomen more numerous on head and thorax, 3(2-6) on anal-lobe sclerotization, 5(2-6) in lightly sclerotized rim around each eye. Oral-rim tubular ducts with 1(1-2) large discoidal pore and no setae associated with rim, 10 on submargin from segment II to cerarius 13, paratypes with 9(6-11),, with 0-2 mesad of other abdominal cerarii without duct near frontal cerarius, paratypes with 0(0-1) oral-collar tubular ducts in transverse bands on segments III-VII, abundant on submargin of posterior abdominal segments becoming less numerous anteriorly, few on thorax and head, with 9 mesad of cerarius 12, paratypes with 9(4-14), 8 associated with cerarii 10 and 11, paratypes 6(3-13), 1 posterior of eye, paratypes 1(1-3), 4 or 5 on each side of head, paratypes 3(2-5), 1 or 2 near or in frontal cerarius. Setae as follow: 4 cisanal, 73μ long, paratypes 73(41-88)μ long; 2 or 1 cisvulvar on each side, paratypes 2(1-2), 37μ long, paratypes 30(24-44)μ long; longest anal-lobe seta 102μ long, paratypes 110(102-124)μ long; body setae of 3 lengths, longest on abdomen 64μ long, paratypes 63(48-78)μ; longest interantennal seta 74μ long, paratypes 83(73-105)μ; longest seta on trochanter of hind leg 116μ long, paratypes 120 (111-129)μ long.

Circulus 1.3 times as wide as long, paratypes 1.4(1.3-1.6) times width 124μ, paratypes 138(124-148)μ, circulus divided by intersegmental line. Labium 161μ long, paratypes 173(146-195)μ long. Posterior spiracle greatest length 74μ long, paratypes 88(73-93)μ long. Antennae 8-segmented, 474μ long, lengths of each segment as follows: I 62μ, II 77μ, III 67μ, IV 40μ, V 49μ, VI 42μ, VII 42μ, VIII 89μ long; paratypes 504(451-549)μ long, length of each segment as follows: I 71(66-78)μ, II 78(68-85)μ, III 73(66-78)μ, IV 44(43-49)μ, V 51(46-61)μ, VI 41(37-49)μ, VII 46(41-49)μ, VIII 90(85-95)μ long. Length of antennal segment VIII / segment II 1.2, paratypes 1.2(1.1-1.4), antennal segment VIII / segment III 1.3, paratypes 1.3 (1.2-1.4).

Legs with 54 and 60 translucent pores on dorsal surface of hind tibia, paratypes with 51(47-54), with 35 and 37 translucent pores on hind femur, paratypes with 32(22-38) absent from remaining segments. Femur 257μ long, paratypes 285 (254-305)μ long, tibia 287μ long, paratypes 312(283-337)μ long; tarsus 114μ long, paratypes 110(102-115)μ long, tibia / tarsus 2.6, paratypes 2.8(2.6-3.0). Hind tibia with 32 setae, paratypes 34(31-39).

UNUSUAL VARIATION: None

U.S. SPECIMENS EXAMINED: None

OTHER SPECIMENS EXAMINED: Galapagos: Santa Cruz Island, Darwin Research Station (24-I-1964, on unknown host, R.O. Schuster) 10 slides, 10 specimens (UCD, USNM); Location unknown, (15-XII-1975, on *Acacia macrocantha*, M. Williams) 1 slide, 1 specimen (AU).

HOSTS AND DISTRIBUTION: This species is known from Santa Cruz Island only.

DISCUSSION: *Pseudococcus schusteri* is very similar to *P. insularis* but differs by having: Submedial row of oral-rim tubular duct equally spaced between medial and submarginal rows; cerarius 12 with 29(21-36) trilocular pores; hind tibia 312(283-337)μ long; 2(1-2) cisvulvar setae; interantennal setae 83(73-105)μ long; antennae 504(451-549)μ long. *Pseudococcus insularis* has: Submedial row of oral-rim tubular ducts closely associated with submarginal row; cerarius 12 with 12(10-15) trilocular pores; hind tibia 373μ long; 4(3-5) cisvulvar setae; interantennal setae 139μ long; and antennae 578μ long.

Pseudococcus sociabilis Hambleton (Figure 29)

Pseudococcus sociabilis Hambleton, 1935: 114.

Costa Lima (1939) considered *Pseudococcus perforatus* Ferris (1935) to be a synonym of *P. sociabilis*. It is evident from Ferris' original description that the species are quite distinct.

SUGGESTED COMMON NAME: Hambleton mealybug.

DIAGNOSIS: Anal-ring setae 174(146-190)μ long; dorsal oral-rim tubular ducts usually without associated discoidal pores 0(0-2); usually without oral rim on submargin between cerarii 15 and 16; tibia 378(341-420)μ long; translucent pores restricted to tibia.

TYPE DATA: We have examined a series of 6 slides containing 29 syntype specimens collected on *Hedera helix* in November, 1934 by Harold Compere. We here designate as lectotype an adult female on the bottom edge of a slide containing 5 adult female syntypes. The right label on the slide states:" *PSEUDOCOCCUS* / *SOCIABILIS* Hambleton / on *Hedera helix* / Avenida Paulista / Sao Paulo, Brazil / Nov. 8, 1934 / H. Compere, Coll.", the left label gives a map of the position of the lectotype and states " LECTOTYPE / PARALECTOTYPE / desig. by / Gimpel and / Miller" (USNM).

Additional paralectotypes are in UCD and USNM some of which were collected on November 4, 1934. We also have seen specimens from the same locality and host collected on October 28, 1934, but because they are not mentioned in the original description, they are not considered to be paralectotypes. We have been unable to locate syntype specimens mentioned in the description collected on *Erythrina reticulata* in September 1935.

The species epithet is from the Latin *sociabilis* meaning sociable and apparently refers to the large clusters of this mealybug that were encountered when it was first collected.

FIELD CHARACTERS: Hambleton (1935) reported that the adult female has red body contents, the dorsum is covered with white wax except for 4 longitudinal lines, the marginal wax filaments are well developed and average 1/3-1/2 the width of the body. He also reported that the insect constructs a loose ovisac.

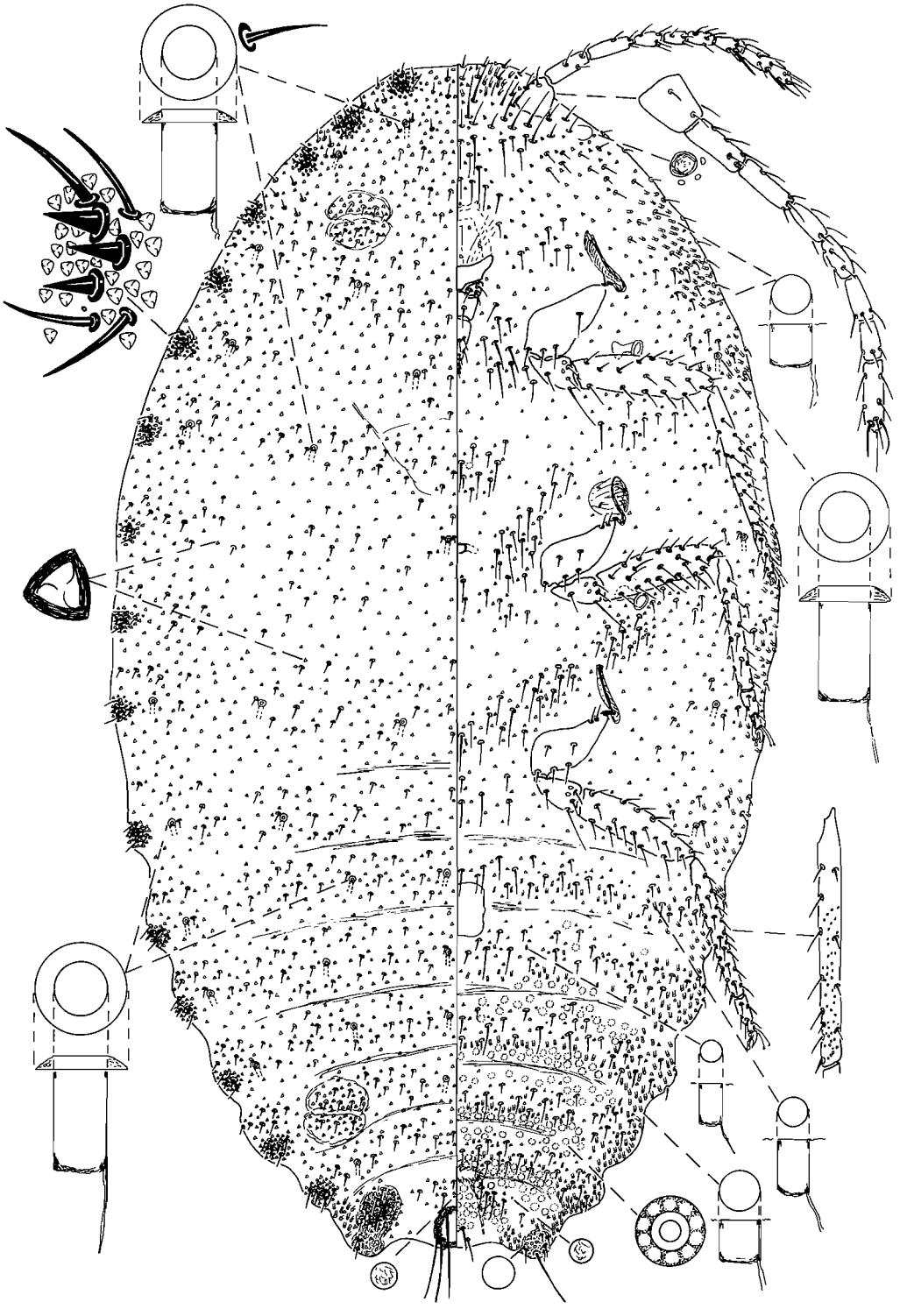

Figure 29. Adult female, *P. sociabilis,* Sao Paulo, Brazil, X-28-1934, on *Hedera helix.*

SLIDE MOUNTED CHARACTERS: Mounted 2.5(1.9-3.1) mm long, 1.5(0.9-1.7) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: 1-8 (2), 9 (1-2), 10 (1-2), 11 (2), 12 (2-3), 13-14 (2), 15 (3), 16 (3-4), 17 (3). Cerarius 12 with 4(2-5) auxiliary setae, 23(16-27) trilocular pores, 1(0-2) discoidal pores. Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 1 size, about equal to small size on venter, scarce. Oral-rim tubular ducts with 0(0-2) discoidal pores and 1(0-2) seta associated with rim, oral rims posterior of frontal cerarii, absent from submargin between cerarii 15 and 16, on each thoracic segment, abdominal segments I-VII, with 22(18-25) on abdomen. Oral-collar tubular ducts restricted to margin between cerarii 1 and 2. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 11(10-15)μ long, 5(3-7) dorsomedial setae on segment VIII, longest 16(15-19)μ long.

Anal-ring setae 174(146-190)μ long, 1.9(1.7-2.0) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in posterior and anterior band on segments V-VIII, with posterior band on submargin and several scattered anteriorly on segment IV, scattered on segment IX, thorax with 0(0-1). Trilocular pores scattered over venter, 86(82-128) on segment VI. Discoidal pores of 2 sizes, large size about 4μ in diameter, 4(3-5) on anal lobe, 2(1-4) in membranous rim associated with each eye, few associated with multilocular disc pores. Oral-rim tubular ducts with 1(0-2) discoidal pore and 0(0-1) seta associated with rim, 3(3-4) on submargin from segment II to cerarius 13, without duct near frontal cerarius; oral-collar tubular ducts in transverse bands on segments III-VII, on margin and submargin on thorax and head of 3 sizes, small and narrow associated with setae mesally on abdomen, medium associated with posterior band of multilocular disc pores on segments IV-VII and on submargin, short and broad on margin, with 11(4-18) in cluster mesad of cerarii 12, 6(2-12) associated with cerarii 10 and 11, 0(0-2) posterior of eye, 7(4-11) on each side of head. Setae as follows: 4 cisanal, 36(29-39)μ long; 4(3-5) cisvulvar on each side, 43(24-59)μ long; longest anal-lobe seta 107(98-115)μ long; body setae of 3 lengths, longest on abdomen 100(73-110)μ long; longest interantennal seta 130(98-166)μ long; longest seta on trochanter of hind leg 130(123-161)μ long.

Circulus 1.5(1.3-2.0) times wider than long,width 118(86-138), divided by segmental fold between segments III and IV. Labium 173(158-190)μ long. Posterior spiracle greatest length 82(68-127)μ long. Antennae 8-segmented, 575(560-615)μ long, length of each segment as follows: I 74(66-93)μ, II 81(73-93)μ, III 84(73-93)μ, IV 54(49-61)μ, V 62(51-73)μ, VI 54(49-61)μ, VII 54(49-56)μ, VIII 102(98-110)μ long. Length of antennal segment VIII / segment II 1.3(1.2-1.5), antennal segment VIII / segment III 1.3(1.1-1.4).

Legs with 57(29-91) translucent pores on dorsal surface of hind tibia, absent from remaining segments. Femur 312(276-341)μ long, slightly shorter than tibia; tibia 378(341-420)μ long; tarsus 122(117-134)μ long. Tibia/tarsus 3.1(2.9-3.3). Hind tibia with 40(34-46) setae.

UNUSUAL VARIATION: One specimen has an oral-rim tubular duct on dorsal submargin between cerarii 15 and 16; another has 1 ventral oral rim near the frontal cerarius.

U.S. SPECIMENS EXAMINED: None

OTHER SPECIMENS EXAMINED:
Brazil: Sao Paulo (X-28-1934, *Hedera helix*, H. Compere), 4 slides, 19 specimens (USNM and UCD), (XI-4-1934, *Hedera helix*, H. Compere), 3 slides, 18 specimens (UCD), (XI-8-1934, *Hedera helix*, H. Compere), 3 slides, 16 specimens (UCD).

HOSTS AND DISTRIBUTION: This species was collected on *Hedera helix* by Hambleton and Compere in 1934 and on *Erythrina reticulata* (= *E. speciosa*) in 1935 from the same locality in Sao Paulo, Brazil. We have only examined specimens from *Hedera helix* and have not found specimens from outside of Brazil.

DISCUSSION: For a comparison of *Pseudococcus sociabilis* with *P. importatus* and *P. pertusus* see the discussion sections of the latter 2 species.

Pseudococcus solenedyos Gimpel and Miller, new species (Figure 30)

SUGGESTED COMMON NAME: Oral-rim mealybug.

DIAGNOSIS: Translucent pores restricted to hind tibia; narrow sclerotized rim sometimes present around eye, with 2(1-3) discoidal pores; ventral oral rim associated with frontal cerarius; cerarius 12 with 0(0-2) associated oral collars.

TYPE DATA: The adult female holotype is a single specimen on a slide labeled as follows: Left label "Jaurez, Mexico / ex Psidium sp. fruit / II-4-78 / El Paso 8371 / Bejarano / Balsam"; right label "Pseudococcus / solenedyos / Gimpel & Miller / HOLOTYPE" (USNM). There are 13 paratypes on 11 slides that are deposited in BMNH, MCM, UCD, USNM.

The species epithet is derived from the Greek nouns *nedyos* meaning "belly or venter" and *solen* meaning "pipe or channel" and refers to the ventral oral-rim tubular ducts that occur on the ventral surface of the head of this species.

FIELD CHARACTERS: The species occurs on the fruit and probably foliage of its host.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 1.9 mm, width 0.9 mm. Paratypes 2.6(1.9-3.6) mm long, 1.5(0.8-2.6) mm wide.

DORSUM: With 16 or 17 pairs of cerarii, paratypes 17, cerarian formula as follows: Left side, 1-9 (2), 10 (0-2), 11(2), 12 (3), 13-14 (2), 15 (3), 16 (3-5), 17 (3). Cerarius 12 (right side) with 2 auxiliary seta, paratypes 3(1-5), 19 trilocular pores, paratypes 19(12-27), 1 discoidal pore, paratypes 2(0-3). Cerarius 1 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered;

discoidal pores of 1 variable size, scattered over dorsum, associated with oral-rim tubular ducts, 3μ in diameter, scattered sparsely. Oral-rim tubular ducts with 1(0-3) discoidal pores and 0(0-1) seta associated with rim, oral rims present posterior of frontal cerarii, present on submargin between cerarii 15 and 16, present on submarginal, submedian, and median areas of body, with 25 oral rims on abdomen, paratypes with 31(25-45), oral-collar tubular ducts only on submargin between posterior cerarii. Body setae of 2 sizes, longest seta on abdomen, excluding segment VIII, 21μ long, paratypes 22(17-27)μ long;, 4 dorsomedial setae on segment VIII, paratypes 5(4-6), longest seta 22μ long, paratypes 19(17-27)μ long.

Anal-ring seta 185μ long, paratypes 170(138-187)μ long; 2.0 times as long as greatest diameter of ring, paratypes 1.7(1.4-2.0).

VENTER: Multilocular disc pores in posterior and anterior bands on segments V-VII, in posterior band on segment IV, scattered on segments VIII and IX, paratypes with anterior and posterior bands on segments V-VII, with at least 1 pore in posterior area of segment IV, without pores on thorax, paratypes with 0(0-2) pores. Trilocular pores scattered, 108 on segment VI, paratypes 109(90-132). Discoidal pores on 1 size, 3μ in diameter, paratypes 3(2-4)μ, 2 or 3 in membranous rim around each eye, paratypes sometimes with weakly sclerotized rim, with 2(1-3) pores, 1 or 3 on basal sclerotization of anal lobe, paratypes 3(1-5) pores. Oral-rim tubular ducts with 0(0-2) discoidal pores and 0(0-1) setae associated with rim, with 8 ducts on submargin from segment II to cerarius 13, paratypes with 9(5-15) ducts, without duct near frontal cerarius; oral-collar tubular ducts on submarginal areas without rim, in segmental band on segments VII-IV or III, associated with posterior band of multilocular disc pores, few on thorax and head, 2 mesad of cerarius 12, paratypes with O(0-2) ducts, 2 associated with cerarii 10 and 11, paratypes 1(0-3) ducts, 4 posterior of eye, paratypes 5(1-9), with 1 or 2 ducts on each side of head, paratypes 1 (0-2). Setae as follows: 4 cisanal, longest 54μ long, paratypes 50(42-62)μ long; 4 or 5 cisvulvar on each side, paratypes 4(2-6), 44μ long, paratypes 53(37-79)μ long; longest anal-lobe seta 138μ long, paratypes 142(133-156)μ long; longest body setae on abdomen 109μ long, paratypes 111(71-148)μ long; longest interantennal seta 133μ long, paratypes 130(123-163)μ long; longest seta on trochanter of hind leg 128μ long, paratypes 145(128-163)μ long.

Circulus 1.3 times wider than long, paratypes 1.4(1.2-1.6) times, width 192μ, paratypes 203(170-245)μ, divided by intersegmental fold. Labium 175μ long, paratypes 192(175-205)μ long. Posterior spiracle greatest length 82μ, paratypes 83(74-106)μ. Antennae 8-segmented, 521μ long, lengths of each segment as follows: I 69μ, II 77μ, III 84μ, IV 47μ, V 54μ, VI 44μ, VII 49μ, VIII 96μ; paratypes 535(496-601)μ long, length of each segment as follows: I 72(67-82)μ, II 78(67-87)μ, III 85(59-101)μ, IV 45(41-52)μ, V 51(47-54)μ, VI 46(42-49)μ, VII 46(44-49)μ, VIII 98(89-104)μ long. Length of antennal segment VIII / segment II 1.4, paratypes 1.2(1.0-1.4), antennal segment VIII / segment III 1.2, paratypes 1.2(1.0-1.7).

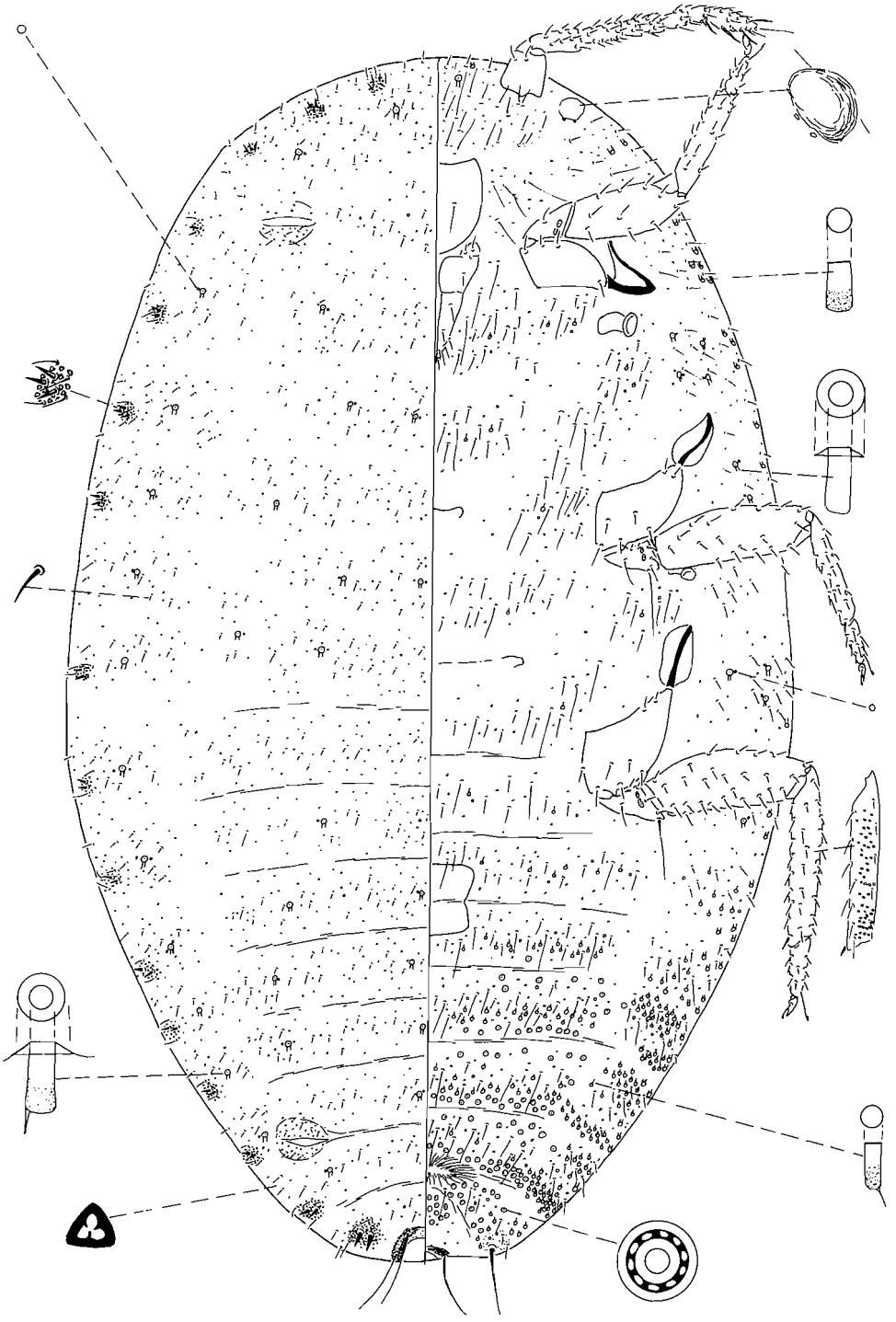

Figure 30. Adult female, *P. solenedyos*, Mexico, VII-18-1985, on miscellaneous plant material.

Legs with 69 translucent pores on dorsal surface of hind tibia, paratypes 51(25-75); without pores on other leg segments. Femur 316μ long, paratypes 324(296-382)μ long, shorter than tibia; tibia 353μ long, paratypes 357(319-405)μ long; tarsus 106μ long, paratypes 115(106-121)μ long. Tibia / tarsus 2.9, paratypes 3.1(2.7-3.3). Hind tibia with 48 setae, paratypes 50(47-58) setae.

UNUSUAL VARIATION: The 3 specimens from mango have a reduced number of translucent pores on the hind tibia which are restricted to the distal half of the segment.

U.S. SPECIMENS EXAMINED: None

OTHER SPECIMENS EXAMINED: Mexico: Locality unknown (9-VIII-1978, *Punica granatum*, A.D. Wood), 1 slide, 1 specimen (USNM); (31-VIII-1983), *Punica granatum*, W. Winnie), 1 slide, 2 specimens (UCD); (13-IX-1985, *Punica granatum*, J. Aliaga), 1 slide, 2 specimens (BMNH); (9-IX-1985), *Punica granatum*, D. Gutierrez), 1 slide, 1 specimen (USNM); (18-VII-1985, miscellaneous plant material, M. Richter), 1 slide, 1 specimen (USNM); (17-V-1986, *Mangifera indica*, J. Nakahara), 1 slide, 1 specimen (USNM); (4-IX-1986, *Punica granatum*, K. Scharf), 1 slide, 1 specimen (MCM); (25-IV-1988 *Mangifera indica*, C. Yates), 1 slide, 1 specimen (CDAS); (10-XII-1987, *Psidium* sp., B. Tapscott), 1 slide, 1 specimen (USNM); 1-X-1987, *Psidium guajava*, J. Aliaga), 1 slide, 1 specimen (USNM); (23-IV-1988 *Spondias mombin*, Kroell), 1 slide, 1 specimen (USNM); (7-VI-1988, *Mangifera indica*, J. Torres), 1 slide, 1 specimen (USNM).

HOSTS AND DISTRIBUTION: *Pseudococcus solenedyos* is known only from Mexico where it has been taken on fruit of pomegranate, mango, papaya and hog plum.

DISCUSSION: *Pseudococcus solenedyos* is very similar to *P. donrileyi* and can be separated only by using a combination of characters: *P. solenedyos* differs by having: 0(0-1) oral collars near cerarius 12; rim around eye weakly sclerotized 50% of time; 2(1-3) discoidal pores near eye; anal-lobe seta 142(133-156)μ long; and hind tibia 357(319-405)μ long. *Pseudococcus donrileyi* has: 3(1-5) oral collars near cerarius 12; rim around eye weakly sclerotized; 4(2-6) discoidal pores near eye; anal-lobe seta 117(96-133)μ long; and hind tibia 313(277-333)μ long.

Pseudococcus sorghiellus (Forbes) (Figure 31)

Coccus sorghiellus Forbes, 1885: 71.
Dactylopius sorghiellus (Forbes): Forbes, 1894: 106.
Pseudococcus sorghiellus (Forbes): Ferris, 1953: 421.

SUGGESTED COMMON NAME: Eastern trochanter mealybug.

DIAGNOSIS: Translucent pores on all segments of hind leg except tarsus; circulus small and oval, width about 52μ; legs short, femur about 180μ long; 17 pairs of cerarii.

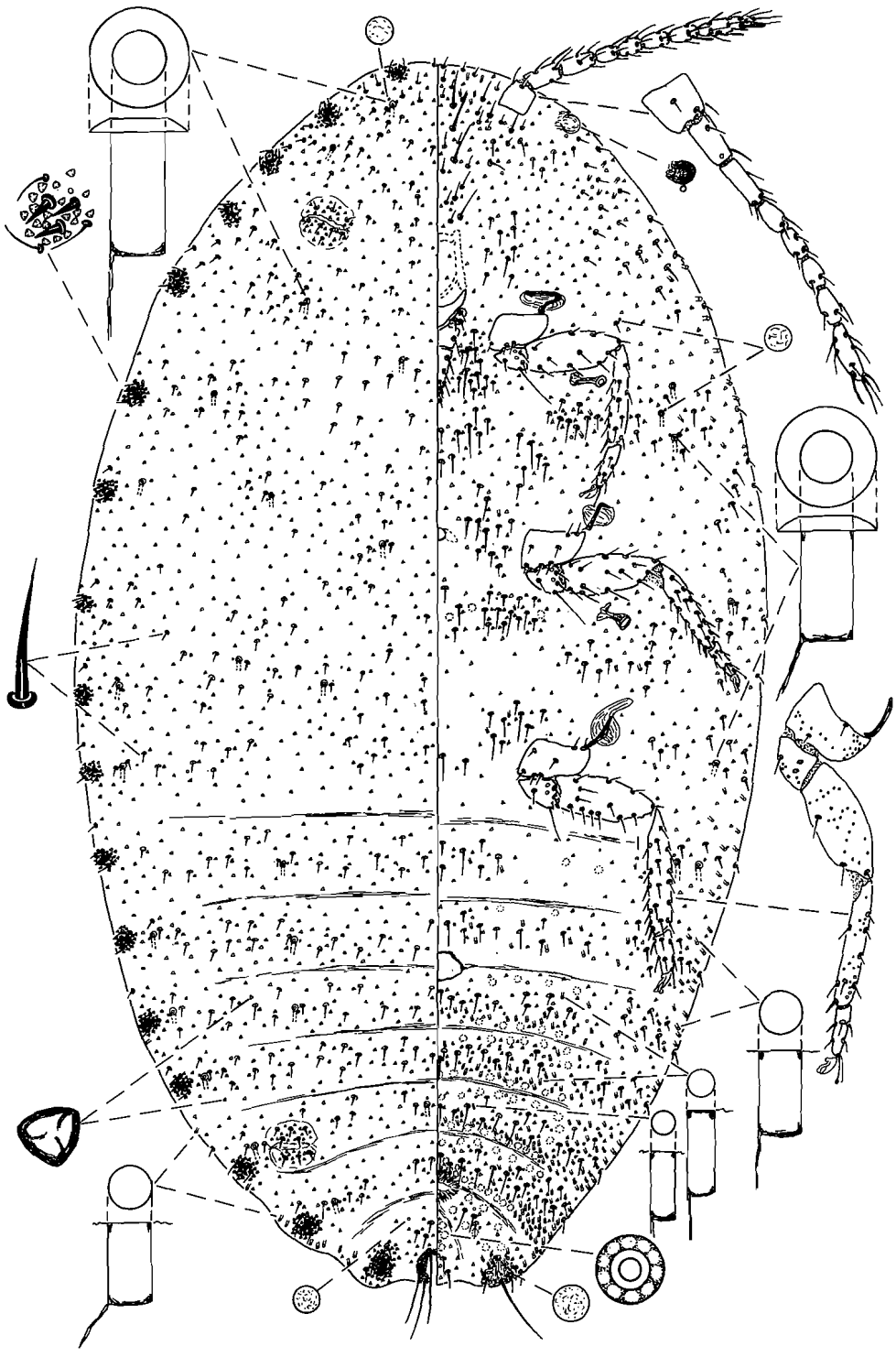

Figure 31. Adult female, *P. sorghiellus*, Florida, III-17-1972, on *Polygala rugelii*.

TYPE DATA: We have examined a specimen purported to be part of the type series labeled as follows: left label "*Pseudococcus* / *sorghiellus* / Forbes / TYPE / Acc. #4667 (USNM)". Unfortunately there is no evidence such as locality data or host information confirming that it is a syntype. Therefore, we have not designated it as a lectotype. The species epithet is from the Latin diminutive *ellus* meaning "little" and refers to the small size of the mealybug.

FIELD CHARACTERS: This species generally is taken from roots but is occasionally collected on above ground portions of the host.

SLIDE MOUNTED CHARACTERS: Mounted 1.8(1.4-2.4) mm long, 1.2(0.8-1.6) mm wide.

DORSUM: With 17 pairs of cerarii, rarely 16, cerarian formula as follows: 1-8 (2), 9 (1-2), 10-11 (1-2), 12 (2-3), 13 (1-3), 14 (2), 15 (3), 16 (2-4), 17 (3). Cerarius 12 with 3(2-4) auxiliary setae, 15(9-21) trilocular pores, 1(0-3) discoidal pore. Cerarius 1 and sometimes 2 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered evenly; discoidal pores of 1 size, scattered sparsely, associated with oral-rim tubular ducts. Oral-rim tubular ducts with 1(0-3) small discoidal pore and 1(0-2) short seta associated with rim, present posterior of frontal cerarii, present in submarginal area between cerarii 15 and 16 about 50% of time, usually in submarginal, submedial, and medial areas of most body segments, occasionally in reduced numbers, with 19(3-31) on abdomen. Oral-collar tubular ducts only on margin between cerarii. Body setae of 2 sizes, longest seta on abdomen excluding setae on segment VIII 15(11-22)μ long; 6(4-8) dorsomedial setae on segment VIII, longest 18(12-25)μ long.

Anal-ring setae 117(104-128)μ long, 1.7(1.4-2.0) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in posterior and anterior bands on segments IV or rarely V-VII, occasionally on III, normally scattered on segments II, III, VIII, IX, occasionally on segment II, with 4(2-9) on thorax. Trilocular pores scattered over venter, 85(38-114) on segment VI. Discoidal pores of 2 sizes, large size about 3μ in diameter, 1(0-2) in membranous rim around each eye, 2(0-4) on anal-lobe sclerotization; small size associated with anterior band of multilocular disc pores on segments V-VII, scattered over venter. Oral-rim tubular ducts with 1(0-1) discoidal pore and 0(0-1) seta associated with rim, 3 (0-4) on submargin from segment II to cerarius 13, without duct near frontal cerarii; oral-collar tubular ducts associated with posterior band of multilocular disc pores on segments V-VII, abundant on submargin of segments VI-VIII, scattered on segments III-V, becoming less numerous on submargin anteriorly, few on thorax and head, with 3(1-5) mesad of cerarius 12, 1(0-3) associated with cerarii 10 and 11, with 2 (0-6) posterior of eye, 2(0-4) on each side of head. Setae as follows: 4 cisanal, 26(20-37)μ long; 2(1-4) cisvulvar on each side, 27(20-33)μ long; longest anal-lobe seta 96(90-106)μ long; longest body setae on abdomen 41(32-49)μ long; longest interantennal seta 74(49-89)μ long; longest seta on trochanter of hind leg 83(67-96)μ long.

Circulus 1.4(1.1-1.7) times as wide as long, width 52(31-87)μ, variable, usually divided by segmental fold of segments III and IV. Labium 126(106-138)μ long. Posterior spiracle greatest length 66(51-79)μ long. Antennae 8-segmented, occasionally 7-segmented, 329(254-366)μ long, length of each segment when 8-segmented as follows: I 47(44-52)μ, II 48(35-54)μ, III 39(25-49)μ, IV 21(15-27)μ, V 31(20-35)μ, VI 26(20-32)μ, VII 35(30-40)μ, VIII 78(69-84)μ long. Length of antennal segment VIII / segment II 1.6(1.4-2.0), antennal segment VIII / III 2.0(1.6-2.8).

Legs with 13(8-21) translucent pores on dorsal surface of hind tibia, 18(7-31) on hind femur, 4(0-12) on hind trochanter, 24(6-51) on hind coxa. Femur 179(136-198)μ long, about same length as tibia; tibia 173(125-198)μ long; tarsus 91(81-97)μ long. Tibia / tarsus 1.9(1.5-2.3). Hind tibia with 23(18-27) setae.

UNUSUAL VARIATION: Several specimens from Virginia and West Virginia appear to have translucent pores on the femur and/or tibia of the middle pair of legs. Antennae are normally 8-segmented but occasionally have 7-segments on 1 or both sides. The circulus varies in size, at times being very small (about 27μ wide) and at times being fairly large (about 87μ wide). When the circulus is small, the dividing segmental line is weak, giving the circulus an appearance similar to that of *P. microcirculus*. A number of specimens from Alabama lack oral-rim tubular ducts on the venter laterad of cerarius 12.

U.S. SPECIMENS EXAMINED: 210 slides, 397 specimens as follows: Alabama: *Cassia nictitans, Lespedeza cuneata, Lyonia ligustrina, Oenothera humifusa, Phaseolus vulgaris, Solidago* sp.
Arkansas: In soil of peach orchard.
Connecticut: *Medicago sativa.*
Delaware: *Glycine max.*
District of Columbia: *Narcissus* sp., *Trifolium pratense.*
Florida: *Ambrosia artemisiifolia, Andropogon virginicus, Aster curtisii, Centella asiatica,* Compositae, *Crotalaria pumila,* Gramineae, *Hydrocotyle umbellata, Lachnanthes caroliniana, Oenothera* sp., *Poinsettia* sp., *Polygala rugelii, Pyracantha* sp., *Rosmarinus officinalis, Rubus* sp., *Solidago* sp., *Vaccinium* sp.
Georgia: *Chamaecrista robusta, Glycine max,* Compositae.
Indiana: *Rubus* sp., *Trifolium* sp.
Illinois: *Sorghum sp.*
Maryland: *Acer* sp., *Acorus calamus, Artemisia vulgaris, Beta vulgaris, Buxus* sp., *Chamaecrista* sp., *Cyperus* sp., *Eupatorium* sp., *Glycine max, Iris laevigata, Oxalis corniculata, Phaseolus* sp., *Plantago* sp., *Polygonum* sp., *Prunus* sp., *Rubus* sp., *Salix* sp., *Solanum tuberosum, Solidago* sp., *Spirea myrtilloidea, Tamarix perlandra, Trifolium* sp.
Massachusetts: *Solidago* sp.
Mississippi: *Strophostyles helvola,* in soil in peach orchard.
Missouri: *Cynara scolymus.*
New Hampshire: *Trifolium* sp.
New Jersey: *Achillea* sp., *Solidago* sp., *Vaccinium* sp.

New York: *Arctostaphylos uvaursi, Baptisia tinctoria, Eupatorium* sp., *Solidago* sp.
North Carolina: *Fragaria* sp., *Narcissus* sp., *Polygonum* sp., *Rubus* sp., *Trifolium* sp.
Ohio: *Glycine max, Solidago* sp., *Trifolium pratense.*
Pennsylvania: *Phaseolus vulgaris, Trifolium repens.*
South Carolina: *Anthemis* sp. *Chamaecrista* sp., *Citrullus vulgaris, Cyperus* sp., *Erigeron* sp., *Eupatorium capillifolium, Gossypium* sp., *Rumex acetocella, Trifolium* sp.
Tennessee: *Aster* sp., Gramineae, *Lespedeza* sp.
Virginia: *Achillea millefolium, Arachis* sp., *Asclepias* sp., *Aster pilosus, Lespedeza* sp., *Pisum sativum, Pueraria* sp., *Rubus* sp., *Sedum* sp., *Trifolium pratense, Vernonia* sp.
West Virginia: *Aster pilosus, Prunus* sp., *Solidago* sp., *Trifolium repens.*

OTHER SPECIMENS EXAMINED:
Mexico: Vera Cruz (27-II-1972, unknown host, D.R. Miller and F.D. Parker) 1 slide, 1 specimen (USNM).

HOSTS AND DISTRIBUTION: *Pseudococcus sorghiellus* was first collected in Illinois on the roots of sorghum in 1884. This species is wide spread in the eastern U. S.; it has been collected commonly on the roots of legumes, composites and a diversity of other hosts.

Outside of the U.S., *P. sorghiellus* is known only from a single collection from an unknown host in Veracruz, Mexico.

The host list includes 57 genera.

DISCUSSION: *P. sorghiellus* is very similar to *P. dolichomelos* but differs by having: Sum of measurement of hind femur, tibia and tarsus 445(343-489)μ long; antennae 329(254-366)μ long; circulus usually small, width 66(51-79)μ, undivided; few oral collars on thorax and head, (cerarius 10 and 11 with 1(0-3), cerarius 12 with 3(1-5), area near eye with 2(0-6), each side of head with 2(0-4); longest ventral body seta on abdomen 41(32-49)μ long. *Pseudococcus dolichomelos* has: Sum of measurement of hind femur, tibia and tarsus 585(479-696)μ long; antennae 422(360-490)μ long; circulus usually large, width 91(59-111)μ and divided by intersegmental line; many oral collars on thorax and head, cerarius 10 and 11 with 7(1-17), cerarius 12 with 9(3-13), area near eye with 8(3-15), each side of head with 6(1-10); longest ventral body seta on abdomen 63(42-89)μ long.

For a comparison of this species with *Pseudococcus bermudensis, P. dysmicus,* and *P. spanocera* see the discussion sections of the latter 3 species.

Pseudococcus spanocera Gimpel and Miller, new species (Figure 32)

SUGGESTED COMMON NAME: Florida trochanter mealybug.

DIAGNOSIS: Circulus small located on segment III; translucent pores inconspicuous, usually present on hind coxa, trochanter, femur, tibia; antennae 7-segmented; 11(13-16) pairs of cerarii; 4(0-13) dorsal oral rims.

TYPE DATA: Adult female holotype is single specimen on slide labeled as follows: Right label "Holotype / *Pseudococcus* / *spanocera*"; left label "Pseudococcus sorghiellus red. cera./ On *Flaveria* sp. / *Iva imbricata* / Ft. Myers Beach/ Lee Co., Fla. / IV-11-1974, R.F. Denno/ D.R. Miller #2680" (USNM). There are 24 paratypes on 20 slides that are deposited in: BMNH, CDAS, FSCA, MCM, MNHP, UCD, UG, USNM, VPI, ZIL.

The species epithet is derived from the Greek words *spanos* meaning "scarce", and *kera* meaning "wax" and refers to the reduced number of wax-bearing cerarii that characterizes this species.

FIELD CHARACTERS: No available information except that the species occurs on the roots or crown of its host.

SLIDE MOUNTED CHARACTERS: Adult female holotype oval, length 1.2 mm, width 0.7 mm. Paratypes 1.7(1.2-2.2) mm long, 0.9(0.7-1.6) mm wide.

DORSUM: With 12 pairs of cerarii, cerarian formula as follows: Left side, 1-7 (2), 8 (0), 9 (1), 10 (0), 11 (1), 12-13 (2), 14-16 (0), 17 (3), paratypes 1 (2), 2 (1-2), 3-9 (0-2), 10 (0), 11 (0-2), 12 (0-3), 13-14 (0-2), 15-17 (0-3). Cerarius 12 (right side) with 1 auxiliary seta, paratypes 0(0-2), 6 trilocular pores, paratypes 5(4-8), without discoidal pores, paratypes 0(0-1). Cerarii 1 and 2 with basal sclerotization. Multilocular disc pores absent; trilocular pores scattered; discoidal pores of 1 variable size, most abundant along body margin. Oral-rim tubular ducts with rim distinct, of 10 paratypes studied in detail, 9 possess oral rims, with 1(0-2) associated discoidal pores, 0(0-1) associated seta; oral rims present near frontal cerarius. of 10 paratypes studied in detail, 7 possess rims on one or both sides of head, absent from submargin between cerarii 15 and 16, other oral rims when present, located submarginally near cerarii, occasionally also present submedially, with 2 oral rims on abdomen, paratypes with 4(0-13); oral-collar tubular ducts absent. Body setae of 2 sizes, longest body setae on abdomen, excluding those on segment VIII, 23 μ long, paratypes 20(13-25)μ long; 4 dorsomedial setae on VIII, paratypes 5(3-6), longest segment setae 25 μ long, paratypes 24(15-32)μ long.

Anal-ring setae 124μ long, paratypes 119(101-143)μ long, 1.5 times as long as greatest diameter of ring, paratypes 1.6(1.4-2.0).

VENTER: Multilocular disc pores in posterior and anterior bands on segments IV, without pores on other segments, paratypes with pores sometimes absent from segments IV or with 1 or 2 pores on segments III and/or II, with 4 pores on head and thorax, paratypes with 2(0-4) multilocular pores on thorax and head. Trilocular pores scattered, 60 on segment VI, paratypes 68 (40-98). Discoidal pores of 1 variable size, 3μ in diameter, paratypes 3(2-3)μ, 0 or 1 set in membranous rim around eye, paratypes 1(0-2), 2 on anal lobe sclerotization, paratypes

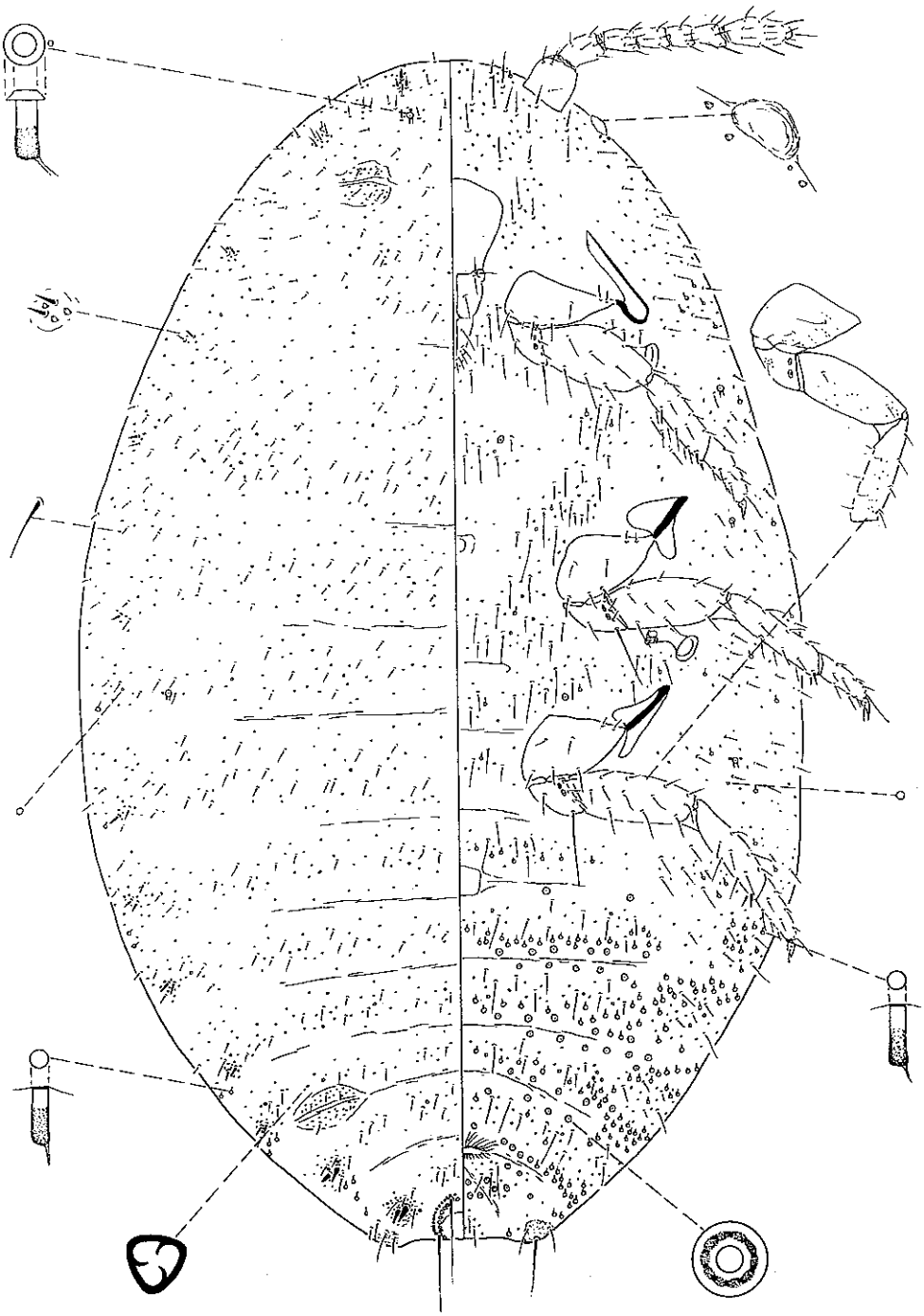

Figure 32. Adult female, *P. spanocera,* Fort Myers Beach, Lee Co., Florida, IV-11-1974, on *Iva imbricata.*

2(1-4). Oral-rim tubular ducts with rim weakly developed or absent, with 0(0-2) discoidals and 0(0-1) setae associated with rim, with 1 duct on submargin from segment II to cerarius 13, paratypes with 1(0-2) ducts; oral-collar tubular ducts in transverse band on segments VII-IV or III, associated with posterior band of multilocular disc pores, few on thorax and head, 2 ducts mesad of cerarius 12, paratypes with 2(0-4), 1 duct associated with cerarii 10 and 11, paratypes 0(0-1), without ducts posterior of eye, paratypes 0(0-5), 2 ducts on each side of head, paratypes 1(0-3). Setae as follows: 4 cisanal, longest 32μ long, paratypes 30(21-35)μ long; 2 or 3 cisvulvar on each side of body, paratypes 3(1-4), longest 44μ long, paratypes 32(20-44)μ long; longest anal-lobe seta 111μ long, paratypes 114(96-133)μ long; longest body seta on abdomen 54μ long, paratypes 47(30-59)μ long; longest interantennal seta 67μ long, paratypes 78(62-89)μ long; longest seta on trochanter of hind leg 79μ long, paratypes 80(64-84)μ long.

Circulus 1.5 times as wide as long, paratypes 1.6(1.4-1.8), width 49μ, paratypes 50(27-77)μ, not divided by segmental fold. Labium 114 long, paratypes 125(114-138)μ long. Posterior spiracle greatest length 67μ, paratypes 61(50-74)μ. Antennae 7-segmented, right antenna 298μ long, length of each segment as follows: I 42μ, II 36μ, III 31μ, IV 30μ, V 22μ, VI 32μ, VII 82μ, paratypes 301(267-335)μ long, length of each segment as follows: I 45(40-52)μ, II 40(30-49)μ, III 32(27-42)μ, IV 31(20-40)μ, V 26(21-30)μ, VI 33(27-35)μ, VII 82(77-87)μ long. Length of antennal segment VII / segment II 2.3, paratypes 2.0(1.8-2.8), antennal segment VII / segment III 2.6, paratypes 2.4(1.3-3.1).

Legs with 10 inconspicuous translucent pores on hind tibia, paratypes 11(6-16); 12 pores on hind femur, paratypes 10(3-19); 2 pores on trochanter, paratypes 1(0-4); 17 pores on hind coxa, paratypes 6(0-17). Femur 158μ long, paratypes 159 (131-180)μ long, slightly longer than tibia; tibia 158μ long, paratypes 148(114-161)μ long; tarsus 94μ long, paratypes 88(79-94)μ long. Tibia / tarsus 1.7, paratypes 1.7(1.4-1.8). Hind tibia with 17 setae, paratypes 17(13-21) setae.

UNUSUAL VARIATION: A small number of specimens seem to lack translucent pores on the hind trochanter and/or hind coxa.

U.S. SPECIMENS EXAMINED: Paratypes: Arkansas: Clay Co., locality unknown (14-VIII-1979, *Glycine max*, R. G. Chenowith), 3 slides, 6 specimens (CDAS, UCD, USNM).
Florida: Alachua Co., Gainesville (14-VI-1967, *Cyperus* sp., D.H. Habeck), 3 slides, 3 specimens (BMNH, FSCA, USNM); Clay Co., Doctors Inlet (22-I-1974, *Narcissus* sp., W.H. Pierce), 5 slides, 5 specimens (FSCA, MNHP, USNM, VPI, ZIL); Dade Co., Miami (30-XII-1972, *Scoparia dulcis*, W.H. Pierce), 2 slides, 2 specimens (FSCA, USNM); Lee Co., Ft. Myers Beach (11-IV-1974, *Flaveria* sp. or *Iva imbricata*, R.F. Denno and D.R. Miller), 1 slide, 1 slide, 1 specimen (USNM); Manatee Co., Parrish (16-II-1977, *Ambrosia artemisifolia*, W.H. Pierce), 1 slide, specimen (USNM); Polk Co., Haines City (22-IX-1972) *Chrysopsis graminifolia*, W.H. Pierce), 2 slides, 2 specimens (USNM); St. Lucie Co., Bluefield (17-XI-1982, *Aeschynomene pratensis*, K. Hibbard), 3 slides, 3 specimens (FSCA, MCM,

USNM); Suwannee Co., Live Oak (19-IV-1979, *Rhododendron* sp., A.E. Graham), 1 slide, 1 specimen (USNM).

Not Paratypes: Florida: Brevard Co., Merritt Island (9-II-1965, on *Bidens* sp., H.I. Holtsberg) 1 slide, 1 specimen (FSCA); Dade Co., Key Largo (5-IV-1974, host unknown,R.F. Denno, D.R. Miller) 1 slide, 1 specimen (FSCA); Indian River Co., Fellsmere (8-III-1982, *Rhynchospora microcephala*, E.W. Campbell) 4 slides, 4 specimens (FSCA), Orange Co., Orlovista, (7-III-1980, *Buxus* sp., F.L. Ware, W.P. Henderson) 3 slides, 3 specimens (FSCA).
Georgia: Taylor Co., location unknown (11-IV-1980, cactus, R. Breshear) 1 slide, 1 specimen (UG).

HOSTS AND DISTRIBUTION: *Pseudococcus spanocera* has been collected most commonly in Florida with single records from Arkansas and Georgia. As with other species in the *P. sorghiellus* complex, *P. spanocera* has a broad host range.

DISCUSSION: *Pseudococcus spanocera* has been confused with *P. sorghiellus* because both species possess small legs, translucent pores on the hind trochanter and coxa, and a small circulus. However, *P. spanocera* can be separated by having: Antennae 7-segmented; apical segment of antenna/segment II 2.0(1.8-2.8); 17(13-21) setae on hind tibia; 4(0-13) oral rims on abdomen; 11 (13-16) pairs of cerarii; 5(4-8) trilocular pores in cerarius 12.

Pseudococcus sorghiellus has: Antennae usually 8-segmented; apical segment of antenna/segment II 1.6(1.4-2.0); 23(18-27) setae on hind tibia; 19(3-31) oral rims on abdomen; 17 pairs of cerarii, rarely 16; 15(9-21) trilocular pores in cerarius 12.

Pseudococcus viburni (Signoret) (Figure 33)

Dactylopius viburni Signoret 1875: 323. (recently rediscovered by Ben-Dov and Matile-Ferrero, 1995).
Dactylopius indicus Signoret 1875: 317 (synonymy by Ben-Dov and Matile-Ferrero, 1995).
Dactylopius affinis Maskell 1894: 90.
Pseudococcus affinis (Maskell): Fernald 1903: 97.
Pseudococcus viburni (Signoret): Fernald 1903: 111.
Pseudococcus obscurus Essig 1909: 43.
Pseudococcus capensis Brain 1912: 182.
Pseudococcus nicotianae Leonardi 1913: 76 (synonymy by Ben-Dov and Matile-Ferrero, 1995).
Pseudococcus longispinus var. *latipes* Green 1917: 264.
Pseudococcus malacearum Ferris 1950: 185.
Pseudococcus latipes Green: Williams 1962: 40.

SUGGESTED COMMON NAME: Obscure Mealybug.

DIAGNOSIS: Oral-rim tubular ducts usually absent in submedial row from segments III-VII; 13(10-18) oral rims on dorsum of segments I-VII; dorsal oral rim absent on submargin between cerarii 15 and 16; 2(1-3) discoidal pores near each eye; hind tibia with 95(38-162) translucent pores; hind femur with 65(15-150) translucent pores; 10(8-16) oral collars in cluster mesad of cerarius 12; 1(0-2) oral collars associated with cerarii 10 and 11.

SLIDE MOUNTED CHARACTERS: Mounted 2.5(1.8-3.5) mm long, 1.3(0.8-2.0) mm wide.

DORSUM: With 17(16-17) pairs of cerarii, cerarian formula as follows: 1-9 (2), 10 (0-2), 11 (2), 12 (3), 13-14 (2), 15 (3), 16 (3-4), 17 (3). Cerarius 12 with 3(2-4) auxiliary setae, 19(15-23) trilocular pores, 2(1-3) discoidal pores. Cerarius 1 with basal sclerotization, cerarii 1 and 2 with basal sclerotization in older adult females. Multilocular disc pores absent; trilocular pores scattered, becoming less numerous toward submargin; discoidal pores of 1 size, about equal to small size on venter, scattered sparsely over dorsum. Oral-rim tubular ducts usually with 1 discoidal pore and no setae associated with rim, present posterior of frontal cerarii, absent from submargin between cerarii 15 and 16, present on each thoracic segment, abdominal segments I-VII, usually absent submedially on segments III-VII, with 13(10-18) on abdomen. Oral-collar tubular ducts only on submargin between cerarii. Body setae of 2 sizes, longest seta on abdomen, excluding segment VIII, 15(10-20)μ long; 6(4-7) dorsomedial setae on segment VIII, longest 20 (17-24)μ long.

Anal-ring setae 153(134-171)μ long, 1.7(1.5-2.0) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores in posterior and anterior bands on segments V-VII, sometimes with posterior band on segment IV, scattered on segments VIII and IX, occasionally on III, 1(0-7) pores on thorax. Trilocular pores scattered over venter, 154(132-200) on segment VI. Discoidal pores of 2 sizes, large size about 4μ in diameter, 2(1-3) set in membranous rim around each eye, occasionally 1 or 2 on ventral submargin, 3(2-5) on anal-lobe sclerotization. Oral-rim tubular ducts with 1(0-2) small discoidal pores and 0(0-1) seta associated with rim, 3(1-5) from segment II to cerarius 13, without ducts near frontal cerarii; oral-collar tubular ducts associated with posterior band of multilocular disc pores on segments IV-VII, abundant on submargin anteriorly to segment III, becoming less numerous anteriorly to area laterad of cerarius 11, few on head and mesal portion of venter, with 10(8-16) in cluster mesad of cerarius 12, 1(0-2) associated with cerarii 10 and 11, 0(0-2) ducts posterior of eye, 2(0-6) ducts on each side of head. Setae as follows: 4 cisanal, longest 35(19-49)μ long; 4(3-5) cisvulvar on each side, 53(37-73)μ long; longest anal-lobe seta 125(109-136)μ long; longest body seta on abdomen 80(46-122)μ long; longest interantennal setae 102(73-134)μ long; longest seta on trochanter of hind leg 144(108-157)μ long.

Circulus 1.2 (1.0-1.7) times as wide as long, width 118(71-148)μ, divided by segmental fold between segments III and IV. Labium 175(146-207)μ long. Posterior spiracle greatest length 73(53-85)μ long. Antennae 8-segmented, 509(456-585)μ long, lengths of each segment as follows: I 70(60-90)μ, II 74(60-85)μ, III 79(60-93)μ, IV 40(34-49)μ, V 50(36-61)μ, VI 44(36-61)μ, VII 47(41-61)μ, VIII 105(97-110)μ long. Length of antennal segment VIII / segment II 1.4(1.3-1.7), antennal segment VIII / segment III 1.4(1.2-1.6).

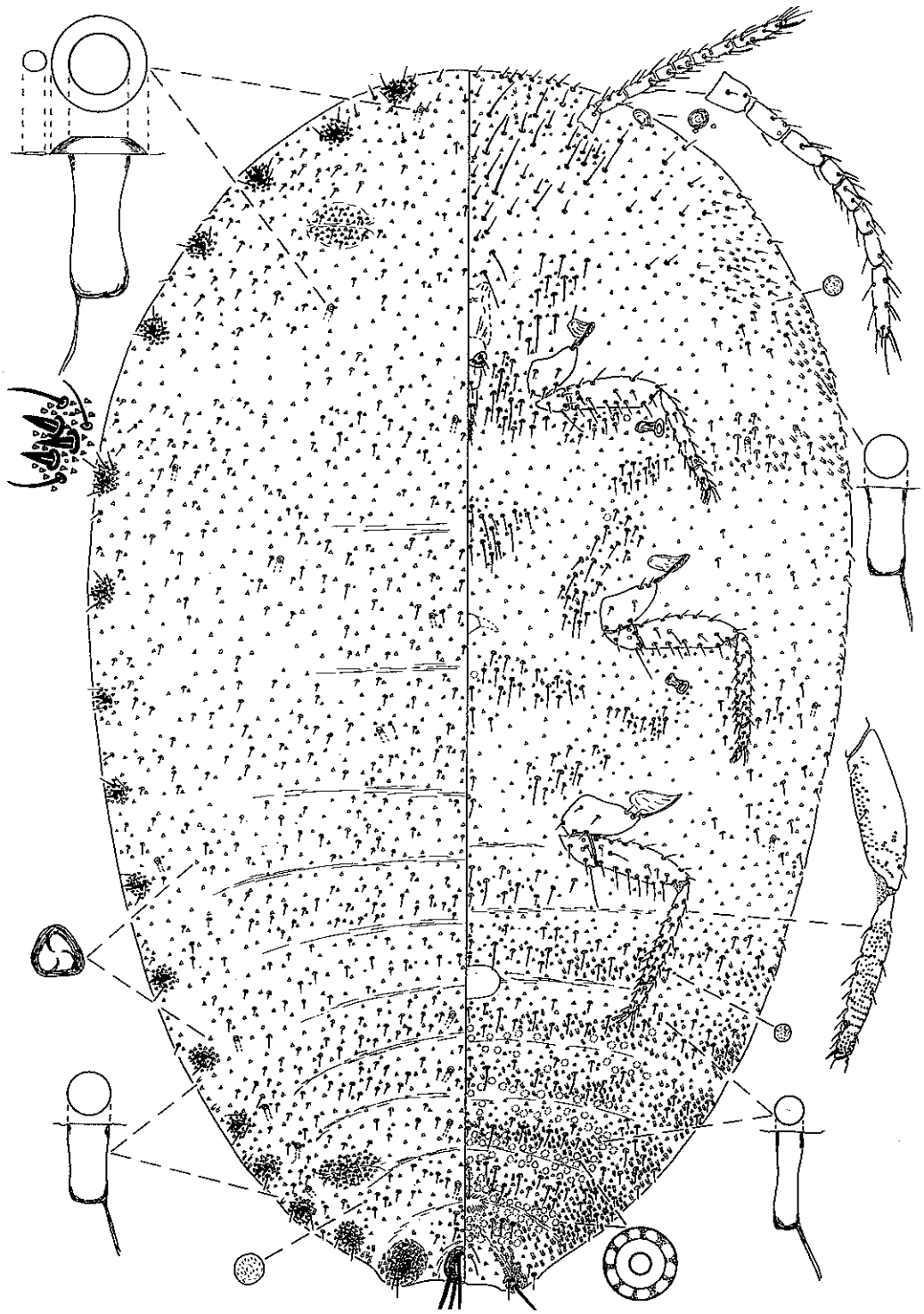

Figure 33. Adult female, *P. viburni*, on *Opuntia* sp.

Legs with 95(38-162) conspicuous translucent pores on dorsal surface of hind tibia, 65(15-150) translucent pores on dorsal surface of hind femur, absent from remaining segments. Femur 295(263-356)μ long, slightly shorter than tibia; tibia 329(268-381)μ long; tarsus 122(114-142)μ long. Tibia/tarsus 2.7(2.2-3.0). Hind tibia with 36(31-38) setae.

UNUSUAL VARIATION: This species is unusually variable in many characteristics and may include more than 1 species. For example, the range in number of translucent pores on the hind tibia is larger than is found in other species of this group. At present, we are unable to distinguish more than a single, highly variable entity.

SPECIMENS EXAMINED: 286 slides, 584 specimens:
Alabama: *Ilex vomitoria, Mimosa* sp.
California: *Acacia* sp., *Acorus* sp., *Anemone* sp., *Arenaria* sp., *Astrophytum* sp., *Baccharis pilularis, Bromelia* sp., *Buxus japonica, Cactaceae, Carica papaya, Citrus* sp., *Crassula* sp., *Cytisus* sp., *Epithelantha micromaris, Erica vagens, Eriogonum* sp., *Geranium* sp., *Malus* sp., *Phytolacca dioica, Pinus radiata, Pinus* sp., *Punica granatum, Pyrus communis, Rhododendron* sp., *Strelitzia regina, Tamarix gallica, Umbellularia californica, Taxus* sp.
Connecticut: *Polygonum orientalis.*
Delaware: *Rhododendron* sp.
District of Columbia: *Ageratum* sp., *Amaryllis* sp., *Annona* sp., Cactaceae, *Canna* sp., *Carica papaya, Catalpa* sp., *Cestrum nocturnum, Clematis paniculata, Cyperus* sp., *Dianthus* sp., *Echeveria* sp., *Euonymus radicans, Euphorbia* sp., fern, *Gaultheria shallon, Gladiolus* sp., Gramineae, *Lilium tenuifolium, Medicago sativa, Morus* sp., *Narcissus* sp., *Nerium oleander, Nicotiana* sp., Palmaceae, *Pereskia aculeata, Pereskiopsis* sp., *Persea* sp., *Phoenix* sp., *Phytolacca dioica, Prunus* sp., *Rhododendron* sp., *Salix* sp., *Sarracenia* sp., *Sedum* sp., *Tamarix* sp., *Theobroma cacao, Vaccinium* sp., *Vitis* sp.
Georgia: Cactaceae, Flowers.
Hawaii: *Acalypha* sp., *Canna* sp., *Carica papaya, Euphorbia pulcherrima, Gardenia jasminoides, Gardenia* sp., *Helianthus* sp., *Helichrysum* sp., *Holmskioldia sanguinea, Litchi chinensis, Passiflora edule, Pittosporum undulatum, Zingiber officinale.*
Illinois: Fern, Filicinae, *Taxus cuspidata, Taxus* sp., *Umbellularia californica.*
Indiana: *Euphorbia* sp.
Iowa: Bulbs.
Maryland: *Aglaonema* sp., *Albizzia* sp., *Amaryllis* sp., Cactaceae, *Dianthus* sp., *Euonymus alatus, E. radicans, Euphorbia* sp., fern, *Forsythia* sp., *Gladiolus* sp., *Ilex* sp., *Rhododendron* sp., *Ruscus aculeatus, Solanum* sp., *Tulipa* sp., *Vitis* sp..
Massachusetts: *Cyclamen* sp., *Thuja* sp.
Michigan: *Euphorbia* sp.
Missouri: *Nepenthes hainanensis.*
New Jersey: Cactaceae, fern, *Gladiolus* sp.
New York: *Asparagus sprengeri, Aster* sp., Cactaceae, *Calla* sp., *Camellia* sp., *Eleagnus pungens variegata, Euonymus* sp., *Euphorbia pulcherrima, Gerbera* sp.,

Gladiolus sp., *Hedera* sp., *Lilium giganteum, Lonicera tatarica, Pailsia africana, Pittosporum* sp., *Rhipsalis leucorhaphis, Rhododendron* sp., *Solanum* sp., *Zygocactus truncatus.*
North Carolina: *Cereus* sp., *Clematis* sp., Fern, *Heuchera sanguinea, Solanum tuberosum.*
Ohio: *Acalypha* sp., bamboo, *Caesalpinia* sp., *Cereus candicans, Euphorbia* sp., *Gladiolus* sp.
Oregon: *Gladiolus* sp., *Tulipa* sp.
Pennsylvania: *Abutilon* sp., *Acer* sp., *Begonia* sp., Cactaceae, *Crassula rubicunda, Euphorbia pulcherrima, Nephrolepis bostoniensis, Opuntia* sp., *Rhododendron* sp.
South Carolina: *Ilex crenata* 'Rotundifolia', *Nephrolepis bostoniensis.*
Utah: *Begonia* sp., *Croton* sp.
Virginia: *Catalpa* sp., *Gladiolus* sp., *Hedera* sp., *Ilex* sp., Orchidaceae, *Rhipsalis* sp., *Rhododendron* sp., *Tulipa* sp., *Zizania* sp.
Washington: *Calla* sp., *Poinsettia* sp.
West Virginia: Fern.
Wisconsin: *Euonymus fortunei, Hedera helix.*

OTHER SPECIMENS EXAMINED: 268 slides, 560 specimens:
Argentina: Cactaceae, *Ceiba* sp., *Daubentonia tripetti, Echinopsis* sp., *Pyrus* sp., *Rhipsalis* sp., *Solanum tuberosum, Vitis* sp.
Australia: *Camellia* sp., *Dahlia* sp., *Pyrus communis, Watsonia* sp.
Azores: Cactaceae, *Citrus* sp., *Dianthus* sp., *Ficus* sp., *Fragaria* sp., *Laurus* sp., *Malus* sp., *Passiflora* sp., pumpkin, *Pyrus communis, Ruscus* sp., *Sechium edule, Solanum tuberosum*, squash, *Vitis* sp., *Zantedeschia* sp.
Belgium: *Camellia* sp., *Echinocereus pectinatus, Epiphyllum* sp., *Euonymus* sp., *Ficus decora, Laurus nobilis, Rhipsalis* sp.
Brazil: *Medicago sativa.*
Canada: *Begonia* sp., *Echinocatus* sp., *Cereus quadricostatus, Euphorbia pulcherrima, Mammillaria pectinata, Passiflora* sp.
Canary Islands: *Euphorbia* sp., *Solanum muricatum.*
Chile: *Cereus spiniflora, Lapagaria rosae, Malus* sp., melon, *Prunus* sp., *Pyrus* sp., *Vitis* sp.
Costa Rica: *Passiflora quadrangularis, Sechium edule.*
Cuba *Phyllocactus* sp..
Denmark: *Malus sylvestris.*
Easter Island: *Ananas comosus, Citrus* sp., *Dolichos* sp., *Sophora* sp.
Ecuador: Fern, *Pelargonium* sp.
England: *Camellia* sp., *Cereus* sp., *Cypripedium* sp., *Echeveria* sp., *Hibbertia perfolia, Laurus* sp., *Pyrus* sp., *Ricinus* sp.
France: *Dahlia* sp., *Diospyros kaki, Hoya* sp., *Kalanchoe globuliferae, Mimosa* sp., Orchidaceae, *Solanum* sp., *Tamarix* sp.
Germany: *Aglaonema* sp., *Begonia* sp., *Bouvardia* sp., Cactaceae, *Camellia* sp., *Cereus boumannii, Cereus serpens, Cereus* sp., *Dieffenbachia picta, Echinocereus eruwbergi, Epiphyllum* sp., *Hylocereus* sp., *Mammillaria* sp., *Opuntia floccosa*, Palmaceae, *Pereskia* sp., *Phyllocactus* sp., *Phyttocierous cimralarinus, Selen-*

icereus grandiflorus, *Solanum* sp., *Sparmannia africana*, *Typhonodorum* sp., *Zygocactus* sp.
Guatemala: *Citrus* sp., *Odontoglossum grande*, Orchidaceae.
Holland: *Begonia* sp.
Italy: *Citrus* sp., *Crataegus* sp., *Cyclamen* sp., *Cytisus scoparius*, *Diospyros* sp., *Laurus* sp., *Malus* sp., *Punica* sp., *Sechium edule*, *Vitis* sp., *Zantedeschia* sp.
Jamaica: *Brassica maculata*
Korea: *Diospyros kaki*
Madeira Island: *Malus sylvestris*, *Passiflora edulis*, *Sechium edule*, *Solanum tuberosum*.
Mexico: *Acanthocereus* sp., Cactaceae, *Carica papaya*, *Citrus* sp., *Dianthus* sp., *Echinocactus* sp., *Echeveria* sp., *Epiphyllum anguliger*, *Ficus carica*, *Gladiolus* sp., *Lilium* sp., *Passiflora* sp., Orchidaceae, *Punica granatum*, *Rhipsalis* sp.
Morocco: Bulb.
Netherlands: Cactaceae.
New Zealand: Cactaceae, *Malus sylvestris*, *Passiflora* sp., *Prunus domestica*, *Prunus* sp., *Pyrus* sp.
Panama: *Cattleya* sp., *Epidendrum* sp.
People's Republic of China: *Punica* sp.
Portugal: *Allium sativum*, *Annona reticulata*, *Brassica* sp., *Citrus* sp., *Crocus* sp., Cycadaceae, *Cydonia* sp., *Dahlia* sp., *Geranium* sp., *Gladiolus* sp., Iridaceae, *Malus* sp., *Prunus* sp., *Punica granatum*, *Pyrus* sp., *Vascum* sp., *Viburnum odoratissimum*, *Vitis* sp.
Scotland: Host unknown.
Sri Lanka: *Cineraria* sp., *Thunbergia natalensis*.
Spain: Cactaceae, *Malus sylvestris*, *Beta vulgaris*.
Sweden: *Hedera helix*, *Hedera* sp.
Union of South Africa: *Malus sylvestris*, *Prunus* sp., *Pyrus communis*, *Vitis* sp.
Uruguay: *Echinocactus* sp.
Venezuela: *Zea mays*.

HOSTS AND DISTRIBUTION: From the material examined, the earliest U. S. collection record is 1898 from California. The species is widespread throughout the United States. *Pseudococcus viburni* is a cosmopolitan species that we have recorded from 141 plant genera. Common hosts include cactus, fruit trees such as citrus, plums, pomegranates, pears, apples, and bulbs, tubers, and corms such as narcissus, potatoes, and gladiolus; it undoubtedly has been transported from continent to continent in commerce. This species also has been recorded from Louisiana (McKenzie 1967).

DISCUSSION: Unfortunately, no single character can be used consistently to separate *P. viburni* from all other species of *Pseudococcus*. As has been pointed out on several other occasions, *P. viburni* often is confused with *P. maritimus* and only recently have definitive characters been discovered that will distinguish between them (Wilkey and McKenzie 1962, Miller et al. 1984). Based on this analysis, the following combination of characters can be used: *P. viburni* has few, if any, dorsal submedial oral-rim tubular ducts on segments III-VII; has 13

(10-18) oral-rims on dorsum of abdomen; lacks an oral rim on dorsal submargin between cerarii 15 and 16; 95(38-162) translucent pores on the hind tibia, 65(15-150) translucent pores on the hind femur; 2(1-3) discoidal pores associated with each eye, and short setae (e.g. longest dorsal body setae on segment VIII 20(17-24)μ long, longest interantennal seta 102(73-134)μ long); 154(132-200) trilocular pores on venter of segment VI; 1(0-2) oral-collar tubular ducts associated with cerarii 10 and 11. *Pseudococcus maritimus* has 1, often more, dorsal submedial oral-rim tubular ducts on segments III-VII; has 27(19-35) oral-rims on dorsum of abdomen; has an oral rim on dorsal submargin between cerarii 15 and 16; 26(15-64) translucent pores on the hind tibia, 18(8-51) such pores on the hind femur; 0(0-3) discoidal pores associated with each eye, and long setae (e.g. longest dorsal setae on segment VIII 32(22-42)μ long, longest interantennal seta 124(105-149)μ long); 92(40-133) trilocular pores on segment VI; 14(6-20) oral-collar tubular ducts associated with cerarii 10 and 11.

For a comparison of *P. viburni* with *P. eriocerei*, *P. insularis*, *P. mandio* and *P. nakaharai* see the discussion sections of the latter 4 species.

General Description of Third Instar Female

The following characters were found in all third instar females and therefore are given in this section rather than in individual species descriptions.

Cerarius 1 with basal sclerotization. Dorsal oral-collar tubular ducts and multilocular disc pores absent. Trilocular pores evenly distributed on both surfaces. Dorsal discoidal pores of 1 size, scattered. Ostioles with setae and trilocular pores on each lip.

Diagnosis: Third instar females can be separated from all other instars by having: 7-segmented antennae (rarely 6); no dorsal submedial oral-rim tubular ducts; no vulva; tibia/tarsus 1.2-1.8; 17-80 trilocular pores on venter of segment VI; 9-17 setae on hind tibia; oral-rim tubular ducts usually present.

KEY TO THE THIRD INSTAR FEMALES OF THE PSEUDOCOCCUS MARITIMUS GROUP

1. Antennae greater than 285μ long; hind femora greater than 150μ long 3
-- Antennae less than 280μ long; hind femora less than 150μ long 2
2 (1). Oral-rim tubular ducts usually present on thorax, with 2(0-4); circulus situated between segments III and IV; 1(0-1) small discoidal pore associated with each eye; 2(0-3) ventral oral rims on submargin between segment II and cerarius 13 ..... *sorghiellus* (Forbes)
-- Oral-rim tubular ducts usually absent from thorax; circulus situated on segment III; 2(0-3) large discoidal pores associated with each eye; 0(0-1) ventral oral rims on submargin between segment II and cerarius 13 ..... *microcirculus* McKenzie

3 (1). Labium less than 150μ long; anal-lobe seta usually less than 125μ long 4
-- Labium greater than 150μ long; anal-lobe seta usually greater than 125μ long ..... *nakaharai* n.sp.
4 (3). With more than 4 ventral oral-collar tubular ducts on submargin of abdomen, thorax and head 5
-- Without ventral oral-collar tubular ducts on submargin of abdomen, thorax and head or rarely with 1 or 2 ..... *viburni* (Signoret)
5 (4). Oral-rim tubular ducts absent from dorsal submargin between cerarii 15 and 16 6
-- Oral-rim tubular ducts present on at least 1 side of body on dorsal submargin between cerarii 15 and 16 ..... *maritimus* (Ehrhorn)
6 (5). Eye with sclerotized rim, usually with more than 2 discoidals on rim 7
-- Eye with membranous rim, usually with 1 discoidal on rim ..... *importatus* McKenzie
7 (6). With 3 or fewer oral-rim tubular ducts on dorsum of abdomen; without mediolateral oral-rim tubular ducts on dorsum of abdomen 8
-- With 4 or more oral-rim tubular ducts on dorsum of abdomen; with mediolateral oral-rim tubular ducts on dorsum of abdominal segment II ..... *jackbeardsleyi* n. sp.
8(7) Anal-lobe setae 79(74-85)μ long; hind tibia 171(151-188)μ long; tibia/tarsus 1.6(1.5-1.7); oral collars without rim ..... *landoi* (Balachowsky)
-- Anal-lobe setae 114(106-121)μ long; hind tibia 147(123-158)μ long; tibia/tarsus 1.4(1.1-1.5); some oral collars with faint rim ..... *elisae* Borchsenius

Pseudococcus elisae Borchsenius

THIRD INSTAR FEMALE (Figure 34)

DIAGNOSIS: 2(0-4) dorsal oral-rim tubular ducts on thorax, 2(0-3) on abdomen; without mediolateral oral rims on abdomen; 4(2-6) discoidal pores near each eye; lightly sclerotized rim around eye; 2(2-3) ventral oral-collar tubular ducts on each side of head, 3(2-4) between cerarius 10 and 11; submarginal row of oral collars on abdomen; some marginal oral collars with faint rim; without oral rims on submargin from segment II to cerarius 13.

SLIDE MOUNTED CHARACTERS: Mounted 1.5(1.3-1.7) mm long, 0.9(0.7-1.0) mm wide.

DORSUM: With 17 pairs of cerarii, cerarian formula as follows: 1-11 (2), 12 (3), 13-14 (2), 15 (2-3), 16 (2-4), 17 (3). Cerarius 12 with 1(0-3) auxiliary setae, 11(7-13) trilocular pores, 1(0-2) discoidal pores. Discoidal pores usually located medially and mediolaterally, associated with oral-rim tubular ducts, with 2(2-4) in cluster associated with medial setae on segment VIII about size of trilocular

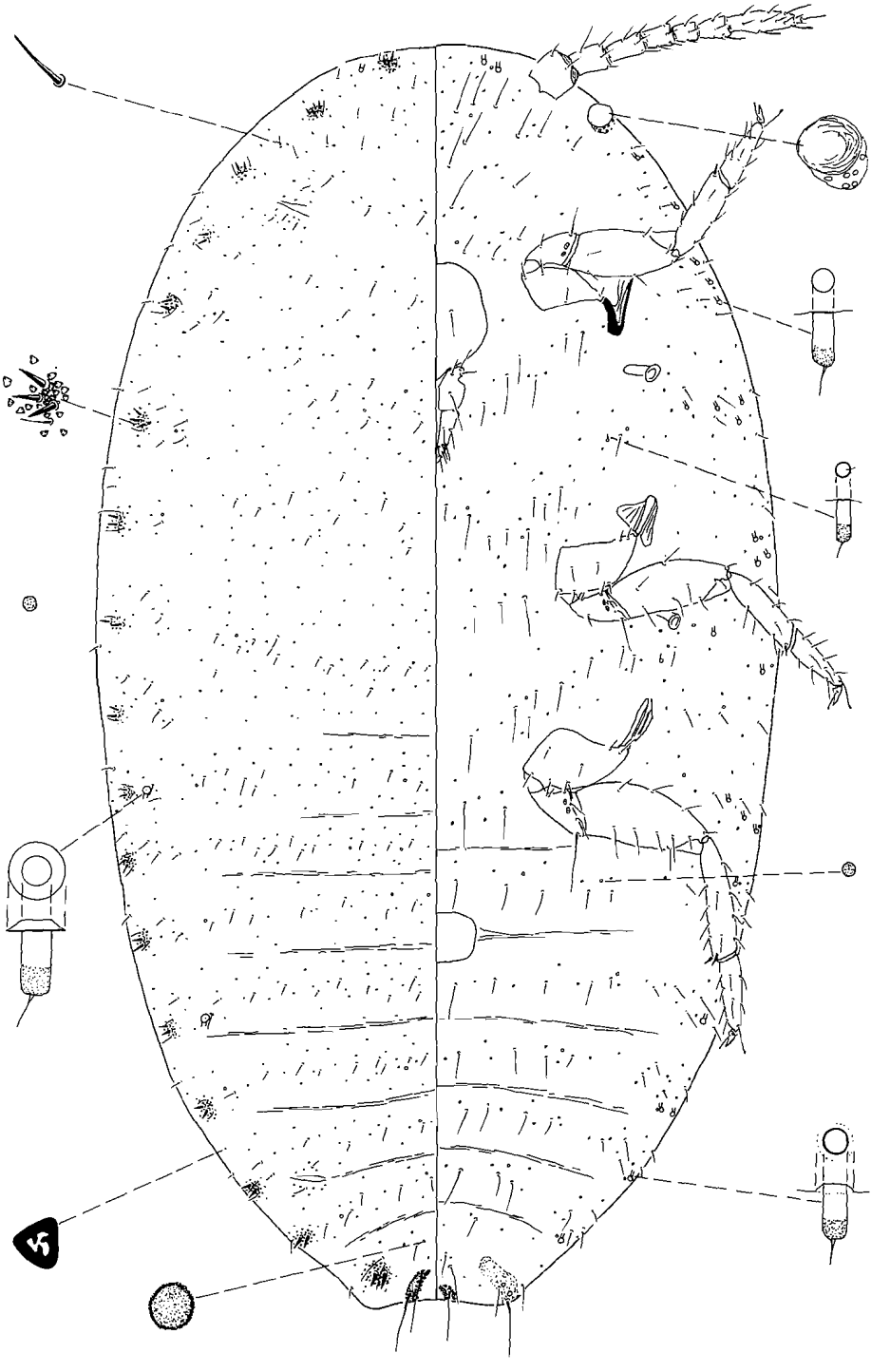

Figure 34. Third instar female, *P. elisae*, Armuelles, Panama, XII-1-1993, on *Musa* sp.

pore. Oral-rim tubular ducts with 1(0-2) discoidal pores and 1(0-3) seta associated with rim, 0(0-2) oral rims present posterior of frontal cerarii, absent on submargin between cerarii 15 and 16 and near cerarius 2, when present on thorax located laterally on mesothorax and mediolaterally on metathorax, with 2(0-4) on thorax, when present on abdomen located laterally on 1 or more of segments I, III, IV, V, or VI, with 2(0-3) on abdomen. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 24(20-32)μ long; 2(2-3) dorsomedial setae on segment VIII, 22(18-30)μ long.

Anal-ring setae 101(83-116)μ long, 1.6(1.1-1.9) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores usually absent; 30(22-38) trilocular pores on segment VI. Discoidal pores of 2 sizes, large size about 4μ in diameter, 2(2-4) on basal sclerotization of anal lobe, 4(2-6) in lightly sclerotized rim around each eye, scattered on abdomen and thorax, associated with rim of some oral-collar tubular ducts. Oral-rim tubular ducts absent; oral-collar tubular ducts on submargin of thorax and abdomen, with 1(0-1) in cluster of setae posterior of each spiracle, 2(2-3) on each side of head, 1(1-3) mesad of cerarius 15, 2(1-4) mesad of cerarius 13, 2(1-4) mesad of cerarius 12, 3(2-4) between cerarii 11 and 10, some marginal oral collars with faint rim. Setae as follows: 4 cisanal, 46(37-54)μ long; 1(1-2) cisvulvar on each side, 29(20-35)μ long; longest anal-lobe seta 114(106-121) μ long; body setae of 3 lengths, longest on abdomen 48(42-56)μ long; longest interantennal seta 94(79-106)μ long; longest trochanter seta 89(79-99)μ long.

Circulus 1.0(0.9-1.5) times as wide as long, width 85(72-101)μ, divided by segmental fold of segments III and IV. Labium 138(133-146)μ long. Posterior spiracle greatest length 53(49-57)μ long. Antennae 7-segmented, 328(304-353)μ long, length of each segment as follows: I 51(43-57)μ, II 46(44-49)μ, III 42(37-52)μ, IV 32(25-38)μ, V 31(30-35)μ, VI 37(32-40)μ, VII 86(79-93)μ long. Length of antennal segment VII / segment II 1.9(1.7-2.0), antennal segment VII / segment III 2.1(1.7-2.3).

Femur 178(170-187)μ long; tibia 147(123-158)μ long; tarsus 108(103-111)μ long. Tibia / femur 0.8(0.7-0.9); tibia / tarsus 1.4(1.1-1.5). Tibia with 16 (13-17) setae.

SPECIMENS EXAMINED: The description is based on 13 specimens on 7 slides from: Colombia, Ecuador, Panama.

DISCUSSION: *Pseudococcus elisae* is very similar to *P. landoi* but differs by having: Longest anal-lobe seta 114(106-121)μ long; hind tibia 147(123-158)μ long; tibia/femur 0.8(0.7-0.9); tibia/tarsus 1.4(1.1-1.5). *Pseudococcus landoi has* longest anal-lobe seta 79(74-85)μ long; hind tibia 171(151-188)μ long; tibia/femur 0.9(0.9-1.0); tibia/tarsus 1.6(1.5-1.7).

Material from Guatemala on banana has more oral-collar tubular ducts on the abdomen, thorax, and head.

Pseudococcus importatus McKenzie

THIRD INSTAR FEMALE (Figure 35)

DIAGNOSIS: 1(0-3) dorsal oral-rim tubular ducts on thorax, 1(0-2) near frontal cerarii; 1(0-2) discoidal pores near each eye; 1(0-4) oral-collar tubular ducts on each side of head, 2(0-4) mesad of cerarius 13, 3(1-4) between cerarii 10 and 11; oral collars absent mesad of cerarius 15; oral collars present on submarginal area of abdomen.

SLIDE MOUNTED CHARACTERS: Mounted 1.2(1.0-1.7)mm long, 0.8(0.5-1.0) mm wide.

DORSUM: With 17(16-17) pairs of cerarii, cerarian formula as follows: 1-9 (2), 10 (1-2), 11 (2), 12 (3), 13 (2), 14 (2-3), 15 (3), 16 (3-4), 17 (3). Cerarius 12 with 2(1-2) auxiliary setae, 12(9-13) trilocular pores, 1(0-1) discoidal pore. Discoidal pores associated with oral-rim tubular ducts. Oral-rim tubular ducts scarce, with 1(0-2) discoidal pores and 0(0-1) seta associated with rim, 1(0-2) oral rims present posterior of frontal cerarii, usually absent on submargin between cerarii 15 and 16, present about 50% of time near cerarius 2, 1(0-3) on thorax, 3(0-6) on abdomen. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 12(10-12)μ long; 3(2-4) dorsomedial setae on segment VIII, 12(10-12)μ long.

Anal-ring setae 88(73-98)μ long, 1.6(1.3-1.9) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores absent; 28(22-38) trilocular pores on segment VI. Discoidal pores of 2 sizes, large size about 4μ in diameter, 2(1-3) on basal sclerotization of anal lobe, on thorax posterior of spiracles, 1(0-2) in membranous rim around each eye, few on submargin of abdomen and thorax, associated with rim of some oral-collar tubular ducts. Oral-rim tubular ducts absent; oral-collar tubular ducts on submargin of thorax and abdomen, with 0(0-1) in cluster of setae posterior of each spiracle, 1(0-4) on each side of head, absent mesad of cerarius 15, 2(0-4) mesad of cerarius 13, 1(0-3) mesad of cerarius 12, 3(1-4) between cerarii 11 and 10. Setae as follows: 4 cisanal, 24(20-27)μ long; 1(0-1) cisvulvar on each side, 20(20-24)μ long; longest anal-lobe seta 78(68-85)μ long; body setae of 3 lengths, longest on abdomen 48(29-61)μ long; longest interantennal seta 62(51-73)μ long; longest trochanter seta 86(80-95)μ long.

Circulus 1.8(1.4-2.5) times as wide as long, width 68(52-96)μ, divided by segmental fold of segments III and IV. Labium 127(112-149)μ long. Posterior spiracle greatest length 54(46-61)μ long. Antennae 7-segmented, 338(289-370)μ long, length of each segment as follows: I 46(41-49)μ, II 46(41-52)μ, III 46(39-59)μ, IV 35(29-41)μ, V 32(24-39)μ, VI 38(34-44)μ, VII 90(83-98)μ long. Length of antennal segment VII / segment II 1.8(1.8-2.1), antennal segment VII / segment III 1.8(1.7-2.1).

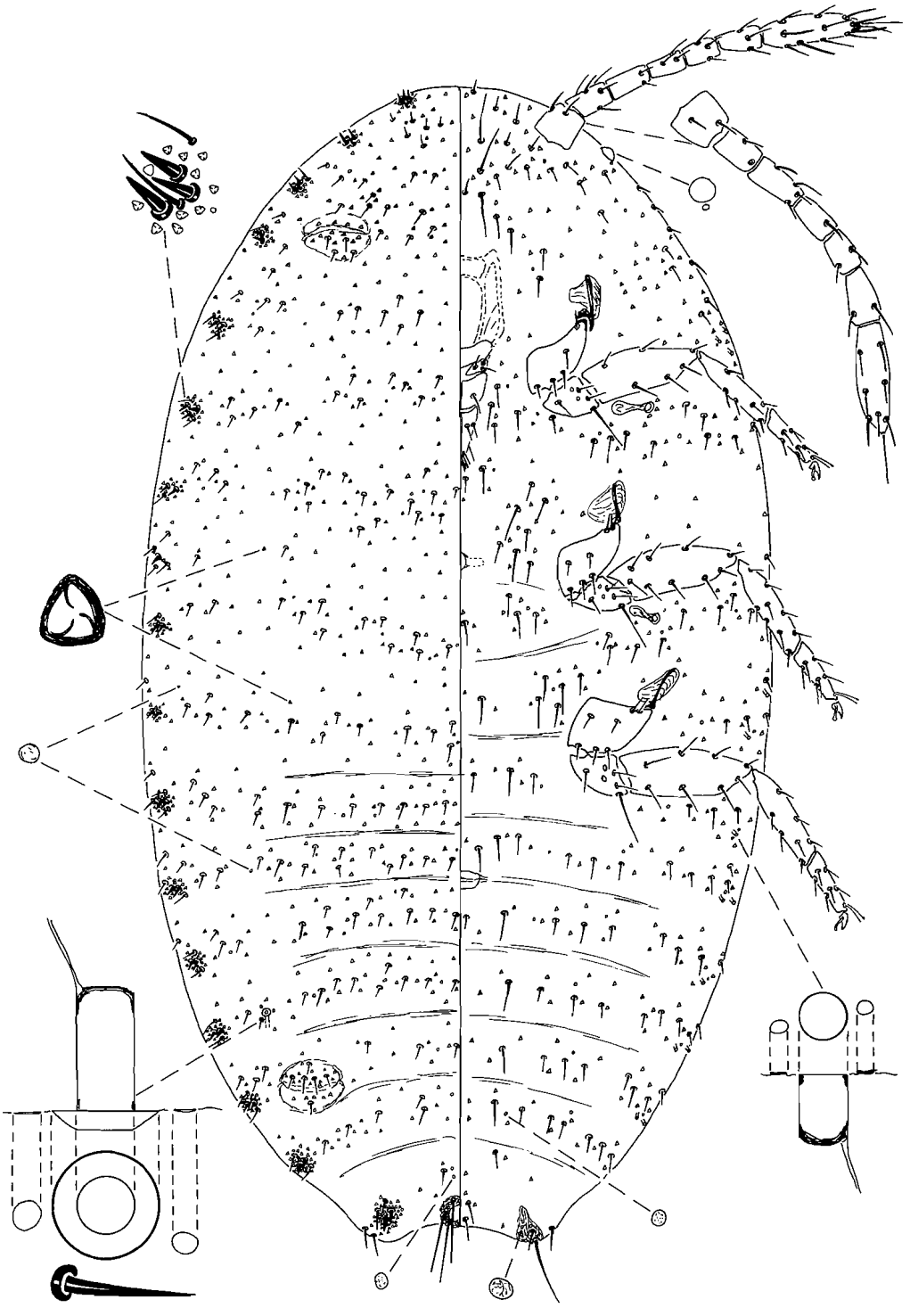

Figure 35. Third instar female, *P. importatus,* Brazil, X-6-1975, on orchid leaf.

Femur 169 (154-183)μ long; tibia 151(134-171)μ long; tarsus 96(90-114)μ long. Tibia / femur 0.9(0.9-1.0); tibia / tarsus 1.6(1.3-1.7). Tibia with 14(13-15) setae.

SPECIMENS EXAMINED: The description is based on 85 specimens on 46 slides from: Australia, Belgium, Brazil, Costa Rica, England, Guatemala, Jamaica, Mexico, New Jersey.

DISCUSSION: *Pseudococcus importatus* is similar to *P. microcirculus* but differs by having: 12(9-13) trilocular pores in cerarius 12; 1(0-2) discoidal pores associated with each eye; 1(0-3) oral-collar tubular ducts associated with cerarius 12, 2(0-4) with cerarius 13, 3(1-4) between cerarii 10 and 11; labium 127(112-149)μ long; posterior spiracle 54(46-61)μ long; antennae 338(289-370)μ long; hind femur 169(154-183)μ long; longest trochanter seta 86(80-95)μ long. *Pseudococcus microcirculus*: has 6(5-8) trilocular pores in cerarius 12; 2(0-3) discoidal pores associated with each eye; no oral-collar tubular ducts associated with cerarius 12, 13, or 10 and 11; labium 86(80-96)μ long; posterior spiracle 40(37-47)μ long; antennae 258(243-278)μ long; hind femur 124(117-132)μ long; longest trochanter seta 60(54-69)μ long.

Pseudococcus jackbeardsleyi Gimpel and Miller, new species

THIRD INSTAR FEMALE (Figure 36)

DIAGNOSIS: 5(4-6) dorsal oral-rim tubular ducts on thorax, 7(5-10) on abdomen; mediolateral oral rims on segment II; 3(1-5) discoidal pores near each eye; lightly sclerotized rim around eye; 1(1-3) ventral oral-collar tubular ducts on each side of head, 1(1-3) between cerarius 10 and 11; submarginal row of oral collars on abdomen.

SLIDE MOUNTED CHARACTERS: Mounted 1.5(1.1-1.9) mm long, 0.9(0.7-1.1) mm wide.

DORSUM: With 16(16-17) pairs of cerarii, cerarian formula as follows: 1-7 (2), 8 (1-2), 9 (2), 10 (0-2), 11 (2), 12 (2-3), 13-14 (2), 15 (3), 16 (2-4), 17 (3). Cerarius 12 with 1(0-3) auxiliary setae, 10(5-14) trilocular pores, 1(0-2) discoidal pores. Discoidal pores usually located medially and mediolaterally, associated with oral-rim tubular ducts, with 1(0-2) in cluster associated with medial setae on segment VIII usually about half size of trilocular pore. Oral-rim tubular ducts with 1(0-2) discoidal pores and 1(0-3) seta associated with rim, 2(1-2) oral rims present posterior of frontal cerarii, absent on submargin between cerarii 15 and 16, often present near cerarius 2, on thorax located in any or all of the following positions, laterally on mesothorax, mediolaterally on prothorax and metathorax, and medially on prothorax and mesothorax, with 5(4-6) on thorax, on abdomen located in any or all of the following positions, laterally on segments I, III, IV, V, or VII, mediolaterally on segment II, with 7(5-10) on abdomen. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 19(15-27)μ long; 3(2-3) dorsomedial setae on segment VIII, 16(12-22)μ long.

Anal-ring setae 102(89-122)μ long, 1.6(1.4-1.8) times as long as greatest diameter of ring.

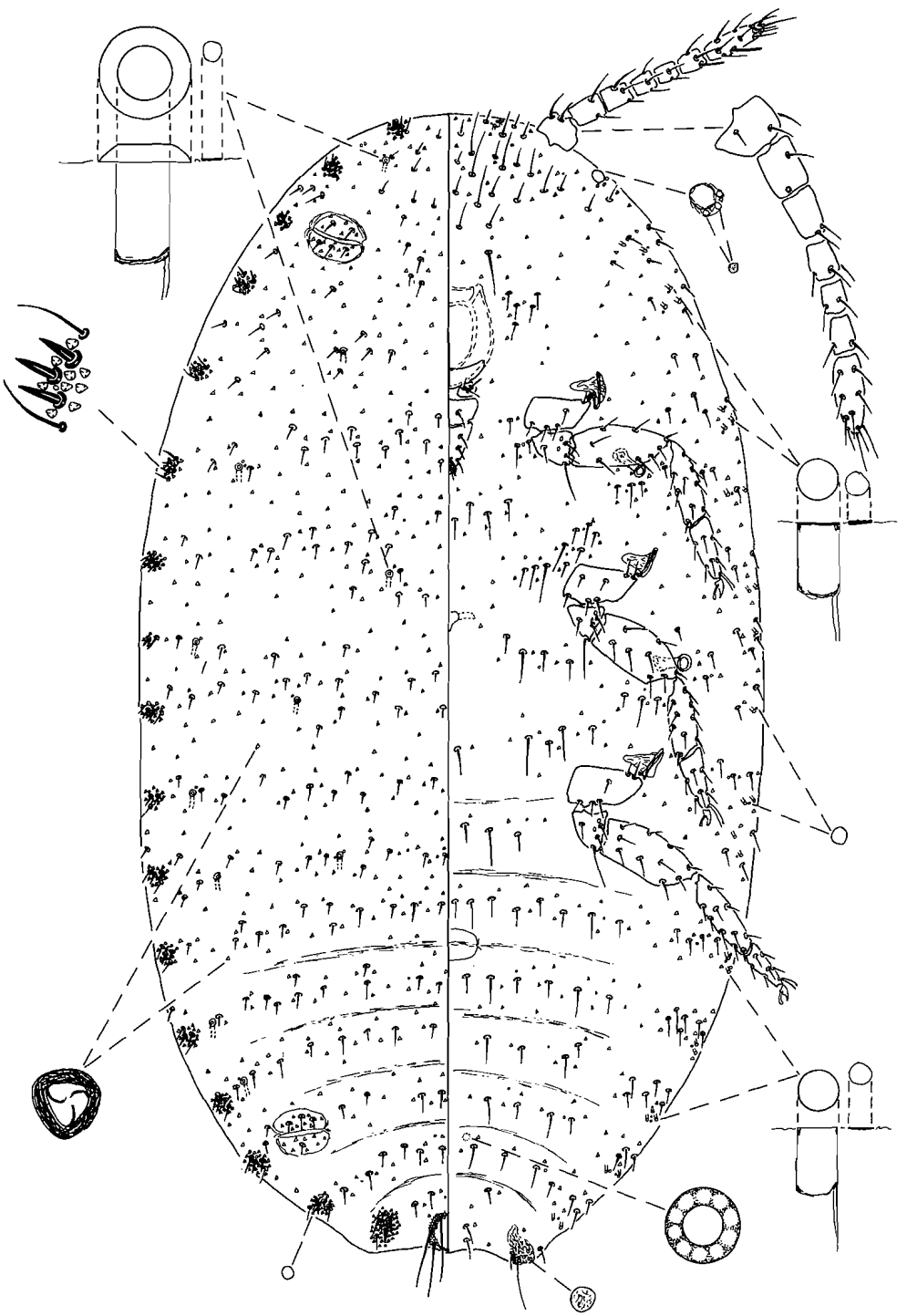

Figure 36. Third instar female, *P. jackbeardsleyi,* Guatemala, IV-19-1948, on *Musa* sp.

VENTER: Multilocular disc pores usually absent, 0(0-1), when present located on segment VII; 32(22-48) trilocular pores on segment VI. Discoidal pores of 2 sizes, large size about 4μ in diameter, 2(0-3) on basal sclerotization of anal lobe, 3(1-5) in lightly sclerotized rim around each eye, scattered on abdomen and thorax, associated with rim of some oral-collar tubular ducts. Oral-rim tubular ducts few, with 1(0-2) discoidal pore and 0(0-1) seta associated with rim, 2(1-4) on submargin from segment II to cerarius 13; oral-collar tubular ducts on submargin of thorax and abdomen, with 1(0-1) in cluster of setae posterior of each spiracle, 2(1-3) on each side of head, 1(0-4) mesad of cerarius 15, 2(1-5) mesad of cerarius 13, 1(1-3) mesad of cerarius 12, 1(1-3) between cerarii 11 and 10. Setae as follows: 4 cisanal, 30(17-41)μ long; 1(0-2) cisvulvar on each side, 25(17-37)μ long; longest anal-lobe seta 86(59-93)μ long; body setae of 3 lengths, longest on abdomen 55(37-74)μ long; longest interantennal seta 79(61-90)μ long; longest trochanter seta 86(71-100)μ long.

Circulus 1.1(0.8-1.6) times as wide as long, width 74(59-86)μ, divided by segmental fold of segments III and IV. Labium 124(102-136)μ long. Posterior spiracle greatest length 56(44-68)μ long. Antennae 7-segmented, 322(295-366)μ long, length of each segment as follows: I 43(37-49)μ, II 42(37-49)μ, III 44(37-51)μ, IV 34(29-44)μ, V 31(27-37)μ, VI 38(34-42)μ, VII 85(80-93)μ long. Length of antennal segment VII / segment II 2.1(1.8-2.3), antennal segment VII / segment III 2.0(1.8-2.2).

Femur 175(163-183)μ long; tibia 156(141-170)μ long; tarsus 107(102-115)μ long. Tibia / femur 0.9; tibia / tarsus 1.4(1.3-1.5). Tibia with 15 (14-17) setae.

SPECIMENS EXAMINED: The description is based on 35 specimens on 28 slides from: Bahamas, Colombia, Cuba, Dominican Republic, Guatemala, Honduras, Puerto Rico, Virgin Islands.

DISCUSSION: *Pseudococcus jackbeardsleyi* is similar to *P. elisae* but differs by having: 2(0-2) oral-rim tubular ducts near frontal cerarii; 5(4-6) dorsal oral-rim tubular ducts on thorax, 7(5-10) on abdomen; at least 1 mediolateral oral rim on dorsum of segment II; cerarius 10 usually absent or represented by 1 or 2 conical setae and 5 or less trilocular pores; 1(0-2) discoidal pores on dorsomedial area of segment VIII; 2(1-4) oral rims on submargin of venter from segment II to cerarius 13; cisanal setae 30(17-41)μ long; anal-lobe setae 86(59-93)μ long. *Pseudococcus jackbeardsleyi* has 0(0-2) oral-rim tubular ducts near frontal cerarii; 2(0-4) dorsal oral-rim tubular ducts on thorax, 2(0-3) on abdomen; without mediolateral oral rims on abdomen; cerarius 10 well developed; 2(2-4) discoidal pores on dorsomedial area of segment VIII; without oral rims on submargin of venter from segment II to cerarius 13; cisanal setae 46(37-54)μ long; anal-lobe setae 114(106-121)μ long.

For a comparison of *P. jackbeardsleyi* and *P. viburni* see the discussion section of the latter.

Material from Guatemala on banana has more oral-collar tubular ducts on the abdomen, thorax, and head.

Pseudococcus landoi (Balachowsky)

THIRD INSTAR FEMALE (Figure 37)

DIAGNOSIS: Oral-rim tubular ducts absent near frontal cerarii; 0(0-1) dorsal oral rim on thorax, absent from abdomen; with slightly sclerotized rim around eye; 1(1-3) oral-collar tubular ducts near cerarius 12, 2(1-4) near cerarius 13, 2(1-4) on each side of head, 2(1-4) between cerarii 10 and 11; 1(1-2) mesad of cerarius 15; cisanal setae 50(37-61)μ long; longest interantennal seta 83(71-90)μ long.

SLIDE MOUNTED CHARACTERS: Mounted 1.7(1.5-2.0)mm long, 1.0(0.9-1.2) mm wide.

DORSUM: With 17(16-17) pairs of cerarii, cerarian formula as follows: 1-7 (2), 8 (1-2), 9 (2), 10 (0-2), 11 (2), 12 (3), 13-14 (2), 15 (2-3), 16 (3-4), 17 (3). Cerarius 12 with 2 (1-3) auxiliary setae, 13(9-15) trilocular pores, 1(0-1) discoidal pore. Discoidal pores associated with oral rims when present. Oral-rim tubular ducts usually absent, with 2 discoidal pores and no setae associated with rim, 0(0-1) on thorax, absent elsewhere. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 16(10-24)μ long; 2 dorsomedial setae on segment VIII, 18(12-27)μ long.

Anal-ring setae 100(90-112)μ long, 1.7(1.5-1.9) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores absent; 31(27-34) trilocular pores on segment VI. Discoidal pores of 2 sizes, large size about 6μ in diameter, 0(0-1) on basal sclerotization of anal lobe, 2(0-4) in lightly sclerotized rim around each eye, 1 associated with rim of oral-rim tubular ducts, few on submargin of abdomen and thorax, associated with oral-collar tubular ducts. Oral-rim tubular ducts scarce, with 2 discoidal pores and no setae associated with rim, 0(0-2) on submargin from segment II to cerarius 13; oral-collar tubular ducts on submargin of thorax and abdomen, with 1(0-1) in cluster of setae posterior of each spiracle, 2 (1-4) on each side of the head, 1(1-2) mesad of cerarius 15, 2(1-4) mesad of cerarius 13, 1(1-3) mesad of cerarius 12, 2(1-4) between cerarii 10 and 11. Setae as follows: 4 cisanal, 50(37-61)μ long; 1 cisvulvar on each side, 25(20-29)μ long; longest anal-lobe seta 79(74-85)μ long; body setae of 3 lengths, longest on abdomen 42(32-68)μ long; longest interantennal seta 83(71-90)μ long; longest trochanter seta 95(91-98)μ long.

Circulus 1.3 times as wide as long, width 89(79-99)μ, divided by segmental fold of segments III and IV. Labium 122(111-132)μ long. Posterior spiracle greatest length 48(41-57)μ long. Antennae 7-segmented, 320(298-351)μ long, length of each segment as follows: I 43(39-49)μ, II 46(44-49)μ, III 43(35-49)μ, IV 30(22-37)μ, V 29(26-34)μ, VI 35(30-41)μ, VII 88(85-90)μ long. Length of antennal segment VII / segment II 2.0(1.8-2.2), antennal segment VII / segment III 1.9(1.8-2.4).

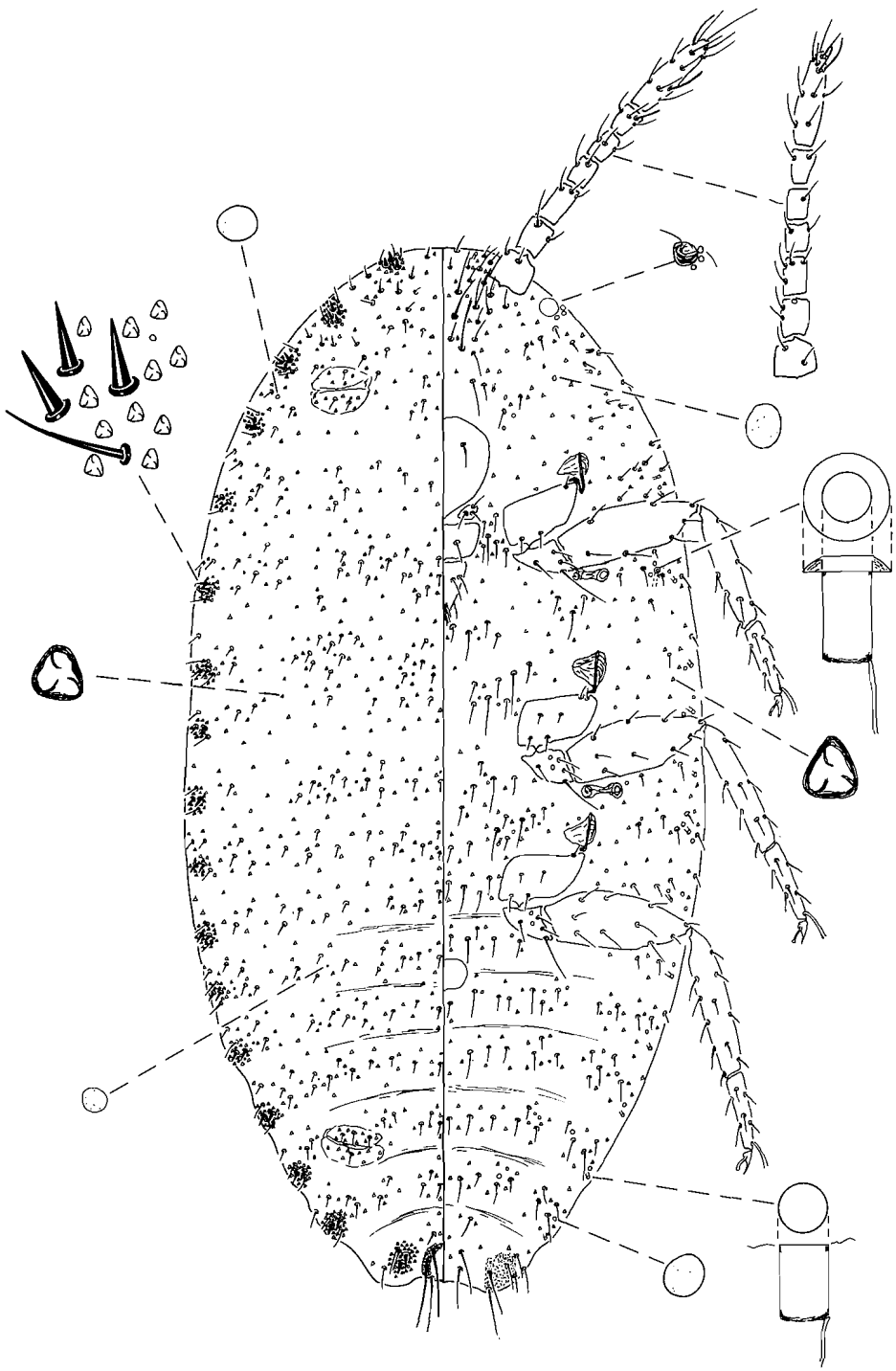

Figure 37. Third instar female, *P. landoi,* Costa Rica, XII-24-1948, on *Philodendron* sp.

Femur 179(161-190)μ long; tibia 171(151-188)μ long; tarsus 107(100-115)μ long. Tibia / femur 0.9(0.9-1.0), tibia / tarsus 1.6(1.5-1.7). Tibia with 16(15-16) setae.

SPECIMENS EXAMINED: The description is based on 3 specimens on 3 slides from Costa Rica and Barbados

DISCUSSION: *Pseudococcus landoi* is most similar to *P. elisae.* For a comparison of these species see the discussion section of the latter.

Pseudococcus maritimus Ehrhorn

THIRD INSTAR FEMALE (Figure 38)

DIAGNOSIS: Oral-rim tubular duct present on submargin between cerarii 15 and 16; oral rim usually present near cerarius 2; submarginal oral-collar tubular ducts present on ventral abdomen; 7(5-9) oral rims on dorsal thorax; 3(2-4) oral rims on ventral submargin between segment II and cerarius 13; oral collars present near some or all of cerarii 10-13, absent near cerarius 15.

SLIDE MOUNTED CHARACTERS: Mounted 1.5(1.1-2.0)mm long, 0.8 (0.6-1.1)mm wide.

DORSUM: With 17(15-17) pairs of cerarii, cerarian formula as follows: 1-5 (2), 6 (1-2), 7-9 (2), 10 (0-2), 11 (1-2), 12 (2-3), 13 (2), 14 (1-2), 15 (0-3), 16 (3-4), 17 (3). Cerarius 12 with 1(1-2) auxiliary setae, 6(4-10) trilocular pores, 0(0-2) discoidal pore. Discoidal pores associated with oral-rim tubular ducts. Oral-rim tubular ducts with 1(0-2) discoidal pores and 0(0-1) seta associated with rim, 2(0-2) oral rims present posterior of frontal cerarii, usually present on submargin between cerarii 15 and 16, present about 70% of time near cerarius 2, 7(5-9) on thorax, 8(5-11) on abdomen. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 14(11-17)μ long; 2(2-4) dorsomedial setae on segment VIII, 14(10-22)μ long.

Anal-ring setae 110(93-126)μ long, 1.8(1.3-2.2) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores present on 4 of 10 specimens, with 1(0-3) pores; 28(22-42) trilocular pores on segment VI. Discoidal pores of 1 size, about 2μ in diameter, 1(0-2) on basal sclerotization of anal lobe, on thorax posterior of spiracles, 1 (0-1) in membranous rim around each eye, few on submargin of abdomen and thorax, rarely associated with rim of some oral-collar tubular ducts. Oral-rim tubular ducts with 0(0-1) discoidal pores and no seta, 3(2-4) on submargin from segment II to cerarius 13; oral-collar tubular ducts on submargin of thorax and abdomen, those on abdomen varying from 1(0-2) on submargin of each segment, with 0(0-1) in cluster of setae posterior of each spiracle, 1(0-1) on each side of head, absent near cerarius 15, 2(0-4) mesad of cerarius 13, 0(0-1) mesad of cerarius 12, 1(0-2) between cerarii 11 and 10. Setae as follows: 4 cisanal,

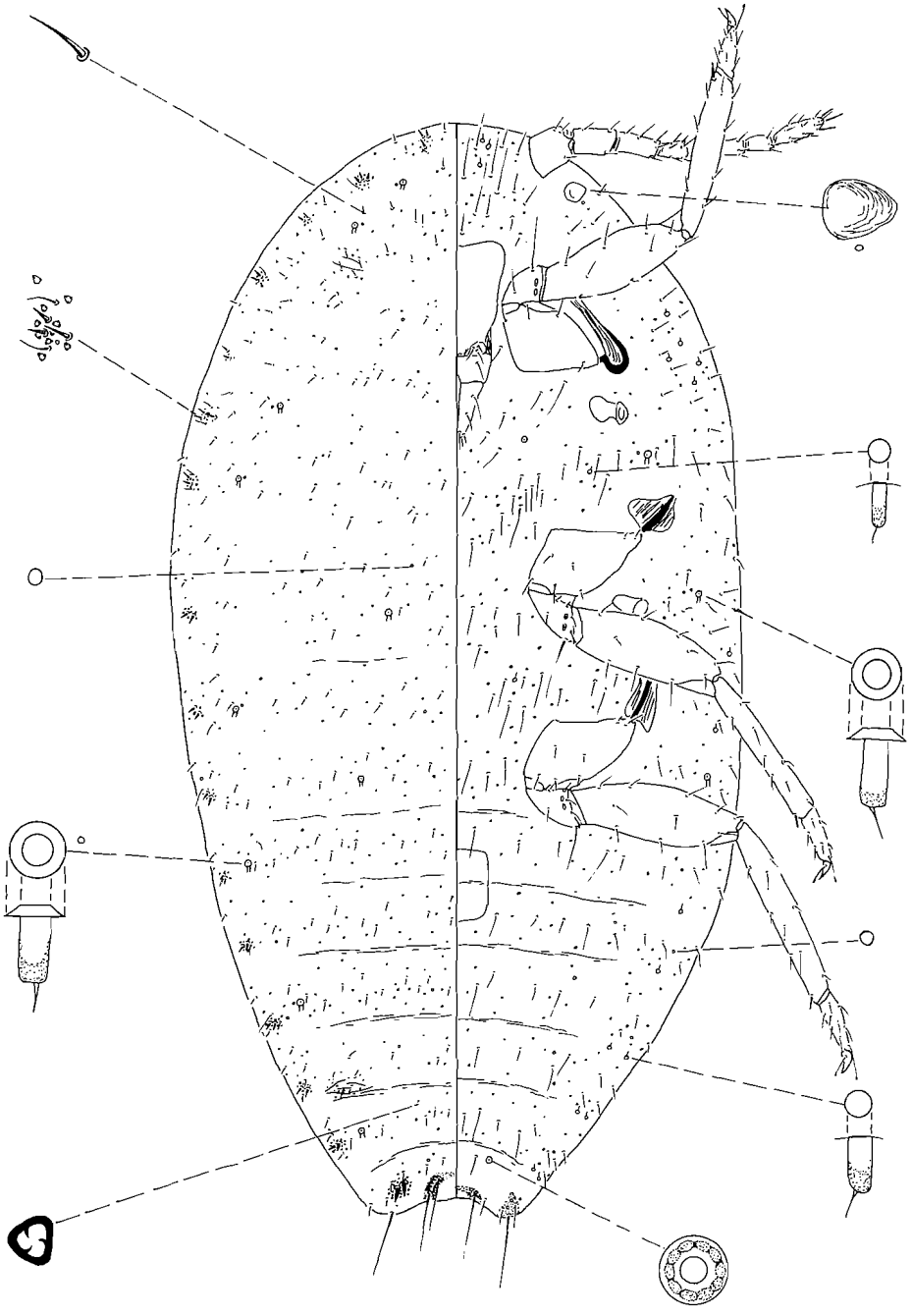

Figure 38. Third instar female, *P. maritimus* Santa Cruz, California, VII-1899, on *Eriogonum* sp.

29(25-35)μ long; 1(1-2) cisvulvar on each side, 25(15-32)μ long; longest anal-lobe seta 95(77-111)μ long; body setae of 3 lengths, longest on abdomen 58(42-69)μ long; longest interantennal seta 80(62-96)μ long; longest trochanter seta 83(70-96)μ long.

Circulus 1.3(0.9-1.7) times as wide as long, width 79(59-121)μ, divided by segmental fold of segments III and IV. Labium 129(116-148)μ long. Posterior spiracle greatest length 50(42-59)μ long. Antennae 7-segmented, 324(285-378)μ long, length of each segment as follows: I 42(35-49)μ, II 42(40-49)μ, III 42(32-52)μ, IV 29(20-38)μ, V 31(27-37)μ, VI 37(32-42)μ, VII 87(79-96)μ long. Length of antennal segment VII/segment II 2.1(1.9-2.4), antennal segment VII/segment III 2.1(1.8-2.5).

Femur 164(146-183)μ long; tibia 153(136-180)μ long; tarsus 100(93-111)μ long. Tibia/femur 0.9(0.9-1.0); tibia/tarsus 1.5(1.3-1.7). Tibia with 15(14-18) setae.

SPECIMENS EXAMINED: The description is based on 18 specimens on 13 slides from: California, Maryland, North Carolina, Ohio, Oregon and Washington.

DISCUSSION: *Pseudococcus maritimus* is similar to *P. viburni* but differs by having: dorsal oral rim present on submargin between cerarii 15 and 16; usually having oral rim near cerarius 2; oral collars present on ventral submargin of thorax and abdomen; 3(2-4) oral rims on ventral submargin between segment II and cerarius 13; 7(5-9) oral rims on dorsal thorax; 28(22-42) trilocular pores on venter of segment VI. *Pseudococcus viburni* has: dorsal oral rim absent from submargin between cerarii 15 and 16; oral rim absent near cerarius 2; oral collars usually absent from submargin of thorax and abdomen; 0(0-2) oral rims on ventral submargin between segment II and cerarius 13; 3(0-5) oral rims on dorsal thorax; 41(22-70) trilocular pores on venter of segment VI.

Pseudococcus microcirculus McKenzie

THIRD INSTAR FEMALE (Figure 39)

DIAGNOSIS: With 0(0-2) dorsal oral-rim tubular ducts on thorax, 0(0-3) on abdomen; anal ring setae 67(61-88)μ long; without oral-collar tubular ducts on submargin of head, thorax, or abdomen; long ventral body setae 29(20-37)μ long; labium 86(80-96)μ long; antennae 258(243-278)μ long; hind femur 124(120-117)μ long; 11(10-13) tibial setae on hind leg.

SLIDE MOUNTED CHARACTERS: Mounted 1.0(0.9-1.4)mm long, 0.6(0.5-0.9) mm wide.

DORSUM: With 16(13-17) pairs of cerarii, cerarian formula as follows: 1-7 (2), 8 (1-2), 9-11 (0-2), 12 (2-3), 13-14 (0-2), 15 (2-3), 16 (2-4), 17 (3). Cerarius 12 with 1(1-2) auxiliary seta, 6(5-8) trilocular pores, 0(0-1) discoidal pore. Discoidal pores associated with oral-rim tubular ducts when present. Oral-rim tubular

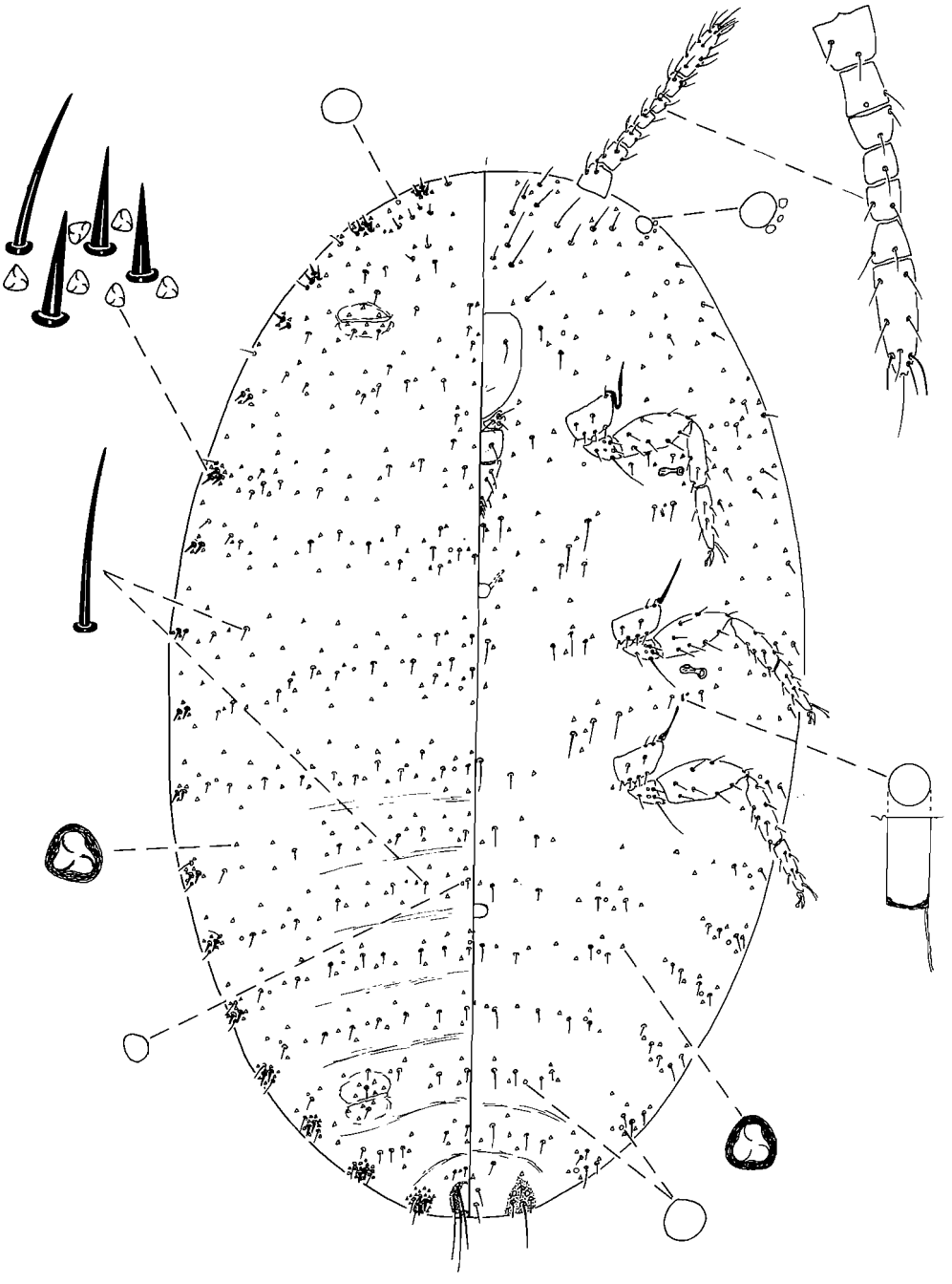

Figure 39. Third instar female, *P. microcirculus,* Adelphi, Maryland, V-20-1978, on *Calanthe vestita.*

ducts usually absent, with 1(0-2) discoidal pores and 1(0-1) seta associated with rim, 0(0-1) oral rim posterior of frontal cerarii, 0(0-2) on thorax, 0(0-3) on abdomen. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 15(10-17)μ long; 2(1-3) dorsomedial setae on segment VIII, 14(12-17)μ long.

Anal-ring setae 67(61-88)μ long, 1.5(1.3-1.6) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores absent; 22(17-28) trilocular pores on segment VI. Discoidal pores of 2 sizes, large size about 5μ in diameter, 3(1-4) on anal lobe, 2(0-3) in membranous rim around each eye, on thorax posterior of spiracles; few on submargin of abdomen and thorax. Oral-rim tubular ducts usually absent, with 0(0-1) discoidal pore and 1(0-1) seta associated with rim, 0(0-1) on submargin from segment II to cerarius 13; oral-collar tubular ducts scarce, 1(0-1) associated with cluster of setae posterior of each spiracle, absent from submarginal areas of abdomen and head, absent mesad of cerarius 15, 13, 12, and between 11 and 10. Setae as follows: 4 cisanal, 20(17-24)μ long; 1 cisvulvar seta on each side, 15(12-17)μ long; longest anal-lobe seta 64(54-73)μ long; body setae of 3 lengths, longest on abdomen 29(20-37)μ long; longest interantennal seta 44(30-56)μ long; longest trochanter seta 60(54-69)μ long.

Circulus 1.6(1.3-2.0) times as wide as long, width 22(13-32)μ, situated on segment III, not divided by segmental fold of segments III and IV. Labium 86(80-96)μ long. Posterior spiracle greatest length 40(37-47)μ long. Antennae 7-segmented, 258(243-278)μ long, length of each segment as follows: I 33(27-37)μ, II 36(34-39)μ, III 33(24-37)μ, IV 24(22-29)μ, V 23(22-24)μ, VI 30(29-32)μ, VII 73(68-78)μ long. Length of antennal segment VII / segment II 2.0(2.0-2.1), antennal segment VII / segment III 2.2(1.9-2.8).

Femur 124(117-132)μ long; tibia 107(98-115)μ long; tarsus 76(73-80)μ long. Tibia / femur 0.9(0.8-0.9), tibia / tarsus 1.4(1.3-1.5). Tibia with 11(10-13) setae.

SPECIMENS EXAMINED: The description is based on 50 specimens on 41 slides from: Belgium, Brazil, Canal Zone, Costa Rica, Dominican Republic, Guatemala, Jamaica, Maryland, Mexico, Surinam, Trinidad.

DISCUSSION: *Pseudococcus microcirculus* is most similar to *P. sorghiellus* but has: 0(0-2) dorsal oral-rim tubular ducts on thorax; no ventral multilocular pores; 3(1-4) discoidal pores on anal-lobe sclerotization; 2(0-3) discoidal pores near each eye; 0(0-1) ventral oral rims on submargin between segment II and cerarius 13; circulus 1.6(1.3-2.0) times as wide as long; circulus not divided by segmental line between segments III and IV; length of antennal segment VII / segment III 2.2(1.9-2.8). *Pseudococcus sorghiellus* has: 2(0-4) dorsal oral rims on thorax; 1(0-2) ventral multilocular disc pores on abdomen; 1(1-2) discoidal pores on anal-lobe sclerotization; 1(0-1) discoidal pore near each eye; 2(0-3) ventral oral rims on submargin between segment II and cerarius 13; circulus 2.0(1.9-2.2) times as wide as long; circulus divided by segmental line between segments III and IV; length of antennal segment VII / segment III 2.7(2.3-3.5).

Pseudococcus nakaharai Gimpel and Miller, new species

THIRD INSTAR FEMALE (Figure 40)

DIAGNOSIS: Longest dorsal body setae 20(12-30)μ long; 2(0-7) ventral multilocular disc pores on abdomen; 53(38-80) trilocular pores on venter of segment VI; 2(0-3) cisvulvar setae; cisvulvar setae 37(27-54)μ long; labium 176(159-192)μ long; anal-lobe seta 134(122-144)μ long; dorsal oral rims usually restricted to submarginal areas near cerarii 17, 12, and 8.

SLIDE MOUNTED CHARACTERS: Mounted 1.7(1.5-2.0)mm long, 1.0(0.9-1.2) mm wide.

DORSUM: With 16(14-17) pairs of cerarii, cerarian formula as follows: 1-3 (2), 4-5 (1-2), 6 (2), 7 (1-2), 8 (2-3), 9 (1-2), 10 (0-2), 11 (0-2), 12 (2-3), 13 (2), 14 (1-2), 15 (1-3), 16 (2-4), 17 (1-3). Cerarius 12 with 2(1-3) auxiliary setae, 11(6-17) trilocular pores, 2 (0-3) discoidal pores. Discoidal pores associated with oral-rim tubular ducts. Oral rims with 1(0-1) discoidal pore and 0(0-1) seta associated with rim, 2(0-2) oral rims present posterior of frontal cerarii, also present near cerarii 12 and 8, 2(0-4) on thorax, 2(0-3) on abdomen. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 20(12-30)μ long; 3(2-4) dorsomedial setae on segment VIII, 22(20-27)μ long.

Anal-ring setae 105(93-115)μ long, 1.4(1.2-1.6) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores on submargin, 2(0-7) on segments V-VII; 53(38-80) trilocular pores on segment VI. Discoidal pores of 2 sizes, large size about 6μ in diameter, 2(1-4) on basal sclerotization of anal lobe, 2(1-4) in membranous rim around each eye, few on submargin of abdomen and thorax, occasionally associated with rim of oral-rim tubular ducts. Oral-rim tubular ducts few, with 0(0-1) discoidal pore and 0(0-1) seta associated with rim, 1(0-2) on submargin from segment II to cerarius 13; oral-collar tubular ducts on thorax and abdomen, often restricted to posterior 1-3 segments on abdomen, 1(0-2) associated with cluster of setae posterior of each spiracle, without oral collars near frontal cerarii, 0(0-1) mesad of cerarius 15, 1(0-2) mesad of cerarius 13, 1(0-1) mesad of cerarius 12, 1(0-1) between cerarii 10 and 11. Setae as follows: 4(4-5) cisanal, 37(24-49)μ long; 2(0-3) cisvulvar on each side, 37(27-54)μ long; longest anal-lobe seta 134(122-144)μ long; body setae of 3 lengths, longest on abdomen 46(34-56)μ long; longest interantennal seta 56(49-61)μ long; longest trochanter seta 85(76-93)μ long.

Circulus 1.4(1.1-1.8) times as wide as long, width 95(79-118)μ, divided by segmental fold of segments III and IV. Labium 176(159-192)μ long. Posterior spiracle greatest length 66(61-71)μ long. Antennae 7(6-7)-segmented, 334(312-372)μ long, length of each segment as follows: I 44(41-49)μ, II 44(41-49)μ, III 44(39-49)μ, IV 29(27-34)μ, V 34(27-37)μ, VI 37(34-39)μ, VII 93(85-98)μ long.

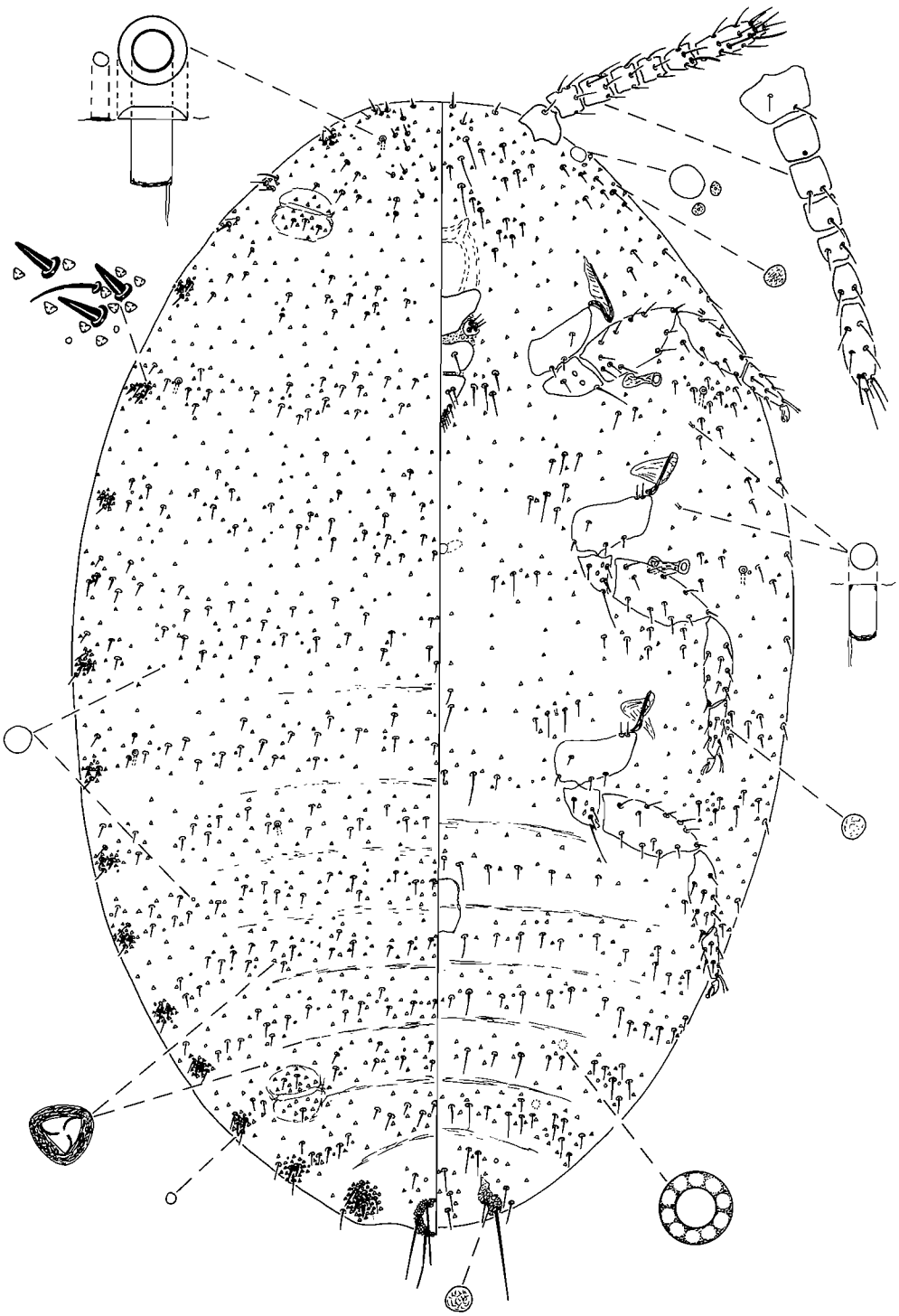

Figure 40. Third instar female, *P. nakaharai,* Mexico, VI-13-1951, on *Wilcoxia schmollii.*

Length of antennal segment VII / segment II 2.1(1.9-2.3), antennal segment VII / segment III 2.1(1.9-2.2).

Femur 185(167-200)μ long; tibia 166(134-183)μ long; tarsus 110(98-115)μ long. Tibia / femur 0.9(0.8-0.9); tibia / tarsus 1.5(1.4-1.6). Tibia with 14(9-15) setae.

SPECIMENS EXAMINED: The description is based on 65 specimens on 34 slides from: Guatemala, Mexico, Peru and Washington, D.C.

DISCUSSION: *Pseudococcus nakaharai* is similar to *P. viburni* but has: Longest dorsal seta on segment VIII 22(20-27)μ long; 2(0-7) ventral multilocular disc pores on abdomen; largest discoidal pore about 6μ in diameter; 2(0-3) cisvulvar setae; longest interantennal seta 56(49-61)μ long; labium 176(159-192)μ long; anal-lobe seta 134(122-144)μ long; submarginal oral collars on thorax and abdomen; dorsal submarginal oral rims restricted to areas near cerarii 8, 12, and 17. *Pseudococcus viburni* has: Longest dorsal seta on segment VIII 12(10-15)μ long; no ventral multilocular disc pores; largest discoidal pore about 4μ in diameter; 1(1-2) cisvulvar setae; longest interantennal seta 88(78-98)μ long; labium 127(105-146)μ long; anal-lobe seta 105(93-127)μ long; submarginal oral collars usually absent from thorax and abdomen; dorsal submarginal oral rims usually present near one of cerarii number 4, 5, or 6 in addition to 8, 12, and 17.

Pseudococcus sorghiellus (Forbes)

THIRD INSTAR FEMALE (Figure 41)

DIAGNOSIS: 0(0-2) oral-rim tubular ducts near frontal cerarii; longest dorsal body setae 9(7-12)μ long; 1(0-2) ventral multilocular disc pores on abdomen; oral-collar tubular ducts absent from submargin of head, thorax and abdomen; cisanal setae 18(17-20)μ long; circulus width 42(27-57)μ; interantennal setae 45(37-49)μ long; labium 94(80-109)μ long; antennae 243(227-273)μ long; length of antennal segment VII / segment III 2.7(2.3-3.5); hind femur 124(110-148)μ long.

SLIDE MOUNTED CHARACTERS: Mounted 0.9(0.8-0.9) mm long, 0.5(0.4-0.5) mm wide.

DORSUM: With 16(15-17) pairs of cerarii, cerarian formula as follows: 1-7 (2), 8 (1-2), 9 (2), 10 (0-2), 11 (2), 12 (2-3), 13 (2), 14 (0-2), 15 (0-3), 16 (3-4), 17 (3). Cerarius 12 with 1(1-2) auxiliary setae, 7(6-11) trilocular pores, 1(0-1) discoidal pore. Discoidal pores associated with oral rims. Oral-rim tubular ducts few, with 1(0-2) discoidal pores and 0(0-1) seta associated with rim, 0(0-2) oral rims posterior of frontal cerarii, 2(0-4) on thorax, 2(0-4) on abdomen. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 9(7-12)μ long; 2(2-4) dorsomedial setae on segment VIII, 13(10-17)μ long.

Anal-ring setae 82(68-91)μ long, 1.5(1.4-1.7) times as long as greatest diameter of ring.

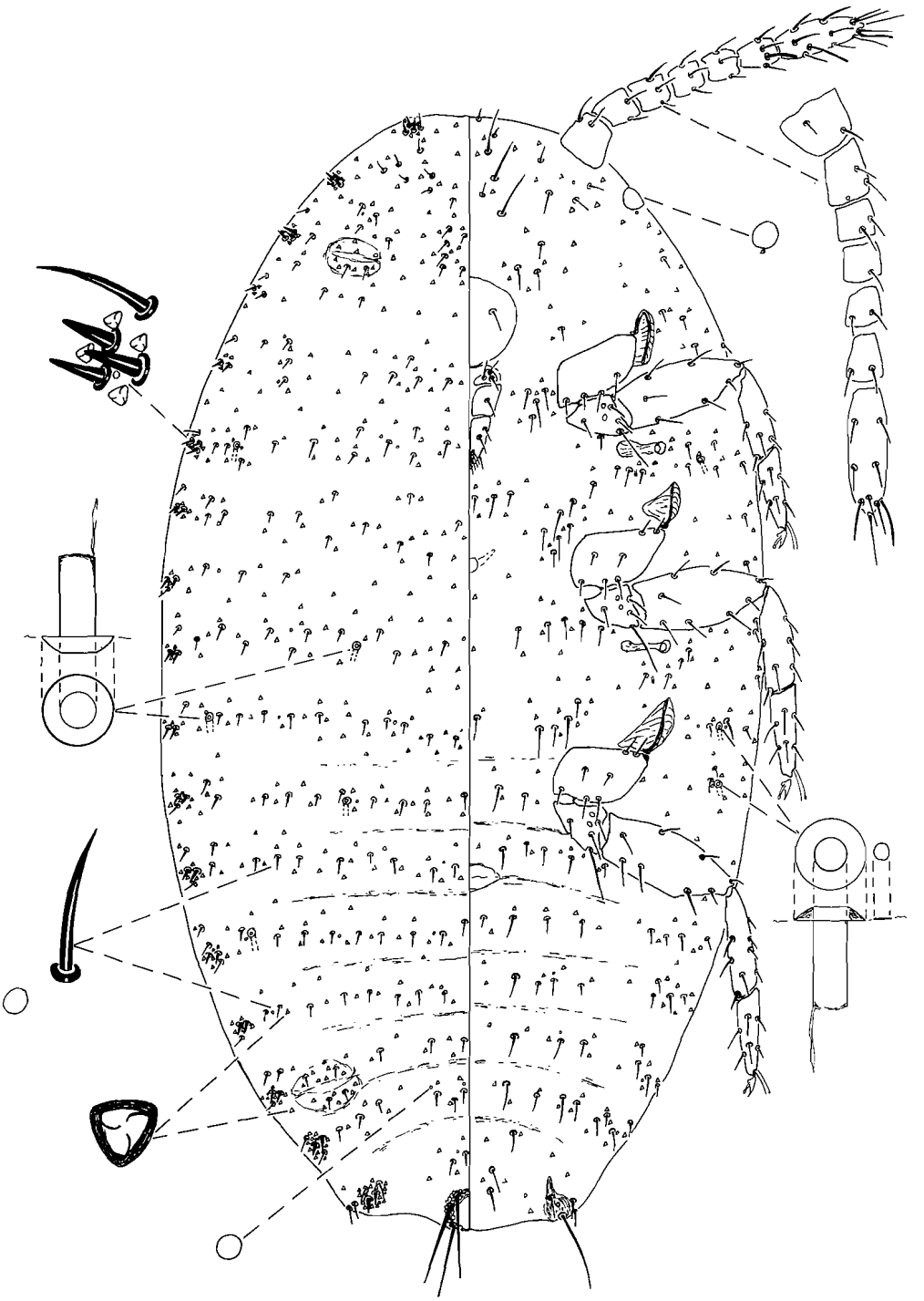

Figure 41. Third instar female, *P. sorghiellus* Auburn, Alabama, VIII-15-1974, on *Lespedeza cuneata*.

VENTER: Multilocular disc pores absent or few, 1(0-2) on segments IV, V, VIII, or IX; 30(18-45)trilocular pores on segment VI. Discoidal pores of 2 sizes, large size about 7μ in diameter, 1(1-2) on basal sclerotization of anal lobe; 1(0-1) in membranous rim around each eye, few on submargin of abdomen and thorax, associated with rim of oral-rim tubular ducts. Oral-rim tubular ducts with 1(0-1) discoidal pore and 0(0-1) seta associated with rim, 2(0-3) on submargin from segment II to cerarius 13; oral-collar tubular ducts with 1(0-1) associated with cluster of setae posterior of each spiracle, absent elsewhere. Setae as follows: 4 cisanal, 18(17-20)μ long; 1 cisvulvar, 15(12-17) μ long; longest anal-lobe seta 79(68-96)μ long; body setae of 3 lengths, longest on abdomen 33(24-46)μ long; longest interantennal seta 45(37-49)μ long; longest trochanter seta 60(52-69)μ long.

Circulus 2.0(1.9-2.2) times as wide as long, width 42(27-57)μ, divided by segmental fold of segments III and IV. Labium 94(80-109)μ long. Posterior spiracle greatest length 48(41-56)μ long. Antennae 7(6-7)-segmented, 243(227-273)μ long, length of each segment as follows: I 35(32-40)μ, II 32(27-35)μ, III 26(20-32)μ, IV 20(15-22)μ, V 21(17-24)μ, VI 27(22-31)μ, VII 70(66-74)μ long. Length of antennal segment VII / segment II 2.2(2.0-2.5), antennal segment VII / segment III 2.7(2.3-3.5).

Femur 124(110-148)μ long; tibia 112(99-141)μ long; tarsus 84(73-99)μ long. Tibia / femur 0.9; tibia / tarsus 1.3(1.2-1.5). Tibia with 12(11-13) setae.

SPECIMENS EXAMINED: The description is based on 12 specimens on 8 slides from: Alabama, Florida, Maryland New Jersey, North Carolina, South Carolina, Tennessee, Virginia.

DISCUSSION: *Pseudococcus sorghiellus* is most similar to *P. microcirculus*. For a comparison of these species see the discussion section of the latter.

Pseudococcus viburni (Signoret)

THIRD INSTAR FEMALE (Figure 42)

DIAGNOSIS: 41(22-70) trilocular pores on venter of abdominal segment VI; longest ventral body setae 54(44-80)μ long; longest interantennal setae 88(78-98)μ long; anal-lobe seta 105(93-127)μ long; usually without oral collars mesad of cerarii 10, 11, 12, and 13; oral collars usually absent from abdomen.

SLIDE MOUNTED CHARACTERS: Mounted 1.7(1.1-1.9)mm long, 0.7(0.5-0.8) mm wide.

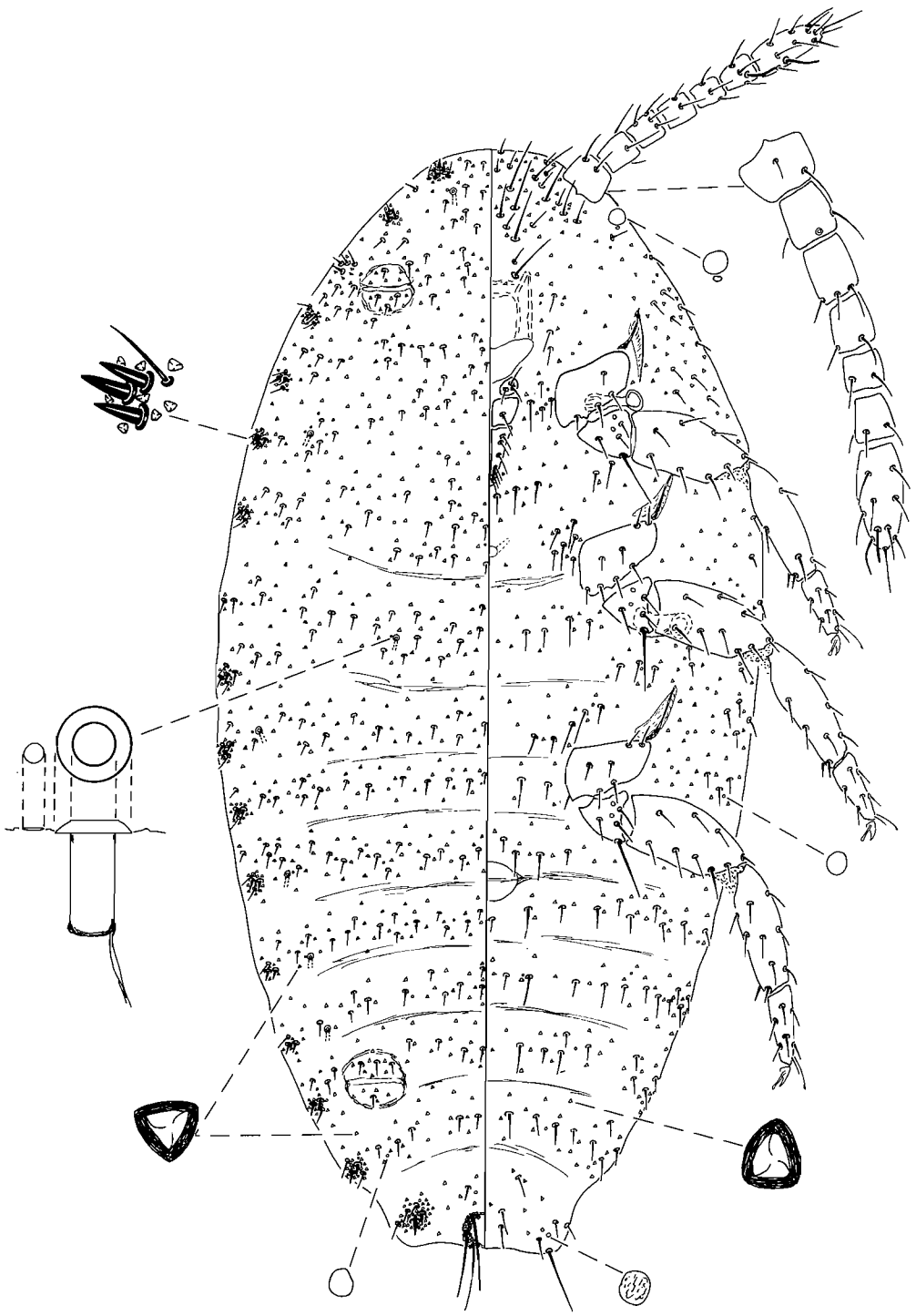

Figure 42. Third instar female, *P. viburni* England, VI-10-1938, on fern.

DORSUM: With 17(15-17) pairs of cerarii, cerarian formula as follows: 1-7 (2), 8 (0-2), 9 (2-4), 10 (0-2), 11 (1-2), 12 (2-3), 13-14 (2), 15 (2-3), 16 (2-4), 17 (3). Cerarius 12 with 1(0-2) auxiliary setae, 8(6-12) trilocular pores, 1(0-1) discoidal pore. Discoidal pores associated with oral-rim tubular ducts. Oral-rim tubular ducts with 1(1-2) discoidal pore and 0 (0-1) seta associated with rim, 2(0-2) oral rims posterior of frontal cerarii, absent on submargin between cerarii 15 and 16, absent near cerarius 2, 3 (0-5) on thorax, 5(2-8) on abdomen. Body setae of 2 sizes, longest on abdomen, excluding segment VIII, 15(12-17)μ long; 2(1-3) dorsomedial setae on segment VIII, 12(10-15)μ long.

Anal-ring setae 110(90-122)μ long, 1.7(1.4-1.8) times as long as greatest diameter of ring.

VENTER: Multilocular disc pores absent; 41(22-70) trilocular pores on segment VI. Discoidal pores of 2 sizes, large size about 4μ in diameter, 2(1-2) on basal sclerotization of anal lobe, on thorax posterior of spiracles, 1(1-3) in membranous rim around each eye, few on submargin of abdomen and thorax. Oral-rim tubular ducts usually absent, when present, with 1 discoidal pore and no seta associated with rim, 0(0-2) on submargin from segment II to cerarius 13; oral-collar tubular ducts restricted to submargin of thorax and usually absent from abdomen, 1(0-1) associated with cluster of setae posterior of each spiracle, 0(0-1) on each side of head, absent mesad of cerarius 15, 0(0-1) mesad of cerarius 13, 0(0-1) mesad of cerarius 12, 0 (0-2) between cerarius 11 and 10. Setae as follows: 4 cisanal, 32(20-37)μ long; 1(1-2) cisvulvar seta, 27(17-34)μ long; longest anal-lobe seta 105(93-127)μ long; body setae of 3 lengths, longest on abdomen 54(44-80)μ long; longest interantennal seta 88(78-98)μ long; longest trochanter seta 90(78-105)μ long.

Circulus 1.4(1.0-2.0) times as wide as long, width 78(64-99)μ, divided by segmental fold. Labium 127(105-169)μ long. Posterior spiracle greatest length 59(49-66)μ long. Antennae 7-segmented, 335(285-390)μ long, length of each segment as follows: I 44(37-54)μ, II 46(37-54)μ, III 46(29-54)μ, IV 34(27-39)μ, V 32(27-37)μ, VI 39(32-44)μ, VII 88 (78-98)μ long. Length of antennal segment VII / segment II 1.9 (1.7-2.2), antennal segment VII / segment III 2.0(1.8-2.7).

Femur 178(146-202)μ long; tibia 166(134-195)μ long; tarsus 110(93-122)μ long. Tibia / femur 0.9(0.9-1.0); tibia / tarsus 1.5(1.4-1.8). Tibia with 14(11-16) setae.

SPECIMENS EXAMINED: The description is based on 15 specimens on 10 slides from: Azores, California, Chile, England, Guatemala, Hawaii, Illinois, Oregon.

DISCUSSION: *Pseudococcus viburni* is similar to *P. jackbeardsleyi* but differs by having: 3(0-5) dorsal oral-rim tubular ducts on the dorsal thorax; 41(22-70) trilocular pores on the venter of segment VI; no sclerotized rim around the eye; anal-lobe seta 105(93-127)μ long; 0(0-1) oral-collar tubular duct near frontal cerarius and near cerarius 13. *Pseudococcus jackbeardsleyi* has: 5(4-6) oral rims on the dorsal thorax; 32(22-48) trilocular pores on the venter of segment VI; lightly sclerotized rim around the eye; anal-lobe seta 86(59-93)μ long; 2(1-3) oral collars near frontal cerarius and 2(1-5) near cerarius 13.

For a comparison of *P. viburni* and *P. nakaharai* see the discussion section of the latter.

CONCLUSIONS

During the course of this study, we examined all obvious morphological characters of the adult female in detail. Several new characters were discovered that are highly useful for distinguishing species including: The number of oral-collar tubular ducts on the venter associated with cerarii 12 and 10-11 and located posterior of the eye and on the head; presence or absence of an oral-rim tubular duct on the venter near the frontal cerarius; presence or absence of an oral rim on the dorsum between cerarii 15 and 16; number of submarginal oral rims on the venter between abdominal segment II and cerarius 13; number of oral rims on the dorsal abdomen; lengths of longest dorsal setae, interantennal setae, cisvulvar setae, longest ventral seta on abdomen and longest cisanal seta; length of the leg segments, length of the labium, number of setae on the tibia; and the number of cisvulvar setae.

We have reconfirmed the usefulness of several other characters including: The general distribution of oral-rim tubular ducts; the number of discoidal pores associated with the eye; the presence of a sclerotized rim near the eye; the number and distribution of translucent pores on the hind leg segments; the size of the circulus; the number of cerarii; presence or absence of dorsal oral collars and multilocular disc pores. Several characters were studied that did not prove useful including: The number of coxal-rim setae; the length of the circulus; the number of pores and setae associated with the ostioles; the number of setae on the labium.

Several problems have been solved that previously caused considerable consternation. *Pseudococcus microcirculus* and *P. sorghiellus* seemed to possess far more variation than most other species in the group. We now have been able to distinguish three cryptic species in the *P. microcirculus* complex, i.e. *P. microcirculus*, *P. neomicrocirculus* and *P. apomicrocircululs* and four in the *P. sorghiellus* complex, i.e. *P. sorghiellus*, *P. dolichomelos*, *P. dysmicus*, and *P. spanocera*.

More than half of the species in the *P. maritimus* complex are pests of houseplants, ornamentals or agricultural crops. Several of these occur in the United States, but a few have not been introduced into the U.S. Economic species include: *P. viburni* on cactus, citrus, plum, pomegranate, pear, apple and potato; *P. apomicrocirculus* on orchids; *P. dolichomelos* on narcissus, tomato, plum, and clover; *P. elisae* on banana, coffee, and beans; *P. jackbeardsleyi* on eggplant, tomato, potato, guava, banana, pepper; *P. mandio* on cassava; *P. maritimus* on grape, pear, apple, other fruit trees, yew and maple; *P. microcirculus* on orchids; *P. peregrinabundus* on banana; *P. solenedyos* on pomegranate, guava and mango; *P. sorghiellus* on beans, soybeans, clover, blackberries, sorghum and fruit trees; and *P. spanocera* on soybean. Of these, *P. apomicrocirculus*, *P. landoi*, *P. mandio*, *P. neomicrocirculus*, *P. peregrinabundus*, and *P. solenedyos* do not occur in the U.S. and should be of special concern to the quarantine programs of the Animal Plant Health Inspection Service. Special attention also should be given to *P. donrileyi* which has been collected on citrus in southern Texas, where it may have been introduced from Mexico.

Analysis of intraspecific variation remains an enigma. Each species should be studied under controlled conditions to determine the effect of environmental factors. The work of Cox (1981) has shown that a great deal of variability can be attributed to external effects. Species such as *P. maritimus* and *P. viburni* in the eastern U.S. appear to encompass unresolved complexes, but we have been unable to find characters that will segregate cryptic species. Island habitats appear to possess an unusual diversity of *Pseudococcus maritim*us complex species, but in most cases insufficient material is available to diagnose different species. From the small sample of specimens available from the Galapagos it appears that each major island has at least one endemic species. The faunas of the Caribbean Islands and California Islands also appear to possess a diverse series of island endemics.

At the present time, we can do no more than speculate about the relationships of the *P. maritim*us complex with other mealybugs. We currently believe that species of the complex are more closely related to taxa in the *Dysmicoccus brevipes* group (Beardsley 1965) than they are to *Pseudococcus* congenitors. This situation reflects our belief that *Pseudococcus* is not a natural group. It appears that use of the presence or absence of oral-rim tubular ducts is not a valid character for distinguishing between *Pseudococcus* and *Dysmicoccus*. The most striking similarity between the *P. affinis* and *D. brevipes* groups is the presence of discoidal pores associated with the eye. This character is most likely derived. Other similarities are the distribution of the oral-collar tubular ducts, the distribution of the translucent pores on the hind legs, and the number and construction of the cerarii.

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