

THE ARMORED SCALE INSECTS OF VENEZUELA
(HOMOPTERA: COCCOIDEA: DIASPIDIDAE)

by

Alfredo D'Ascoli

Thesis submitted to the Graduate Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Entomology

APPROVED: Michael Kosztarab
Michael Kosztarab

James McD. Grayson
James McD. Grayson

Robert L. Pienkowski
Robert L. Pienkowski

Robert D. Ross
Robert D. Ross

E. Craig Turner Jr.
E. Craig Turner Jr.

April, 1971

Blacksburg, Virginia

LD
5655
1856
1971
D38
c.2
Storage

In memory of Alberto Fernandez Yopez
To Flavia, Adriana, Ingrid and Oscar

ACKNOWLEDGMENTS

The author wishes to express his sincere appreciation to Dr. Michael Kosztarab, his major advisor, for his personal and continuous assistance and guidance throughout the course of this investigation. Appreciation is also extended to Dr. James McD. Grayson, Head, Department of Entomology, at the Virginia Polytechnic Institute and State University, for providing space, facilities and personal assistance which made my graduate study in Entomology possible; and to the other members of my graduate committee, Drs. Robert L. Pienkowski, Robert D. Ross and E. Craig Turner, Jr., for their critical evaluation and helpful suggestions regarding my course work and this thesis.

These studies were financed through a fellowship of the Consejo de Desarrollo Científico y Humanístico of the Universidad Central de Venezuela. I am thankful to Dr. Olinto Camacho, Executive Secretary of the Consejo de Desarrollo Científico y Humanístico and to the members of the Advisory Board, for their understanding and financial support of this study. Appreciation is also extended to Dr. Manuel V. Benezra, Dr. Francisco Fernandez Yopez and Prof. Gerardo Yopez T. of the Facultad de Agronomía for granting me a leave of absence of my duties in the Departamento of Zoología Agrícola for my graduate study in Entomology.

To the following persons the author is deeply indebted for providing information and specimens on loan: Miss Louise M. Russell, Dr. Douglass R. Miller, Mr. Sueo Nakahara, U. S. Department of

Agriculture, (U. S. National Museum of Natural History Collection); Ing. Mario Cernieli, Fundacion Shell (Servicio Shell para el Agricultor Collection); Ing. Nestor Angeles, Centro de Investigaciones Agronomicas M. A. C. (M. A. C. Collection). Several members of the Departamento de Zoologia Agricola, U. C. V., helped me with their collections throughout the years, I mention here but a few names: Dr. Francisco Fernandez-Yepez, Ing. Carlos J. Rosales, Ing. Santiago Clavijo, Ing. David Villasmil, Ing. J. Carlos Marin, Ing. Jorge Teran, Ing. Armando Notz, Mr. Mario Gelvez.

Finally, the author would like to acknowledge his fellow graduate students, Russell C. Brachman, James O. Howell, Paris Lambdin, and Mike L. Williams; laboratory technicians and part time helpers, Mary E. Moses, Julia Moses, Magda Kubinsky, Kathy Surles, Pami Fagelson, Janet Lynch and Joyce Sims for their useful suggestions and technical assistance with this study.

TABLE OF CONTENTS

	<u>Page</u>
ACKNOWLEDGMENTS	iii
LIST OF ILLUSTRATIONS	v
INTRODUCTION	1
MATERIALS AND METHODS OF STUDY	3
Diaspididae material examined	3
Mounting methods	3
Descriptions	4
List of abbreviations	5
Measurements	6
Illustrations	6
KEY TO THE FAMILIES OF COCCOIDEA OF VENEZUELA	7
SUBFAMILY AND KEY TO THE TRIBES OF DIASPIDIDAE OF VENEZUELA	9
LIST OF SPECIES INCLUDED	10
MORPHOLOGICAL CHARACTERISTICS OF THE DIASPIDINAE FEMALES .	
TRIBE ASPIDOTINI	14
TRIBE DIASPIDINI	21
TRIBE ODNASPIDINI	139
LITERATURE CITED	224
VITA	248

LIST OF ILLUSTRATIONS

	<u>Page</u>
Plate 1. - General morphology of a Diaspidinae female.	15
Plate 2. - Morphological details of pygidium	19
Plate 3. - <u>Abgrallaspis cyanophylli</u> (Signoret)	25
Plate 4. - <u>Abgrallaspis deffinis</u> (Newstead).	28
Plate 5. - <u>Abgrallaspis nakaharai</u> n. sp.	32
Plate 6. - <u>Abgrallaspis palmae</u> (Cockerell)	36
Plate 7. - <u>Acutaspis agavis</u> (Townsend and Cockerell)	41
Plate 8. - <u>Acutaspis perseae</u> (Comstock).	44
Plate 9. - <u>Acutaspis reniformis</u> (Cockerell).	48
Plate 10. - <u>Aonidiella aurantii</u> (Maskell)	53
Plate 11. - <u>Aonidiella orientalis</u> (Newstead).	56
Plate 12. - <u>Aspidiella hartii</u> (Cockerell)	61
Plate 13. - <u>Aspidiella sacchari</u> (Cockerell)	64
Plate 14. - <u>Aspidiotus destructor</u> (Signoret).	68
Plate 15. - <u>Chrysomphalus aonidum</u> (Linnaeus).	74
Plate 16. - <u>Chrysomphalus dictyospermi</u> (Morgan)	77
Plate 17. - <u>Chrysomphalus pinnulifer</u> (Maskell).	81
Plate 18. - <u>Chrysomphalus propeus</u> Banks	85
Plate 19. - <u>Clavaspis herculeana</u> (Doane & Hadden)	89
Plate 20. - <u>Furcaspis biformis</u> (Cockerell).	93
Plate 21. - <u>Hemiberlesia lataniae</u> (Signoret).	97
Plate 22. - <u>Hemiberlesia rapax</u> (Comstock)	101
Plate 23. - <u>Melanaspis alinea</u> (Newstead).	105
Plate 24. - <u>Melanaspis santensis</u> Lepage	110

	<u>Page</u>
Plate 25. - <u>Melanaspis tenax</u> McKenzie.	114
Plate 26. - <u>Mycetaspis defectopalus</u> Ferris	118
Plate 27. - <u>Mycetaspis personata</u> (Comstock).	122
Plate 28. - <u>Palinaspis barbata</u> Ferris.	126
Plate 29. - <u>Pseudaonidia trilobitiformis</u> (Green)	130
Plate 30. - <u>Selenaspidus articulatus</u> (Morgan).	134
Plate 31. - <u>Aulacaspis rosae</u> (Bouche).	142
Plate 32. - <u>Aulacaspis tubercularis</u> Newstead	146
Plate 33. - <u>Diaspis boisduvalii</u> Signoret	151
Plate 34. - <u>Diaspis echinocacti</u> Bouche	155
Plate 35. - <u>Howardia biclavis</u> (Comstock)	159
Plate 36. - <u>Ischnaspis longirostris</u> (Signoret)	163
Plate 37. - <u>Lepidosaphes beekii</u> (Newman)	169
Plate 38. - <u>Lepidosaphes gloverii</u> (Packard).	174
Plate 39. - <u>Lepidosaphes tokionis</u> (Kuwana)	178
Plate 40. - <u>Lopholeucaspis cockerelli</u> (Grandpre & Charmoy) .	182
Plate 41. - <u>Niveaspis cattleyae</u> Lepage	186
Plate 42. - <u>Parlatoria proteus</u> (Curtis).	190
Plate 43. - <u>Pinnaspis buxi</u> (Bouche)	196
Plate 44. - <u>Pinnaspis strachani</u> (Cooley)	199
Plate 45. - <u>Pseudaulacaspis major</u> (Cockerell).	204
Plate 46. - <u>Pseudaulacaspis pentagona</u> (Targioni-Tozzetti). .	208
Plate 47. - <u>Pseudoparlatoria parlatorioides</u> (Comstock) . . .	212
Plate 48. - <u>Unaspis citri</u> (Comstock)	216

	<u>Page</u>
Plate 49. - <u>Velataspis dentata</u> (Hoke)	220
Plate 50. - <u>Odonaspis guadaue</u> n. sp.	226
Plate 51. - <u>Odonaspis saccharicaulis</u> (Zehntner)	229

INTRODUCTION

Scale insects are among the most serious plant pests throughout the world. The Diaspididae is the largest scale insect family and probably the most important economically.

No comprehensive taxonomic study dealing with the scale insects of Venezuela has been conducted in the past; old reports concerning these insects have been prepared on the species which are important as pest of citrus, Labrador (1958 and 1961) Doreste and Cermeli (1961). Ballou (1945) listed 31 scale insect species of which 16 were Diaspididae. Ferris (1941) reported 3 species of Diaspididae from Venezuela.

Forty-nine species are included in this study, of which 2 are new species (Abgrallaspis nakaharai n. sp., and Odonaspis guadaue n. sp.) and described herein. Twenty-seven additional species are recorded from Venezuela for the first time.

The description of each species is based on females, since males and nymphs were available only in a few species. While this is essentially a taxonomic and faunistic study, the hosts on which the scale insects were found are listed. No meaningful distribution can be made based on collections available, mainly because most of the collection were limited to those made by the author and his coworkers at the Instituto de Zoologia Agricola, U.C.V., in the vicinity of Maracay where the Institute is located, and most of the material borrowed from the U.S. National Museum of Natural History was collected from imported plant material by the U.S.D.A. Plant Quarantine Division Inspectors who gave for locality only

the country of origin "Venezuela".

Ballou (1945), listed Quadraspidiotus perniciosus (Comstock), as being present in Venezuela based on a single collection made from an infested apple tree imported from the U.S.A. It is the author's opinion that this species is not present at this time in Venezuela, because of the absence of its primary hosts, the cultivated trees belonging to the Rosaceae family, and also because of the influence of the tropical climate.

It is hoped that this study can be used as a basis for future research in Venezuela. More collecting needs to be made throughout the many ecologically different areas of the country; especially of non-cultivated plants. The accumulation of distributional and biological records will lead to a better understanding of the Venezuelan armored scale insect fauna.

MATERIALS AND METHODS OF STUDY

Diaspididae material examined

1. Universidad Central de Venezuela, Facultad de Agronomía, Instituto de Zoología Agrícola. Maracay, Aragua, Venezuela. Ing. Agr. Alfredo D'Ascoli, in charge of the collection.
2. Fundación Shell, Servicio Shell para el Agricultor, Departamento de Entomología. Collections were loaned through the courtesy of Ing. Agr. Mario Cermeli.
3. Ministerio de Agricultura y Cria, Centro de Investigaciones Agronómicas, Departamento de Entomología. Collections and records of Charles H. Ballou were seen through the courtesy of Ing. Agr. Nestor Angeles.
4. United States Department of Agriculture, Agricultural Research Service, Entomology Research Division. The important and essential material of the National Collection of Coccoidea was made available through the courtesy of Miss Louise M. Russell and Dr. Douglass R. Miller.

Mounting Methods

Specimens were preserved either dry or in 70% ethyl alcohol and were mounted on microscopic slides with the aid of an A0 Spencer binocular dissecting microscope.

Both dry and alcohol preserved specimens were mounted according to the following procedure:

1. The specimens were transferred into 10% KOH and heated until the KOH started to bubble.

2. All body contents were expelled while in KOH by slightly pressing the insect.
3. After the specimens became transparent, they were washed in distilled water, from 10 minutes to one hour.
4. The specimens were stained in acid fuchsin from 10 minutes to several hours, depending on the sclerotization of specimens obtained.
5. The specimens were transferred to 95% ethyl alcohol for 5 to 15 minutes or until all excess stain was washed out.
6. The specimens were transferred to clove oil for 10 minutes or more.
7. The specimens were mounted in Canada balsam under 12 or 15 mm cover glass.
8. The slides were permanently marked with a diamond point pencil.
9. Slides were kept in a drying oven at a temperature of around 40° C for 2 weeks before labeling.

Descriptions:

Morphological descriptions of the adult female are as follows: Prosoma, prepygidial segments and pygidium. For each body area the dorsal surface is described first. In the case of the pygidium, I follow the pattern of description used by most of the earlier authors (Ferris, 1938; Balachowsky, 1954; Kosztarab, 1959), starting from the apex of pygidium toward the anterior part. Records listed on the material studied as follows: scientific name of the host (when available), family of the host, locality, state, date of

collection, (Collector or his initials), (Collection: where the material is deposited). The statement, "Venezuela (Quarantine)", means that it was collected in the U.S. Customs by the Plant Quarantine Service Officers of the U.S.D.A., on plant material imported from Venezuela. The cities of Cagua, El Limon, Las Delicias, Maracay, Palo Negro and Turmero are located in Aragua state and to avoid much repetition, the state's name is not given. In the cases where no depository collection is given, in the second parenthesis after date, the material is deposited in Instituto de Zoologia Agricola Collection, U.C.V. Maracay, Venezuela and duplicated in the V.P.I.&S.U. Collection, Blacksburg, Virginia.

List of abbreviations

1. Collectors:

AD: Alfredo D'Ascoli
 CHB: Charles H. Ballou
 DV: David Villasmil
 FFY: Francisco Fernandez-Yepez
 JCM: Jose Carlos Marin
 JT: Jorge Teran
 MC: Mario Cermeli
 SC: Santiago Clavijo

2. Collections:

CIA: Centro de Investigaciones Agronomicas Collection
 IZA: Instituto de Zoologia Agricola Collection
 SSPA: Servicio Shell para el Agricultor Collection
 USNM: U.S. National Museum of Natural History

3. Dates:

Arabic: day

Roman: month

Arabic:Year (last two digits)

Measurements

All measurements are in microns unless stated otherwise. Measurements were made using an ocular micrometer and a Reichert phase contrast microscope. Magnification was from 35X to 1500X. The measurements in the text show the average, followed by the range in parentheses. Averages under 10 microns were rounded off to the nearest tenth of a micron. When many specimens of a species were studied, the range recorded includes the range of variation, but when few specimens were studied, it is possible that the range limits could be expanded with additional material.

Illustrations

Drawings are outlined using a Leitz Prado 500 microslide projector. The details and enlargements were drawn by using a Zeiss RA and a Reichert phase contrast microscope and a Zeiss camera lucida for certain structures. Each figure has a central drawing for the whole specimen with the left half representing the dorsal surface and the right half the ventral surface. All drawings are not made to the same scale, and the enlargements are not in proportion with each other.

KEY TO THE FAMILIES OF COCCIDEA OF VENEZUELA

(The key refers only to adult females)

1. Abdominal spiracles present. 2
Abdominal spiracles absent 3
2. Anal ring reduced, without pores and setae MARGARODIDAE
Anal ring well developed, with many pores
and 6 long setae. ORTHEZIIDAE
3. Legs absent or reduced to sclerotized
tubercles or plates 4
Legs well developed. 7
4. Eight-shaped pores present 5
Eight-shaped pores absent. 6
5. Antennae well developed, with 5 to 9
segments. LECANODIASPIDIDAE
Antennae represented by an unsegmented
tubercle. ASTEROLECANIIDAE
6. Last abdominal segments fused into a pygidium;
labium 1-segmented; anal cleft absent DIASPIDIDAE
Pygidium absent; labium 2-segmented;
anal cleft present. ACLERDIDAE
7. Legs with tibia and tarsus fused into a
single segment. CONCHASPIDIDAE
Legs with tibia and tarsus separated 8
8. Anal ring absent; anal opening a
transverse slit DACTYLOPIIDAE

- Anal ring well developed and bearing setae;
- anal opening circular. 9
9. Dorsal ostioles and ventral circuli present . . PSEUDOCOCCIDEA
- Dorsal ostioles and ventral circuli absent. 10
10. Anal cleft and two anal plates present. COCCIDAE
- Anal cleft and anal plates absent ERIOCOCCIDAE

SUBFAMILY AND KEY TO TRIBES OF DIASPIDIDAE IN VENEZUELA

All the species of Diaspididae of Venezuela on this work belong to the subfamily Diaspidinae which is represented by 3 tribes.

Key to the tribes of Diaspidinea of Venezuela

1. Median lobes fused into a single lobe; adult female without plates or gland spines; microducts not segmentally arranged. ODONASPIDINI
- Median lobes never fused into a single lobe; adult female with plates or gland spines; microducts and macroducts usually showing some evidence of segmental arrangement 2
2. Microducts of the one-barred type; second pygidial lobe simple; fringed plates normally present; adult female antennae with one seta; gland tubercles and gland spines absent ASPIDIOTINI
- Microducts of the two-barred type; second pygidial lobe bilobed; fringed plates normally absent; adult female antennae with two or more setae; gland tubercles and gland spines usually present. . DIASPIDINI

LIST OF SPECIES INCLUDED

The species marked with an asterisk (*) are new additions to the Venezuelan coccid-fauna.

Family: DIASPIDIDAE

Subfamily: DIASPIDINAE

Tribe: ASPIDIOTINI

Abgrallaspis

*cyanophylli (Signoret)

*diffinis (Newstead)

*nakaharai n. sp.

*palmae (Cockerell)

Acutaspis

agavis (Townsend & Cockerell)

perseae (Comstock)

reniformis (Cockerell)

Aonidiella

*aurantii (Maskell)

*orientalis (Newstead)

Aspidiella

*hartii (Cockerell)

*sacchari (Cockerell)

Aspidiotus

destructor Signoret

Chrysomphalus

aonidium (Linnaeus)

dictyospermi (Morgan)

*pinnulifer (Maskell)

*propsimus Banks

Clavaspis

*herculeana (Doane & Hadden)

Furcaspis

biformis (Cockerell)

Hemiberlesia

lataniae (Signoret)

*rapax (Comstock)

Melanaspis

*alinea (Newstead)

*santensis Lepage

*tenax McKenzie

Mycetaspis

*defectopalus Ferris

*personata (Comstock)

Palinaspis

*barbata Ferris

Pseudaonidia

*trilobitiformis (Green)

Selenaspis

articulatus (Morgan)

Tribe DIASPIDINI

Aulacaspis

rosae (Bouche)

tubercularis Newstead

*echinocacti (Bouche)

Diaspis

boisduvalii Signoret

*echinocacti (Bouche)

Howardia

*biclavis (Comstock)

Ischnaspis

longirostris (Signoret)

Lepidosaphes

beckii (Newman)

gloverii (Packard)

*tokionis Kuwana

Lopholeucaspis

cockerelli (Grandpre & Charmoy)

Niveaspis

*cattleyae Lepage

Parlatoria

proteus (Curtis)

Pinnaspis

*buxi (Bouche)

strachani (Cooley)

Pseudaulacaspis

pentagona (Targioni-Tozzetti)

major (Cockerell)

Pseudoparlatoria

*parlatoriodes (Comstock)

Unaspis

citri (Comstock)

Vetalaspis

*dentata (Hoke)

Tribe ODONASPIDINI

Odonaspis

*gadua n. sp.

*saccharicaulis (Zuehntner)

MORPHOLOGICAL CHARACTERISTICS OF THE DIASPIDINAE FEMALES

The body is covered with a removable scale, which is composed of first and second instar exuviae, and wax secreted by the adult female. The waxy secretions may extend underneath and completely envelope the female. In Lopholeucaspis, the adult female remains within the cast skin of second molt, and called pupillarial.

Adult female

(Illustrated in Plate 1, unless otherwise stated)

Segmentation of the body

Throughout the Coccoidea, there is a tendency for the segments of the body to become fused. In Diaspididae, this fusion of segments reaches the maximum. For this study, the body will be considered in 3 parts: Prosoma, composed of the head and thoracic segments. In most cases, it is difficult to separate the prosoma from the abdomen, except for the presence of the metathoracic spiracle. The prepygidial segments of the abdomen are composed of segments I through IV. The pygidium is composed of the fused segments V through VIII. Ferris (1941), considered segments IX, X, and XI to be greatly reduced, and represented only by the vulva and the anal opening.

Setae

All the species have setae. These are of primary importance in determining the basic segmentation of the abdomen, since they occupy fixed positions, there is one for each pygidial segment on the dorsal side (Plate 2).

Antennae

In all species, the antennae are reduced to an unsegmented

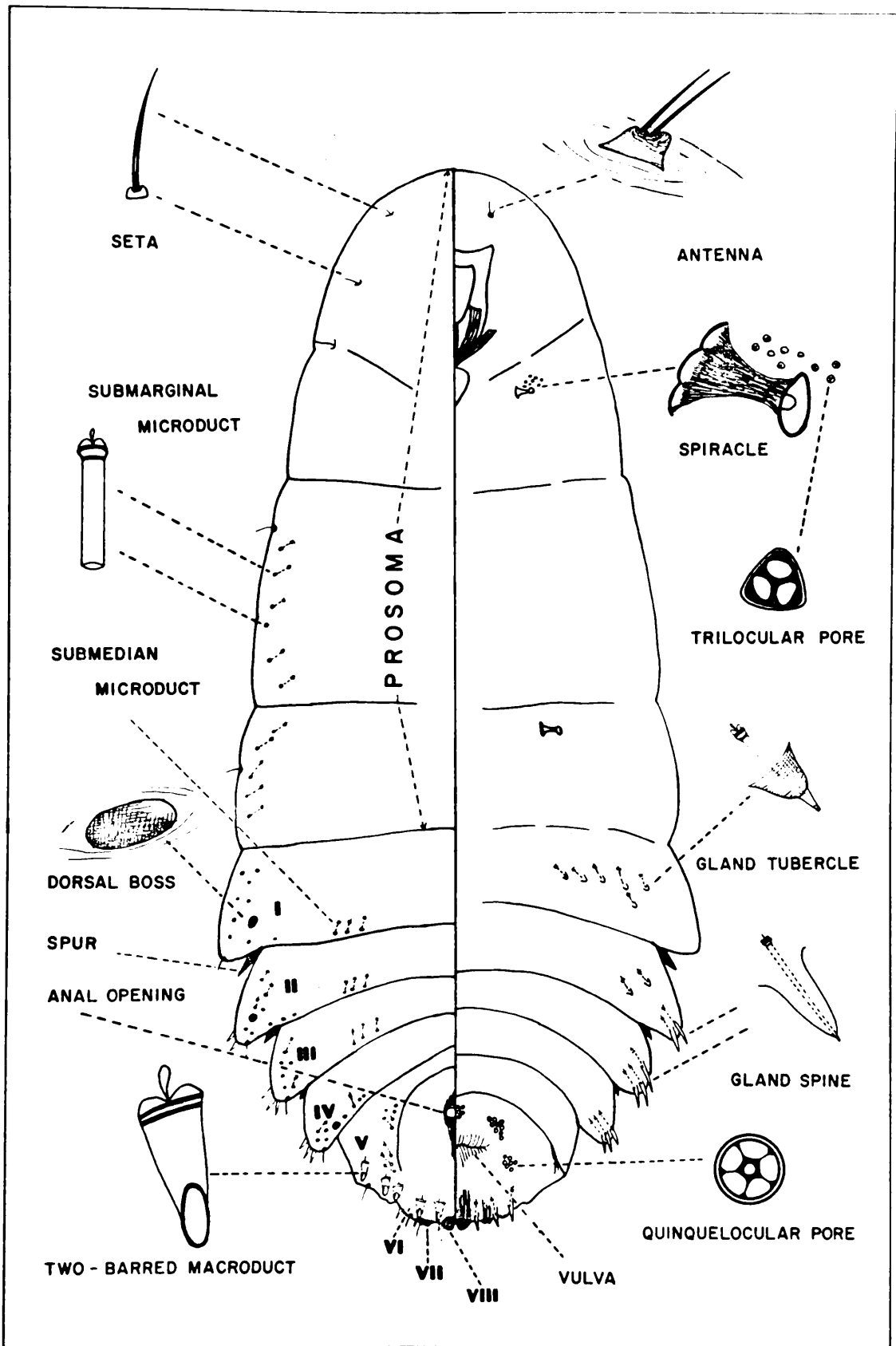


Plate I. - General morphology of a Diaspidinae female

tubercle bearing one or more setae. This is not of taxonomic value for recognition of genera or species, but may be helpful in determining tribes. The tribe Diaspidini have two or more setae, while the Aspidiotini rarely bear more than one.

Mouthparts

These are made up of the clypeolabral shield, with the internal framework of the tentorium, and the bases of the mandible and maxillae. The one-segmented labium is usually cup-shaped. For the purpose of this work, the mouthparts have no significance, and only the measurements will be given.

Spiracles

Two thoracic pairs only. Illustrations have been for all the species, but because of their similarity, they are of little taxonomic value. The associated pores in Diaspidini are of 2 types, trilocular and quinquelocular. These are of taxonomic value for the separation of genera. In Aspidiotini, with the exception of the genera Pseudaonia and Furcaspis, these pores are absent.

Tubular ducts

Members of the family Diaspididae form part of the scale covering from secreted wax. This wax is produced by glands that open through tubular ducts. These ducts seem to be of two types: either one-barred ducts, (Plate 2), which are slender, and bear one sclerotized bar as inner closure, are characteristic of the tribe Aspidiotini. Or two-barred ducts, which are relatively short, and their inner closure seems to be formed from two parallel, transverse, sclerotized bars.

They are characteristic of the tribe Diaspidini. In this second type, two forms may be distinguished: Two-barred macroducts, usually restricted to the pygidial area. These are quite broad, and the opening, in most cases, with a sclerotized ring-like structure. The two-barred microducts are short, with minute openings. They may be found throughout the body.

Gland spines and gland tubercles

These are present in most of the Diaspidini, as marginal and submarginal structures. They are usually elongated conical processes. One or more slender microduct extends through the length of the process, with the orifice located at the apex. The term "gland spine" is used for the hyaline, elongated ones, usually restricted to the abdomen. The term "gland tubercle" is used for the short, slightly sclerotized ones, usually present on the prosoma and prepygidial segments only.

Plates: (Plate 2)

Plates are present in most of the Aspidotini, as marginal pygidial structures. In general, these membranous structures are more or less branched or fimbriate, sometimes may be much reduced and unbranched. They seldom contain microducts.

Pygidial lobes: (Plate 2)

In Aspidiotini and Diaspidini, the pygidial segments, are in part, produced at their lateral margins into flattened, sclerotized processes, called "lobes". The number of pairs of lobes are variable. Median lobes, or L_1 , are part of segment VIII. They are always

present, located side by side at the apex of the pygidium. The second pair, or L_2 , normally are part of segment VII. L_2 may be bilobed, as in Diaspidini, or simple, as in Aspidotini. If a third pair, or L_3 , are present, they are part of segment VI and may be bilobed or simple. In a few species, a definite fourth pair, or L_4 , may be found which are part of segment V. In species with reduced lobes, the segmentally arranged setae, which are normally present at the base of the lobes, remain to mark the position of the segment (e.g. Palinaspis barbata).

Pygidial scleroses: (Plate 2)

Along the margin of the pygidium, are found some sclerotized structures, commonly referred to as paraphyses. These structures usually arise from the angles of the lobes. In addition, there may be paraphyses in the interlobular spaces, as in Melanaspis and related genera.

Anal opening

The anus is a circular or oval opening in the dorsum of the pygidium. The size and position varies with the genus, and has been used as a taxonomic character. A sclerotized area, free of pores and setae, often surrounds the anus.

Perivulvar pores

The quinquelocular pores in the region of the vulva are commonly referred to as perivulvar pores. The most common arrangement of these pores is in five groups. In the species descriptions a system of abbreviations is used to show the number of pores in the various

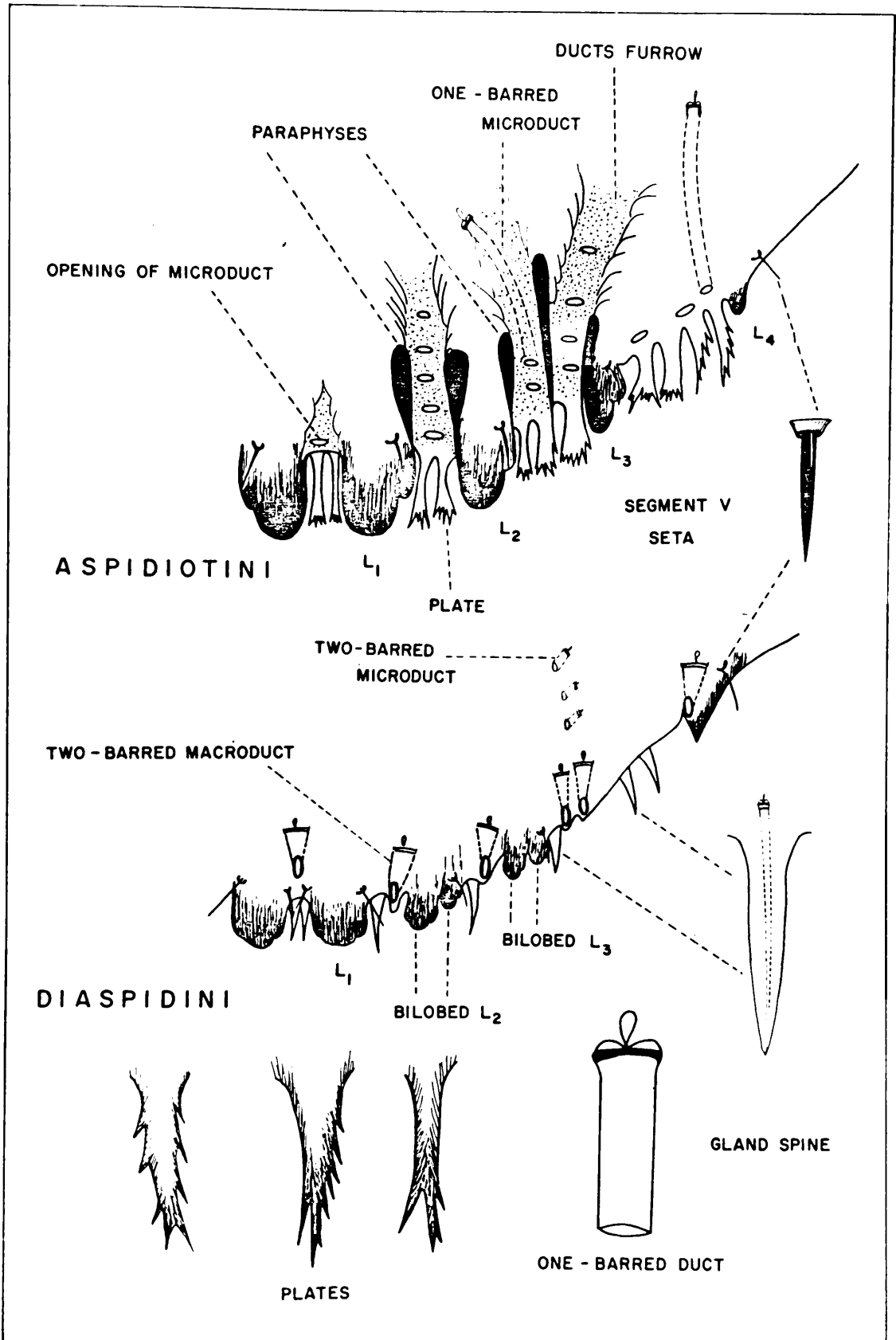


Plate 2. - Morphological details of pygidium

groups. If there are 7 or 8 pores in the posterior 2 groups, 8 to 10 pores in the 2 median groups, and 3 to 4 pores in the anterior group, it would be shown as follows: 7-8,(8-10),3-4. When only 4 groups are present, the formula will end in 0, meaning that anterior group is absent.

TRIBE ASPIDIOTINI

Key to the genera of the tribe Aspidiotini in Venezuela

1. Fourth pair of pygidial lobes present 2
 Fourth pair of pygidial lobes absent. 5
2. Dorsum of pygidium with a large and
 conspicuous reticulation Pseudaonidia
 Dorsum of pygidium without reticulation 3
3. Two paraphyses in second interlobular
 space. Chrysomphalus
 Three paraphyses in second interlobular
 space. 4
4. Cephalic region produced to a lobe-like
 structure; margin of abdomen sculptured. Mycetaspis
 Cephalic region without lobe-like structure;
 margin of abdomen not sculptured Melanaspis
5. Deep constriction between meso and
 metathorax Selenaspidus
 No constriction between meso and
 metathorax 6
6. L₂ and L₃ absent. 7
 L₂ and L₃ represented at least by small
 sclerotization of the margin or well developed 8
7. Paraphyses arising from mesal angles of median
 lobes long, wide, and with a terminal knob;
 dorsal bosses absent Clavaspis

- Paraphyses arising from mesal angles of
 median lobes short and slender without
 terminal knob; dorsal bosses present Palinaspis
8. Trilocular pores associated with anterior
 spiracle; plates chelate Furcaspis
- No pores associated with anterior spiracles;
 plate never chelate 9
9. Paraphyses present 10
 Paraphyses absent. 13
10. Second interlobular space with 3 paraphyses;
 pygidium acute. Acutaspis
- Second interlobular space with 2 paraphyses;
 pygidium short and broad. 11
11. L_2 and L_3 small membranous; plates beyond
 L_3 few short and non-fimbriated Hemiberlesia
- L_2 well developed, L_3 tooth-like and
 sclerotized well developed; plates
 beyond L_3 fimbriated. 12
12. L_3 well developed, notched on outer side; mesal
 paraphyses of median lobes well developed Aonidiella
- L_3 lanceslate or spiniform; mesal paraphyses
 of median lobes absent. Abgrallaspis
13. L_3 well developed and notched on outer side;
 plates beyond L_3 numerous and fimbriated. Aspidiotus
- L_3 poorly developed; plates beyond L_3 absent or
 non-fimbriated Aspidiella

Genus Abgrallaspis Balachowsky

Type of the genus: Aspidiotus cyanophylli Signoret, 1869.

Abgrallaspis Balachowsky, 1948:306; 1956:14; Schmutterer, 1959:73;

Kosztarab, 1964:14; Davidson, 1964:638; Borchsenius, 1966:313;

Morrison and Morrison 1966:1; Komosinska, 1969:46. Borchseniaspis

Zahradnik, 1959:65.

Description of the genus

Referable to the tribe Aspidiotini, with one barred duct, fringed plates. Median lobes well developed and prominent, notched on both sides or one only; L_2 well developed smaller than L_1 , triangular or notched on outer side; L_3 smaller than L_2 , lanceolate or spiniform. Paraphyses present at base of the interlobular spaces. Prosoma at maturity membranous or very slightly sclerotized. Anal opening conspicuously large and posterior to vulva; its diameter about the same as the length of median lobes.

Key to species of Abgrallaspis

1. Perivulvar pores present 2
 Perivulvar pores absent 3
2. L_2 notched on the outer side; anal opening
 removed 1 1/2 times its diameter from the
 margin cyanophylli (Signoret)
 L_2 laceolate; anal opening removed less than
 one time its diameter from the margin . . . palmae (Cockerell)
3. L_1 notched on both margins; dorsal microducts
 present on prepygidial segments. nakaharai n. sp.

L₁ notched on the outer margin only; dorsal

microducts absent on prepygidial segments . . diffinis (Newstead)

Abgrallaspis cyanophylli (Signoret)

Plate 3

Aspidiotus cyanophylli Signoret, 1869:119; Dietz and Morrison, 1916:

294. Aspidiotus (Evanspidiotus) cyanophylli Leonardi, 1898:75.

Furcaspis cyanophylli MacGillivray, 1921:407. Hemiesia cyano-

phylli Ferris, 1938:SII-237; Zimmerman, 1948:358. Abgrallaspis

cyanophylli Balachowsky, 1943:322; 1956:16; Schmutterer, 1959:73;

Borchsenius, 1966:314; Komosinska, 1969:56. Diaspidiotus cyano-

phylli Bodenheimer, 1952:337.

Material studied

On Persea americana, Lauraceae, Caracas, D. F., 4-VII-40 (CHB) (CIA & USNM). Pithecolobium saman, Leguminosae, Venezuela, (Quarantine), 16-IV-59. Unidentified Leguminosae, Venezuela (Quarantine), 22-V-51.

Scale of the female

Whitish or gray, elongated oval, flat exuviae central.

Adult female

Body pyriform (fig. a) 767 (605 to 975) long, 411 (502 to 709) wide. Derm at maturity membranous except for the pygidium which is slightly sclerotized.

Prosoma

With a marginal thoracic spine (fig. b) acute and sclerotized.

Ventrum: Antenna (fig. c) a sclerotized tubercle with one seta about

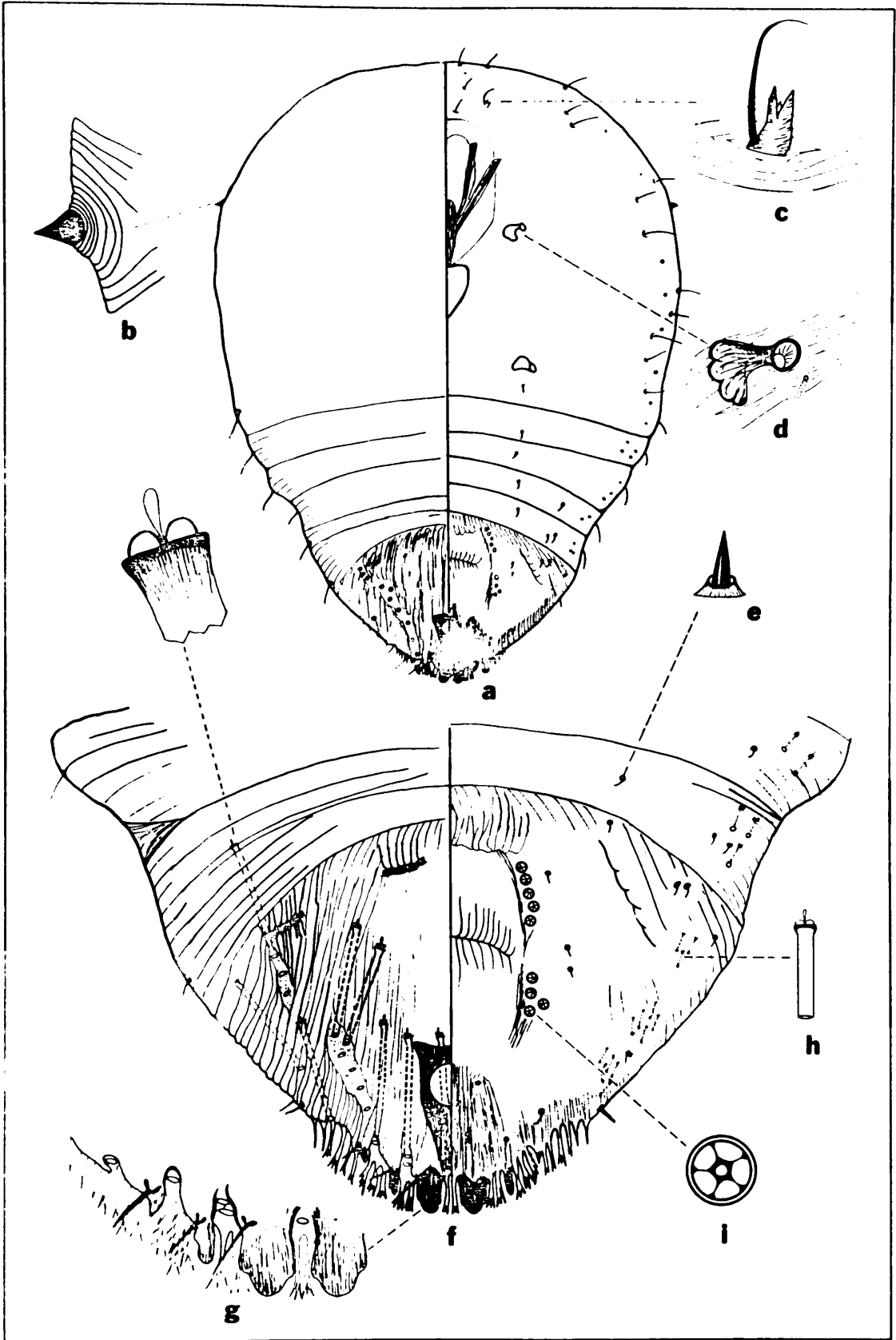


Plate 3. - *Abgrallaspis cyanophylli* (Signoret)

23 long. Clypeolabral shield 140 long and 110 wide; Anterior spiracle (fig. d) with 1 associated microduct; posterior spiracle same size and shape of anterior spiracle and with 1 associated microduct.

Band of submarginal microducts and setae around the entire prosoma.

Prepygidial segments of abdomen

Ventrum: Segments I to IV with submarginal clusters of microducts and a pair of conical setae (fig. e) submedially.

Pygidium (fig. f)

Dorsum: Median lobes (fig g) well developed, notched on both sides, 15 wide, separated from each other by a distance about half its width; L_2 smaller than L_1 , notched on the outer side, L_3 short, without notches, pointed. Paraphyses short and narrow, on the interlobular spaces and arising from the angles of the lobes. Marginal microducts about 50 long, 1 between median lobes, 2 between L_1-L_2 , 1 between L_2-L_3 ; 1 beyond L_3 ; rows of 4 submarginal microducts and 6 submedially. Anal opening almost circular, 23 in diameter; placed about $1\frac{1}{4}$ times this diameter from the base of L_1 ; located posterior to vulva on the venter. Anal apophysis present; area around the anal opening heavily sclerotized.

Ventrum: Plates on the interlobular spaces fimbriated, 1 pair between median lobes, as long as the lobes, 2 between L_1-L_2 , 3 between L_2-L_3 slightly branched and fimbriated on the sides; 5 or 6 beyond L_3 some of them being spiniform. Submarginal clusters of microducts (fig. h) on segments VI and V. Conical setae (fig. e) 4 pairs submarginally, 3 latera of perivulvar pores, 3 on the anterior margin of the pygidium.

Quinquelocular perivulvar pores (fig. 1) in 4 groups, formula 3-6,(4-7),0. Paravular scleroses slightly developed. Ventral scleroses arising from L₂.

Illustration based on material from Phitecolobium saman, Venezuela (Quarantine).

Recognition characteristics

The 3 pairs of well developed lobes, conspicuously large anal opening, binotched median lobes, L₂ notched on the outer side, Perivulvar pores in 4 groups, acute and sclerotized thoracic spine and anal apophysis makes this species distinct.

Notes

This polyphagous species is very widely distributed; it has been recorded from all regions of the world. It is a new addition for the Venezuelan Coccid-fauna.

Abgrallaspis diffinis (Newstead)

Plate 4

Aspidiotus affinis Newstead, 1893a:186. Aspidiotus diffinis Newstead, 1893b:281. Aspidiotus (Diaspidiotus) diffinis Cockerell, 1897a:23. Hemiberlesia diffinis Leonardi, 1897b:132; Ferris, 1938:SII-238; Balachowsky, 1948:298; 1956:107; Kosztarab, 1964:34; Borchsenius, 1966:305. Aspidiotus jatrophae var. parrotti Newell, 1899:23. Aspidiotus diffinis parrotti Fernald, 1903:258. Hemiberlesia diffinis parrotti MacGillivray, 1921:438.

Material studied

One female on Spondias mombin, Anacardiaceae, El Limon, 26-V-66

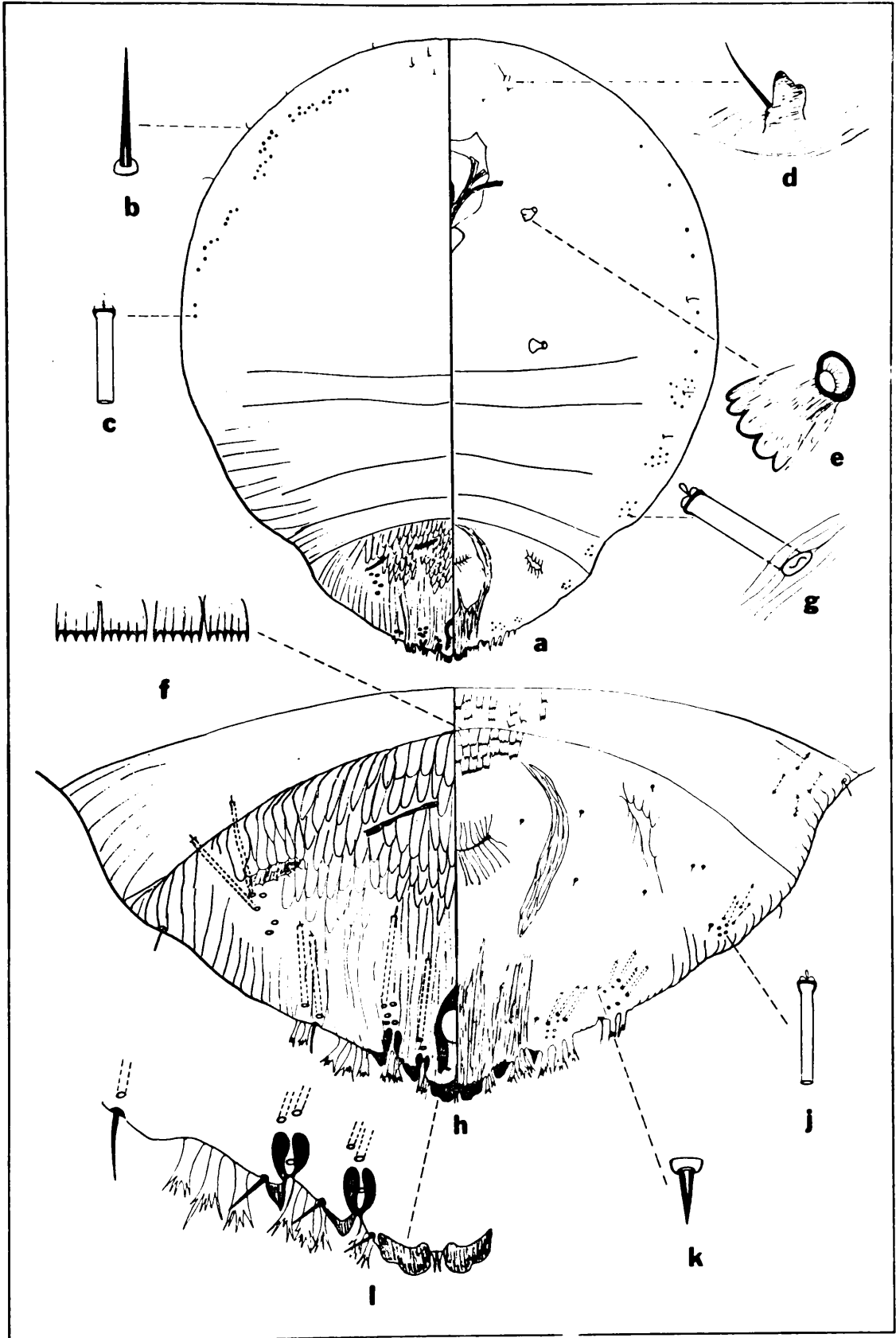


Plate 4.- *Abgrallaspis diffinis* (Newstead)

(AD).

Scale of the female

Gray, somewhat elongate, convex, exuviae submarginal.

Adult female

Body subcircular (fig. a) 1221 long, and 1137 wide; Derm membranous at maturity.

Prosoma

Dorsum: With several marginal setae (fig. b) on the head. Band of submarginal microducts (fig. c).

Ventrum: Antenna (fig. d) a sclerotized tubercle with 1 seta about 23 long. Clypeolabral shield 215 long and 140 wide. Anterior and posterior spiracle (fig. e) without associated ducts or pores of same size and shape. Area between the spiracles with several rows of slightly sclerotized serrate squamations (fig. f). Row of submarginal microducts from the level of anterior spiracle to the abdomen.

Prepygidial segments of abdomen

Ventrum: Segment I to IV with submarginal clusters of microducts (fig. g). Rows of serrate squamations (fig. f) medially on each segment.

Pygidium (fig.h)

Ventrum: Median lobes (fig. i) well developed, notched on the outer side, 20 wide, separated from each other by a distance less than a half its width; L_2 much smaller than L_1 and lanceolate; L_3 short, in the form of a small, sharply pointed tooth. Paraphyses well developed, 1 pair located between L_1 - L_2 and 1 pair between L_2 - L_3

in the interlobular spaces. Pygidial microducts about 109 long, 3 on segment VII, 6 on segment VI and 7 on segment V. Anal opening oval, 20 in diameter; placed about 1 time this diameter from the base of L_1 ; located posterior to vulva on the venter. Anal apophysis wide and not reaching the apex of pygidium.

Ventrum: Plates on the interlobular spaces fimbriated, 1 pair between the median lobes; 2 between L_1 - L_2 , 3 between L_2 - L_3 slightly branched; 3 beyond L_3 slightly branched; 2 beyond the seta of segment V. Submarginal clusters of microducts (fig. j) on segments VII, VI and V. Conical setae (fig. k) 3 pairs submarginally, 2 pairs lateral of paravulvar scleroses, 1 pair anterior to vulva, 4 additional pairs on segment V. Paravulvar scleroses well developed. Ventral scleroses, continuous arising from bases of L_1 and L_2 .

Illustration based on material from Spondias mombim, El Limon, Aragua, Venezuela.

Recognition characteristics

The 3 pairs of well developed lobes, conspicuously large anal opening; L_1 notched on the outer side, L_2 and L_3 well developed; absence of perivulvar pores and dorsal microducts on the prepygidial segments of abdomen makes this species distinct.

Notes

This polyphagous species is known only on the tropical and subtropical regions of the new world. It is a new addition to the Venezuelan coccid-fauna.

Abgrallaspis nakaharai n. sp.

Plate 5

Material studied

One slide with 2 adult females intercept in Quarantine at Miami, Fla., on Sobralia sp., Orchidaceae, by A. S. Mills, 7-IX-48. This slide, labeled "Miami 879" and "USNM 49-691", is in the U.S. National Museum of Natural History collection of Coccoidea. Holotype female is the encircled specimen on the slide. No dry material was available for the study of a larger series and the scale of the female.

Adult female

Body oval (fig. a) 768 to 1063 long, 428 to 738 wide; Derm membranous at maturity except for the pygidium which is slightly sclerotized.

Prosoma

With a marginal thoracic spine (fig. b) acute and sclerotized.

Dorsum: Row of 3 submarginal microducts (fig. c) on the metathorax; several marginal setae scattered from the head to the abdominal segments.

Ventrum: Antenna (fig. d) a sclerotized, cylindrical tubercle with 1 seta about 23 long arising from the side; on the top of the antenna is a pit with 2 small short setae. Clypeolabral shield 180 long and 112 wide. Anterior spiracle (fig. e) surrounded by stripped sclerotization and 1 associated microduct (fig. f); posterior spiracle same size and shape of anterior spiracle. Area between anterior

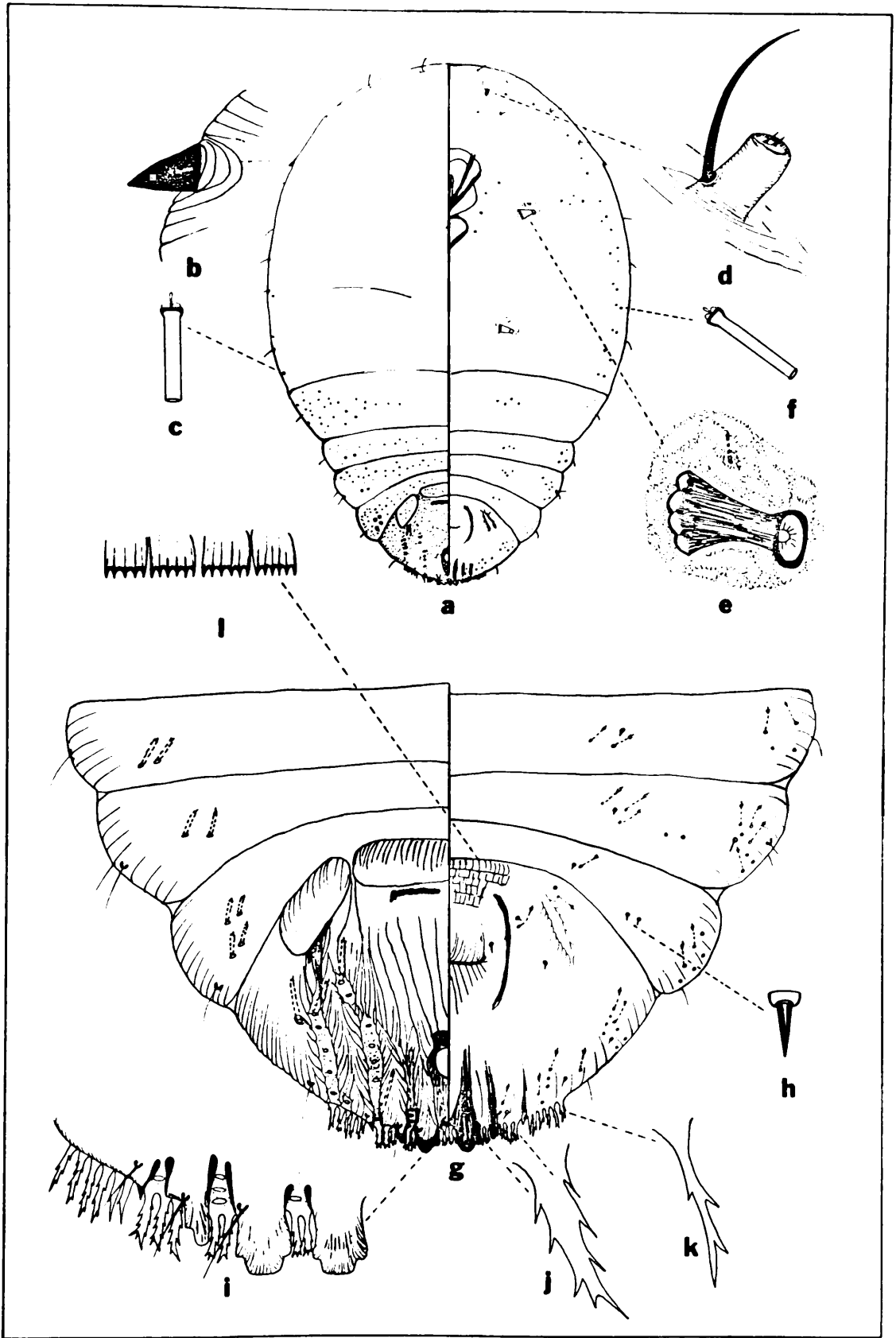


Plate 5. - *Abgrallaspis nakaharai* n.sp.

spiracle and clypeolabral shield with a row of 4 or 5 microducts. Submarginal area of the prosoma with a band of microducts (fig. f) and few scattered setae.

Prepygidial segments of abdomen

Dorsum: Segments I to III with 2 pairs of submarginal microducts, about 31 long, and one marginal seta; segment IV (fig. g) with a cluster of 4 microducts submarginally and 1 seta.

Ventrum: Segments I to IV with a cluster of 6 to 10 microducts submarginally, additional clusters of 1 to 3 microducts submedially associated with 1 conical seta (fig. h); segments III and IV with 2 pairs of submarginal conical setae.

Pygidium.

Dorsum: Median lobes (fig. i) well developed, prominent, margins straight and parallel, notched on both sides, 20 wide; separated by a distance shorter than the width of one of them; L_2 smaller than L_1 and notched on the outer side; L_3 smaller than L_2 , in the form of a small, sharply pointed tooth. Paraphyses short and narrow, on the interlobular spaces arising from the angles of the lobes. Marginal pygidial microducts, about 31 long, 1 between the median lobes; 3 between the paraphyses of L_1 - L_2 ; 1 between the paraphyses of L_2 - L_3 ; additional rows of 6 or 7 pygidial microducts submarginally and submedially. Anal opening oval, 21 in diameter; placed 1 1/2 times from the base of L_1 . Anal apophysis present and surrounding the anal opening.

Ventrum: Plates fimbriated mainly on the sides (figs. j & k), located

1 pair between the median lobes; 2 between L_1 - L_2 ; 3 between L_2 - L_3 and 6 beyond L_3 . Clusters of 2 to 8 microducts submarginally on segments VII, VI, and V; 2 additional microducts on the anterior margin. Conical setae, 3 pairs submarginally; 2 lateral of paravulvar scleroses and anterior to vulva. Perivulvar pores absent. Paravulvar scleroses present. Ventral scleroses arising from the base of the lobes. Several rows of slightly sclerotized serrate squamations (fig. 1) anterior to vulva.

Illustration based on material from Sobralia sp., Orchidaceae, Venezuela (Quarantine).

Recognition characteristics

A. nakaharai can be separated from the closely related species, those lacking perivulvar pores and with dorsal microducts on the prepygidial segments, by the following characteristics: A. seurati (Marchal) and A. kaussarii Balachowsky all lacking L_3 , while A. nakaharai has those well developed. A. amygdalicola (Borchsenius) has more than 10 submarginal microducts on each prepygidial segment, A. nakaharai has only 2 to 4. A. mammillaris (Lindinger) lacks plates beyond L_3 while A. nakaharai has 6 well developed plates beyond L_3 .

Notes

A. nakaharai n. sp. is named after Mr. Sueo Nakahara of the Plant Quarantine Division, USDA, who aided me in many ways during the preparation of this work.

Abgrallaspis palmae (Cockerell)

Plate 6

Aspidiotus rapax var. palmae Cockerell, 1892:333. Aspidiotus palmae Cockerell, 1893a:39. Aspidiotus (Hemiberlesia) palmae Cockerell, 1897:24. Aspidiotus (Evanspidiotus) palmae Leonardi, 1898:75. Aspidiotus unguiculatus Leonardi, 1914:199. Furcaspis palmae MacGillivray, 1921:407. Gonaspidotus unguulatus MacGillivray, 1921:432; Hemiberlesia palmae Ferris, 1938:SII-242; Balachowsky 1956:114; Schmutterer, 1959:71; Abgrallaspis palmae Balachowsky, 1948:320. Borchseniaspis palmae Zahradnik, 1959:65; Borchsenius, 1966:313.

Material studied

One female on Maximilian sp., Palmae, "Catalina Lower Orinoco", Venezuela, May 1896 (Rusby & Squires) (USNM).

Scale of the female

Not seen, described by Ferris, 1938, as "white, somewhat oval, quite convex, exuviae subcentral and very dark".

Adult female

Body circular (fig. a) 443 long, 384 wide; Derm membranous at maturity.

Prosoma

With a marginal thoracic spine (fig. b) acute and sclerotized, with 2 associated marginal setae.

Dorsum: With a pair of dorsal bosses submedially on the head; a row of marginal setae (fig. c) and another row of submedian setae

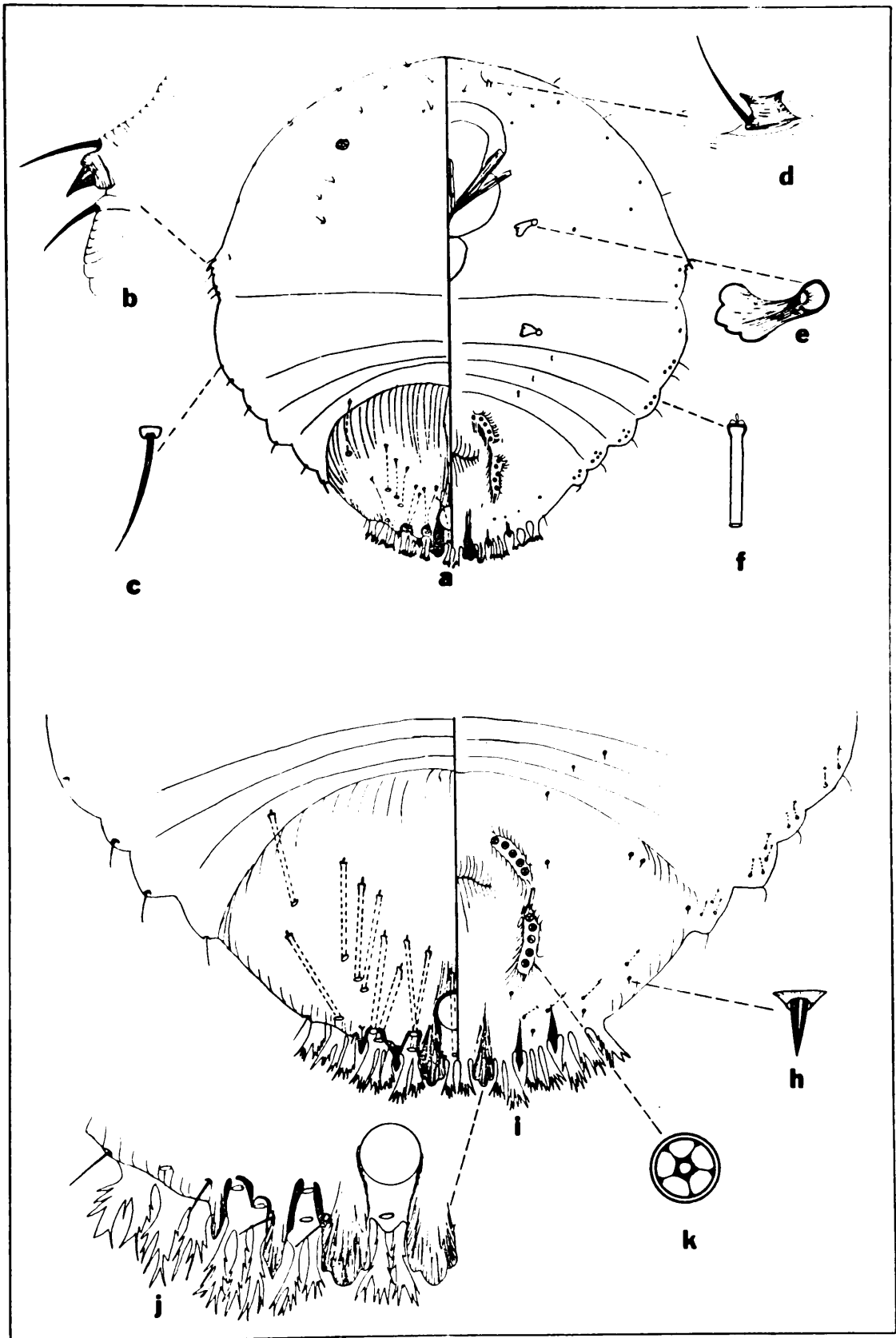


Plate 6. - *Abgrallaspis palmae* (Cockerell)

on the head.

Ventrum: Antenna (fig. d) reduced a sclerotized tubercle with 1 seta about 20 long. Clypeolabral shield 164 long and 136 wide; Anterior spiracle (fig. e) without associated ducts or pores; posterior spiracle similar in size and shape to anterior spiracle. Several scattered microducts (fig. f) on the head continuous row of submarginal microducts from the thoracic spine to the pygidium.

Prepygidial segments of abdomen

Dorsum: Segments I to IV with 1 pair of marginal setae (fig. c) each.

Ventrum: Segments I to IV with submarginal clusters of microducts and a pair of conical setae (fig. h) submedially.

Pygidium (fig. f)

Dorsum: Median lobes (fig. j) well developed, prominent, straight, parallel, notched on both sides, 20 wide, separated by a distance equal to the width of one of them; L_2 smaller than L_1 , lanceolate; L_3 smaller than L_2 , in the form of a small, sharply pointed tooth. Paraphyses short and narrow, on the interlobular spaces arising from the angles of the lobes. Marginal microducts about 58 long, 1 between median lobes; 2 between L_1 - L_2 ; 2 between L_2 - L_3 ; 1 beyond L_3 ; a row of 4 microducts submedially. Anal opening circular, conspicuously large, 23 in diameter; placed by less than its diameter from the base of L_1 . Anal apophysis absent.

Ventrum: Plates unusually large, all exceeding the median lobes in length, extremely fimbriated and many of them branched and fimbriated laterally; 1 pair located between median lobes; 2 between L_1 - L_2 ; 3

between L_2 - L_3 ; 3 larger ones beyond L_3 . A row of 4 microducts submarginally; between this row of microducts and the margin there is a row of 3 conical setae (fig. h), 2 more laterad of perivulvar pores. Quinquelocular perivulvar pores (fig. k) in 4 groups, formula - , (-), 0.

Illustration based on material from Maximiliana sp., Palmae, "Catalina Lower Orinoco" Venezuela.

Recognition characteristics

The unusual large and fimbriated plates, conspicuously large anal opening and 3 pairs of well developed lobes makes this species distinct.

Notes

This species is known from many countries in the tropical and subtropical regions of the world, especially on palms but is also found in a wide variety of plants. This is a new addition for the Venezuelan coccid-fauna.

Genus Acutaspis Ferris

Type of the genus: Aspidiotus perseae Comstock, 1881.

Acutaspis Ferris, 1941:SIII-328; McKenzie, 1956:22; Balachowsky 1958:164; Balachowsky 1959:360; Schmutterer 1959:109; Kosztarab 1963:18; Borchsenius, 1966:354; Morrison and Morrison 1966:3.

Description of the genus

Referable to the tribe Aspidiotini; one-barred ducts, L_2 not bilobed; Prosomatic region subcircular, pygidium strongly acute, angle subtended by the apex of pygidium being less than 90 degrees.

Acutaspis agavis (Townsend and Cockerell)

Plate 7

Aspidiotus agavis Townsend and Cockerell, 1898:178. Chrysomphalus agavis Cockerell, 1899a:396; Fernald, 1903:285; MacGillivray, 1921:421; Ballou, 1945:91. Acutaspis agavis Ferris, 1941:SIII-329; McKenzie, 1947:34. Borchsenius, 1966:354. Melanaspis agaves Lindinger, 1943:147.

Material studied

On Agave cocui, Amaryllidaceae, Ejido, Merida, (23-III-69) (Trujillo). On Agave sisalana, Amaryllidaceae, Barquisimeto, Lara, 3-X-41 (Sigala) (IZA & USNM).

Scale of the female

Body subcircular, (fig. a) 935 (827 to 1196) long, 745 (605 to 1004) wide; Derm at maturity membranous except for a slight sclerotization of pygidium.

Prosoma

Thoracic margin with a small, sclerotized tubercle (fig. b).

Dorsum: With a submarginal continuous band of microducts from the head to the pygidium.

Ventrum: Antenna (fig. c) a sclerotized tubercle with 1 lateral seta, about 16 long. Clypeolabral shield 183 long and 152 wide; anterior spiracle (fig. d) with 3 associated microducts; posterior spiracle same size and shape, but without associated microducts.

Prepygidial segments of abdomen

Dorsum: Segments I to IV with a submarginal row of 3 or 4 microducts and a submedian cluster of 2 or 3 microducts.

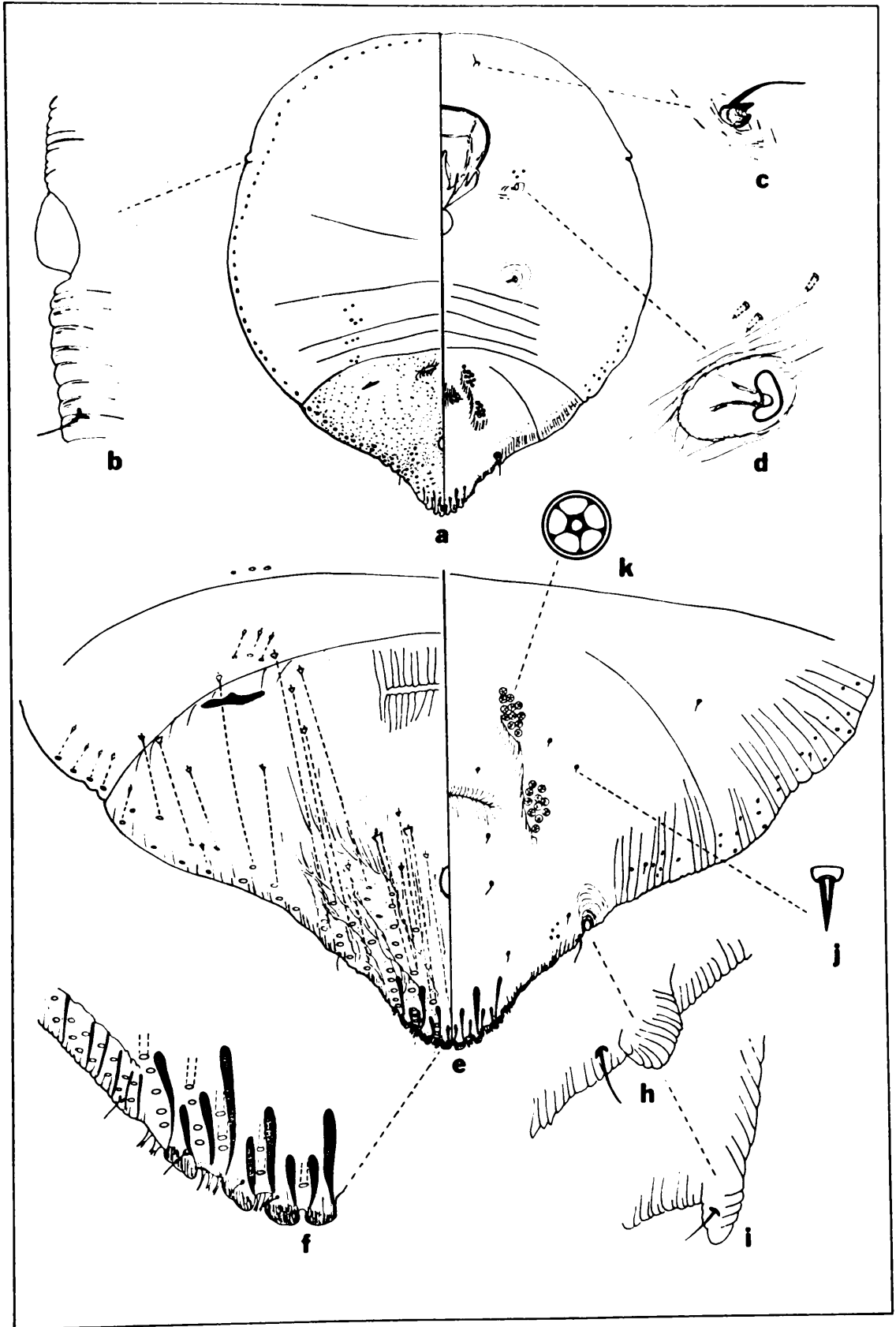


Plate 7. - *Acutaspis agavis* (Townsend and Cockerell)

Ventrum: Segments I to IV with a continuous submarginal band of microducts. Segmentation not well defined.

Pygidium (fig. e)

Dorsum: Median lobes (fig. f) almost semi-circular in form; L_2 about same size as L_1 , slightly notched on the outer margin; L_3 same size of L_2 and slightly binotched. Margin beyond L_3 sclerotized and crenulated. Paraphyses present, strongly developed and arranged as follows: median lobes with a paraphysis arising from the mesal angle; first interlobular space with a long paraphysis arising from the outer angle of L_2 , followed by a short one, and the shorter one from the mesal angle of L_3 . Third interlobular space with a long paraphysis arising from the outer angle of L_3 . Beyond L_3 , from the sclerotized margin, several small paraphysis-like sclerotization are present. Dorsal microducts slender, about 1 long; 1 microduct with the opening between the mesal paraphyses of median lobes; 2 between the paraphyses of first interlobular space; 6 between the paraphyses of second interlobular space; 5 lateral of paraphysis of L_3 . Between the paraphysis-like scleroses beyond L_3 numerous opening of microducts on segment VII. Anal opening oval, 23 in diameter; placed about 6 times this diameter from the base of L_1 , located posterior to vulva on the venter.

Ventrum: Plates never longer than the lobes, bifid or slightly fimbriated; absent between the median lobes, 2 between L_1 - L_2 ; 3 between L_2 - L_3 ; 2 beyond L_3 . Margin of pygidium close to setae of segment V varies from a simple folding (fig. e) to an evagination

of the margin (fig. h) to a tubercle-like formation (fig. i); in the material examined only one side of the pygidium with this unusual formation. Submarginal clusters of microducts on segments VI and V. Conical setae (fig. j) 3 pairs, submarginally, 2 laterad of perivulvar pores, 1 anterior to vulva and 2 posteriorly. Quinquelocular perivulvar pores (fig. k) in 4 groups, formula 6-13,(8-11),0.

Illustration based on material from Agave cocui, Amarillidaceae, Ejido, Merida, Venezuela.

Recognition characteristics

The 3 paraphyses in the second interlobular space, 3 pair of lobes, acute pygidium, minute plates, absence of plates between median lobes, membranous body and the association with Agrave spp. makes this species distinct.

Notes

This New World species is restricted to plants on the genus Agave, the distribution so far is restricted to U.S.A., Mexico and Venezuela.

Acutaspis perseae (Comstock)

Plate 8

Aspidiotus perseae Comstock, 1881a:301. Aspidiotus (Chrysomphalus) perseae Cockerell, 1897:22. Chrysomphalus perseae Leonardi 1899:223; Fernald, 1903:292; MacGillivray 1921:420. Acutaspis perseae Ferris, 1941:SIII-332; Balachowsky 1951:594; Schmutterer 1959:110; Borchsenius, 1966:355. Chrysomphalus (Acutaspis) perseae Merrill, 1953:38.

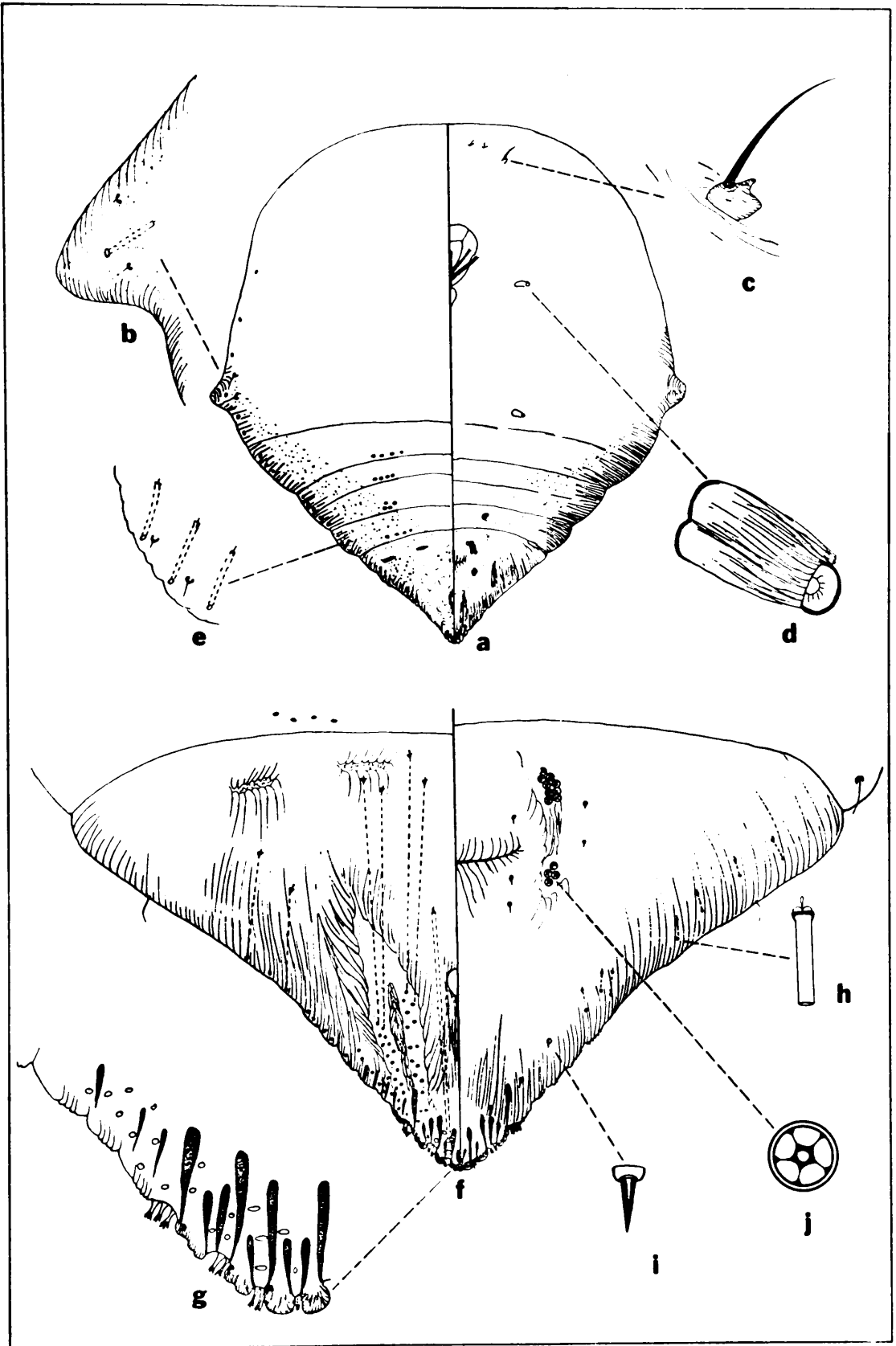


Plate 8. - *Acutaspis perseae* (Comstock)

Material studied

On Anthurium sp., Araceae, Venezuela (Quarantine), 7-IX-48 (USNM). Cattleya sp. Orchidaceae, Venezuela (Quarantine), 2 slides. Epidendrum sp., Orchidaceae, Venezuela (Quarantine), 2 slides. Laelia sp., Orchidaceae, Venezuela (Quarantine), 2-IX-41. Oncidium sp., Orchidaceae, Venezuela (Quarantine), 3 slides. Schomburgkia humboldtia, Orchidaceae, Maracay, 17-V-65 (Horowitz).

Scale of the female

Reddish brown, circular, flat, exuviae central and black.

Adult female

Body form broadly turbinate (fig. a) 1120 (886 to 1270) long, 1050 (783 to 1211) wide. Derm of prosoma membranous at maturity; submarginal area from the umbo to the pygidium and across the abdominal segments sclerotized.

Prosoma

Lateral margin of thorax on each side with a conspicuous blunt lobe or umbo (fig. b), this umbo can be well developed as shown on fig a or reduced on the young adult females, the material examined shows variation from no umbo and membranous margins to heavily developed and sclerotized umbo.

Dorsum: Submarginal band of scattered microducts on the thorax.

Ventrum: Antenna (fig. c) a sclerotized tubercle with 1 lateral seta, about 16 long. Anterior spiracle (fig. d) without associated ducts or pores; posterior spiracle same shape and size as anterior spiracle.

Prepygidial segments of abdomen

Dorsum: Segments I to IV with a submarginal band of microducts (fig. e) and a submedian row of 4 or 5 microducts; segmentation is not well defined.

Ventrum: Submarginal area sclerotized with a few scattered microducts throughout the segments.

Pygidium: (fig. f)

Dorsum: Median lobes (fig. g) almost semicircular in form; L_2 about same size as L_1 , slightly notched on the outer side; L_3 same size of L_2 and binotched. Margin beyond L_3 sclerotized and crenulated. Paraphyses present, strongly developed and arranged as follows: median lobe with a short paraphysis arising from the mesal angle; first interlobular space with a long parphysis arising from the outer angle of L_1 and a short one from the mesal angle of L_2 ; second interlobular space with a long paraphysis arising from the outer angle of L_2 , followed by 2 short ones; third interlobular space with a long paraphysis arising from the outer angle of L_3 ; beyond L_3 several paraphysis-like sclerotizations present. Dorsal microducts slender, about long; 1 microduct with the opening between the mesal paraphyses of median lobes; 2 or 3 between paraphyses of first interlobular space; 3 or 4 between the paraphyses of second interlobular space; 3 or 4 laterad of the mesal paraphysis of L_3 . Between the paraphysis-like scleroses, beyond L_3 , numerous openings of microducts present. Submedian band of long microducts on segment VII. Anal opening oval, 20 in diameter; placed about 5 times this diameter from the base of L_1 , located posterior to

vulva on the venter.

Ventrum: Plates never longer than the lobes, bifid or slightly fimbriated; absent between the median lobes; 2 between L_1-L_2 ; 3 between L_2-L_3 ; 3 beyond L_3 . Submarginal microducts (fig. h) scattered throughout segments VI and V. Conical setae (fig. i) 3 pairs submarginally, 2 lateral of perivulvar pores, 1 anterior to vulva and 2 posterior. Quinquelocular perivulvar pores (fig. j) in 4 groups, formula: 4-6,(6-8),0.

Illustration based on material from Schomburgkia humboltia, Orchidaceae, Maracay, Aragua, Venezuela.

Recognition characteristics

The 3 paraphyses on second interlobular space, 3 pair of lobes, acute pygidium, minute plates, presence of umbos on both sides of the thorax, heavy sclerotization on the submargin makes this species distinct.

Notes

This New World species, is found on many hosts, but primarily on orchids. After examination of numerous specimens of A. persea, I found this very closely related to A. umboniferus (Newstead), and perhaps it is the same species, but because the lack of live material from which series of different stages of the females could be studied, it is impossible in the present work to make any definite conclusions about the validity of both species or the presence of a new synonymy.

Acutaspis reniformis (Cockerell)

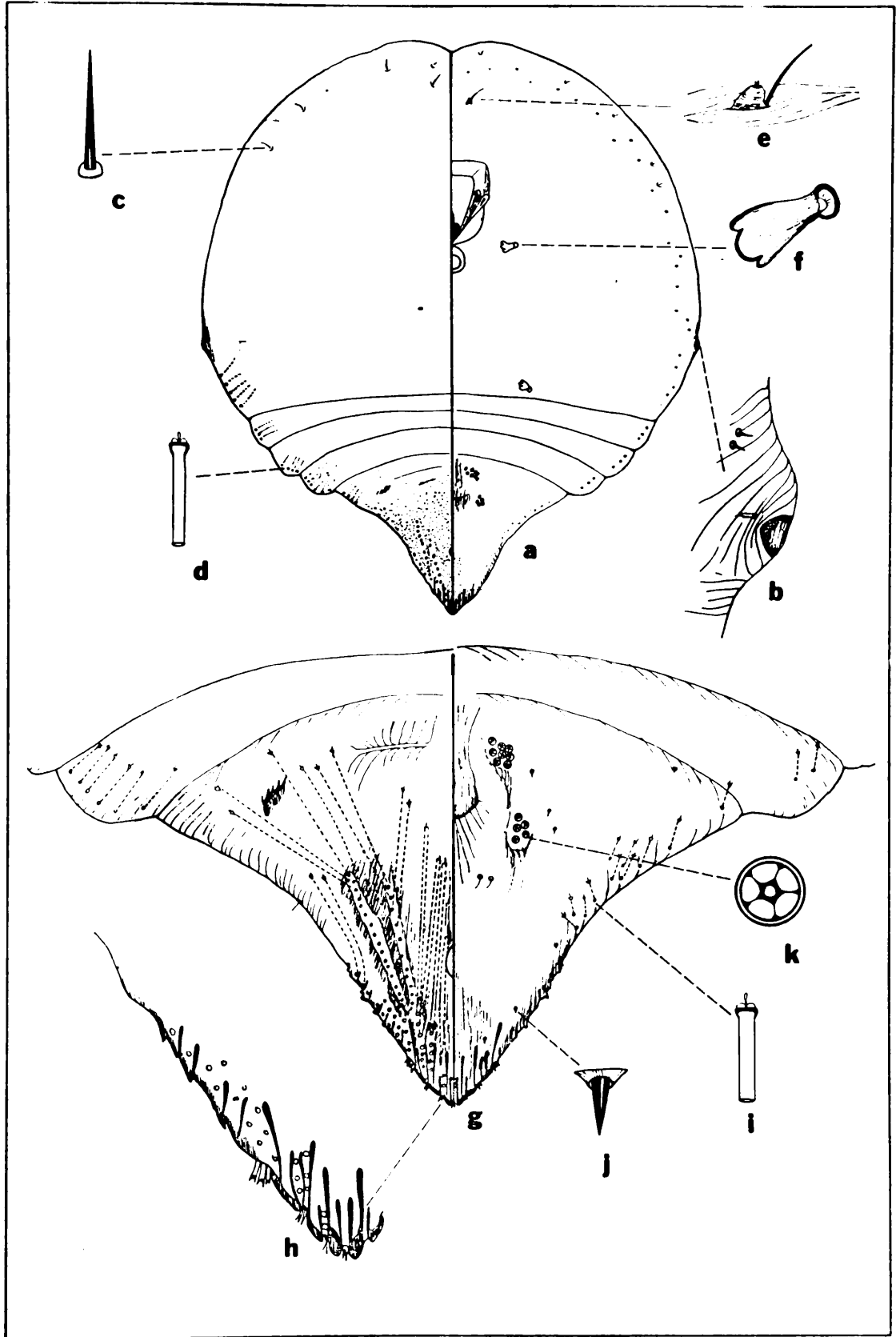


Plate 9. - *Acutaspis reniformis* (Cockerell)

Aspidotus reniformis Cockerell, 1897b:265. Aspidiotus (Chrysomphalus) reniformis Cockerell, 1897a:24. Chrysomphalus reniformis Cockerell, 1899a:396, Fernald, 1903:293; MacGillivray, 1921:417. Acutaspis reniformis Ferris, 1941:SIII-333x; Borchsenius, 1966:355.

Material studied

One female on Sapotaceae, Puerto Ayacucho, Territorio Amazonas, 20-V-40 (Pittier) (USNM).

Scale of the female

Not seen, described by Ferris, 1941, as "pale reddish brown or straw colored, circular, flat, exuviae central".

Adult female

Body strongly turbinate; 1033 long and 886 wide. The cephalic margin of the body with a median notch (fig. a). Derm at maturity membranous.

Prosona

Thoracic tubercle small and inconspicuous (fig. b) located on the margin between the spiracles.

Dorsum: Several submarginal setae (fig. c) scattered on the head.

Row of submarginal microducts (fig. d) posterior to thoracic tubercle.

Ventrum: Antenna (fig. d) a sclerotized tubercle with 1 lateral seta, about 20 long. Clypeolabral shield 234 long and 140 wide.

Anterior spiracle (fig. f) without associated ducts or pores;

posterior spiracle same shape and size as anterior spiracle. Band of microducts submarginally from the head to the abdomen.

Prepygidial segments of abdomen

Dorsum: Segments I to IV with a submarginal row of 3 to 6 microducts (fig. d).

Ventrum: Segments I to IV with a submarginal row of 2 or 3 microducts.

Pygidium: (fig. g)

Elongate and very acute.

Dorsum: Median lobes (fig. h) very low and inconspicuous semicircular in form; L_2 longer than L_1 and not notched; L_3 longer than L_2 and not notched; margin beyond L_3 sclerotized and coarse by serrate.

Paraphyses present, thin but well developed, arranged as follows:

median lobes with a short paraphysis arising from the mesal angle;

first interlobular space with a long paraphysis arising from the

outer angle of L_1 and a short one from the mesal angle of L_2 ; second

interlobular space with a long paraphysis arising from the outer

angle of L_2 , followed by two short paraphyses; third interlobular

space with a long paraphysis arising from the outer angle of L_3 ;

beyond L_3 several paraphysis-like sclerotizations present. Dorsal

microducts slender, about 1 long; 2 microducts with the opening

between the paraphyses of first interlobular space; 6 between the

paraphysis of second interlobular space; 3 laterad of outer

paraphysis of L_3 . Submedian rows of 12 to 15 long microducts on

segments VII and VI. Anal opening oval, 39 in diameter; placed

about 3 times this diameter from the base of L_1 , located posterior

to vulva on the venter.

Ventrum: Plates slightly longer than the lobes, bifid or slightly

fimbriated; 2 between median lobes; 2 between L_1-L_2 ; 3 between L_2-L_3 ; 3 beyond L_3 . Submarginal cluster of microducts (fig. i) on segment V. Conical setae (fig. j) 3 pairs submarginally, 2 laterad of perivulvar pores and 2 posterior to vulva. Quinquelocular perivulvar pores (fig. k) in 4 groups, formula 3-5,(8-9),0.

Illustration based on material from Sapotaceae, Puerto Ayacucho, Territorio Amazonas, Venezuela.

Recognition characteristics

The 3 paraphyses in the second interlobular space, 3 pair of lobes, acute and elongate pygidium, minute plates, notch on the cephalic region makes this species distinct.

Notes

This species was previously known only from the original record, on an unidentified plant from Oxaca, Mexico. This new addition to the Venezuelan coccid-fauna extends the range of the species to Northern South America.

Genus Aonidiella Berlese and Leonardi

Type of the genus: Aspidiotus aurantii Maskell, 1879.

Aonidiella Berlese and Leonardi, 1896:347; Fernald, 1903:285; MacGillivray, 1921:392; Ferris, 1938:SII-178; McKenzie, 1938:1; Balachowsky: 1948:359; 1956:22; McKenzie, 1956:22; Borchsenius, 1966:292; Morrison and Morrison, 1966:13.

Description of the genus

Referable to the tribe Aspidiotini; one-barred ducts, fringed plates, L_2 not bilobed. Prosomatic region at maturity tending to be

much enlarged and sclerotized, lateral region produced into lobes, 3 pairs of lobes well developed, L₄ merely a slight point on the margin. Paraphyses small but well developed not present beyond L₃. Anal opening small, anterior to vulva.

Key to species of Aonidiella

Perivulvar pores present; dorsal cluster of

microducts on prepygidial segments of

abdomen. orientalis (Newstead)

Perivulvar pores absent; no dorsal microducts

on prepygidial segments of abdomen aurantii (Maskell)

Aonidiella aurantii (Maskell)

Plate 10

Aspidiotus aurantii Maskell, 1879:199; Green, 1896b:58; Newstead 1901:

88. Aspidiotus citri Comstock, 1881:8. Aspidiotus coccineus

Gennadius, 1881:189. Aspidiotus gennadii Targioni-Tozzetti, 1881:

151. Aonidiella aurantii Berlese 1896:254; MacGillivray, 1921:443;

Ferris, 1938:SII-179; McKenzie 1938:6; Balachowsky, 1948:366; 1956:

30; Borchsenius, 1966:292. Chrysomphalus aurantii Cockerell, 1899a:

396; Fernald, 1903:287.

Material studied

On Rosa sp., Rosaceae, Cumana, Sucre, 22-VI-43 (FFY) (IZA & USNM).

Tangerines, Venezuela (Quarantine) 11-X-58 (USNM).

Scale of the female

Body turbinate on the young adult females (fig. a), at maturity the prosoma tends to be reniform (fig. b), its lobes crowding against

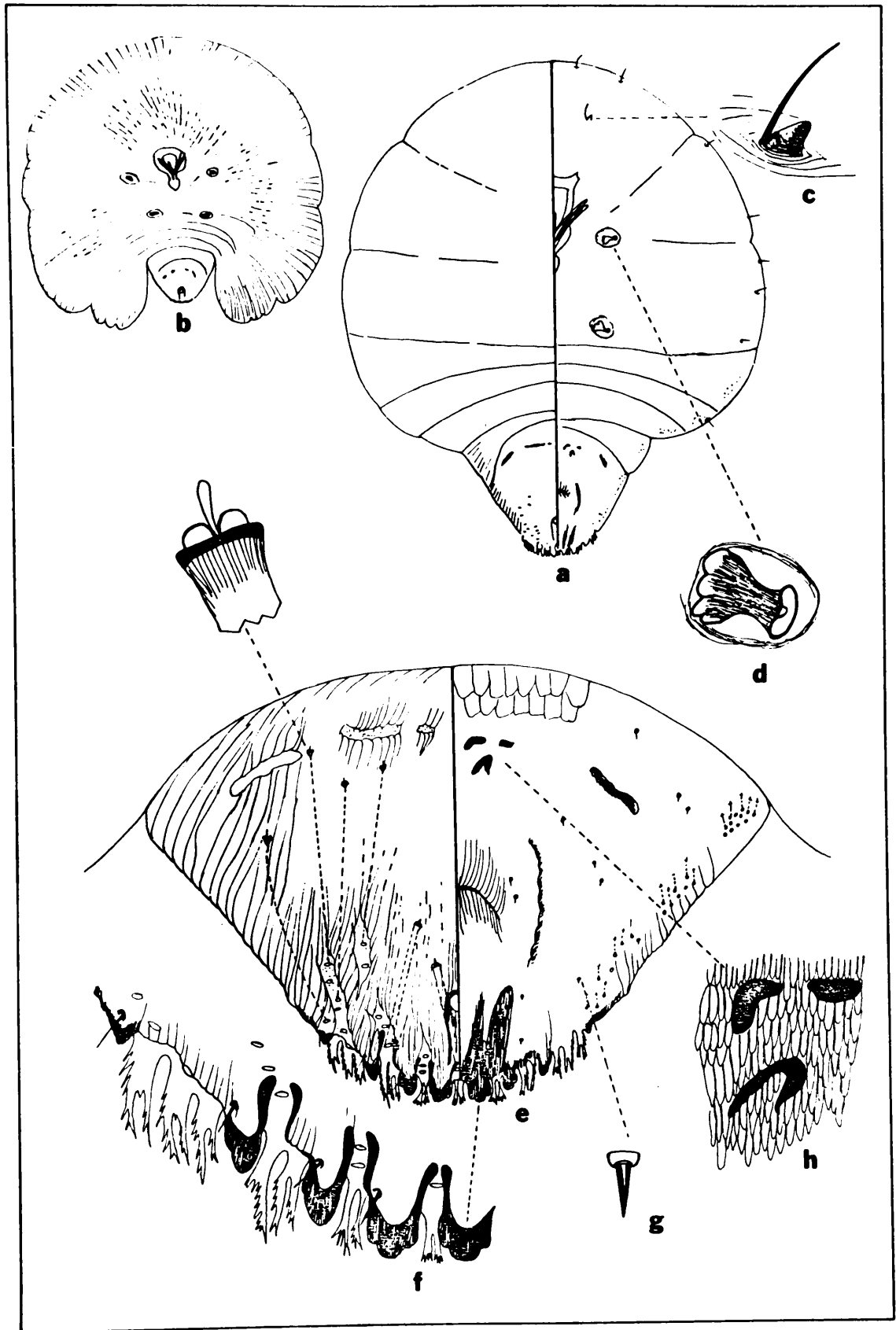


Plate 10.- *Aonidiella aurantii* (Maskell)

the retracted pygidium; 911 (797 to 1122) long and 1089 (797 to 1476) wide. Derm at maturity highly sclerotized.

Prosoma

Ventrum: Antenna (fig. c) a sclerotized tubercle with one seta about 27 long. Clypeolabral shield 176 long and 129 wide. Anterior spiracle (fig. d) without associated pores or ducts; posterior spiracle same size and shape as anterior spiracle.

Prepygidial segments of abdomen

Ventrum: Segment IV with a submarginal cluster of microducts.

Pygidium: (fig. e)

Dorsum: Median lobes (fig. f) large and prominent, about 12 wide, notched on both sides; L_2 and L_3 smaller than L_1 , notched on the outer side; L_4 reduced to a slight sclerotization of the margin. Paraphyses short and slender a pair arising from the mesal angles of median lobes; first and second interlobular spaces with 2 in each. Microducts 93 long, located 1 between mesal paraphyses of median lobes, 2 between paraphyses of first interlobular space, 1 between paraphyses of second interlobular space, 4 on a submedian furrow on segment VI, 7 or 8 on a submarginal furrow on segment V. Anal opening circular, 16 in diameter; placed about 2 times this diameter from the base of L_1 ; located posterior to vulva on the venter. Anal apophyses well developed.

Ventrum: Plates on the interlobular spaces fimbriated, 2 between median lobes; 2 between L_1 - L_2 ; 3 between L_2 - L_3 ; 3 branched and fimbriated ones beyond L_3 . Three clusters of microducts on segments

VI and V. Conical setae (fig. g) 3 pairs submarginally, 3 laterad of paravulvar scleroses and 2 anterior to vulva. Perivulvar pores absent, paravulvar scleroses well developed. A group of 3 small scleroses (fig. h) anterior to vulva on each side.

Illustration based on material from Rosa sp. Cumana, Sucre, Venezuela.

Recognition characteristics

The heavy sclerotization of the prosoma at maturity, 3 pair of lobes, small anal opening, 5 pairs of paraphyses, absence of perivulvar pores and the 3 scleroses anterior to vulva makes this species distinct.

Notes

This extremely polophagous species is known from many countries of the tropical and subtropical regions of the world. It is a new addition to the Venezuelan coccid-fauna.

Aonidiella orientalis (Newstead)

Plate 11

Aspidiotus orientalis Newstead, 1894:26; Fernald, 1903:268. Aspidiotus osbeckiae Green, 1896:4. Aspidiotus pedronis Green, 1905:341. Aspidiotus taprobamus Green, 1905:344. Aspidiotus cocotiphagus Marlatt 1908b:14. Aonidiella orientalis McKenzie, 1937:327; Ferris, 1938:SII-180; McKenzie, 1938:32; Balachowsky, 1948:362; 1956:42; Borchsenius, 1966:297. Chrysomphalus orientalis Lindinger, 1913:73. Furcaspis cocotiphaga MacGillivray, 1921:408. Furcaspis orientalis MacGillivray, 1921:408; Aonidiella taprobama MacGillivray,

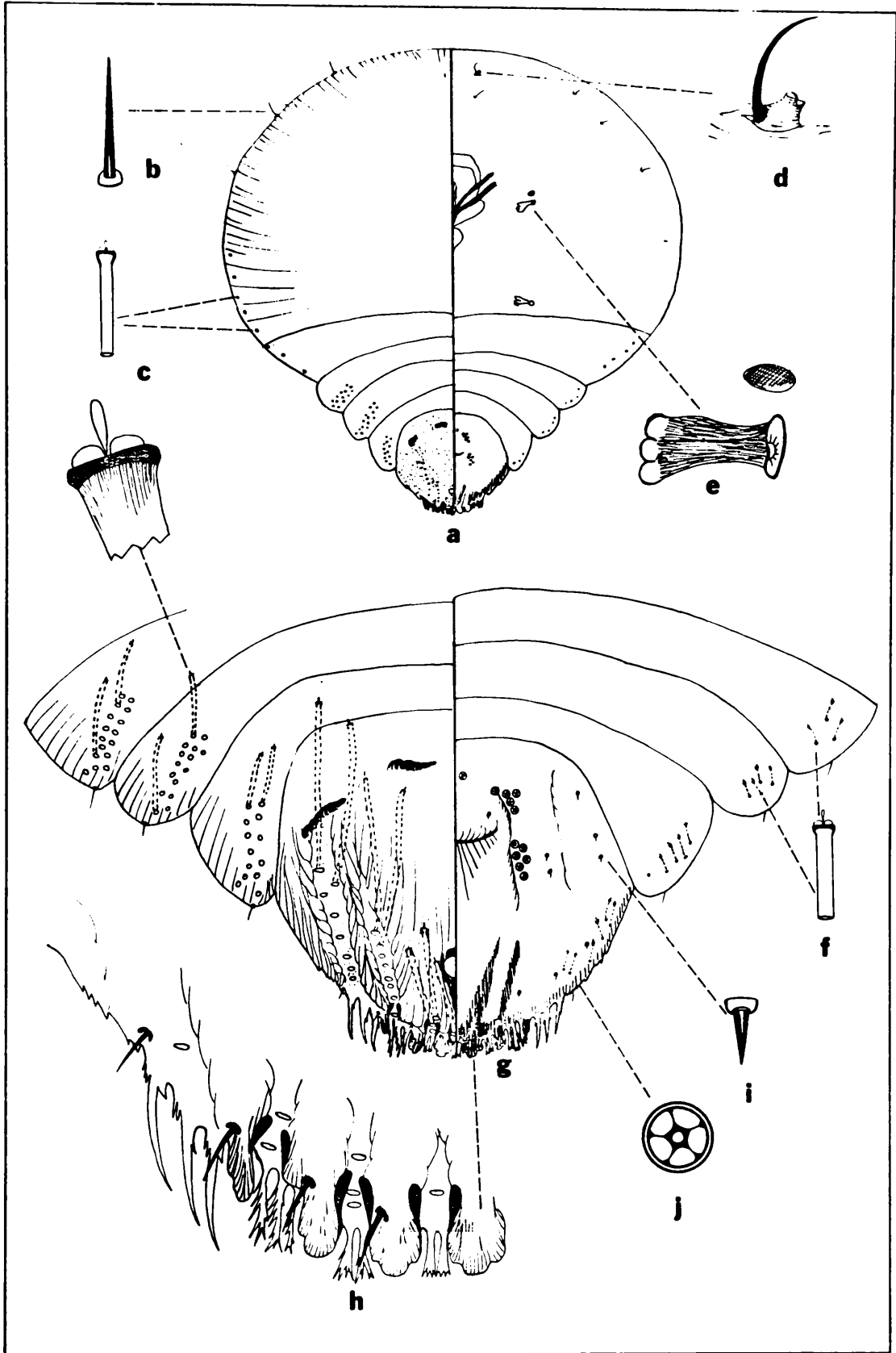


Plate II. - *Aonidiella orientalis* (Newstead)

1921:444.

Material studied

On Ficus carica, Moraceae, Las Lajas, Guarico, 19-IV-62 (AD & FFY). Loranthaceae, Las Lajas, Guarico, 19-IV-62 (AD & FFY). Rosa sp. Rosaceae, Cagua, 3-IV-69 (MC) (IZA & SSPA): El Limon, 13-VII-69 (Gelvez & Barreto); Maracay, 4-VI-66 (Torres); Palo Negro, 4-VII-68 (AD & SC). Tamarindus indica Leguminosae, El Limon, 16-III-62 (AD); 28-II-67 (AD); Maracay, 3-IV-67 (CJR).

Scale of the female

White to straw color, circular, flat, exuviae central and dark brown.

Adult female

Body pear shaped (fig. a) but at full maturity and the pygidium become retracted into the prosoma; 1178 (1063 to 1255) long, 1026 (900 to 1255) wide. Anterior part of the body heavily sclerotized at maturity.

Prosoma

Dorsum: Several marginal setae (fig. b) on the head. Row of submarginal microducts (fig. c) on the meso and meta thorax.

Ventrum: Antenna (fig. d) a sclerotized tubercle with one seta about 27 long. Clypeolabral shield 191 long and 117 wide. Anterior spiracle (fig. d) with an associated sclerotized area; posterior spiracle same size and shape as anterior spiracle but without a sclerotized area.

Prepygidial segments of abdomen

Dorsum: Segments II to IV with a submarginal cluster of 12 to 18

microducts, which are about half long of those on the pygidium.

Ventrum: Segments I to IV with submarginal clusters of 3 to 5 microducts (fig. f).

Pygidium: (fig. g)

Dorsum: Median lobes (fig. h) large and prominent, about 16 wide, notched on both sides; L_2 smaller than L_1 and notched on outer margin; L_3 smaller than L_2 and notched on the outer side only; L_4 absent. Paraphyses short and slender, a pair arising from the mesal angles of median lobes; first and second interlobular spaces with 2 each. Microducts 66 long, located 1 between the median lobes, the rest in 3 furrows, one on segment VII with 3; segment VI with 7 or 8 microducts; segment V with 8 or 9. Anal opening circular, 16 in diameter; placed about 1 1/2 times this diameter from the base of L_1 ; located posteriorly to vulva on the venter.

Ventrum: Plates on the interlobular space fimbriated, 2 between median lobes; 2 between L_1 - L_2 ; 3 between L_2 - L_3 ; 3 beyond L_3 , these sword shaped, with a pointed process. Cluster of submarginal microducts on segment V. Conical setae (fig. i) 3 pairs submarginally; 2 laterad of perivulvar pores; 1 anterior to vulva; 3 on the anterior margin of pygidium. Quinquelocular perivulvar pores (fig. j) in 4 groups, formula 3-5,(4-7),0. Ventral scleroses arising from L_1 and L_2 .

Illustration based on material from Rosa sp. Rosaceae, Maracay, Aragua, Venezuela.

Recognition characteristics

The heavy sclerotization of the prosoma at maturity, 3 pairs of lobes, small anal opening, 5 pairs of paraphyses, 4 groups of perivulvar pores, and dorsal microducts on prepygidial segments of abdomen makes this species distinct.

Notes

This polphagous species is known from many countries of the tropical and subtropical regions of the world. It is a new addition to the Venezuelan coccid-fauna.

Genus Aspidiella Leonardi

Type of the genus: Aspidiotus sacchari Cockerell, 1893.

Aspidiella Leonardi, 1898:50; Fernald, 1903:251; MacGillivray, 1921:387; Ferris, 1938:SII-187; Balachowsky, 1958:282; Borchsenius, 1966:243; Morrison & Morrison, 1966:16.

Description of the genus

Referable to the tribe Aspidiotini, one barred ducts, fringed plates and L_2 not bilobed; two pairs of well developed pygidial lobes; L_3 represented by a slight sclerotized point; paraphyses absent; perivulvar pores present; spiracle without associated pores.

Key to species of Aspidiella

Plates present beyond L_3 ; median lobes without basal

scleroses; associated with Dioscorea hartii (Cockerell)

Plates absent beyond L_3 ; median lobes with a

conspicuous basal scleroses; associated with

Gramineae. sacchari (Cockerell)

Aspidiella hartii (Cockerell)

Plate 12

Aspidiotus hartii Cockerell, 1895:7; Fernald, 1903:260. Aspidiotus hartii var. luntii Cockerell in Hart 1896; Fernald 1903:260. Aspidiotus (Aspidiella) hartii Leonardi, 1898:62. Aspidiella hartii MacGillivray, 1921:404; Ferris 1938:SII-188; Balachowsky, 283.

Material studied

5 females on Discorea rotundata, Discoreaceae, El Limon, 13-X-69 (Barrios).

Scale of the female

Brownish, circular, flat, exuviae central; occurring only on the tubers.

Adult female

Body circular or turbinate (fig. a), 698 (620 to 768) long, 596 (531 to 590) wide; derm at maturity membranous. Margin of the body sculptured.

Prosoma

Dorsum: Band of numerous microducts on submarginal area (fig. b); row of setae submedially.

Ventrum: Antenna (fig. c) as a sclerotized tubercle with one seta about 23 long. Clypeolabral shield 206 long and 132 wide. Anterior spiracle and mouth parts with numerous rows of squamosael plates (fig. e); posterior spiracles same size and shape as anterior spiracle, with 4 to 6 associated microducts; area between the spiracles

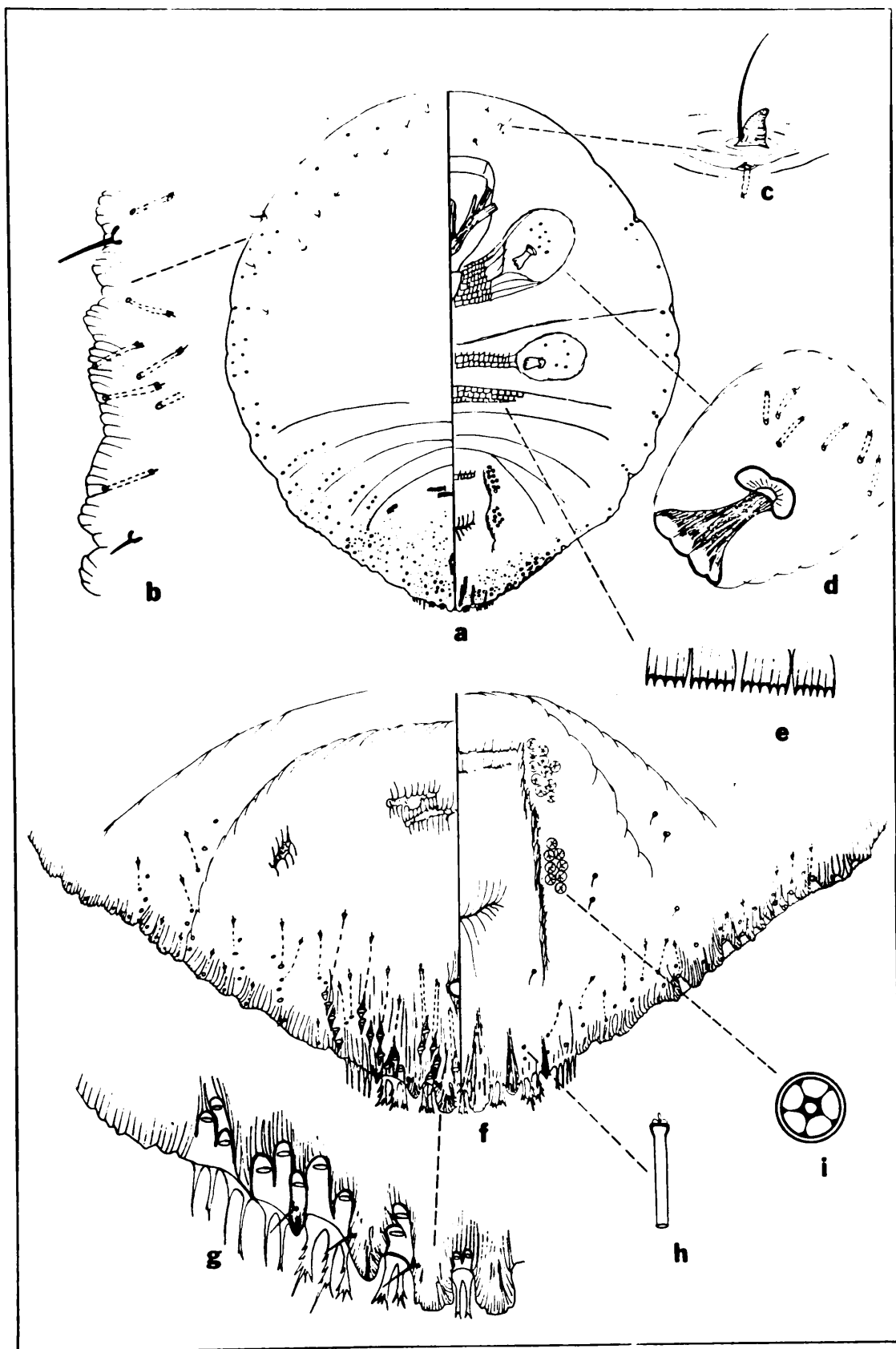


Plate 12. - *Aspidiella hartii* (Cockerell)

with several rows of squamose plates.

Prepygidial segments of abdomen

Dorsum: Segments I to IV with several marginal microducts in addition to the row of microducts extending from the margin toward the submedian area on each segment.

Ventrum: Segment I, with few marginal microducts and several rows of squamose plates medially; segments II to IV with few marginal microducts.

Pygidium: (fig. f)

Dorsum: Median lobes (fig. g) well developed, notched both sides in apex and about 16 wide; L_2 smaller than L_1 , rounded some specimens with a small notch on the outer margin; L_3 represented by a point. Band of microducts, 46 long, along the margin and submargin of the pygidium; one pair of microducts submarginally on segment VII; also 3 rows of microducts on segments VII; VI, and V, reaching the level of the anus; opening of microducts surrounded by sclerotized ring open on the posterior end; anal opening circular, 20 in diameter; placed about 3 times its diameter from the base of L_1 , located posterior to the vulva on the venter; area around the anal opening more sclerotized than the rest of the pygidium.

Ventrum: Plates in the interlobular spaces are fimbriated, 2 between median lobes; 2 between L_1 - L_2 ; 3 between L_2 - L_3 ; 5 or 6 simple plates beyond L_3 . A band of microducts submarginally, some of the microducts open in an invagination at the margin, especially on segments VI and V. Quinquelocular perivulvar pores (fig. i) in 4 groups, formula

- , (-), 0; paravulvar scleroses slightly sclerotized; conical setae in a submarginal row in addition to 4 pairs laterad of perivulvar pores and one pair posterior to vulva.

Illustration based on material from Dioscorea rotundata, Discoraceae, El Limon Aragua, Venezuela.

Recognition characteristics

The sculptured margin of abdomen, plates beyond L_3 , the numerous rows of serrate squamations being median lobes without basal scleroses always associated with Dioscorea makes this species distinct.

Notes

Originally described from Trinidad this species is found only on plants of the genus Dioscorea. It is distributed in the West Indies, and the tropical areas of the Pacific. This new addition to the Venezuelan coccid-fauna extends the range of the species to Northern South America.

Aspidiella sacchari (Cockerell)

Plate 13

Aspidiotus sacchari Cockerell, 1893b:255; Fernald, 1903:278. Aspidiella sacchari MacGillivray, 1921:405; Ferris, 1938:SII-189; Balachowsky, 1958:284 Targionia sacchari Merrill and Chaffin, 1923:253.

Material studied

On Panicum barbinoides, Gramineae, Urena, Tachira, 18-V-49 (FFY) (IZA & USNM1).

Scale of female

Not seen; described by Ferris, 1938, as "pale brown, circular,

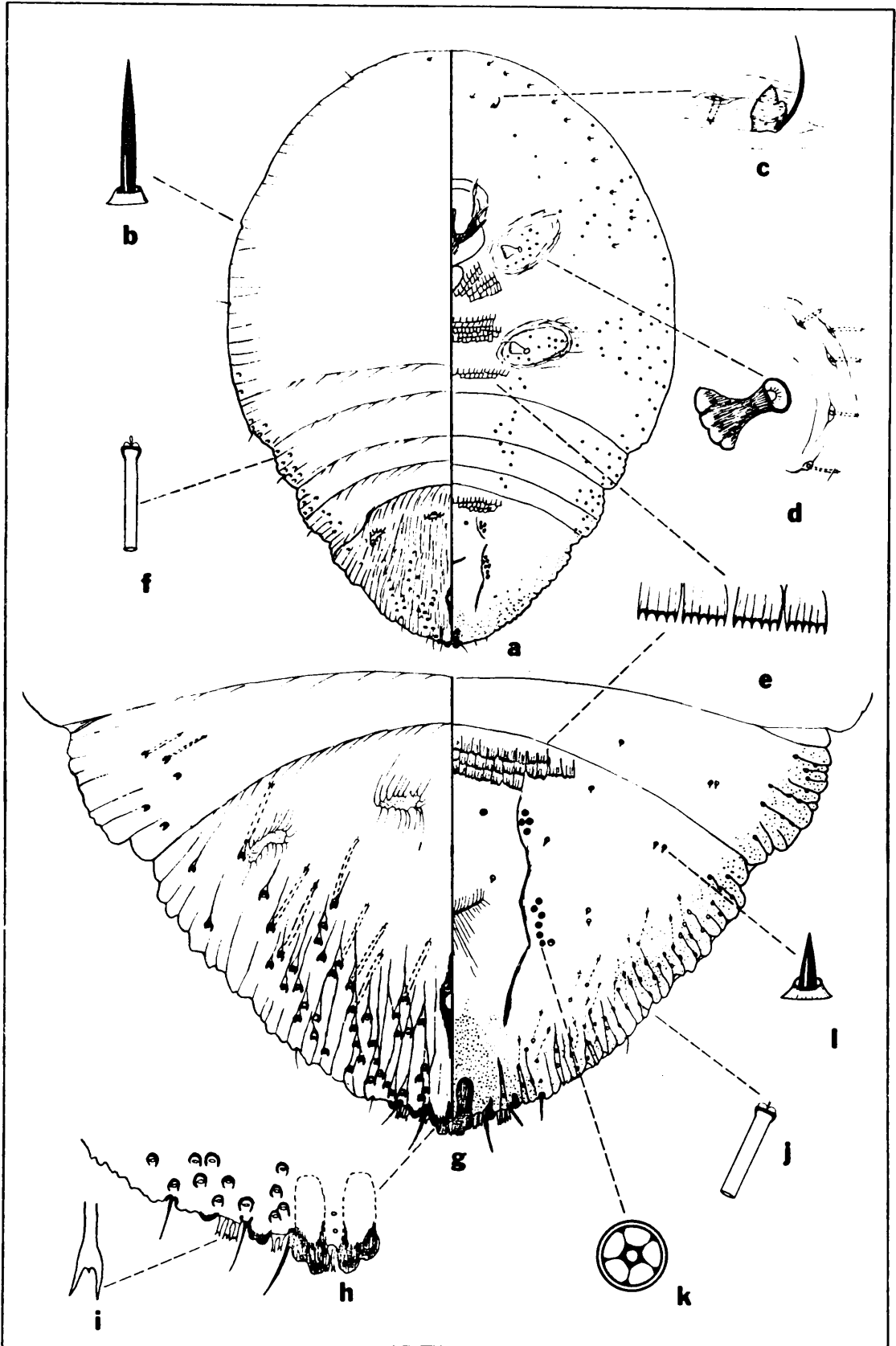


Plate 13. - *Aspidiella sacchari* (Cockerell)

thin, flat, with exuviae central".

Adult female

Body turbinate (fig. a) 1073 (797 to 1520) long, 782 (502 to 856) wide. Derm at maturity membranous. Margin of the body sculptured.

Prosoma

Dorsum: With 3 or 4 marginal setae (fig. b); few submarginal microducts on the posterior end of the prosoma.

Ventrum: Antenna (fig. c) as a sclerotized tubercle with one seta about 23 long. Clypeolabral shield 195 long and 136 wide; anterior spiracle (fig. d) with numerous associated microducts; area between the anterior spiracles and mouthparts with numerous rows of sclerotized squamosa plates (fig. e); posterior spiracle same size and shape 25 anterior spiracles, with less numerous associated microducts; area between the posterior spiracles with rows of serrate squamations. A cluster of microducts between the spiracles and margin; continuous marginal row of microducts from the head to the abdomen.

Abdomen: Prepygidial segments

Dorsum: Segments I to IV with a cluster of marginal microducts (fig. f); one marginal seta on each segment.

Ventrum: Segment I with several marginal microducts and a small cluster of microducts submedially; two rows of squamose plates medially. Segments II to IV with the margin sculptured and a cluster of microducts extending from the margin toward the submarginal area. A cluster of microducts submedially.

Pygidium (fig. g)

Dorsum: Median lobes (fig. h) well developed, notched on the outer side and about 16 wide; L_2 smaller than L_1 , notched on the outer side; L_3 represented by a sclerotized point on the margin. Beyond L_3 the margin sculptured. A band of submarginal microducts, 50 long each. An additional band extending anteriorly from the base of L_3 , and a short and non-continuous band extending anteriorly from the base of L_2 . The openings of the microducts are surrounded by a half-moon like sclerosis. Anal opening oval, 11 in diameter; placed about 6 times this diameter from the base of L_1 , located posterior to the vulva on the venter; area around the anal opening more heavily sclerotized than the rest of the pygidium.

Ventrum: Plates in the interlobular spaces bifurcated or with an additional tooth in the middle of the fork (fig. i), 2 between median lobes; 2 between L_1 - L_2 ; 3 between L_2 - L_3 ; no plates beyond L_3 . Median lobes with a conspicuous elongate sclerosis extending into the pygidium from its base. Margin beyond L_3 heavily invaginated in some places, usually associated with a microduct opening. A wide band of microducts (fig. j) submarginally. Quinquelocular perivulvar pores (fig. k) in 4 groups, formula 6-9,(2-5),0. Paravulvar scleroses slightly sclerotized; conical setae (fig. l) in a submarginal row in addition to 2 pairs laterad of perivulvar pores and one pair posterior to vulva.

Illustration based on material from Panicum barbinoides, Gramineae, Tachira, Venezuela.

Recognition characteristics

The sculptured margin of abdomen, absence of plates beyond L_3 , the numerous rows of serrate squamatus, the median lobes with basal sclerosis, and the association with Gramineae, makes this species distinct.

Notes

Originally described from Jamaica but probably of oriental origin; it is found principally on sugar-cane. This is a new addition to the Venezuelan coccid-fauna.

Genus Aspidiotus Bouche

Type of the genus: Aspidiotus nerii Bouche, 1833.

Aspidiotus Bouche, 1833:52; Maskell, 1879:197; Hempel, 1900:496;

Fernald, 1903:251; Dietz and Morrison, 1916:288; MacGillivray,

1921:387; Ferris, 1938:SII-190; Balachowsky, 1958:228; Schmutterer,

1959:48; Borchsenius, 1966:206; Morrison and Morrison, 1966:17.

Evaspidiotus Leonardi, 1898:74.

Description of the genus

Referable to the tribe Aspidiotini, one-barred ducts; L_2 not bilobed; plates strongly developed, 2 between median lobes; 2 between L_1 and L_2 ; 3 between L_2 - L_3 and in variable number beyond L_3 . Intersegmental scleroses or paraphyses entirely lacking. Perivulvar pores present. Anal opening very large.

Aspidiotus destructor Signoret

Plate 14

Aspidiotus destructor Signoret, 1869a:120; Fernald, 1903:257; MacGill-

ivray, 1921:396; Ferris, 1938:SII-191; Ballou, 1945:90; Balachowsky,

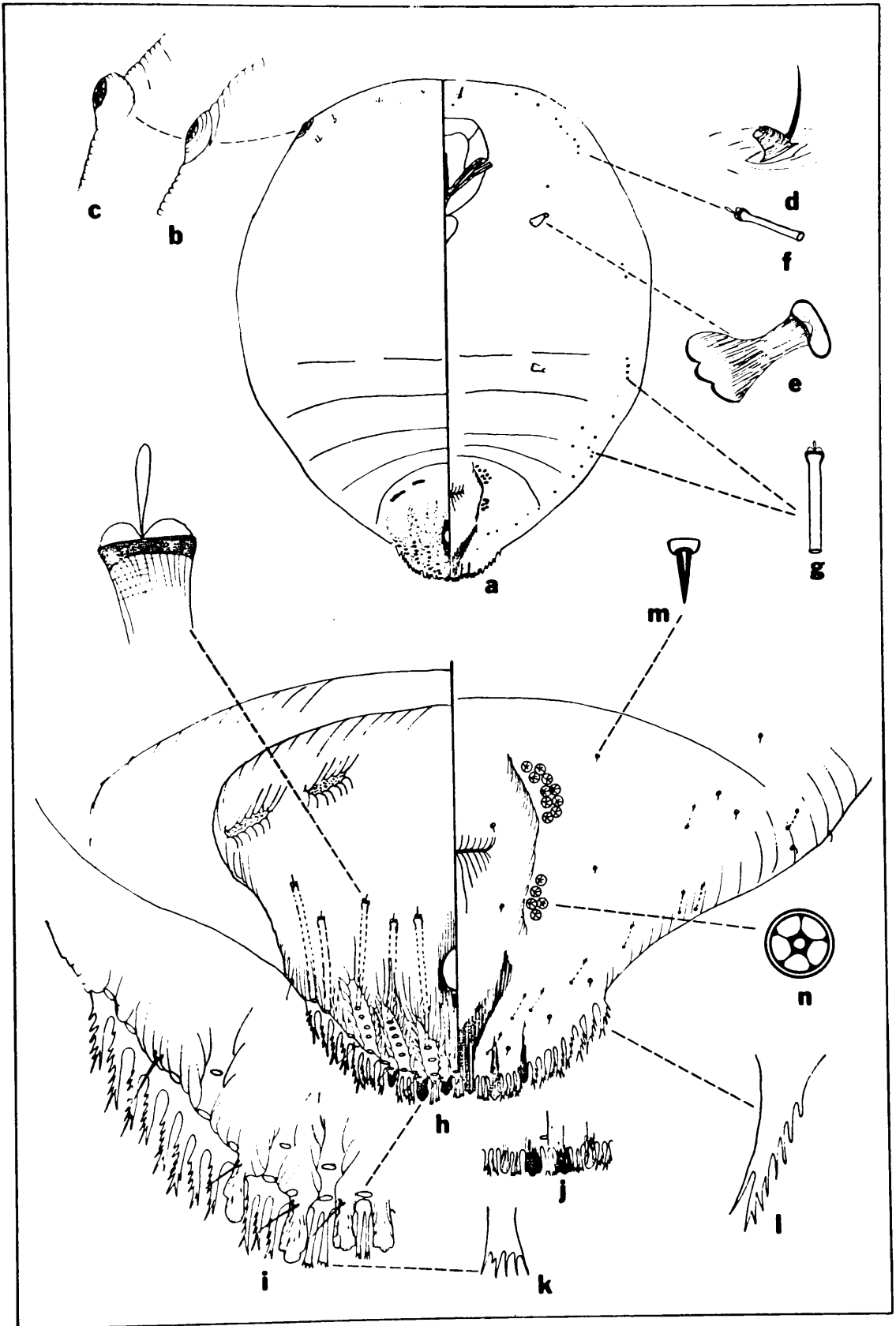


Plate 14. - *Aspidiotus destructor* Signoret

1948:275; Balachowsky, 1956:61; Schmutterer, 1959:51. Aspidiotus fallax. Cockerell, 1893b:252. Aspidiotus cocotis Newstead, 1893a: 186. Aspidiotus (Evaspidiotus) destructor Leonardi, 1898:76. Aspidiotus translucens Cockerell and Robinson, 1915:106. Tennaspidiotus destructor Borchsenius, 1966:270.

Material studied

On Carludovica palmata, Cyclanthaceae, Maracay, 4-VII-39 (CHB) (IZA & CIA); 23-VI-42 (CHB) (CIA). Cocos nuciferae, Palmae, El Limon, 8-VI-68 (AD & SC); Macuto, D. F. 17-IV-39 (CHB) (IZA & CIA); Morichal Largo, Monagas, 9-VIII-66 (FFY & CJR); Ocumare de la Costa, Aragua, 7-V-66 (AD); Puerto Cabello, Carabobo, 6-VI-43 (Vivas) (CIA); Tocuyo de la Costa, Falcon, 9-IV-58 (Mendoza) (IZA & CIA); Urama, Carabobo, 8-VI-39 (CHB). Chrysalidocarpus lutezens, Palmae, Maracay, Elaeis guineensis, Palmae, Bananera, Yaracuy, 1-IV-61 (Cobo). Lagerstroemia indica, Lythraceae, Caripito, Monagas, 7-VIII-66 (FFY & CJR). Musa sapientum, Musaceae, El Limon, 17-IV-67 (AD); 10-XII-68 (Gelvez) Valencia, Carabobo 13-VI-67 (CH). Persea americana, Lauraceae, Cagua, 25-VII-60 (MC) (IZA & SSPA); Maracay, 18-IV-43 (CHB) (IZA & CIA). Terminalia cattapa, Combretaceae, Las Trincheras, Carabobo, 8-XI-40 (Muller) IZA & CIA).

Scale of the female

Circular, flat, exuviae central, white or pale color; usually on the underside of the leaves.

Adult female

Body circular (fig. a), 844 (694 to 1019) long, 705 (606 to 857)

wide. Derm at maturity membranous.

Prosoma

Dorsum: Eye spot marginal, varies from a flat sclerotization (fig. b) to a protuberance on the margin (fig. c); few setae located submarginally.

Ventrum: Antenna (fig. d) as a sclerotized tubercle with a single seta, about 20 long, and a small terminal pit with 2 small setae; 3 or 4 small microducts found near each antenna. Clypeolabral shield (192 to 160) long and (106 to 125) wide. Anterior spiracles (fig. e) without associated pores or ducts; posterior spiracles same shape and size. An irregular row of microducts (fig. f) submarginally from the head to the abdomen.

Prepygidial segments of abdomen

Few scattered microducts (fig. g) on the ventrum found on all these segments.

Pygidium (fig. h)

Dorsum: Median lobes (fig. i) non-zygotic, well developed about 12 wide, notched on each side at the apex; length of these lobes varies from shorter than L_2 to almost the same length (fig. j); L_2 well developed, notched on each side and rounded at the apex; L_3 smaller than L_2 and notched on the outer side; L_4 absent. A marginal row of long microducts, about long; one located between the median lobes; one between L_1 and L_2 ; 2 between L_2 and L_3 ; 5 beyond L_3 . Three rows of long microducts, extending from the margin anteriorly on the pygidium; these rows in furrows. Anal opening oval, 23 in diameter, placed about twice this diameter

from the base of L_1 ; area around anal opening more sclerotized than the rest of the pygidium.

Ventrum: Two apically fringed plates (fig. k) between median lobes; two of the same type of plates between L_1 and L_2 ; 3 fringed plates (fig. l) between L_2 and L_3 ; usually 8 plates laterad of L_3 . A submarginal row of conical setae (fig. m); 2 pairs laterad of perivulvar pores, 1 pair anterior to vulva and 1 pair posteriorly. Ventral median sclerosis of the form of a V, extending from the margin toward the perivulvar pores. Quinquelocular perivulvar pores (fig. n) in 4 groups formula, 4-7,(8-11),0. Paravulvar scleroses present.

Illustration based on material from Musa sapientum, El Limon, Aregua, Venezuela.

Recognition characteristics

The numerous and well developed plates, lack of microducts on the dorsum, the 3 pairs of lobes, V-shaped dorsal sclerotization and the presence of perivulvar pores makes this species distinct.

Notes

This polyphagous species is found in almost all the countries in the tropical and subtropical regions of the world, especially on palms.

Genus Chrysomphalus Ashmead

Type of the genus: Chrysomphalus ficus Ashmead 1880 (= *Coccus anidum* Linnaeus, 758).

Chrysomphalus Ashmead, 1880:268; Leonardi, 1899: 198; Fernald, 1903:

285; MacGillivray, 1921:414. Ferris, 1938:SII-198; McKenzie, 1939:52; Borchsenius, 1966:283; Morrison & Morrison 1966:37.

Description of the genus

Referable to the tribe Aspidiotini, one-barred ducts; fringed pygidial plates; 3 pairs of well developed lobes; L₂ not bilobed; paraphyses present arising from the angles of the lobes or from the interlobular spaces; but none present anterior to L₄; perivulvar pores present; spiracle without associated pores.

Key to species of Chrysomphalus

1. Segment II of abdomen with dorsal submarginal clusters of numerous microducts2
- Segment II of abdomen with only 2 pairs of dorsal submarginal microducts.3
2. Dorsal bosses present on the head and segments I and II of abdomen, thoracic spine blunt and slightly sclerotized. pinnulifer (Maskell)
- Dorsal bosses absent, thoracic spine small, acute and sclerotized aonidum (Linnaeus)
3. Segments I to III of abdomen with dorsal submarginal microducts; thoracic spine weakly sclerotized and slightly fimbriate. dictyospermi (Morgan)
- Only segment II of abdomen with dorsal submarginal microducts; thoracic spine acute and sclerotized prosimus Banks

Chrysomphalus aonidum (Linnaeus)

Plate 15

Coccus aonidum Linnaeus, 1758:455. Chrysomphalus ficus Ashmead, 1880:267; Ferris, 1938:SII-201; McKenzie, 1939:59; Zimmerman, 1948:369. Aspidiotus ficus Comstock, 1881:279. Aspidiotus (Chrysomphalus) ficus Berlese, 1896:188. Chrysomphalus aonidum Cockerell, 1899b:273; Fernald, 1903:286; Dietz and Morrison, 1916:312; MacGillivray 1921:416; Ballou, 1945:91; Labrador, 1958:10; Doreste and Cermeli, 1961:41; Borchsenius, 1966:284.

Material studied

On Citrus aurantifolia, Rutaceae, Cumana, Sucre, 17-VII-43 (FFY) (IZA & CIZ). Citrus aurantium, Rutaceae, Cumana, Sucre, 27-V-43 (FFY) (CIA); Kanarakuni, Bolivar, 6-II-67 (AD & FFY); Las Delicias, 20-VI-68 (AD & SC); Maracay, 10-XI-65 (AD). Citrus mediea, Rutaceae 18-VI-43 (CHB) (CIA). Chrysolidocarpus lutescens, Palmae, Caracas, D. F., 17-VI-59 (AD). Syzygium malaccense, Myrtaceae, Caracas, D.F., 01-XII-38 (CHB) (USNM & IZA).

Scale of the female

Dark red or brown, circular, flat, exuviae central and pale.

Adult female

Body turbinate (fig. a), 1475 (1388 to 1580) long, 1277 (1211 to 1388) wide; Derm at maturity membranous.

Prosoma

With a marginal thoracic spine (fig. b) acute and sclerotized.

Dorsum: Few submarginal setae; row of submarginal microducts (fig c)

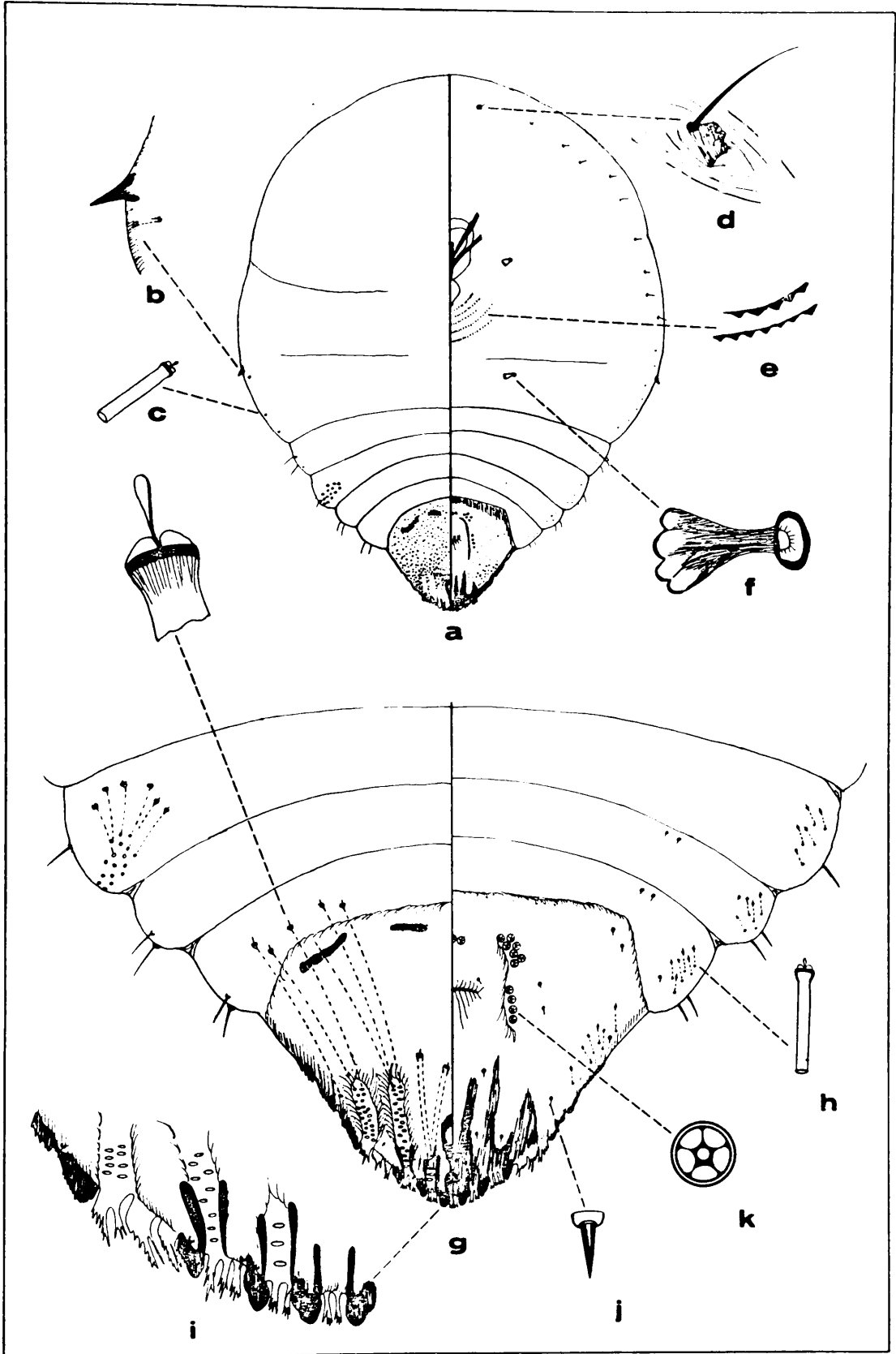


Plate 15.- *Chrysomphalus aonidum* (Linnaeus)

on the meso and metathorax.

Ventrum: Antenna (fig. d) a sclerotized tubercle with one seta about 39 long, and 2 short sensory setae. Clypeolabral shield 180 long and 109 wide, several parallel rows of short derm spines (fig. e) around the mouthparts. Anterior and posterior spiracles similar (fig. f) without associated pores or ducts. A row of microducts on the meso and metathorax. Several submarginal setae on the head region.

Prepygidial segments of abdomen

Dorsum: Segment I with 2 pairs of submarginal short microducts (fig. c) and 2 marginal setae; Segment II (fig. g) with a large cluster of submarginal microducts; segments III and IV without microducts, and 2 pairs of marginal setae.

Ventrum: Segments I to IV with submarginal clusters of short microducts (fig. h); segments III and IV with a pair of submedian conical setae.

Pygidium

Dorsum: Median lobes (fig. i) well developed but rather small about the same size of L_2 and L_3 ; all lobes notched on outer angle, margin beyond L_3 sclerotized for some distance and twice notched. Paraphyses arising from each of the mesal angles of the lobes and 2 more on the interlobular spaces. Furrows of dorsal microducts, first furrow with 3 microducts, somewhat shorter and noticeably broader than those of the second and third. Furrows having 18 to 22 and about 97 long; anal opening oval, 16 in diameter; placed about $2\frac{1}{2}$ times this diameter from the base of L_1 ; area around the anal

opening sclerotized.

Ventrum: Plates in the interlobular spaces fimbriated, 2 between median lobes; 2 between L_1-L_2 ; 3 between L_2-L_3 ; 3 between L_3-L_4 latter differently shaped, the mesal 2 each with a pair of small clavate processes, the third very raggedly divided. A cluster of microducts on segment V. Conical setae (fig. j) 3 pairs, submarginally, 2 laterad of perivulvar pores, a pair anterior to vulva and a pair posterior. Quinquelocular perivulvar pores (fig. k) in 5 groups, formula 4-6,(5-7),0; ventral scleroses arising from the bases of L_1 , L_2 and L_3 .

Illustration based on material from Citrus aurantium, Rutaceae, Kanarakuni, Bolivar, Venezuela.

Recognition characteristics

The small size of pygidium 3 pairs of well developed lobes, presence of perivulvar pores, large cluster of microducts on segment II of abdomen and the acute and sclerotized thoracic spines, makes this species distinct.

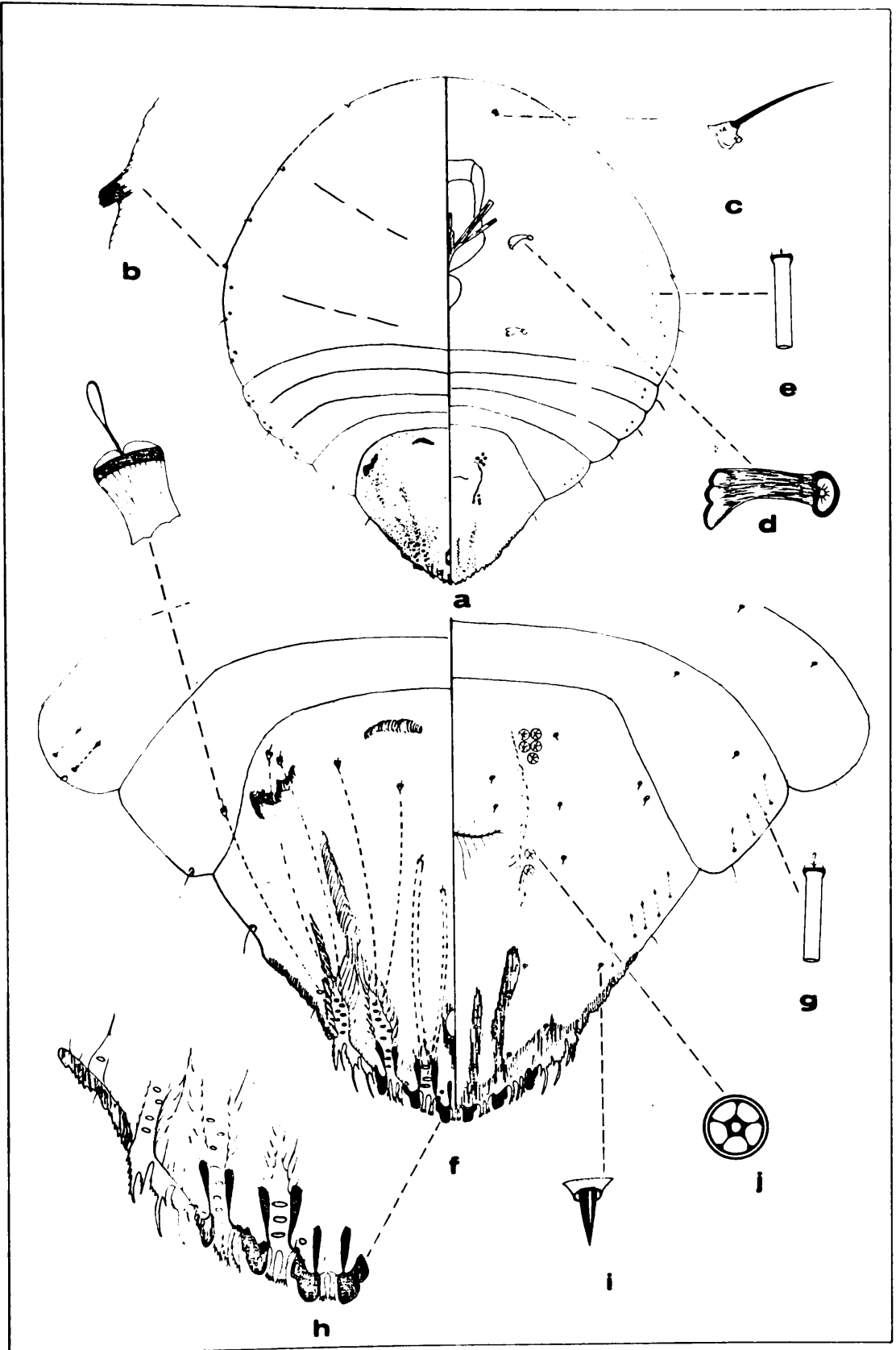
Notes

This polyphagous species is found in many countries of the tropical and subtropical regions of the world in the citrus growing areas is considered a very important pest.

Chrysomphalus dictyospermi (Morgan)

Plate 16

Aspidiotus dictyospermi Morgan, 1889:352. Aspidiotus dictyospermi v. arecae Newstead, 1893:185. Aspidiotus mangiferae Cockerell, 1893b:



255. Aspidiotus arecae Cockerell, 1894b:129. Aspidiotus dictyospermi v. jamaicensis Cockerell, 1894b:129. Chrysomphalus dictyospermi Maskell, 1895b:44; Fernald, 1903:289; Dietz and Morrison, 1916:310; MacGillivray, 1921:416; Ferris, 1938:SII-200; McKenzie, 1939:57; Ballou, 1945:92; Zimmerman, 1948:369; Balachowsky 1956:86; Schmutterer, 1959:54; Borchsenius, 1966:287. Chrysomphalus minor Berlese and Leonardi, 1896:346. Chrysomphalus mangiferae Leonardi, 1899:218. Aspidiotus agrunicola DeGregori, 1915:136. Chrysomphalus jamacensis Malenotti, 1916c:114. Chrysomphalus arecae Malenotti, 1916c:114. Chrysomphalus castigatus Mamet, 1936:94.

Material studied

On Livistonia chinensis, Palmae, El Hatillo, Miranda, 6-IV-41 (CHB) (USNM & CIA). Persea americana, Lauraceae, Caracas, D. F., 4-VII-40 (CHB) (USNM & CIA). Rosa sp. Rosaceae, Caracas, D. F. 15-V-40 (CHB) (CIA); El Limon, 15-VIII-69 (Notz).

Scale of the female

Pale reddish-brown, circular, flat, exuviae central and paler than the rest of the scale.

Adult female

Body subcircular or turbinate (fig. a), 916 (850 to 1033) long and 764 (664 to 886) wide; Derm membranous at maturity.

Prosoma

With a marginal thoracic spine (fig. b) weakly sclerotized and slightly fimbriate.

Dorsum: Several marginal setae; 3 pairs of submarginal microducts on the metathorax.

Ventrum: Antenna (fig. c) a sclerotized tubercle with one seta about 35 long, on the opposite side a pit with 2 short sensory setae. Clypeolabral shield 156 long and 97 wide; Anterior and posterior spiracle (fig. d) similar, without associated pores or ducts. A row of submarginal microducts (fig. e) on the thorax.

Prepygidial segments of abdomen

Dorsum: Segments I to III with 2 pairs of submarginal short microducts and 1 pair of marginal setae; segment IV (fig. f) with a pair of marginal setae and without microducts.

Ventrum: Segments I and II with 2 pairs of submarginal microducts; segment III without microducts; segment IV with 4 pairs of submarginal microducts (fig. g).

Pygidium

Dorsum: Median lobes (fig. h) well developed but rather small about the same size of L_2 and L_3 , all notched on outer margin; margin beyond L_3 sclerotized for some distance; two paraaphyses arising from each interlobular space; 3 furrows of dorsal microducts, first furrow with 3 microducts, somewhat shorter and broader than those of the second and third furrows which are 7 to 9 and about 117 long; anal opening oval, 12 in diameter; placed about $2\frac{1}{2}$ times this diameter from the base of L_1 . Area around the anal opening slightly sclerotized.

Ventrum: Plates in the interlobular spaces fimbriated, 2 between

median lobes; 2 between L_1-L_2 ; 3 between L_2-L_3 ; 3 beyond L_3 , these bearing conspicuous club-shaped appendages, which are slightly serrate. A row of microducts submarginally on segment V; conical setae (fig. i) 3 pairs, submarginally, 3 pairs laterad of perivulvar pores and 2 pairs just anterior to vulva. Quinquelocular perivulvar pores (fig. j) in 4 groups, formula 2-3,(306),0. Paravulvar scleroses well developed; ventral scleroses arising from L_1 and L_2 .

Illustration based on material from Rosa sp. Rosaceae, El Limon, Aragua, Venezuela.

Recognition characteristics

The 3 pairs of well developed lobes, dorsal furrows of microducts; the few microducts on the submargin of the abdomen, the fimbriated thoracic spine, and 4 groups of perivulvar pores, makes this species distinct.

Notes

This polyphagous species is found in many countries of the tropical and subtropical regions of the world, usually associated with palms.

Chrysomphalus pinnulifer (Maskell)

Plate 17

Diaspis pinnulifera Maskell, 1891:4. Chrysomphalus dictyospermi v. pinnulifera Cockerell, 1900:157. Chrysomphalus pinnuliferus MacGillivray, 1921:416. Chrysomphalus pinnulifer Chamberlin, 1927:486; McKenzie, 1939:61; Balachowsky, 1948:355; 1956:88; Borchsenius, 1966:290. Chrysomphalus pinnulifera Balachowsky, 1948:

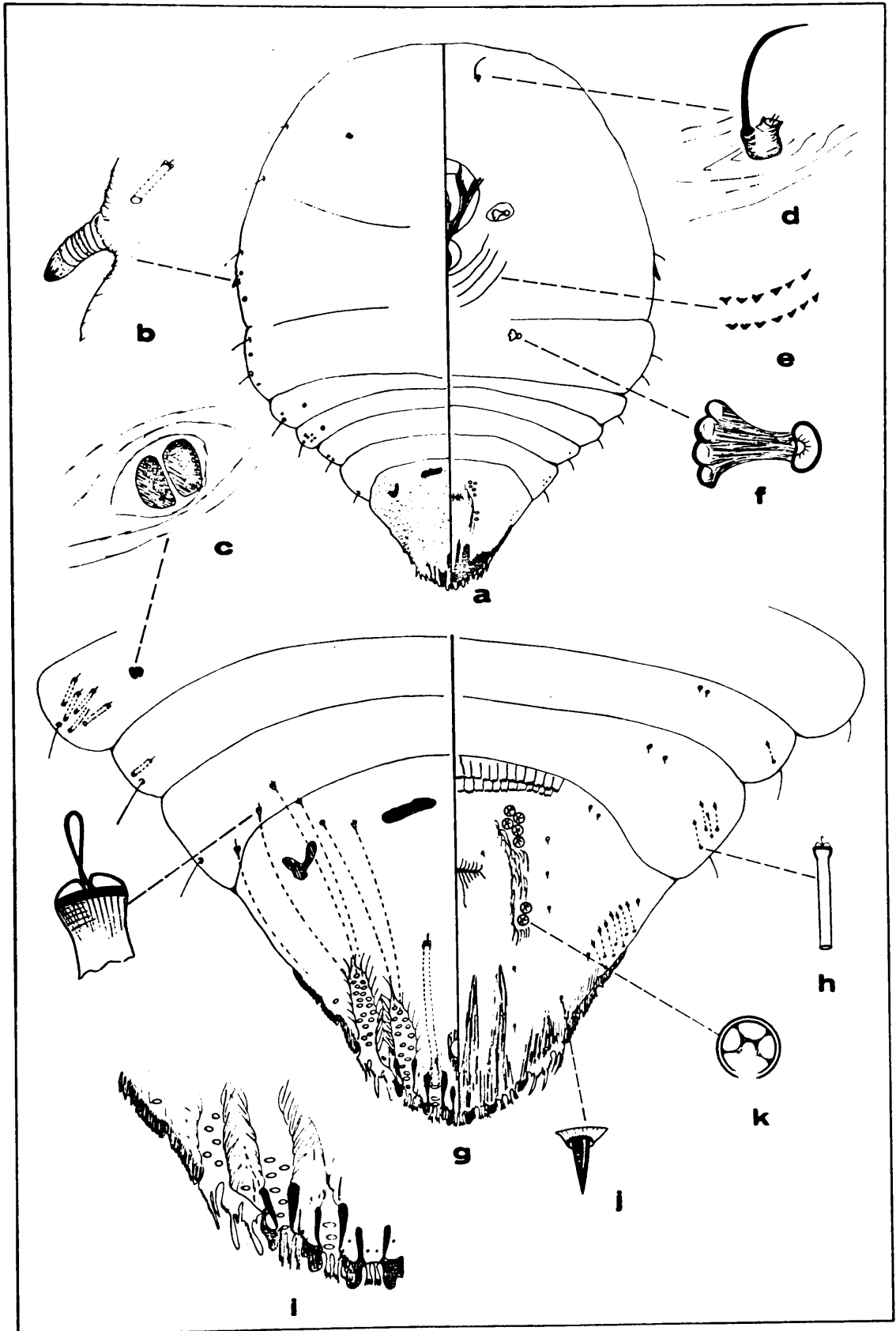


Plate 17. - *Chrysomphalus pinnulifer* (Maskell)

276.

Material studied

On unidentified Gramineae, Venezuela (Quarantine) 12-XII-50 (USNM).

Scale of the female

Not seen, described by McKenzie (1939) as "reddish-brown, with the margin somewhat lighter, rather thin, circular, exuviae central."

Adult female

Body turbinate (fig. a), 1011 (989 to 1033) long and 804 (797 to 812) wide; derm at maturity membranous.

Prosoma

With a marginal thoracic spine (fig. b), weakly sclerotized and blunt.

Dorsum: With a pair of dorsal bosses (fig. c) submedially on the head. Few marginal setae; 4 pairs of microducts on the submargin of meso and metathorax.

Ventrum: Antenna (fig. d) a sclerotized tubercle with one seta about 35 long, and with 2 short setae. Clypeolabral shield 175 long and 117 wide; several parallel rows of short derm spines (fig. e) around the mouth parts; anterior and posterior spiracles (fig. f) similar, without associated pores on ducts.

Prepygidial segments of abdomen

Dorsum: Segment I with a pair of submarginal dorsal bosses (fig. c) and a pair of microducts; segment II with a cluster of 5 to 7 submarginal microducts and a pair of dorsal bosses. Segment III with

a pair of submarginal microducts. Segment IV without microducts; each of the segments with a marginal seta.

Ventrum: Segments III and IV with 1 to 4 pairs of submarginal microducts (fig. h) and 2 pairs of conical setae submedially.

Pygidium

Dorsum: Median lobes (fig. i) well developed but small about the same size of L_2 and L_3 , notched on the outer margin; two paraphyses arising from each of the interlobular spaces. First furrow of dorsal microducts with 3 ducts, somewhat shorter and broader than those of the second and third furrows which are 15 to 20 and about 109 long; anal opening oval, 12 in diameter; placed about 3 times this diameter from the base of L_1 ; located posterior to vulva on the venter; area around the anal opening slightly sclerotized.

Ventrum: Plates of the interlobular spaces are fimbriated, 2 between median lobes; 2 between L_1 - L_2 ; 3 between L_2 - L_3 ; 3 beyond L_3 different; the first 2 with a club-shaped apendages and the third divided into 2 smaller slightly serrate processes. Cluster of microducts (fig. h) submarginally on segment V; conical setae (fig. j) 3 pairs, submarginally, 3 pairs laterad of the perivulvar pores, 2 pairs on the anterior margin of the pygidium, 1 pair anterior to vulva. Quinquelocular perivulvar pores (fig. k) in 4 groups, formula 4-5,(5-6)0. Paravulvar scleroses slightly developed; ventral scleroses arising from L_1 and L_2 . On the anterior margin of the pygidium 2 slightly sclerotized rows of serrate squamations.

Illustration based on material from Gramineae, unidentified,

Venezuela (Quarantine).

Recognition characteristics

The 3 pairs of pygidial lobes, dorsal furrows of microducts, 3 pairs of dorsal bosses, 4 groups of perivulvar pores and the cluster of microducts on the submargin of segment II makes this species distinct.

Notes

This polyphagous species is found on many countries of the tropical and subtropical regions of the world; this is a new addition to the Venezuelan coccid-fauna.

Chrysomphalus propsimus Banks

Plate 18

Chrysomphalus propsimus Banks, 1906:230; McKenzie, 1939:62; Zimmerman, 1948:373; Borchsenius, 1966:290. Chrysomphalus calami Malenotti, 1916a:317.

Material studied

Three females on palm leaves, Venezuela (Quarantine), 14-VI-55 (USNM).

Scale of the female

Not seen, described by McKenzie (1939), as "dark chocolate color, flat and circular, exuviae subcentral."

Adult female

Body subcircular (fig. a), 620 long and 516 wide; Derm at maturity membranous.

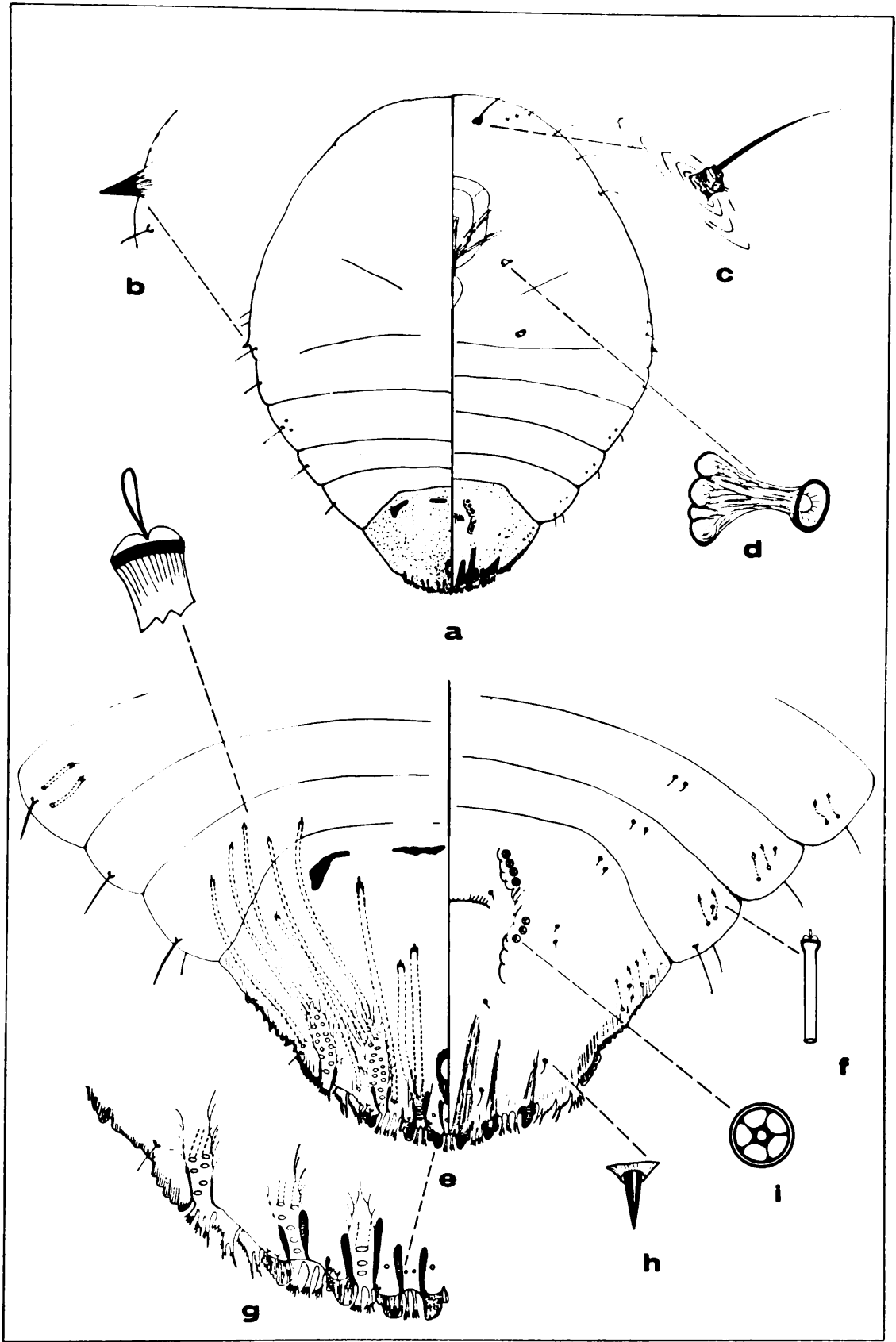


Plate 18. - *Chrysomphalus prosimus* Banks

Prosoma

With a marginal thoracic spine (fig. b) acute and sclerotized.

Dorsum: Without ducts and only a few marginal setae.

Ventrum: Antenna (fig. c) as a sclerotized tubercle with one setae about 23 long, with 2 short sensory setae. Clypeolabral shield 164 long and 121 wide; anterior and posterior spiracles similar (fig. d) without associated pores or ducts.

Prepygidial segments of abdomen

Dorsum: Segment II (fig. e) with 2 pairs of submarginal microducts, no trace of microducts on the other segments. Each segment with a marginal seta.

Ventrum: Segments I to IV with 2 pairs of submarginal microducts (fig. f); segments III and IV with 2 pairs of submedian conical setae.

Pygidium

Dorsum: Median lobes (fig. g) well developed by small about the same size as L_2 and L_3 ; margin of segment V sclerotized, and with tooth-like projections. Two paraphyses arising from each interlobular space. Furrows of dorsal microducts, first furrow with 3 microducts, somewhat shorter and broader of those of the second and third furrows which are 13 to 16 and about 86 long; anal opening oval, 12 in diameter; placed about 2 times this diameter from the base of L_1 ; located posterior to vulva on the venter; are a around the anal opening slightly sclerotized.

Ventrum: Plates of the interlobular spaces small and fimbriated,

2 between median lobes; 2 between L_1-L_2 ; 3 between L_2-L_3 ; 3 beyond L_3 , these larger, deeply branched and fringed; cluster of microducts (fig. f) submarginally on segment V; conical setae (fig. h) 3 pairs submarginally, 2 pairs laterad of the perivulvar pores, 2 pairs on the anterior margin of the pygidium and 1 pair anterior to vulva. Quinquelocular perivulvar pores (fig. i) in 4 groups, formula 2-3,(3-5),0. Paravulvar scleroses weakly developed; ventral scleroses arising from L_1 , L_2 and L_3 .

Illustration based on material from palm, Venezuela, (Quarantine).

Recognition characteristics

The absence of dorsal microducts, with the exception of segment II, on the prepygidial segments, 4 groups of perivulvar pores, dorsal furrows of microducts on the pygidium, and acute and sclerotized thoracic spines makes this species distinct.

Notes

This species is restricted to palms and the previous records are from the asiatic region. It is a new addition to the Venezuelan coccid-fauna and for the New World.

Genus Clavaspis MacGillivray

Type of the genus: Aspidiotus subsimilis var. anonae Houser, 1918 = Aspidiotus herculeanus Doane and Hadden, 1909.

Clavaspis MacGillivray, 1921:391; Ferris, 1938:SII-202; Balachowsky, 1956:90; Kosztarab, 1963:20; Borchsenius, 1966:317; Morrison and Morrison 1966:39. Ferrisaspis MacGillivray, 1921:388. Herdas-

pidiotus MacGillivray, 1921:391.

Description of the genus

Referable to the tribe Aspidiotini, one-barred ducts and without gland spines. Median lobes well developed; L_2 and L_3 absent. Paraphyses between VI-VII and VI-VIII strongly developed; paraphysis arising from the outer angle of median lobes being long and terminating in a circular knob. Plates small, when fimbriated, lateral processes very short. No pores associated with spiracles; anal opening posterior to the vulva.

Clasvaspis herculeane (Doane and Hadden)

Plate 19

Aspidiotus herculeanus Doane and Hadden, 1909:298. Aspidiotus sub-
similis var. anonae Houser, 1918:163. Clavaspis anonae MacGilli-
vray, 1921:441. Clavaspis herculeane MacGillivray, 1921:441;
Ferris, 1938:SII-206; Balachowsky, 1956:94. Aspidiotus symbio-
ticus Hempel, 1932:334. Chrysomphalus alluandi Mamet, 1936:93.
Clavaspis alluandi McKenzie, 1939: Clavaspis symbioticus Vernalha,
1953:230.

Material studied

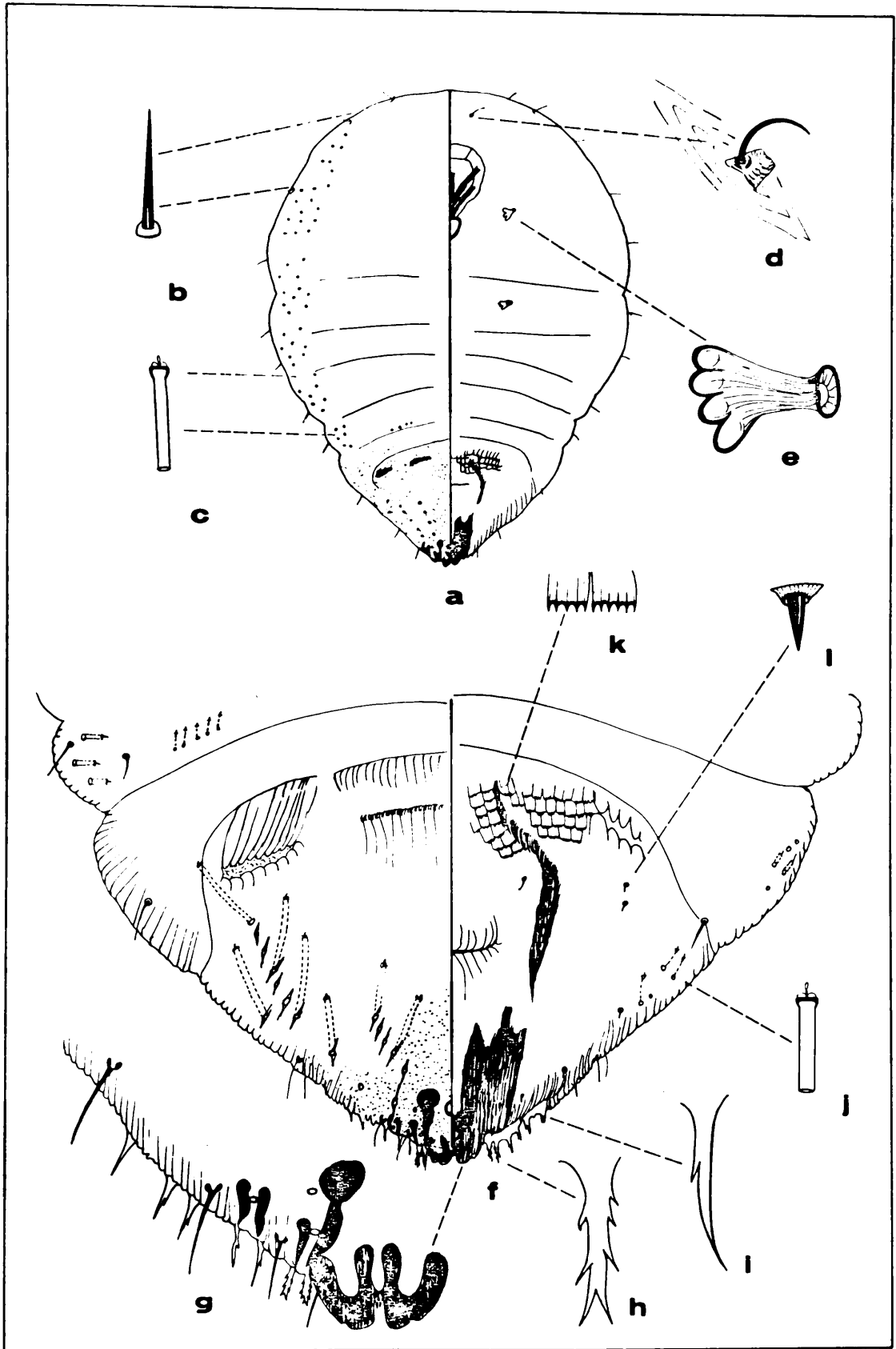
On Spondias mombin, Anacardiaceae, El Limon, 26-V-66 (AD).

Unidentified tree, Parque del Este, Caracas, 20-VIII-69 (AD).

Scale of the female

Gray or whitish in color; circular, exuviae central, usually beneath the bark of the host.

Adult female



Body turbinate (fig. a), 1069 (1241 to 576) long, 801 (576 to 1019) wide. Derm at maturity membranous except the pygidium which is slightly sclerotized.

Prosoma

Dorsum: Numerous marginal setae (fig. b). A continuous submarginal band of microducts (fig. c) extending from the head region toward the abdomen.

Ventrum: Antenna (fig. d) as a sclerotized tubercle with 1 seta about long. Clypeolabral shield 169 long and 112 wide. Anterior and posterior spiracles (fig. e) similar, normal, without associated pores.

Prepygidial segments of abdomen

Dorsum: Segments I to III with a continuous band of microducts submarginally. Segment III with a row of microducts submedially.

Pygidium (fig. f)

Dorsum: Median lobes (fig. g) non-zygotic, well developed about 20 wide, notched laterally at the apex. L_2 , L_3 and L_4 absent. First pair of paraphyses with the mesal member greatly elongated and terminating in an almost detached large knob; other smaller and slender. Second pair likewise small. Microducts of the pygidium long and slender, each about in length; these scattered along the submarginal area. Anal opening small, circular, in diameter, placed about $3 \frac{1}{2}$ times its diameter from the base of L_1 ; posterior to the vulva on the venter.

Ventrum: Plates, 2 short between the median lobes; those beyond the

median lobes vary from fimbriate (fig. h) to bifid (fig. i), there are 6 or 7 present beyond L_1 . A cluster of microducts (fig. j) on submarginal area of segment V. Perivulvar pores lacking; paravulvar scleroses well developed. Serrate squamations (fig. k) surrounding paravulvar scleroses. Conical setae (fig. l) in a submarginal row; 2 pairs laterad of paravulvar scleroses and one pair anterior to vulva.

Recognition characteristics

The unusually large and nail-shaped intersegmental scleroses; absence of L_2 , L_3 and L_4 ; submarginal band of microducts on the dorsal surface and the small plates makes this species distinct.

Notes

This polyphagous species is found in many countries in the subtropical and tropical regions of the world. This is a new addition to the Venezuelan coccid-fauna.

Genus Furcaspis Lindinger

Type of the genus: Aspidiotus biformis Cockerell, 1893.

Furcaspis Lindinger, 1903b:99; MacGillivray, 1921:388; Ferris 1938: SII-230; Zimmerman, 1948:366; Balachowsky, 1958:250; Berchsenius 1956:240; Morrison and Morrison 1966:82.

Description of the genus

Referable to the tribe Aspidiotini, with one-barred ducts, fringed plates; second pygidial lobe not bilobed; three pairs of well developed lobes; dorsal microducts extremely slender, plates of a peculiar type, chelate, with intersegmental scleroses.

Furcaspis biformis (Cockerell)

Plate 20

Aspidiotus biformis Cockerell, 1893b:255. Aspidiotus biformis var. cattleyae Cockerell, 1893d:548. Aspidiotus (Chrysomphalus) biformis Cockerell 1897c:13. Aspidiotus (Evaspidiatus) biformis Leonardi, 1989a:76. Chrysomphalus biformis Cockerell, 1899c:26; Fernald 1903:289. Furcaspis biformis Lindinger, 1908:99; MacGillivray, 1921:407; Ferris 1938:SII-231; Ballou, 1945:92; Lepage and Figuereido, 1947:39; Zimmerman, 1948:366; Fernandez-Yepez et. al. 1957:2. Targionia biformis Lindinger, 1943:152.

Material studied

On Agave sp., Amaryllidaceae, Caracas, D. F., 22-V-38 (CHB) (IZA, CIA & USNM); Venezuela (Quarantine), 2-VIII-54 (USNM). Cattleya gaskelliana, Orchidaceae, El Limon, 25-V-58 (FFY). Cattleya labiata, Orchidaceae, Cumana, Sucre, 27-VII-43 (FFY) (IZA & CIA); El Valle, D. F., 19-IX-43 (FFY) (IZA & CIA). Cattleya percivaliana, Orchidaceae. Venezuela (Quarantine), five lots intercepted between 1931 to 1945 (USNM). Cattleya speciosissima, Orchidaceae Venezuela (Quarantine), 8-I-20 (USNM). Epidendrum sp. Orchidaceae Caracas, D. F., 13-XI-41 (CHB) (CIA). Furcraea humboldtiana, Amaryllidaceae, Arrecife, D. F. 17-IV-43 (CHB) (IZA & CIA); Caracas, D. F. 25-IV-41 (FFY) (IZA & CIA). Oncidium carthaginensis, Orchidaceae, El Limon, 12-X-66 (FFY).

Scale of female

Reddish-brown, circular, exuviae central or subcentra; about 1 mm in diameter.

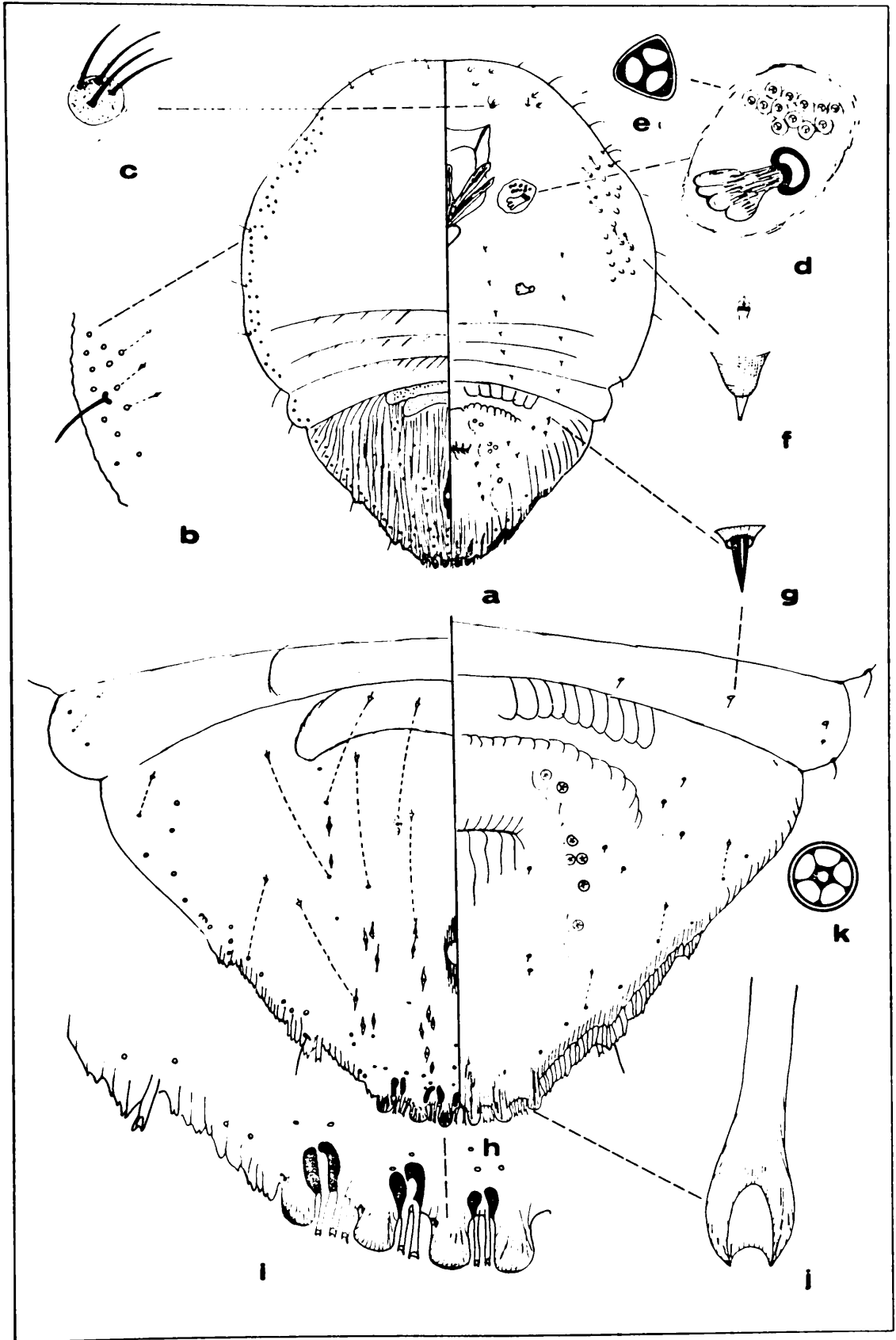


Plate 20. - *Furcaspis biformis* (Cockerell)

Adult female

Body turbinate (fig. a), 1005 (841 to 1167) long, 757 (605 to 915) wide; Derm at maturity membranous except for the pygidium.

Prosoma

Dorsum: Row of numerous microducts, 20 long, in submarginal area (fig. b); 8 to 10 marginal setae, 58 long.

Ventrum: Antenna (fig. c) as a sclerotized tubercle with 4 setae, each about 20 long. Clypeolabral shield 187 (180 to 196) long, and 122 (117 to 129) wide; numerous seta on the head, these of two sizes, marginal 58 long, submarginal 30 long. Anterior spiracle (fig. d) with approximately 12 (8 to 18), associated trilocular pores (fig. e). Posterior spiracle same size and shape but without associated pores. About 20 to 25 gland tubercles (fig. f) in a submarginal, elongate cluster, in the area between the spiracles. Two parallel rows of conical setae (fig. g) extending posteriorly from prothorax toward abdomen.

Prepygidial segments of abdomen (fig. h)

Dorsum: Segments I to IV with a row of 5 or 6 marginal microducts, 35 long, and with one seta on the margin, about 35 long.

Pygidium

Dorsum: Median lobes (fig. i) well developed; straight, rounded at the apex, and about 16 wide. L_2 and L_3 about the same size and shape; L_4 appears as a prominent tooth-like sclerotization, and beyond this the margin shows two more of these projecting sclerotizations. Three pairs of paraphyses present, one at the base of each

interlobular space; between each of these, 2 or 3 openings of microducts. A discontinuous row of microducts along the submargin; the rest of the dorsum of the pygidium is sclerotized with 3 well defined rows of slender microducts, and about 90 long; opening of the microducts surrounded by a sclerotized area. Anal opening circular, 16 in diameter, placed about 6 times this diameter from the base of L_1 . Area around the anal opening more sclerotized than the rest of the pygidium.

Ventrum: Plates on the interlobular space of a very particular type (fig. j) described by Ferris (1938) as chelate; 2 between the median lobes; 2 between L_1-L_2 ; 3 between L_2-L_3 and a slightly large one at the base of L_4 ; few microducts in a row along the submargin. Quinquelocular (fig. k) perivulvar pores in 4 groups, formula 4-6,(2-3),0. Paravulvar scleroses weakly sclerotized. Conical setae 5 pairs laterad of the perivulvar pores; and 3 pairs posterior to vulva.

Illustration based on material from Catteya gaskeliana, El Limon, Aragua, Venezuela.

Recognition characteristics

The chelate plates, 3 pairs of well developed lobes and the very slender microducts, makes this species distinct.

Notes

F. biformis seems to be limited to Orchidaceae and Amaryllidaceae; distribution is restricted to the neo-tropical region with the exception of some records from Hawaii as introduction from the American continent.

Genus Hemiberlesia Cockerell

Type of the genus: Aspidiotus rapax Comstock, 1881.

Hemiberlesia Cockerell 1897a:12; Fernald, 1903:251; Ferris, 1938:SII-232; Balachowsky, 1948:297; Schmutterer, 1959:65; Kosztarab, 1963:33; Borchsenius, 1966:304; Morrison and Morrison, 1966:91. Marlataspis MacGillivray 1921:387. Hemiberlesiana Thiem and Gerneck, 1934:232.

Description of the genus

Referable to the tribe Aspidotini, one-barred ducts. Body circular or subcircular; median lobes well developed and close together; L_1 and L_2 reduced to sclerotized points on the margin; plates elongated, fimbriated, except the ones beyond L_3 ; anal opening circular, conspicuously large; 4 paraphyses present; pygidial dorsal ducts few, long and slender, no definitive furrows formed.

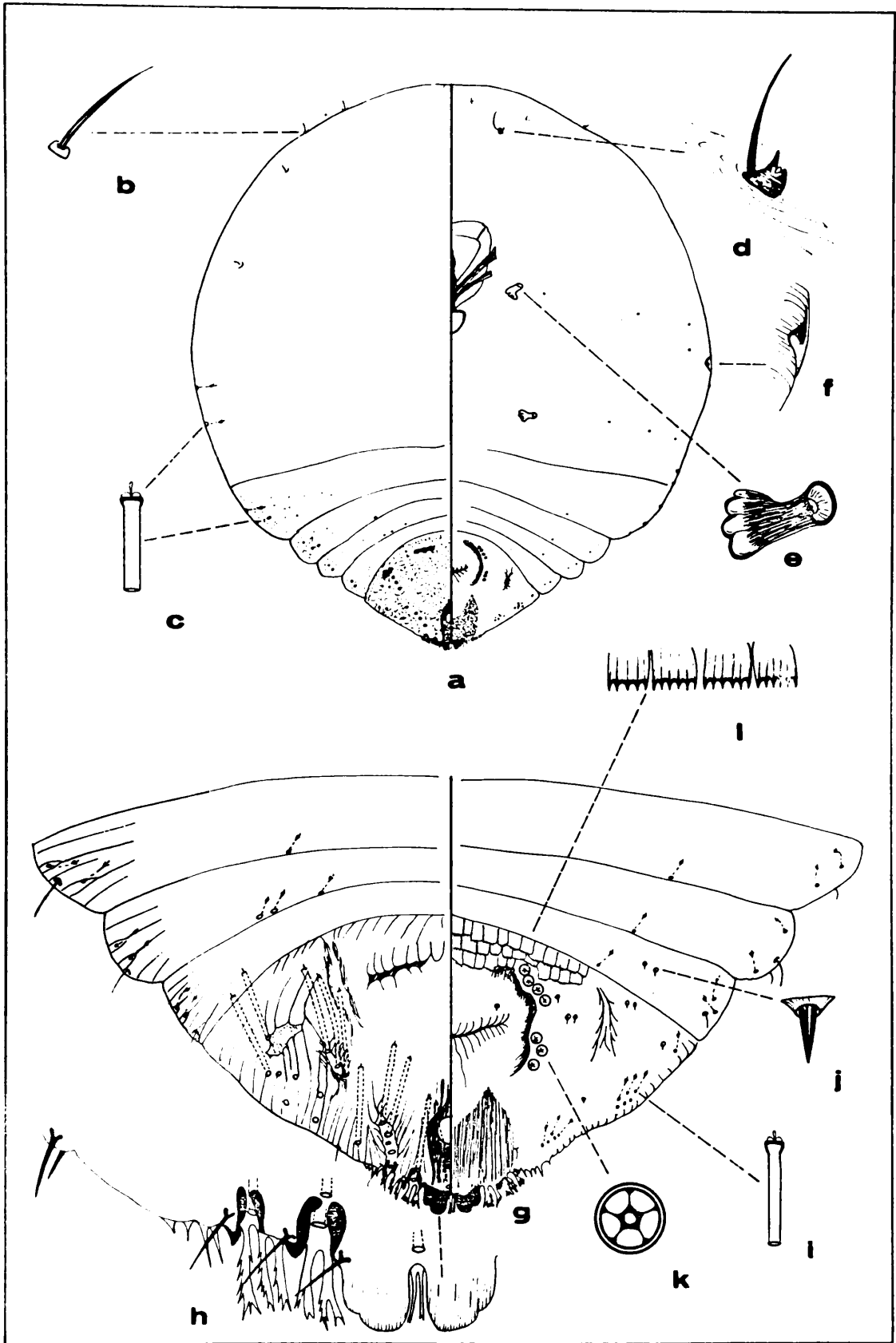
Key to species of Hemiberlesia

Perivulvar pores present; anal apophyses present. lataniae (Signoret)
Perivulvar pores absent; anal apophyses absent. . . rapax (Comstock)

Hemiberlesia lataniae (Signoret)

Plate 21.

Aspidiotus lataniae Signoret, 1869:124; Fernald, 1903:266; Dietz and Morrison 1916:299; Ballou, 1945:90. Aspidiotus cydoniae Comstock, 1881b:295. Aspidiotus crawii Cockerell, 1897a:4. Aspidiotus greenii Cockerell, 1897a:4. Aspidiotus implicatus Maskell, 1897:241. Aspidiotus lateralis Marlatt, 1899:837. Diaspidiotus



lataniae MacGillivray, 1921:412. Hemiberlesia lataniae Cockerell, 1905:202; Ferris, 1938:SII-241; Balachowsky, 1948:282; Schmutterer, 1959:71; Kosztarab, 1963:35; Borchsenius, 1966:306.

Material studied

On Melia azederach, Meliaceae, Maracay, 29-IV-43 (CHB) (IZA & USNM). Spondias sp. Anacardiaceae, Venezuela, (Quarantine), 2-V-46 (USNM).

Scale of the female

Grayish, circular, convex, exuviae submarginal.

Adult female

Body subcircular (fig. a); 1140 (974 to 1181) long, 889 (827 to 1107) wide; Derm at maturity membranous except for the pygidium.

Prosoma

Dorsum: Several marginal and submarginal setae (fig. b); 2 microducts (fig. c) submarginally on metathorax.

Ventrum: Antenna (fig. d) as a sclerotized tubercle with one seta about 31 long. Clypeolabral shield 175 long and 117 wide. Anterior and posterior spiracle (fig. e) similar, without associated pores or ducts. Margin between the spiracle with a small invagination bearing a short thoracic spine (fig. f).

Prepygidial segments of abdomen

Dorsum: Segments I to IV with 2 submarginal microducts (fig. c) each. Segments II and III (fig. g) with 2 or 3 microducts submedially.

Ventrum: Segments I to IV with 2 or 3 submarginal microducts and 1

submedially.

Pygidium

Dorsum: Median lobes (fig. h) large and prominent, about 20 wide, notched on outer angle; L_2 and L_3 reduced to non-sclerotized points on the margin. Paraphyses moderately developed, 2 in each interlobular space. Microducts 55 long, located 1 between median lobes, 2 in the first interlobular space, 5 in a furrow arising from the second interlobular space and 8 to 12 on segment V. Anal opening circular, conspicuously large, 20 in diameter; placed about $1\frac{1}{2}$ times this diameter from the base of L_1 ; located posterior to vulva on the venter. Anal apophyses well developed, area between these sclerotized.

Ventrum: Plates in the interlobular spaces fimbriated, 2 between median lobes; 2 between L_1 - L_2 ; 3 between L_2 - L_3 and 2 to 4 non-fimbriated beyond L_3 . Clusters of microducts (fig. i) submarginally on segments VI and V. Conical setae (fig. j) 3 pairs submarginally, 3 laterad of perivulvar pores and a pair anterior to vulva. Quinquelocular perivulvar pores (fig. k) in 4 groups, formula 2-4(3-4),0. Paravulvar scleroses well developed. Several rows of serrate squamous (fig. l) anterior to vulva.

Illustration based on material from Melia azederach, Meliaceae, Maracay, Aragua, Venezuela.

Recognition characteristics

The reduced L_2 and L_3 , prominent L_1 , large anal opening, presence of 4 pairs of paraphyses, well developed anal apophyses and 4 groups

of perivulvar pores, makes this species distinct.

Notes

This cosmopolitan species is found on a lsye variety of hosts, especially on Palmae, Leguminosae and Rosaceae.

Hemiberlesia rapax (Comstock)

Plate 22

Aspidiotus rapax Comstock, 1881:307, Fernald, 1903:276. Aspidiotus evonymi Targioni-Tozzetti, 1888:420. Diaspis circulata Green 1896a or b:4. Aspidiotus (Hemiberlesia) tricolor Cockerell, 1897a:25. Hemiberlesia camelliae Leonardi 1897c:124. Aspidiotus lucumae Cockerell, 1899c:22. Hemiberlesia argentina Leonardi 1911:237. Hendaspidiotus tricolor MacGillivray, 1921:439. Hemiberlesiana camelliae Thiem and Gerneck, 1934:232. Hemiberlesia rapax Ferris, 1938:SII-244; Balachowsky, 1948:299; Zimmerman, 1948:361; Balachowsky, 1956:116; Schmutterer, 1959:66; Borchsenius, 1966:309.

Material studied

Two females on orchids, Venezuela (Quarantine), 28-X-36 (USNM).

Scale of the female

Not seen; described by Ferris, 1938, as "Gray, circular, highly convex, exuviae submarginal".

Adult female

Body subcircular (fig. a), 915 long, 738 wide; derm at maturity membranous.

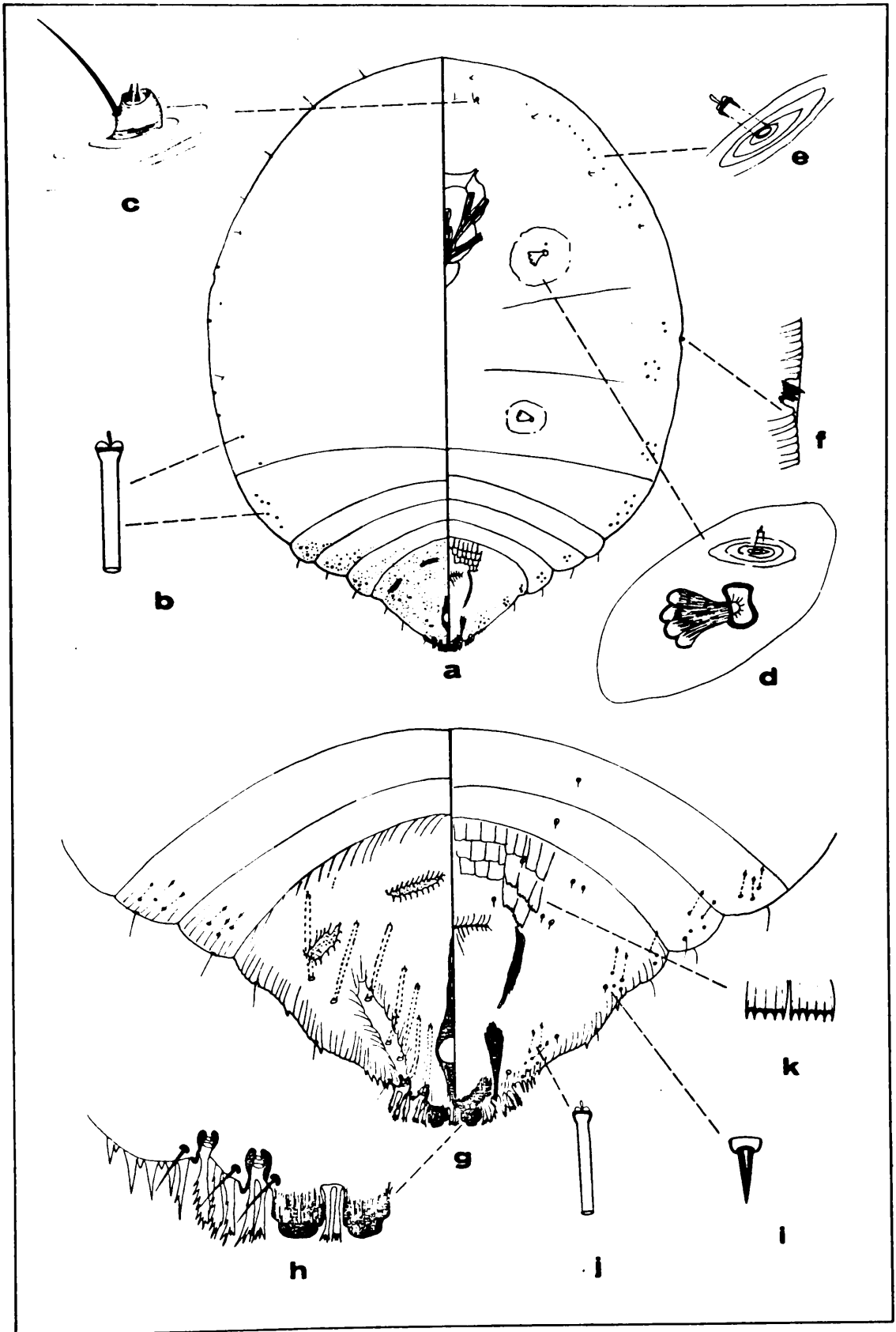


Plate 22. - *Hemiberlesia rapax* (Comstock)

Prosoma

Dorsum: Several marginal and submarginal setae; scattered microducts (fig. b) along the submargin of the thorax.

Ventrum: Antenna (fig. c) as a sclerotized tubercle with one seta about 23 long. Clypeolabral shield 183 long and 117 wide; anterior spiracle (fig. d) with 1 associated microduct; posterior spiracle same size and shape as anterior spiracle but without associated microduct. Submarginal band of microducts (fig. e) from the head to the prepygidial segments. Margin between the spiracles with a small invagination bearing a short fimbriated thoracic spine (fig.f).

Prepygidial segments of abdomen

Dorsum: Segments I to IV with a row of submarginal microducts and marginal setae.

Ventrum: Segments I, III and IV with a small cluster of microducts submarginally.

Pygidium (fig. g)

Dorsum: Median lobes (fig. h) large and prominent, about 16 wide; L_2 and L_3 reduced to non-sclerotized points on the margin. Paraphyses moderately developed, 2 in each interlobular space, except median. Microducts long, located 2 between the paraphyses of first interlobular space, 1 between second pair of paraphyses, and 5 more pairs on the submarginal area of the pygidium. Anal opening circular, conspicuously large, 23 in diameter; placed about $1 \frac{1}{2}$ times this diameter from the base of L_1 ; located posterior to vulva on the venter. Area anterior and posterior to the anal opening more

sclerotized than the rest of the pygidium. Anal apophyses absent.

Ventrum: Plates in the interlobular spaces fimbriated, 2 between median lobes; 2 between L_1 - L_2 ; 3 between L_2 - L_3 and 3 to 5 non-fimbriated beyond L_3 . Cluster of microducts (fig. j) submarginally on segments VI and V. Paravulvar scleroses well developed. Conical setae (fig. i) 3 pairs submarginal, 3 laterad of paravulvar scleroses and a pair anterior to vulva. Several rows of serrate squamations (fig. k) anterior to vulva.

Illustration based on material from orchids, Orchidaceae, Venezuela (Quarantine).

Recognition characteristics

The relatively large anal opening, weakly developed L_1 and L_2 , fringed plates, large median lobes, few microducts dorsally on the pygidium, absence of anal apophyses and perivulvar pores makes this species distinct.

Notes

This cosmopolitan and extremely polyphagous species is a new addition to the Venezuelan coccid-fauna.

Genus Melanaspis Cockerell

Type of the genus: Aspidiotus obscurus Comstock, 1881.

Melanaspis Cockerell, 1897a:13; Fernald, 1903:285; Ferris, 1941:SIII-347; Balachowsky, 1951:578; 1958:191; 1959:360; Borchsenius, 1966:345; Morrison and Morrison 1966:118. Pelomphala MacGillivray, 1921:392.

Description of the genus

Referable to the tribe Aspidiotini, one-barred ducts, L_2 not bilobed; body form oval or curcular; apex of pygidium forming an obtuse angle; 4 pair of lobes; paraphyses well developed; 3 in the interlobular space between L_2 - L_3 . Dorsal pygidial ducts few, very long and slender. Plates minute, slightly fringed, or not at all, bearing the orifices of microducts, present only in the interlobular spaces. Margin usually crenulated and bearing a series of minute microducts. Dorsum of pygidium with a defined pattern of sclerotization: a median area which extends across between the members of the second pair of lobes and forward into the pygidium; a pair of small areas which arises from the base of L_4 and expands laterally for a short distance.

Key to the species of Melanaspis

1. Perivulvar pores present2
 Perivulvar pores absent. tenax (Mackenzie)
2. Plates slightly fimbriated; dorsal
 microducts absent on prepygidial
 segments. santensis Lepage
 Plates not fimbriated; dorsal microducts
 present on prepygidial segments alinea (Newstead)

Melanaspis alinea (Newstead)

Plate 23

Aspidiotus alineus Newstead, 1901:81. Chrysomphalus alineus Fernald, 1903:286; MacGillivray, 1921:413. Pseudischnaspis alineus Houser,

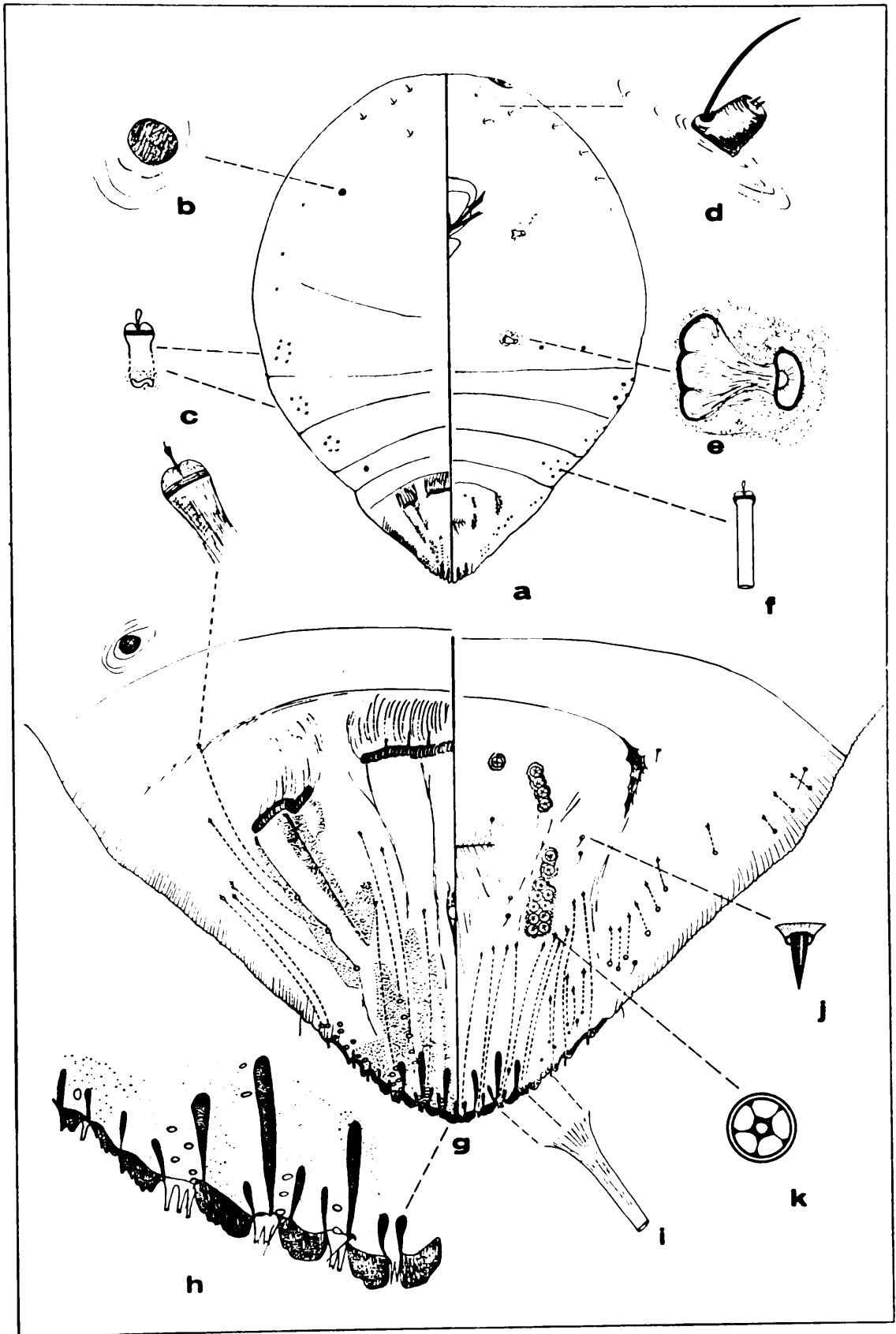


Plate 23.- *Melanaspis alinea* (Newstead)

1918:171. Inaspidiotus alineus McKenzie, 1939:53. Melanaspis
alineus Ferris, 1941:SIII-348; Balachowsky, 1951:586; Borch-
senius, 1966:346.

Material studied

On Cattleya sp. Orchidaceae, Venezuela (Quarantine) (USNM) 8
females. Orchids, Orchidaceae, Venezuela (Quarantine) (USNM) 8
slides with 12 females.

Scale of female

Not seen, described by Ferris (1941), as "brown, circular,
flat; exuviae central and black."

Adult female

Body oval (fig. a); 1388 (886 to 1731) long, 1024 (812 to
1240) wide; Derm at maturity membranous except for the pygidium
which is as described for the genus.

Prosoma

Dorsum: With a pair of dorsal bosses (fig. b) on the head. Sub-
marginal row of 3 microducts (fig. c) on the pro and mesothorax.
Submarginal cluster of microducts on the metathorax. Several
submarginal setae on the head.

Ventrum: Antenna (fig. d) as a sclerotized tubercle with 1 lateral
seta about 23 long, and a terminal pit with 2 short setae. Several
setae around the antennae and submarginally on the head. Clypeolabral
shield 195 long and 117 wide. Anterior and posterior spiracles
(fig. e) similar, surrounded by stippled sclerotization and without
associated pores or ducts. Area between the posterior spiracle and

the margin with 4 microducts (fig. f).

Prepygidial segments of abdomen

Dorsum: Segments I and II with submarginal clusters of 5 or 6 microducts (fig. c); Segment III with a pair of dorsal bosses submarginally.

Ventrum: Segments I to IV with submarginal clusters of 3 to 6 microducts (fig. f).

Pygidium (fig. g)

Dorsum: Median lobes (fig. h) well developed notched on the outer side, 8 wide; L_2 similar to L_1 ; L_3 broader than L_2 and minutely serrate, L_4 similar to L_3 ; margin beyond L_4 sclerotized with tooth-like projections. Paraphyses present, strongly developed and arranged as follows: median lobes with a small paraphysis arising from the mesal angle; first interlobular space with a long paraphysis arising from the outer angle of L_1 and a smaller one from the mesal angle of L_2 ; second interlobular space with a short paraphysis arising from the outer angle of L_2 , followed by a very long paraphysis and a short one from the mesal angle of L_3 . Third interlobular space with a long paraphysis arising from the outer angle of L_3 , from the mesal angle of L_4 arise a very short paraphysis; beyond L_4 several but small paraphyses-like sclerotization present. Dorsal microducts slender, about 136 long numbering about 30 pairs; 2 microducts arise from between the bases of paraphyses in the first interlobular space; 4 between the paraphyses of second interlobular space; 5 between the paraphyses of third interlobular

space; 4 between the paraphyses-like sclerotizations beyond L_4 ; a submarginal row of microducts on segment V; a submedian row of 3 to 5 microducts on segments VI and VII. Anal opening circular, 20 in diameter; placed about 6 times its diameter from the base of L_1 ; located posterior to vulva on the venter. Area around the anal opening sclerotized.

Ventrum: Plates (fig. i) never longer than the lobes, non-fimbriated, and bearing apical pores leading into long microducts; 2 between median lobes, 2 between L_1-L_2 , 2 between L_2-L_3 , 3 between L_3-L_4 and 3 beyond L_4 . Submarginal clusters of 6 microducts on segments VI and V. Conical setae (fig. j) 3 pairs submarginally, 2 laterad of perivulvar pores, 1 anterior to vulva and 2 posterior. Quinquelocular perivulvar pores (fig. k) in 4 groups, formula 4-7,(5-9),0.

Illustration based on material from Cattleya sp., Orchidacea, Venezuela (Quarantine).

Recognition characteristics

The 3 paraphyses in second interlobular space, 4 pairs of lobes, plates minute and nonfringed, dorsal microducts on the prepygidial segments and presence of 4 groups of perivulvar pores makes this species distinct.

Notes

This species is restricted to orchids and has been reported from Mexico to Panama, the Antilles and Florida, this new addition to the Venezuelan coccid-fauna extends its range into northern South America.

Melanaspis santensis Lepage

Plate 24

Melanaspis santensis Lepage, 1942:187; Borchsenius, 1966:352.

Material studied

On Karmeria americana, Guttiferae, Caracas, D. F., 25-XII-65
(AD).

Scale of the female

Black, circular, flat; exuviae central and black.

Adult female

Body subcircular (fig. a), 619 (531 to 768) long, 557 (472 to 738) wide. Derm at maturity slightly sclerotized especially toward the margin; pygidium as described for the genus.

Prosoma

Dorsum: Marginal area somewhat crenulated and with stippled sclerotization (fig. b).

Ventrum: Antenna (fig. c) as a sclerotized tubercle, with 1 lateral seta about 24 long and a terminal pit with 2 short seta. A cluster of setae (fig. d) submarginal at the same level of the antennae, 4 or 5 more in a row submarginally on the head. Clypeolabral shield 187 long, 115 wide. Anterior spiracle (fig. e) without associated pores or microducts, a row of 4 microducts between the atrium and the margin; posterior spiracle same size and shape as anterior spiracle. Row of microducts (fig. f) submarginally from the area of the spiracle to the abdomen.

Prepygidial segments of abdomen

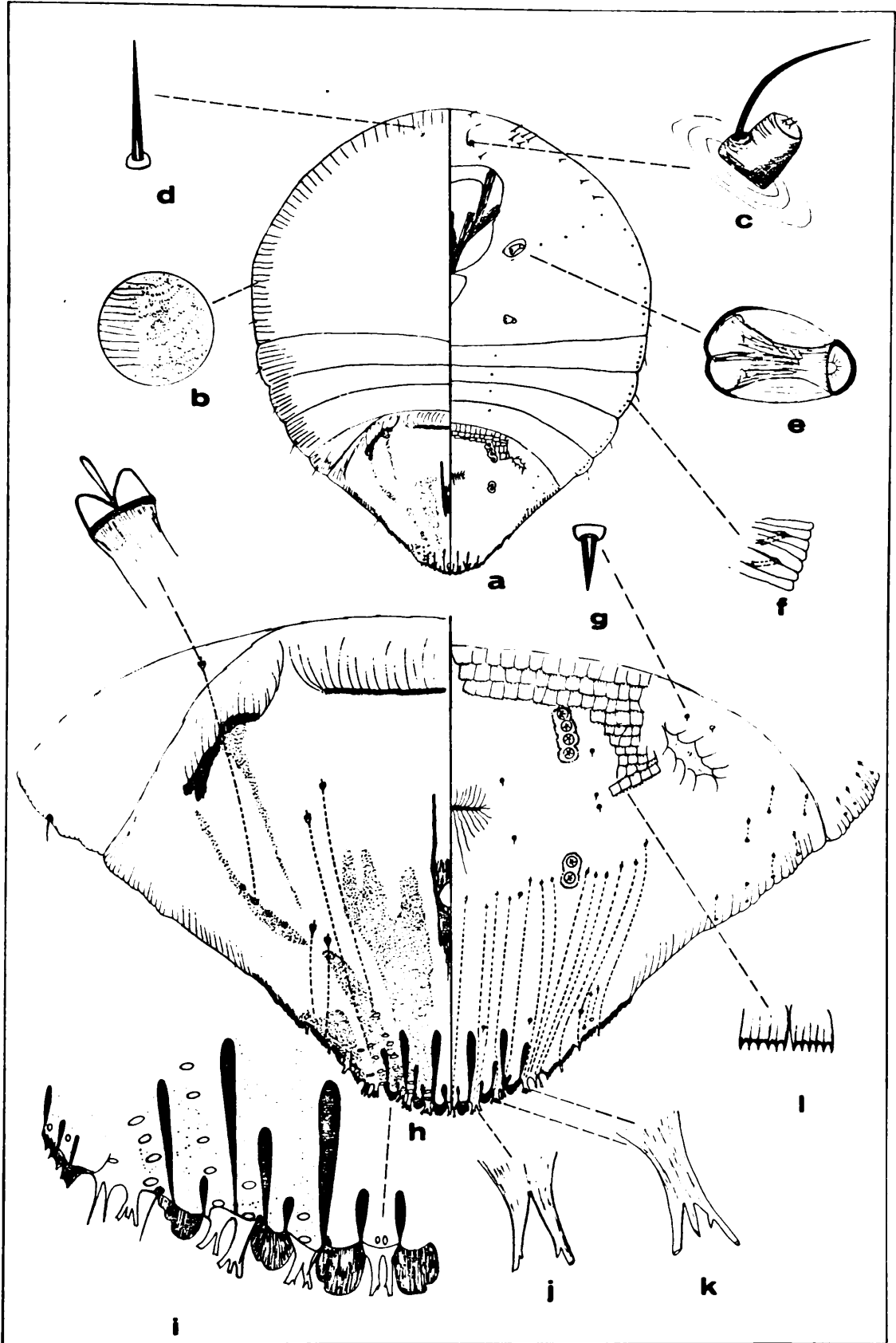


Plate 24. - *Melanaspis santensis* Lepage

Dorsum: Each segment with a marginal seta and more sclerotized than the prosoma.

Ventrum: Segments I to IV with 4 or 5 submarginal microducts (fig. f) and a submarginal pair of conical setae (fig. g).

Pygidium (fig. h)

Dorsum: Median lobes (fig. i) well developed notched on the outer side, 8 wide; L_2 similar to L_1 ; L_3 broader than L_2 and double notched on the outer margin; L_4 weakly developed and minutely serrate, margin beyond L_4 sclerotized and serrate. Paraphyses present, strongly developed and arranged as follows: median lobes with a small paraphysis arising from the mesal angle; first interlobular space with a very long paraphysis, club-shaped, arising from the outer angle of L_1 and a short one from the mesal angle of L_2 ; second interlobular space with a medium size paraphysis arising from the outer angle of L_2 , followed by a very long paraphysis in the middle and a short one from the mesal angle of L_3 . Third interlobular space with a medium size paraphysis arising from the outer angle of L_3 . Beyond L_4 several small paraphysis-like sclerotizations present. Dorsal microducts slender, about 140 long numbering about 20 pairs; 2 microducts arise between the base of paraphyses on the first interlobular space, 3 between the paraphyses of second interlobular space; area between the paraphyses-like scleroses beyond L_4 with 10 openings of microducts, about long. Submedian rows of 4 to 6 microducts on segments V to VII. Anal opening oval, 12 in diameter; placed about 7 times this diameter from the base of L_1 ; located

posterior to vulva on the venter. Anal apophysis present, area around the anal opening sclerotized.

Ventrum: Plates longer than the lobes, slightly fimbriated, and bearing apical pores leading into a long microduct; 2 between median lobes; 2 between L_1-L_2 with a tooth-like formation close to the apice and fused at the base (fig. j); 3 between L_2-L_3 being the first trifurcate (fig. k) and the others non-fimbriated; 3 between L_3-L_4 similar to the preceding group; 3 non-fimbriated beyond L_4 . Submarginal microducts, 2 on segment VI and 7 on segment VII. Conical setae (fig. g) 3 pairs submarginally, 3 pairs laterad of perivulvar pores, 1 pair anterior to vulva and 1 pair posteriorly. Quinquelocular perivulvar pores in 4 groups, formula 2-3,(3-4),0. Area anterior to vulva and lateral to perivulvar pores with several rows of weakly sclerotized serrate squamations (fig. l).

Illustration based on material from Marmea americana, Caracas, D. F., Venezuela.

Recognition characteristics

The 3 paraphyses in second interlobular space, 4 pairs of lobes, plates slightly fimbriated, absence of dorsal microducts on the prepygidial segments, presence of 4 groups of perivulvar pores and the margin being somewhat crenulate, makes this species distinct.

Notes

This species was previously known from Brasil only; this new addition to the Venezuelan coccid-fauna extends the range of the

species to northern South America.

Melanaspis tenax McKenzie

Plate 25

Melanaspis tenax McKenzie, 1944:54; Borchsenius, 1966:353.

Material studied

On orchid, Orchidaceae, Venezuela (Quarantine), 2-XI-49.

Scale of the female

Not seen, described by McKenzie (1944), as "chocolate brown, circular, with exuviae subcentral."

Adult female

Body subcircular (fig. a); 768 long, 753 wide; derm of prosoma membranous, pygidium as described for the genus.

Prosoma

Dorsum: Band of microducts submarginally extending from the head to the abdomen. A pair of dorsal bosses submarginally on the head.

Ventrum: Antenna (fig. c) a sclerotized tubercle, with 1 lateral seta about 27 long. Band of microducts (fig. d) submarginally extending from the head to the abdomen. Clypeolabral shield 242 long and 156 wide. Anterior spiracle (fig. e) with an associated sclerotic spot anteriorly; area between the spiracles and clypeolabral shield with numerous microducts (fig. f) and several rows of serrate squamations. Two parallel bands of microducts are extending from the spiracle to the margin. Posterior spiracle similar to the anterior but without associated scleroses and with

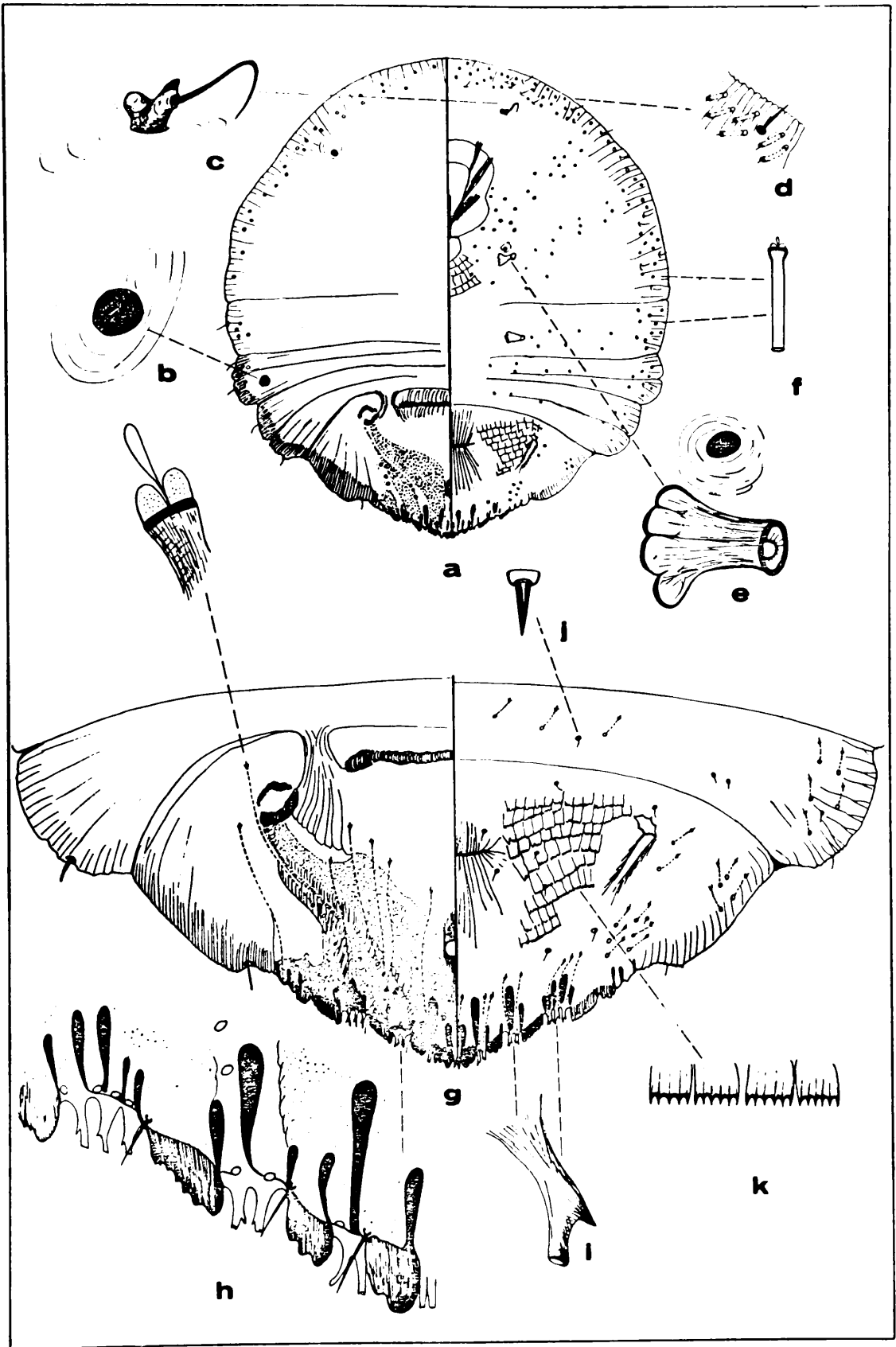


Plate 25. - *Melanaspis tenax* McKenzie

only 1 band of microducts from this to margin.

Prepygidial segments of abdomen

Dorsum: Segment I with 2 pairs of submarginal microducts; segment II with 2 pairs of submarginal microducts and 1 pair of dorsal bosses; segments III and IV without microducts, the submarginal area more sclerotized than the rest of the segment.

Ventrum: Segments I to IV with submarginal clusters of 4 or 5 microducts and several scattered microducts submedially.

Pygidium (fig. g)

Dorsum: Median lobes (fig. h) well developed notched on outer side, L_2 wide; L_2 same size of L_1 and double notched on the outer side; L_3 broader than L_2 and minutely serrate; L_4 similar to L_3 ; margin beyond L_4 sclerotized and minutely serrate. Paraphyses present, strongly developed and arranged as follows: median lobes with a strong paraphysis arising from the mesal angle; first interlobular space with a long, strong and club-shaped paraphysis arising from the outer angle of L_1 and a short and slender from the mesal angle of L_2 ; second interlobular space with a small paraphysis arising from the outer angle of L_2 , followed by a long paraphysis and a medium-sized one from the mesal angle of L_3 ; third interlobular space with 2 short and 2 medium-size paraphyses and a medium-size one arising from the mesal angle of L_4 ; beyond L_4 3 small paraphyses present. Dorsal microducts slender, about 46 long, numbering about 15 pairs; 1 opening between the paraphyses on the first interlobular space; 2 between the paraphyses of second interlobular space; 4 between the

paraphyses of the third interlobular space; 3 between the paraphyses beyond L_4 . Submedian rows of 3 microducts on segments V and VI. Anal opening oval, 12 in diameter; placed about 5 times this diameter from the base of L_1 ; located posterior to vulva on the venter.

Ventrum: Plates same length of the lobes, with a tooth-like formation laterally, and bearing apical pores leading into a short microduct; 2 between median lobes; 2 between L_1-L_2 ; 2 between L_2-L_3 ; 3 between L_3-L_4 . Clusters of 4 to 6 microducts submarginally on segments V and VI, 2 pair submedially on segment V. Conical setae (fig. j), 3 pairs submarginally and 5 pairs lateral to vulva. Perivulvar pores absent. Numerous rows of well developed squamosae plates (fig. k) on each side of vulva.

Illustration based on material from orchid, Orchidaceae, Venezuela (Quarantine).

Recognition characteristics

The 3 paraphyses in second interlobular space, 4 pair of lobes, plates non-fimbriated and with a lateral tooth-like formation, absence of perivulvar pores, and the numerous microducts submarginally on both sides of the prosoma make this species distinct.

Notes

This species seems to be restricted to orchids and has been previously known from Colombia and Guatemala. It is a new addition to the Venezuelan coccid-fauna.

Genus Mycetaspis Cockerell

Type of the genus: Aspidiotus personatus Comstock 1883.

Mycetaspis Cockerell, 1897a:13; Fernald, 1903:285; MacGillivray, 1921:392; Ferris 1941:SSII-369; Balachowsky 1958:205; Borchsenius, 1966:357; Morrison and Morrison, 1966:125.

Description of the genus

Referable to the tribe Aspidiotini, one-barred ducts, fringed plates and L₂ not bilobed; body form circular with the cephalic region produced into a broad lobe-like structure, which at maturity is heavily sclerotized; 4 pairs of pygidial lobes; conspicuous paraphyses in the interlobular spaces; no pores associated with spiracles; margin of the ventral surface of the abdomen sculptured.

Key to the species of Mycetaspis

Each median lobe with an elongate sclerosis,
 extending entirely across the base of the
 lobe; no microducts around the mouthparts. . . . personata (Comstock)
 Median lobes with the basal sclerosis arising
 from the mesal angle; ocular spot absent;
 large number of microducts around the
 mouthparts. defectopalus Ferris

Mycetaspis defectopalus Ferris

Plate 26

Mycetaspis defectopalus Ferris, 1941:SIII-371; Merrill, 1953:62;
 Borchsenius, 1966:357.

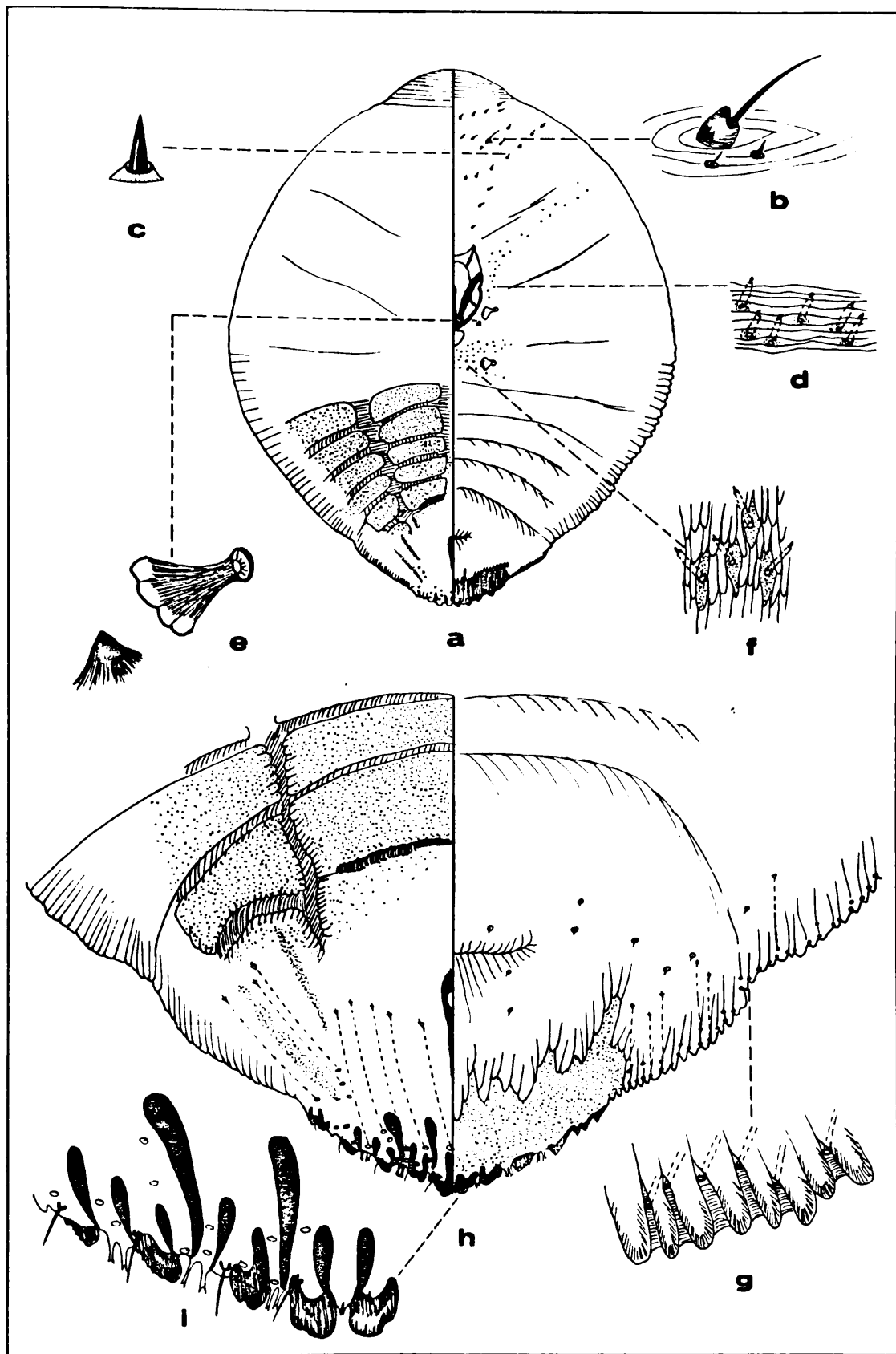


Plate 26. - *Mycetaspis defectopalus* Ferris

Material studied

On unidentified tree, Parque del Este, Caracas, 20-VIII-69 (AD).

Scale of female

Black or dark brown, circular, hemispherical, exuviae central.

Adult female

Body somewhat circular (fig. a), 945 (842 to 1004) long, 892 (753 to 1019) wide; derm at maturity membranous; cephalic process prominent, moderately acute, without setae.

Prosoma

Ventrum: Antenna (fig. b) a sclerotized tubercle with one seta about 20 long. Rows of numerous setae (fig. c) across the venter on the area between the mouthparts and cephalic process. Clypeolabral shield 199 long, 137 wide; band of micropores (fig. e) from the mouthparts diagonally toward the margin. Anterior spiracle (fig. d) without associated pores, but there is a sclerotized protuberance laterad of the basal scleroses; posterior spiracle same size and shape. Area between the spiracles with numerous microducts (fig. f).

Prepygidial segments of abdomen

Dorsum: Derm with a pattern of sclerotization which gives the appearance of plates.

Ventrum: Margin crenulated with numerous microducts about long. These crenulations extend from the area opposite to the spiracles to L₄.

Pygidium (fig. h)

Dorsum: Median lobes (fig. i) well developed in most, rounded at the apex; about 16 wide; L_2 slightly smaller than L_1 with a notch on lateral margin; L_3 and L_4 are shorter and broader. Paraphyses arranged as follows: median lobes with small paraphysis arising from the mesal angle of first interlobular space, with a long stout paraphysis from the outer angle of L_1 , followed by a shorter one arising from the mesal angle of L_2 ; second interlobular space with short paraphysis arising from outer angle of L_2 ; followed by a long and stout and a shorter one arising from the mesal angle of L_3 ; third interlobular space with 2 small paraphyses; beyond L_4 there are some small and inconspicuous scleroses set at some distance from the lobe; between the paraphyses there are always 1 or 2 openings of microducts of about 117 long; a row of microducts submarginally. Anal opening oval, 12 in diameter, placed about 10 times this diameter from the base of L_1 ; located posterior to the vulva on the venter.

Ventrum: Plates short and bifid, 2 in each interlobular space; submarginal area heavily sclerotized; perivulvar pores and paravulvar scleroses lacking. Conical setae, in a submarginal row, and 2 pairs laterad of the vulva, one pair anterior and 2 pairs posteriorly.

Illustration based on material from an unidentified tree, Caracacas, Venezuela.

Recognition characteristics

The cephalic process, numerous microducts around the mouth-parts and plate-like sclerotizations on the derm of dorsum makes this species distinct.

Notes

This species was previously known only from U.S.A. and Panama, this new addition to the Venezuelan coccid-fauna extends the range of the species into South America.

Mycetaspis personata (Comstock)

Plate 27

Aspidiotus personatus Comstock, 1883:56; Newstead, 1901:83. Aonidiella personata Leonardi, 1897:165. Chrysomphalus personatus Fernald, 1903:292; Hempel, 1920:141. Mycetaspis personata MacGillivray, 1921:442; Ferris, 1941:SIII-372; Balachowsky, 1951:575; Kosztarab, 1955:381; Balachowsky, 1958:206; Schmutterer 1959:107. Melanaspis personata Lindinger 1921:427. Pseudoaonidia personata Gomez-Menor, 1941:139.

Material studied

Three females on palm leaves, Venezuela (Quarantine), 14-VI-55 (USNM).

Scale of female

Not seen, described by Ferris, 1941, as "black, almost hemispherical with the exuviae central."

Adult female

Body almost circular (fig. a); 428 (384 to 472) long, 398 (354 to 443) wide; derm at maturity membranous except for the pygidium;

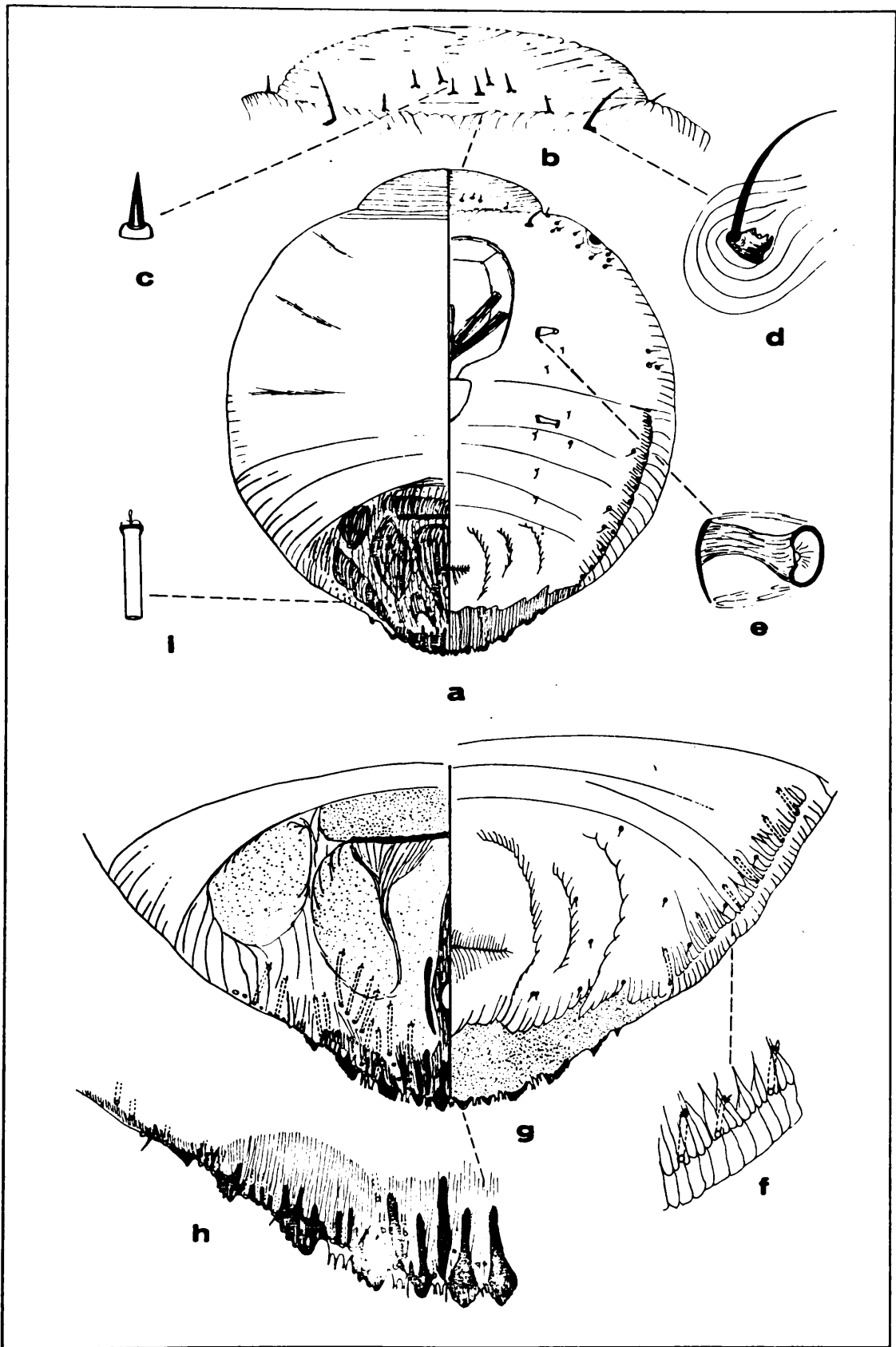


Plate 27. - *Mycetaspis personata* (Comstock)

cephalic process (fig. b) heavily sclerotized, low, almost rectangular with 8 conical setae (fig. c) on the ventral surface.

Prosoma

Ventrum: Antenna (fig. d) as a sclerotized tubercle with one seta about 27 long. Eye spot marginal, sclerotized and surrounded by numerous conical setae (fig. c). Clypeolabral shield 144 long, 101 wide. Anterior and posterior spiracle (fig. e) similar, without associated pores. From the area of the posterior spiracle to the segment V of abdomen a band of submarginal microducts on a crenulated area (fig. f).

Pygidium (fig. g)

Dorsum: Median lobes (fig. h) well developed, rounded at the apex; about 8 wide; L_2 smaller than L_1 and with a lateral notch; L_3 and L_4 broad, low and notched; a large broad tooth just beyond L_4 ; paraphyses arranged as follows: median lobes each with a broad paraphysis; first interlobular space with one long and slender paraphysis accompanied by a smaller one; second interlobular space with a large paraphysis accompanied by 2 short ones arising from L_3 ; third interlobular space with 2 small paraphyses; 3 arising from L_4 ; beyond L_4 a series of short paraphyses along the margin. Openings of marginal microducts (fig. i) between the paraphyses; a row of microducts submarginally; anal opening oval, 12 in diameter, placed about 4 times this diameter from the base of L_1 ; located posterior to the vulva on the venter; anal paraphyses present.

Ventrum: Plates short and bifid, 2 in each interlobular space, except

the third, this with 3 plates. Submarginal area heavily sclerotized; perivulvar pores and paravulvar scleroses lacking; conical setae in a submarginal row, and 5 or 6 more pairs scattered later of vulva.

Illustration based on material from palm leaves, Venezuela (Quarantine).

Recognition characteristics

The cephalic process with short conical setae; paraphyses of the median lobes; eye spot surrounded by conical setae and the submarginal row of microducts on the abdomen makes this species distinct.

Notes

This polyphagous species is known from many countries in the tropical and subtropical regions of the world. It is a new addition to the Venezuelan coccid-fauna.

Palinaspis Ferris

Type of the genus: Targionia quohogiformis Merrill, 1923.

Palinaspis Ferris, 1941:SIII-377; Balachowsky, 1948:314; 1951:571;

Borchsenius, 1966:379; Morrison and Morrison, 1966:142.

Description of the genus

Referable to the tribe Aspidiotini, one-barred ducts, without gland spines. Body fusiform with the prosoma well developed. Median lobes well developed, L_2 represented by scleroses on the margin, anal opening close to the apex of the pygidium and posterior to vulva; ventral scleroses extending from L_1 , and almost reaching the paravulvar scleroses. Plates beyond L_2 only. Perivulvar pores

absent.

Palinaspis barbata Ferris

Plate 28

Palinaspis barbata Ferris, 1942:SIV-432; Borchsenius 1966:320.

Material studied

Two females on unidentified host, Venezuela (Quarantine), April 1946 (USNM).

Scale of the female

Not seen; described by Ferris, (1942) as "more or less circular, white in color, the wax of slightly granular texture, exuviae central."

Adult female

Body fusiform (fig. a), 1080 (842 to 1240) long, 716 (620 to 812) wide. Derm at maturity sclerotized. Margins of the body sculptured.

Prosoma

Dorsum: A pair of dorsal bosses (fig. b) submarginal on the head.

Ventrum: Antenna (fig. c) sclerotized tubercle with one seta, 24 long. Eight to 10 submarginal seta each about 12 long. Clypeolabral shield 17⁴ long and 125 wide. Two pairs of short microducts, between the antennae and the clypeolabral shield. Anterior spiracle (fig. d) with no associated pores but surrounded by a stippled sclerotization with 3 associated microducts (fig. e). Posterior spiracle same shape and size with only 1 associated microduct. Row of microducts in submarginal area.

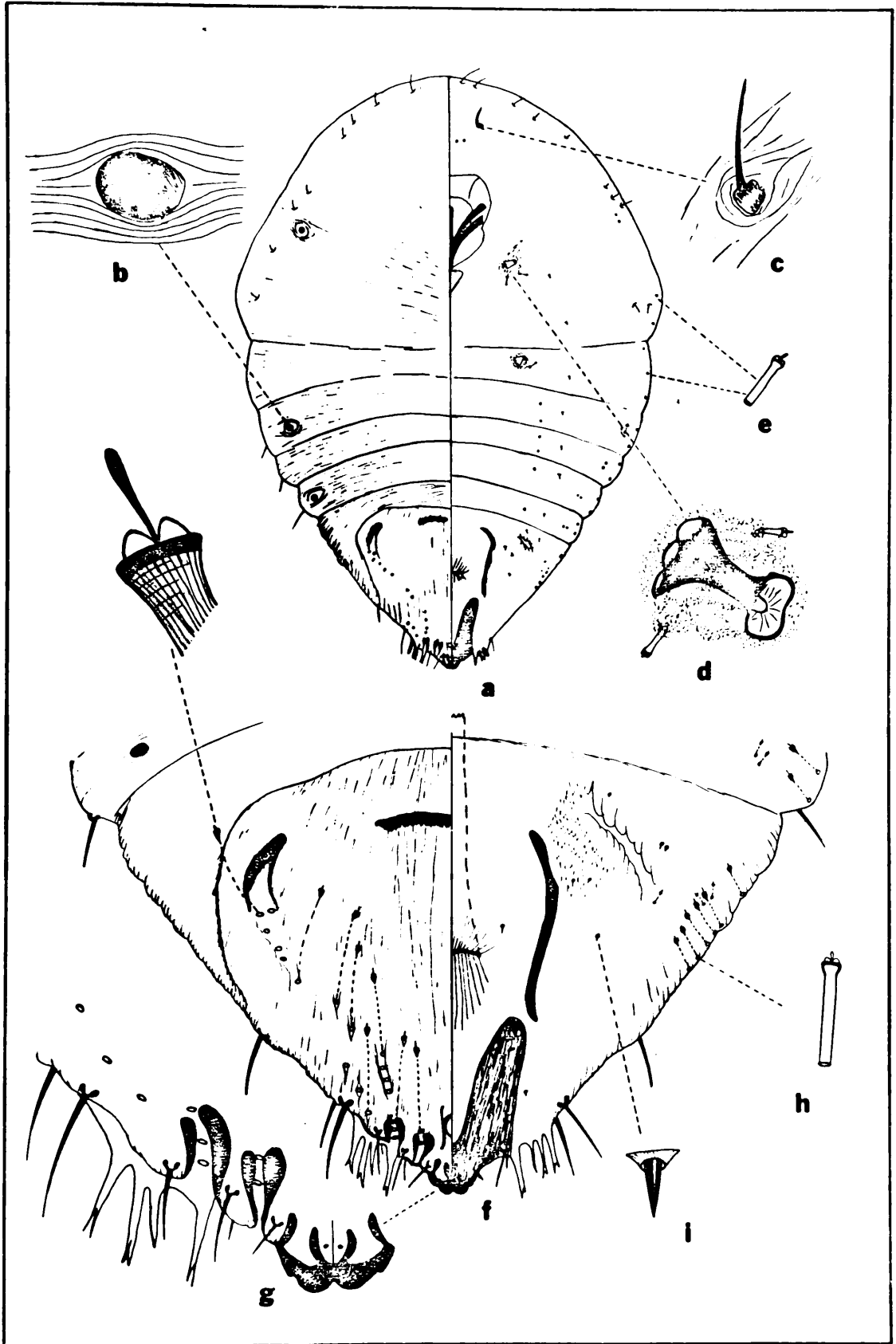


Plate 28. - *Palinaspis barbata* Ferris

Prepygidial segments of abdomen (figs. a & f)

Dorsum: Segments I to IV with a marginal seta. Segments I and III with a pair of submarginal bosses (fig. b).

Ventrum: Segments I to IV with 2 pairs of marginal microducts each about 27 long; 2 pairs of small microducts, about 12 long, submarginally; and one small microduct and one conical spine submedially.

Pygidium

Dorsum: Median lobes (fig. g) short, fused at the base but separated apically, outer margin with a notch; L_2 is reduced to small sclerotized area on the margin; L_3 and L_4 absent. Marginal setae of segments VIII and VII about 20 long; of segment VI about 40 long and V about 50 long. Two short paraphyses 2 or 3 openings of microducts are present. Submarginal row of 3 long microducts, in segment V; row of long microducts extends from the paraphyses to the dorsal scar. Anal opening circular, 20 in diameter, placed about twice its diameter from the base of L_1 , posterior to vulva on the venter.

Ventrum: Marginal setae of segments VII, VI and V approximately the same size as those on the dorsal side. Plates only beyond L_2 ; one long and forked at the apex located close to L_2 ; segment VI with a basally broad and three-branched plate. Cluster of marginal microducts (fig. h) on segment V. Three small microducts submarginally. Ventral scleroses are plate-like broad and extending toward the parvulvar scleroses which is well developed and continuous.

Conical setae (fig. i) 3 pairs anterior to the ventral scar, 2 pairs

between the paravulvar scleroses and ventral scar and 1 pair anterior to the vulva.

Illustration based on material from an unidentified host, Venezuela (Quarantine).

Recognition characteristics

The peculiar plates and fused median lobes makes this species distinct.

Notes

This species was described from Panama in 1938. This seems to be the second time that it has been recorded; it is a new addition to the Venezuelan coccid-fauna.

Genus Pseudaonidia Cockerell

Type of the genus: Aspidiotus duplex Cockerell, 1896.

Pseudaonidia Cockerell, 1897a:14; Fernald, 1903:282; Marlatt, 1908a: 139; MacGillivray, 1921:394; Ferris, 1938:SII-252; Balachowsky, 1958:268; Schmutterer, 1959:112; Borchsenius 1966:229; Morrison and Morrison 1966:163. Pseudaonidiella MacGillivray, 1921:394.

Description of the genus

Referable to the tribe Aspidiotini, one barred ducts and plates present, second pygidial lobe not bilobed. Adult female with a strong constriction on the prosoma. Derm on the dorsum sclerotized except for few membranous areas. Quinquelocular pores associated with the anterior spiracle. Pygidium with 4 pairs of well developed lobes. Dorsal derm with a large reticulated area. Perivulvar pores present.

Pseudaonidia trilobitiformis (Green)

Plate 29

Aspidiotus trilobitiformis Green, 1896a:4, 1896b:41. Aspidiotus (Pseudaonidia) trilobitiformis Cockerell, 1897a:28; Hempel, 1900:499. Aspidiotus (Evaspidiotus) trilobitiformis Leonardi, 1898:77. Aspidiotus darutyi Charmoy, 1898:278; Pseudaonidia trilobitiformis. Cockerell, 1899a:396; Fernald, 1903:284; MacGillivray, 1921:453. Costa Lima, 1942:277; Balachowsky, 1951:684; 1958:272; Borchsenius, 1966:232. Pseudaonidia trilobitiformis darutyi Fernald, 1903:284. Pseudaonidia darutyi Marlatt, 1908a:137; MacGillivray, 1921:453; Lindinger, 1932:194.

Material studied

On Achras zapota, Sapotaceae, El Limon, 30-IX-66 (FFY) (IZA & VPI); Maracaibo, Zulia, 8-X-66 (AD & CJU). Maracay, 3-X-66 (AD). Palo Negro, 4-VII-68 (AD & SC). Anacardium occidentale, Anacardiaceae, El Limon, 22-V-68 (AD & SC). Bauhinia emarginata, Leguminosae, El Limon, 11-IV-66 (AD). El Limon, 9-I-68 (J.T.), El Limon, 16-I-69 (J.T.); Camellia japonica, Theaceae, Palo negro, 4-VIII-68 (AD & SC). Canarium odoratum, Anonaceae, El Limon, 3-VIII-69 (AD). Citrangue carrizo, Rutaceae, El Limon, 25-V-68 (AD & SC). Citrus aurantium, Rutaceae, Palo Negro, 4-VIII-68 (AD & SC). Citrus grandis, Rutaceae, Caracas, 25-XII-66 (AD). Dyospiros kaki, Ebenaceae, Palo Negro, 4-VII-68 (AD & SC). Gaultheria odorata, Ericaceae, El Limon, 8-VII-68 (AD). Ixora chinensis, Rubiaceae, El Limon, 4-VI-69 (Notz). Laurus nobilis, Lauraceae, Palo Negro, 4-VII-68 (AD & SC). Marmes americana,

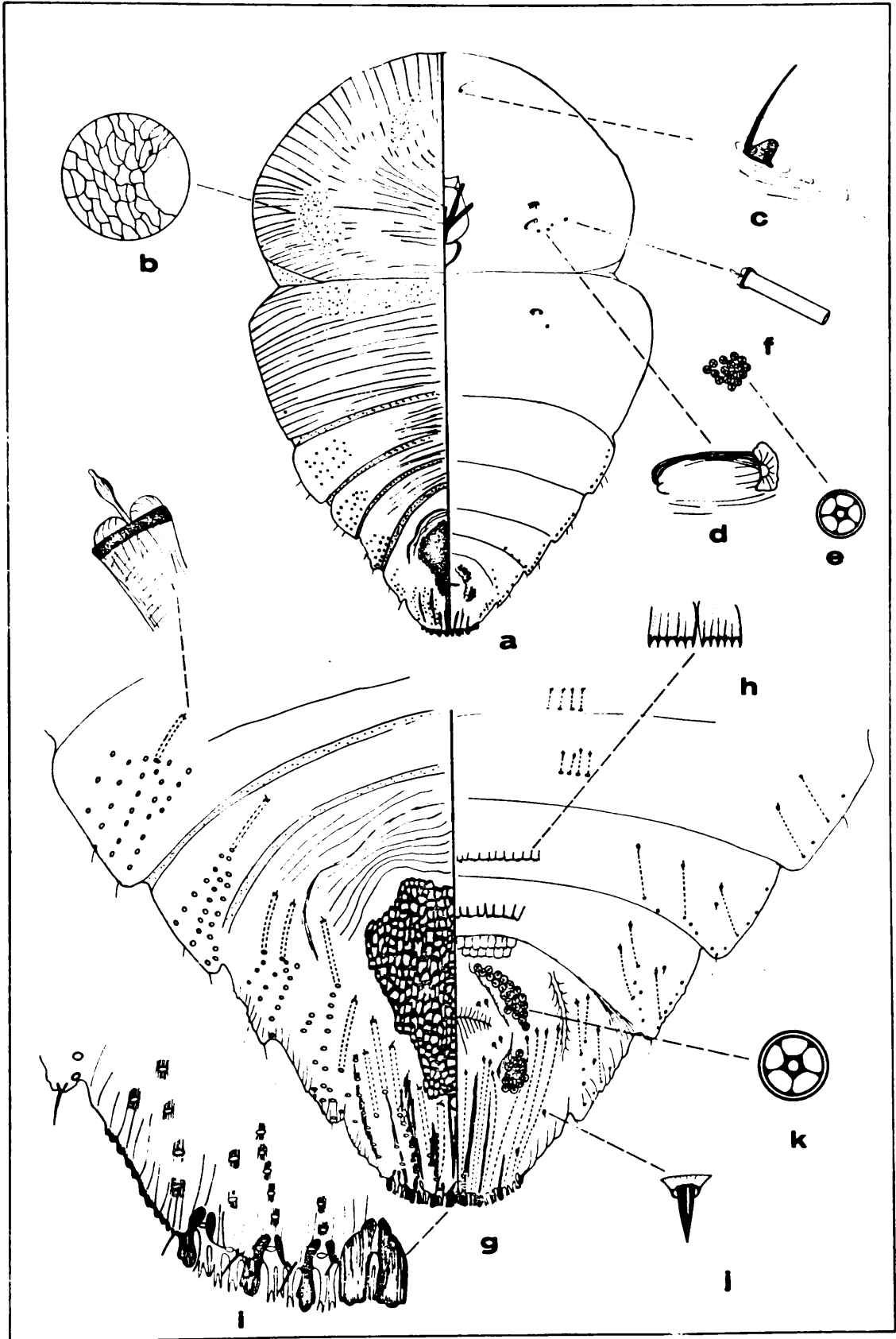


Plate 29. - *Pseudonidia trilobitiformis* (Green)

Guttiferae, Caracas, 25-XII-65, (AD). Mangifera indica, Anacardiaceae, El Limon, 8-VI-68 (AD & SC). Nerium oleander, Apocynaceae, Las Piedras, Falcon 3-XI-68 (FFY); Maracaibo, Zulia, 20-III-66; Persea americana, Lauraceae, El Limon, 8-VI-68 (AD & SC) Plumeria rubra, Apocynaceae, Coro, Falcon, 2-I-68 (Vargas). Psidium guajava, Myrtaceae, El Limon, 8-VI-68 (AD & SC); Perija, Zulia, 9-X-66 (AD & CJR).

Scale of the female

Brown, semi-circular or irregular, flat, exuviae central or subcentral.

Adult female

Body turbinate (fig. a); 1268 (1063 to 1344) long, 865 (709 to 960) wide. Derm at maturity sclerotized especially on the dorsum with the exception of some membranous areas on the prosoma (fig. b).

Prosoma

Ventrum: Antennae (fig. c) as a small sclerotized tubercle with one seta about 20 long, clypeolabral shield 236 (203 to 273) long and 125 (117 to 136) wide. Anterior spiracle (fig. d) with approximately 13 (12 to 15) associated quinquelocular pores (fig. e) and four microducts (fig. f). Posterior spiracle same size and shape but without associated pores and with only one microduct.

Prepygidial segments of abdomen (fig. g)

Dorsum: All the segments with a large submarginal cluster of microducts about 35 long, and 2 marginal setae.

Ventrum: Segments I and II with a submarginal row of slender microducts about 25 long and a submedian row of 4. Segments III and IV

with 2 submarginal rows of slender microducts. Serrate squamations (fig. h) on a medial row.

Pygidium

Dorsum: Median lobes (fig. i) well developed, straight, with two small notches at the apex, and about 12 wide. L_2 , L_3 and L_4 about the same size and shape. Pygidial setae one the base of each lobe about 20 long. Paraphyses short, all about same length, located one pair between L_1-L_2 and L_2-L_3 and one pair at the base of L_4 ; opening of a microduct between each pair of paraphyses. Rows of microducts, each about 82 long, from the margin toward the middle of the pygidium; large cluster of microducts on segment V. Anal opening circular, 16 in diameter, placed about 6 times its diameter from the base of L_1 , area around the anal opening is slightly more sclerotized; located posterior to the vulva on the venter. A large reticulated area anterior to the anal opening which makes this genus characteristic.

Ventrum: Plates in the interlobular spaces bifurcate. Two between the median lobes; 2 between L_1-L_2 ; 3 between L_2-L_3 and 3 between L_3-L_4 ; at the base of each of these plates is the opening of a slender and long microduct, 70 in length. A V-shaped row of slender microducts in segment V. Conical setae (fig. j) 8 pairs submarginally, 2 pairs anterior to vulva and posteriorly. Four groups of quinquelocular perivulvar pores (fig. k) formula, 13-15, (22-27), 0. Paravulvar scleroses weakly sclerotized. Rows of serrate squamations anterior of the large groups of perivulvar pores.

Illustration based on material from Anacardium occidentale, Al

Limon, Aragua, Venezuela.

Recognition characteristics

The large reticulated area on the pygidium, 4 pairs of well developed lobes, numerous microducts on the dorsum and the quinquelocular pores associated with the anterior spiracle make this species distinct.

Notes

This polyphagous species is known from many countries on the tropical areas of the world. It is a new addition for the Venezuelan coccid-fauna.

Genus Selenaspidus Cockerell

Type of the genus: Aspidiotus articulatus Morgan 1889.

Selenaspidus Cockerell, 1897a:14; Fernald, 1903:284; Lindinger, 1909:2; MacGillivray, 1921:394; Ferris 1938:SII-264; Balachowsky 1951:690; Mamet 1958:362; Schmutterer 1959:133; Borchsenius, 1966:253; Morrison and Morrison, 1966:182. Selenaspis Leonardi, 1898:210. Selenaspidiotus Thiem and Gerneck, 1934:230.

Description of the genus

Referable to the tribe Aspidiotini, with one-barred ducts, fringed plates, L₂ not bilobed; median lobes non-zygotic; L₂ and L₃ well developed. Strong constriction between meso and metathorax. No pores associated with the spiracles; anal opening posterior to the vulva.

Selenaspidus articulatus (Morgan)

Aspidiotus articulatus Morgan, 1889:352; Newstead, 1901:127.

Aspidiotus (Selenaspidus) articulatus Cockerell, 1897:14;

Hempel 1900:499. Selenaspidus articulatus Fernald, 1903:284;

Ferris, 1938:SII-265; Ballou, 1945:96; Mamet, 1958:370. Borchsenius, 1966:254; Pseudaonidia articulatus Marlatt, 1908a:132.

Aspidiotus rufescens Lindiger 1932:204.

Material studied

On Archras zapota, Sapotaceae, Palo Negro, 4-VIII-68 (AD & SC).
Allamanda cathartica, Apocynaceae, Las Delicias, 20-VI-68 (AD & SC).
Anacardium occidentale, Anacardiaceae, El Limon, 22-V-68 (AD & SC);
 Turmerito, D. F., 5-12-38 (CHB) IZA & CIA). Annona muricata,
 Annonaceae, El Limon, 8-VI-68 (AD & SC). Camellia japonica,
 Theaceae, Caracas, 18-V-43 (CHB) (CIA); Palo Negro, 4-VII-68 (AD &
 SC). Canna generalis, Cannaceae, Maracay, 3-IV-67 (CJR). Cassia
siamea, Leguminosae, El Limon, 19-XII-68 (FFY); Maracay, 22-IV-69
 (JT). Cedrella fissilis, Meliaceae, Maracay, 3-IV-67 (CJR).
Chrisalidocarpus lutescens, Palmae, Cumana, Sucre, 25-V-43 (CHB)
 (CIA). Chrysobalanus icaco, Rosaceae, Las Delicias, 20-VI-68
 (AD & SC). Citrus aurantium, Rutaceae, El Limon, 15-V-58 (FFY);
 22-V-68 (AD & SC). Citrus grandis, Rutaceae, El Limon, 16-V-68
 (FFY). Citrus reticulatus, Rutaceae, El Limon, 22-V-68 (AD & SC).
Coffea arabica, Rubiaceae, Borburata, Carabobo, 3-IX-68 (Requena);
 Guatire, Miranda, 18-VI-42 (Ponte) (IZA & CIA). Cocos nucifera,
 Palmae, El Limon, 8-VI-68 (AD & SC). Cycos cincinnalis, Cycadaceae,
 Maracay, 19-I-62 (CJR). Dyospiros kaki, Ebenaceae, Palo Negro,

4-VII-68 (AD & SC). Ficus elastica, Moraceae, Caracas, 19-IX-66 (FFY); Maracay, 3-V-67 (CJR). Gardenia jasminoides, Rubiaceae, Caracas, 3-VIII-41 (CHB) (CIA); El Limon, 8-VI-68 (AD & SC). Jasminum sanabac, Oleaceae, Caracas, 18-II-41 (CHB) (CIA). Loranthus sp., Loranthaceae, El Limon, 7-VII-66 (AD). Malpighia glabra, Malpighiaceae, Las Delicias, 20-VI-68 (AD & SC). Mammea americana, Guttiferae, Caracas, 25-XII-65 (AD); Palo Negro, 4-VIII-67 (AD & SC); Mangifera indica, Anacardiaceae, Palo Negro, 4-VII-68 (AD & SC). Melaleuca sp., Myrtaceae, El Limon, 8-VI-68 (AD & SC). Murraya paniculata Rutaceae, El Limon, 21-VI-66 (FFY). Musa sapientum, Musaceae, Maracay, 26-IV-55 (Rodriguez). Persea americana, Lauraceae, El Limon, 8-VI-68 (AD & SC). Syzygium malaccense, Myrtaceae, El Limon, 20-VI-68 (AD & SC). Tamarindus indica, Leguminosae, Maracay, 3-IV-67 (CJR). Tabernaemontana coronaria, Apocynaceae, Maracay, 28-VI-43 (CHB) (CIA). Tabebuia pentaphylla Bignoniaceae, El Limon, 1-VIII-69 (AD). Vitis vinifera, Vitaceae, Palo Negro, 4-VII-68 (AD & SC).

Scale of the female

Circular, flat, exuviae central, white with the exuviae yellowish.

Adult female

Body with a very deep constriction between the meso and metathorax (fig. a) 1357 (1211 to 1477) long and 1270 (1078 to 1388) wide; derm at maturity heavily sclerotized specially on the dorsal surface.

Prosoma

Dorsum: Margin sculptured with an irregular row of microducts (fig. b); thoracic tubercle, small and conical (fig. c).

Ventrum: Antenna (fig. d) as a sclerotized tubercle with a single seta about 16 long; clypeolabral shield 246 long and 145 wide.

Anterior and posterior spiracles (fig. e) without associated pores.

Prepygidial segments of abdomen

Dorsum: Scattered marginal microducts (fig. f) throughout the 4 segments.

Ventrum: Few scattered microducts submarginally without a definitive arrangement.

Pygidium (fig. g)

Dorsum: Median lobes (fig. h) non-zygotic, well developed, about 16 wide, apex rounded; L_2 smaller than L_1 but about the same shape; L_3 well developed, elongated, spur-like; L_4 absent. Marginal microducts with opening located, between median lobes, 1 between L_1 - L_2 and 2 between L_2 - L_3 . Microducts in a submarginal band extending forward up to the area of the anal opening. Anal opening oval, 16 in diameter, placed about $2\frac{1}{2}$ times its diameter from the base of L_1 , and posterior to the vulva on the venter; anal paraphysis well developed.

Ventrum: Plates fringed apically 2 between the median lobes; 2 between L_1 - L_2 ; 3 between L_2 - L_3 , these with broad base; 4 to 6 plates of varying shapes beyond third lobe; beyond these the pygidial margin bears few spine-like projections. Segment V with a submarginal row

of microducts (fig. i). Two compact groups of 4 to 9 quinquelocular perivulvar pores (fig. j) in the paravulvar scleroses which are heavily sclerotized. Ventral scars well defined. Conical setae (fig. k) 2 pairs laterad of paravulvar scleroses and 3 posterior to vulva. Vulva conspicuous, broadly V-shaped. Several rows of serrate squamations (fig. l) anterior to the vulva.

Illustration based on material from Persea americana, El Limon, Aragua, Venezuela.

Recognition characteristics

The deep constriction between the meso and metathorax, conspicuous V-shaped vulva, spur-like L_3 , and the heavy sclerotizations on the dorsal surface makes this species distinct.

Notes

This polyphagous species is known to occur in most of the countries in the tropical and subtropical regions of the world.

TRIBE DIASPIDINI

Key to the genera of the tribe Diaspidini in Venezuela

1. Perivulvar pores present 2
Perivulvar pores absent. 11
2. Trilocular or quinquelocular pores
 associated with anterior spiracle 3
 No pores associated with anterior spiracle . . . Pseudoparlatoria
3. Pores associated with anterior spiracle
 quinquelocular. 4
 Pores associated with anterior spiracle
 trilocular. 6
4. L₂ not bilobed; gland spines fringed and
 plate-like. 5
 L₂ bilobed; gland spines normal. Vetalaspis
5. Adult female pupillarial; cluster of
 quinquelocular pores ventrally on
 segments III and IV of abdomen. Lopholeucaspis
 Adult female not pupillarial; no
 quinquelocular pores on prepygidial
 segments. Parlatoria
6. Dorsum of pygidium with a coarse reticulation. . . . Ischnaspis
 Dorsum of pygidium without trace of reticulation 7
7. L₃ bilobed, about same size of L₂. 8
 L₃ absent or minute. 9

- 8. Body elongated; L₄ absent; trilocular pores
 associated with posterior spiracle. Aulacaspis
- Body subcircular or circular; L₄ present;
 no pores associated with posterior
 spiracle. Diaspis
- 9. Median lobes zygotic; anal opening at the
 level of vulva. 10
- Median lobes non-zygotic; anal opening
 anterior to vulva Lepidosaphes
- 10. Mesal margin of median lobes very close and fused
 in part; no submedian rows of microducts and
 very few on submargin Pinnaspis
- Mesal margin of median lobes divergent;
 submedian and submarginal rows of
 microducts numerous Pseudaulacaspis
- 11. Paraphyses from mesal angles of median
 lobes club-shaped; spiracle associated
 pores quinquelocular; body turbinate. Howardiae
- Paraphyses absent; spiracle associated pores
 trilocular; body elongate 12
- 12. L₃ bilobulated; area between antennae smooth;
 gland spines on prepygidial segments. Unaspis
- L₃ absent; area between antennae with a lobe-
 like process; gland spines absent from
 prepygidial segments Niveaspis

Genus Aulacaspis Cockerell

Type of the genus: Aspidiotus rosae Bouche, 1833.

Aulacaspis Cockerell 1893a:180; Hempel 1900:497; Newstead 1901:79;
Dietz and Morrison 1916:283; MacGillivray 1921:305; Ferris 1937:
SI-9; Balachowsky 1954:240; Borchsenius 1966:135; Morrison and
Morrison 1966:20.

Description of the genus

Referable to the tribe Diaspidini, two-barred ducts; median lobes zygotic and divergent; L_2 and L_3 well developed, bilobed; body elongated, prosoma swollen and exceeding the postsoma. Dorsal ducts arranged in sharply defined rows, composed of submarginal and submedian areas.

Key to the species of Aulacaspis

Microduct in submedian row 1 or 2; microducts in

submarginal row 2 or 3. tubercularis Newstead

Microducts in submedian row 3 to 8; microducts in

submarginal row 4 to 6. rosae (Bouche)

Aulacaspis rosae (Bouche)

Plate 31

Aspidiotus rosae Bouche, 1833:53. Chermes rosae Boisduval, 1868:281.

Diaspis rosae Signoret 1869:441; Comstock 1881b:312; Lupo 1938:157.

Aulacaspis rosae Fernald 1903:236; Dietz and Morrison 1916:284;

MacGillivray 1921:316; Ferris 1937:SI-10; Ballou 1945:91; Balachow-

sky 1954:242; Fernandez-Yepez, et. al., 1957:2; Schmutterer 1959:

197; Kosztarab 1959:411; 1963:57; Borchsenius 1966:139.

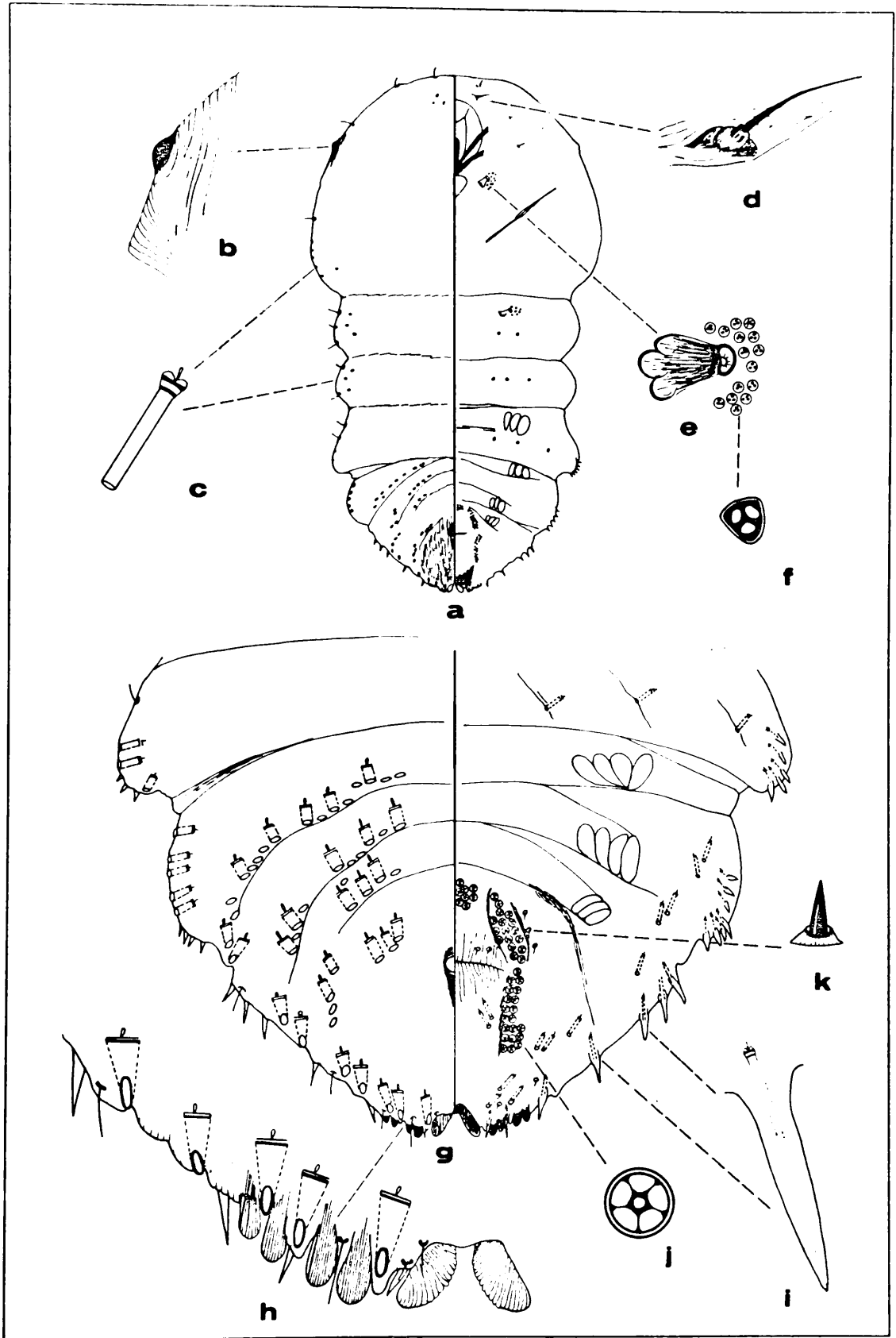


Plate 31. - *Aulacaspis rosae* (Bouché)

Material studied

On Rosa sp., Rosaceae, El Valle D. F., 25-XI-38 (Torres) (USNM and CIA); 5-X-43 (FFY) (IZA & CIA).

Scale of the female

White to grayish, circular, flat; exuviae subcentral.

Adult female

Body elongated (fig. a) with prosoma slightly broader than the postoma; 1129 (1078 to 1181) long; 669 (644 to 694) wide.

Derm at maturity membranous or slightly sclerotized.

Prosoma

Dorsum: Dorsal tubercle (fig. b) small sclerotized protuberance at the margin of the head; small cluster of microducts medially on the head; a row of microducts (fig. c) marginally on the meso and metathorax.

Ventrum: Antenna (fig. d) is a sclerotized tubercle, with 1 seta about 15 long; clypeolabral shield 196 long and 117 wide. Anterior spiracle (fig. e) with 20 to 21 associated trilocular pores (fig. f); posterior spiracle same size and shape, with 6 associated pores.

Prepyridial segments of abdomen

Dorsum: (fig. g) Segment I with a cluster of microducts submarginally; segment II with three microducts marginally; segment III with a row of microducts marginally, a continuous row of microducts on the posterior limit of the segment that is formed by the submedian and submarginal rows, there are about 14 to 18 macroducts; on segment IV the submarginal and submedian rows are better defined and with 4 or 6

and 3 to 8 macroducts respectively, on the anterior marginal with 2 macroducts.

Ventrum: Segment I with 3 pairs of microducts submedially; segment II with a cluster of 5 or 6 short gland spines submarginally and 3 pairs of microducts on submarginal-submedian area; segment III with a cluster of 7 gland spines submarginally, 4 pairs of microducts at the submargin; segment IV with 3 larger gland spines marginally and a pair of microducts.

Pygidium

Dorsum: Median lobes (fig. h) well developed, zygotic, inner side slightly crenulated; about 12 wide; L_2 and L_3 bilobed; L_4 absent. Marginal macroducts, about 20 long, located 1 between L_1-L_2 ; 1 between L_2-L_3 ; 1 between the lobes of L_3 ; 4 beyond L_3 on segments VI and V; a submarginal row of microducts and a submedian row on segment V of 4 microducts each; 3 submedian microducts at the level of the anus. Anal opening circular, 12 in diameter, placed about 6 times this diameter from the base of L_1 ; located at the same level of the vulva on the venter.

Ventrum: Gland spines (fig. i) present 1 on segment VII, 1 on VI and 2 beyond L_3 ; cluster of 6 microducts submarginally. Quinquelocular perivulvar pores (fig. j) in 5 groups, formula, 21-31, (26-28), 6-17. Conical setae (fig. k) 2 pairs submarginally, 3 pairs laterad of the perivulvar pores and 2 pairs anterior to vulva.

Illustration based on material from Rosa sp., El Valle, D.F., Venezuela.

Recognition characteristics

The zygotic L_1 , bilobed L_2 and L_3 , presence of perivulvar pores and the numerous microducts on the submarginal and submedian areas of segments IV to VI make this species distinct.

Notes

This species is restricted to plants of the family Rosaceae and principally to the genera Rosa and Rubus; it is world wide distribution.

Aulacaspis tubercularis Newstead

Plate 32

Aulacaspis (Diaspis) tubercularis Newstead, 1906:73. Aulacaspis cinaramoni Newstead 1908:34. Diaspis (Aulacaspis) cinnamoni v. mangiferae Newstead, 1911:86. Aulacaspis cinnamoni mangiferae Sasser, 1912:90. Diaspis cinnamoni-mangiferae Green, 1919:433. Diaspis mangiferae Ramakrishna Ayyar, 1919:13. Aulacaspis mangiferae MacGillivray, 1921:317; Ballou 1945:91; Scott, 1952: 35; Balachowsky, 1954:246. Aulacaspis tubercularis Sanders, 1909: 49; MacGillivray, 1921:317; Williams, 1961:92; Borchsenius, 1966: 141.

Material studied

On Mangifera indica, Anacardiaceae, Caracas, D. F., 25-X-61 (AD); El Limon, 22-V-68 (AD & SC); El Valle, D. F., 23-VIII-38 (CHB) (CIA & USNM); La Victoria, Aragua, 14-V-69 (Geraus) (SSPA & IZA); Maracay, 15-II-60 (M.C.) (SSPA & IZA); 3-IV-67 (CJR); Turmero, Aragua, 5-IV-60 (MC) (SSPA & USNM). Persea americana, Lauraceae, Caracas, D.

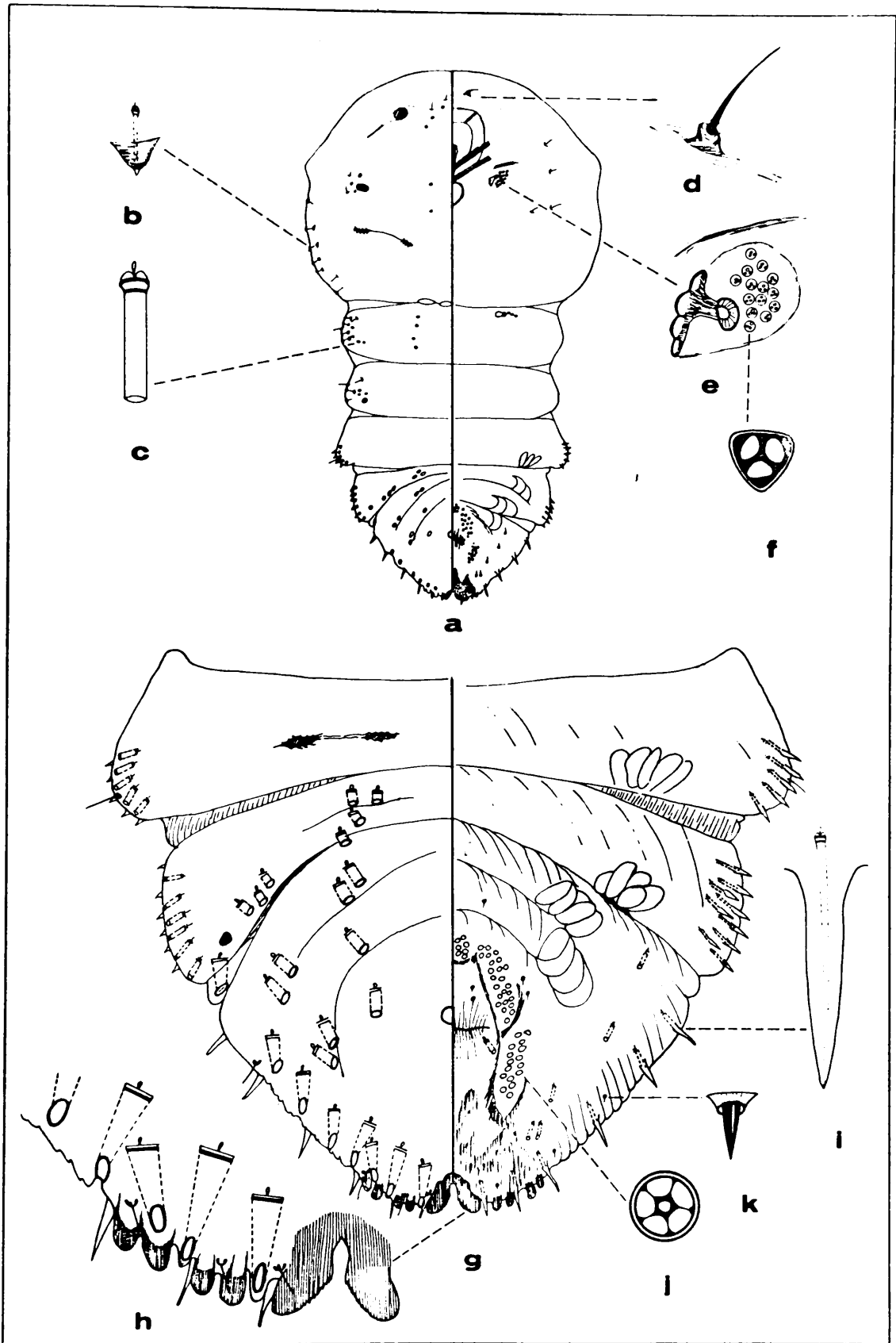


Plate 32. - *Aulacaspis tubercularis* Newstead

F. 19-IX-39 (CHB) (IZA & CIA).

Scale of the female

White with a brownish area around the exuviae, circular, flat, exuviae subcentral.

Adult female

Body elongated (fig. a) with prosoma broader than the post-soma; 1119 (990 to 1344) long; 601 (502 to 783) wide. Derm at maturity membranous.

Prosoma

Dorsum: Dorsal tubercle well developed at the anterior margin but membranous. Small cluster of microducts medially on the head; row of short gland tubercles (fig. b) marginally on the pro and mesothorax; metathoracic segment separated from the rest of the prosoma, with a marginal row of short gland tubercles; submarginal and submedian row of microducts (fig. c). Several sclerotized areas on prosoma submarginally.

Ventrum: Antenna (fig. d) is a small sclerotized tubercle, with 1 seta about 25 long. Clypeolabral shield 196 long, and 106 wide; anterior spiracle (fig. e) with 10 to 20 associated trilocular pores (fig. f); posterior spiracle same size and shape, with 3 associated pores.

Prepygidial segments of abdomen

Dorsum: Segment I, with 2 or 3 short gland tubercles marginally; a pair of dorsal bosses with few associated microducts. Segment II (fig. g) with a row of 5 submarginal microducts larger than the

ones found on prosoma and segment I. Segment III with a row 5 or 6 marginal microducts; a pair of submarginal dorsal bosses; submarginal row of 3 microducts and submedial group of 4 microducts. On the intersegmental area of segments III and IV and on the margin a large macroduct. Segment IV with 2 submarginal microducts and 2 submedially.

Ventrum: Segment II with 5 short gland spines submarginally; Segment III with 8 or 9 short gland spines submarginally; segment IV with 2 larger gland spines marginally and 2 pairs of short microducts submarginally.

Pygidium

Dorsum: Median lobes (fig. h) well developed, zygotic, inner side slightly serrate, about 16 wide; L_2 and L_3 bilobed and about same size; L_4 absent. Marginal macroducts about 23 long, located 1 between L_1 - L_2 ; 1 between L_2 - L_3 ; 1 between the lobes of L_3 , and 4 beyond L_3 on segments VI and V; 2 pairs of submarginal macroducts at the level of the anus; 2 pairs of submedian microducts on the anterior end of the pygidium. Anal opening circular, 12 in diameter, placed about 10 times its diameter from the base of L_1 , located about the same level as the vulva on the venter; area around the anus slightly sclerotized.

Ventrum: Gland spines (fig. i) 1 present on segment VII; 1 on VI and 4 after L_3 ; 3 pairs of microducts submarginally. Quinquelocular perivulvar pores (fig. j) in 5 groups, formula 18-24, (23-29), 13-16. One pair of microducts between the posterior group of peri-

vulvar pores. Conical setae (fig. k) 3 pairs submarginally, 2 pairs laterad of perivulvar pores and 2 pairs anterior to vulva.

Illustration based on material from Mangifera indica, La Victoria Aragua, Venezuela.

Recognition characteristics

The zygotic L_1 , bilobulated L_2 and L_3 , presence of perivulvar pores and few microducts on the submarginal and submedian areas of segments IV to VI make this species distinct.

Notes

This species is found on several plants in the tropical areas, but it is economically important on mango trees since this is the primary host.

Genus Diaspis Costa

Type of the genus: Diaspis calyptroides Costa, 1835 = Aspidiotus echinocacti Bouche, 1833.

Diaspis cocsta, 1835:19; Fernald, 1903:227; Dietz and Morrison, 1916:262; MacGillivray, 1921:306; Ferris, 1937:SI-31; Balachowsky, 1954:173; Schmutterer, 1959:177; Borchsenius, 1966:166; Morrison and Morrison, 1966:59.

Description of the genus

Referable to the tribe Diaspidini, two-barred ducts; median lobes non-zygotic; L_2 and L_3 bilobed; body circular or subcircular; derm at maturity membranous, anterior spiracle with associated trilocular pores; dorsal bosses present; gland spines well developed; anal opening posterior to vulva; thoracic tubercle usually present;

perivulvar pores present in 5 groups.

Key to species of Diaspis

Submedian cluster of microducts on segments II to V

of abdomen; median lobes parallel; thoracic tubercle

small or absent echinocacti (Bouche)

Submedian cluster of microducts absent; median

lobes divergent; thoracic tubercle well

developed boisduvalii Signoret

Diaspis boisduvalii Signoret

Plate 33

Diaspis boisduvalii Signoret, 1869:432; Comstock, 1883:86; Newstead, 1901:153; Fernald, 1903:228; Dietz and Morrison 1916:287; MacGillivray 1921:319; Ferris, 1937:SI-32; Balachowsky, 1954:178; Schmutterer, 1959:186; Borchsenius 1966:168.

Material studied

On Cattleya mossiae, Orchidaceae, Venezuela (Quarantine), 31-IX-46. Cattleya speciosissima, Orchidaceae, Venezuela (Quarantine), 8-II-398. Cattleya superba, Orchidaceae, Venezuela (Quarantine), 1-VI-61. Cattleya sp. Orchidaceae, El Limon, 9-III-62 (FFY). Chrysalidocarpus lutescens Palmae, Caracas, D. F., 27-VIII-69 (AD & A. Cartaya).

Scale of the female

White, circular and flat; exuviae clear yellow, central or subcentral.

Adult female

Body subcircular or turbinate (fig. a); 946 (797 to 1196) long;

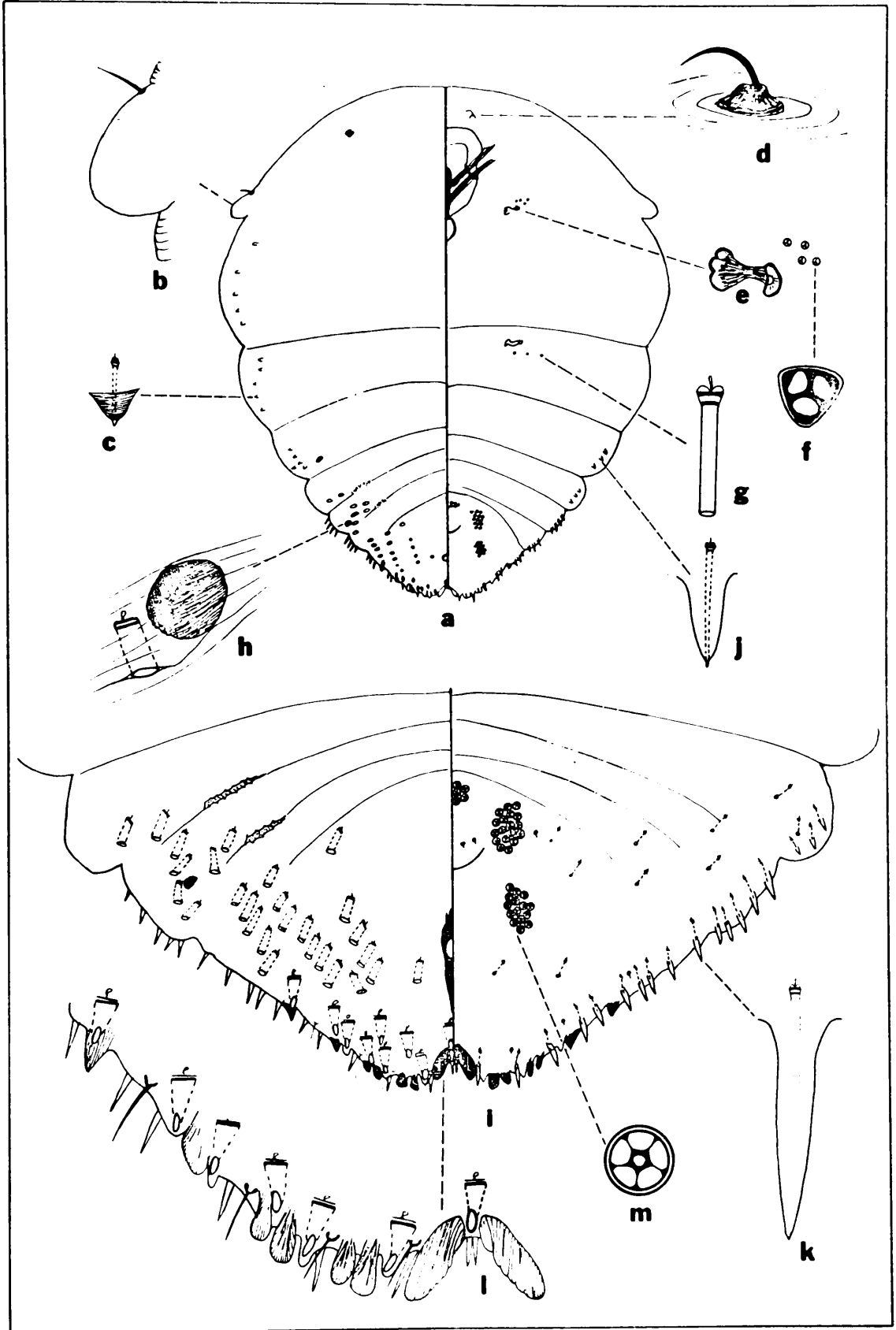


Plate 33. - *Diaspis boisduvalii* Signoret

723 (590 to 797) wide. Derm at maturity membranous.

Prosoma

Thoracic tubercle (fig. b) normally well developed, although these are variable and sometimes lacking.

Dorsum: Head with a pair of dorsal bosses; meso and metathorax with a submarginal row of gland tubercles (fig. c).

Ventrum: Antenna (fig. d) as a sclerotized tubercle, with one seta about 16 long. Clypeolabral shield 183 long and 117 wide; anterior spiracle (fig. e) with 5 to 24 associated trilocular pores (fig. f); posterior spiracle same size and shape without associated pores, with some microducts (fig. g) below and lateral of the atrium.

Prepygidial segments of abdomen

Dorsum: Segment I with a pair of submarginal dorsal bosses (fig. h) and a submarginal row of gland tubercles (fig. c); segment II (fig. i) without dorsal bosses and with only few submarginal microducts; segment III with a pair of dorsal bosses and a cluster of submarginal microducts; segment IV without dorsal bosses and few submarginal microducts.

Ventrum: Segment I and II with 3 pairs of small gland spines (fig. j); segment III and IV with 4 to 5 pairs of marginal gland spines (fig. k).

Pygidium

Dorsum: Median lobes (fig. l) well developed, 20 wide, narrow, not hoked, the bases close together forming a deep median notch, inner side slightly crenulated; L_2 and L_3 bilobed; L_4 reduced to a sclero-

tization on the margin. Marginal macroducts 18 long, located 1 between median lobes, 1 between L_1-L_2 , 1 between L_2-L_3 , 1 between the lobes of L_3 , one on each side of L_4 and 1 on segment V, 2 pairs of submarginal macroducts between L_2-L_3 ; 3 parallel rows of microducts extending from the margin forward on segments V, VI and VII plus a pair close to the anus on segment VIII; anal opening circular, 16 in diameter, placed about 4 times this diameter from the base of L_1 ; located posterior to vulva on the venter.

Ventrum: Gland spines present, 1 pair between median lobes; 1 between L_1-L_2 ; 1 between L_2-L_3 ; 1 between L_3-L_4 and 5 or 6 pairs on segment V. Row of 3 conical setae submarginally, one pair laterad of perivulvar pores and 2 pairs anterior to vulva. Quinquelocular perivulvar pores (fig. m) in 5 groups, formula 9-17,(11-23),6-11. Several microducts scattered on the pygidium.

Illustration based on material from Cattleya sp., El Limon, Aragua, Venezuela.

Recognition characteristics

The bilobulated L_2 and L_3 , macroduct between the median lobes, divergence of median lobes, absence of submedian groups of microduct, well developed thoracic tubercles and subcircular body makes this species distinct.

Notes

This polyphagous species is found in many countries of the tropical and subtropical regions of the world. In Venezuela it is found principally on orchids and palms.

Diaspis echinocacti (Bouche)

Plate 34

Aspidiotus echinocaci Bouche, 1833:53. Diaspis calyptroides Costa, 1835:20. Chermes echinocacti Boisduval, 1868:281. Diaspis cacti Comstock, 1883:93. Diaspis opuntiae Newstead, 1893a:188. Diaspis cacti v. opunticola Cockerell 1894:462. Diaspis echinocacti Fernald, 1903:229; Ferris, 1937:SI-36; Zimmerman, 1948:415; Balachowsky, 1954:189; Schmutterer, 1959:178. Diaspis echinocacti cacti Fernald, 1903:230. Diaspis echinocacti opuntiae, Fernald, 1903:230.

Material studied

On Opuntia sp. Cactaceae, Turmero, 16-IV-69 (Quevedo) (IZA & SSPA); Venezuela (Quarantine) 17-I-45 (USNM).

Scale of the female

White, circular and flat; exuviae yellow, central.

Adult female

Body subcircular (fig. a); 1196 (1033 to 1344) long; 1056 (915 to 1122) wide. Derm at maturity membranous.

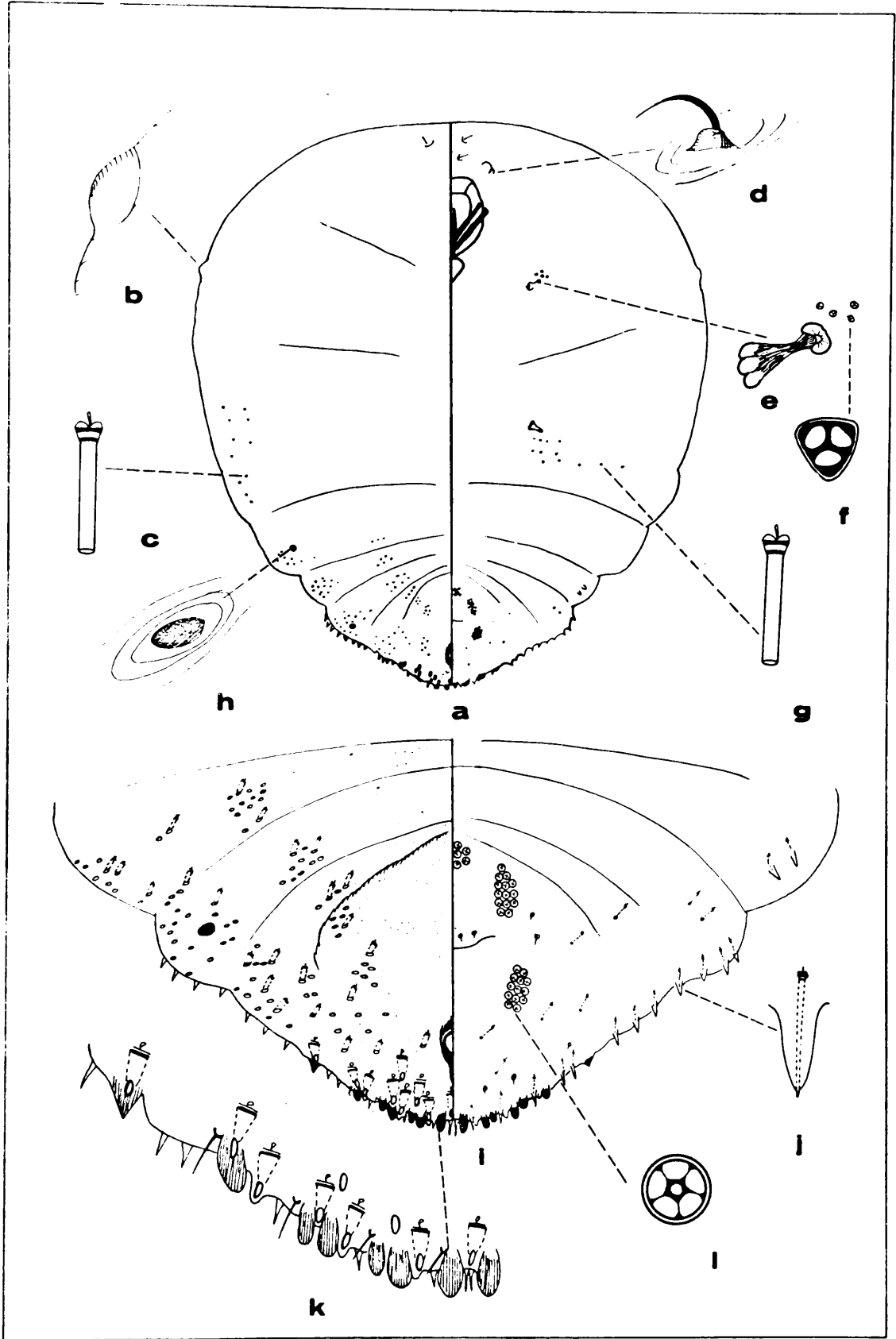
Prosoma

Thoracic tubercle (fig. b) when present small and membranous.

Dorsum: Metathorax with a cluster of microducts (fig. c).

Ventrum: Antenna (fig. d) is a sclerotized tubercle, with one seta about 20 long. Clypeolabral shield 187 long and 117 wide.

Anterior spiracle (fig. e) with 4 to 6 associated trilocular pores (fig. f); posterior spiracle same size and shape without associated



pores, with a numerous microducts (fig. g) below and lateral of the atrium.

Prepygidial segments of abdomen

Dorsum: Segment I and III with a pair of dorsal bosses (fig. h) submarginally; segments I to IV (fig. i) each with a cluster of submedial microducts which makes this species distinct.

Ventrum: Segment III with 2 pairs of gland spines (fig. j) submarginally; segment IV with 4 pairs of gland spines and 2 pairs of microducts submarginally.

Pygidium

Dorsum: Median lobes (fig. k) well developed, about 16 wide, non-zygotic, both margins smooth; L_2 and L_3 bilobed; L_4 well developed; marginal macroducts, about 16 long, located 1 between median lobes; 1 between L_1 - L_2 ; 1 between L_2 - L_3 ; 1 between the lobes of L_3 ; 1 between L_3 - L_4 ; 1 at base of L_4 and 1 on segment V associated with a marginal sclerotization or gland spur. Two submarginal macroducts between L_2 - L_3 . Numerous microducts scattered on the rest of pygidium. Anal opening circular, 16 in diameter, placed about 4 times its diameter from the base of L_1 ; located posterior to vulva on the venter.

Ventrum: Gland spines (fig. j) present, 1 short pair between median lobes; 1 between L_1 - L_2 ; 1 between L_2 - L_3 ; 1 between L_3 - L_4 and 2 on segment V. Row of 3 conical setae submarginally, 2 pairs laterad of perivulvar pores, and 2 pairs anterior to vulva. Quinquelocular perivulvar pores (fig. l), in 5 groups, formula 11-15,(13-20),8-11.

Several microducts scattered on the pygidium.

Illustration based on material from Opuntia sp., Turmero, Aragua, Venezuela.

Recognition characteristics

L₂ and L₃ bilobed, L₄ well developed, macroduct between the median lobes, presence of submedian groups of microducts dorsally on the abdomen, weak development of the thoracic tubercle and the subcircular body makes this species distinct.

Notes

This species is restricted to plants of the family Cactaceae and is found in many countries of the tropical and subtropical regions of the world where cactae are cultivated. It is a new addition to the Venezuelan coccid-fauna.

Genus Howardia Berlese and Leonardi

Type of the genus Chionaspis biclavis Comstock, 1883.

Howardia Berlese and Leonardi, 1896:347; Cockerell, 1896:256; Fernald, 1903:226; MacGillivray, 1921:312; Ferris, 1937:SI-64; Balachowsky, 1954:250; Schmutterer, 1959:204; Borchsenius, 1966:155; Morrison and Morrison, 1966:93. Megalodiaspis Paoli, 1916:256.

Description of the genus

Referable to the tribe Diaspidini; two-barred ducts; median lobes well developed and non-zygotic, but close together basally; club-shaped paraphysis arising from mesal angle of median lobes; L₂ and L₃ absent; quinquelocular pores associated with spiracles; perivulvar pores absent; gland spines and gland tubercles numerous.

Body form turbinate.

Howardia biclavis (Comstock)

Plate 35

Chionaspis biclavis Comstock, 1883:98. Chionaspis biclavis v. detecta Maskell, 1895:49. Howardia biclavis Berlese and Leonardi, 1896: 348; Fernald, 1903:227; MacGillivray 1921:363; Ferris 1937:SI-64; Ballou, 1945:93; Balachowsky, 1954:252; Schmutterer, 1959:204; Borchsenius, 1966:156. Chionaspis (Howardia) biclavis Maxwell-Lefroy, 1903:48. Howardia (Chionaspis) biclavis Ramakrishna-Ayyar, 1921:353.

Material studied

On Achras zapota, Sapotaceae, Los Choros, Miranda, 16-V-41 (CHB) (CIA). Bixa orellana, Bixaceae, San Cristobal, Tachira, 1-IV-44 (CHB). Buddleia davidii, Longaniaceae, Caracas, D. F., 6-IV-43 (CHB) (CIA). Coffea arabica Rubiaceae, Venezuela (Quarantine) 23-IV-36 (SNM). Fushsia sp. Oerotheraceae, Caracas, D. F., 15-I-43 (CHB) (CIA). Gardenia jasminoides, Rubiaceae, Caracas 15-III-40 (CHB) (CIA). Jasminum samba, Oleraceae, Caracas, D.F., 18-V-42 (CHB) (CIA). Mammea americana, Gutteriferae, Turmerito D. F., 25-II-42, (CHB) (CIA). Punica granatum, Punicaceae, Caracas, D. F. 21-XI-39 (CHB) (IZA & USNM). Tabernamontana coronaria, Apocynaceae, Baruta, Miranda, 28-V-41 (CHB) (C(A); Caracas, D. F., 4-IX-38 (CHB).

Scale of the female

White, circular up to 3 mm in diameter, flat; exuviae submarginal.

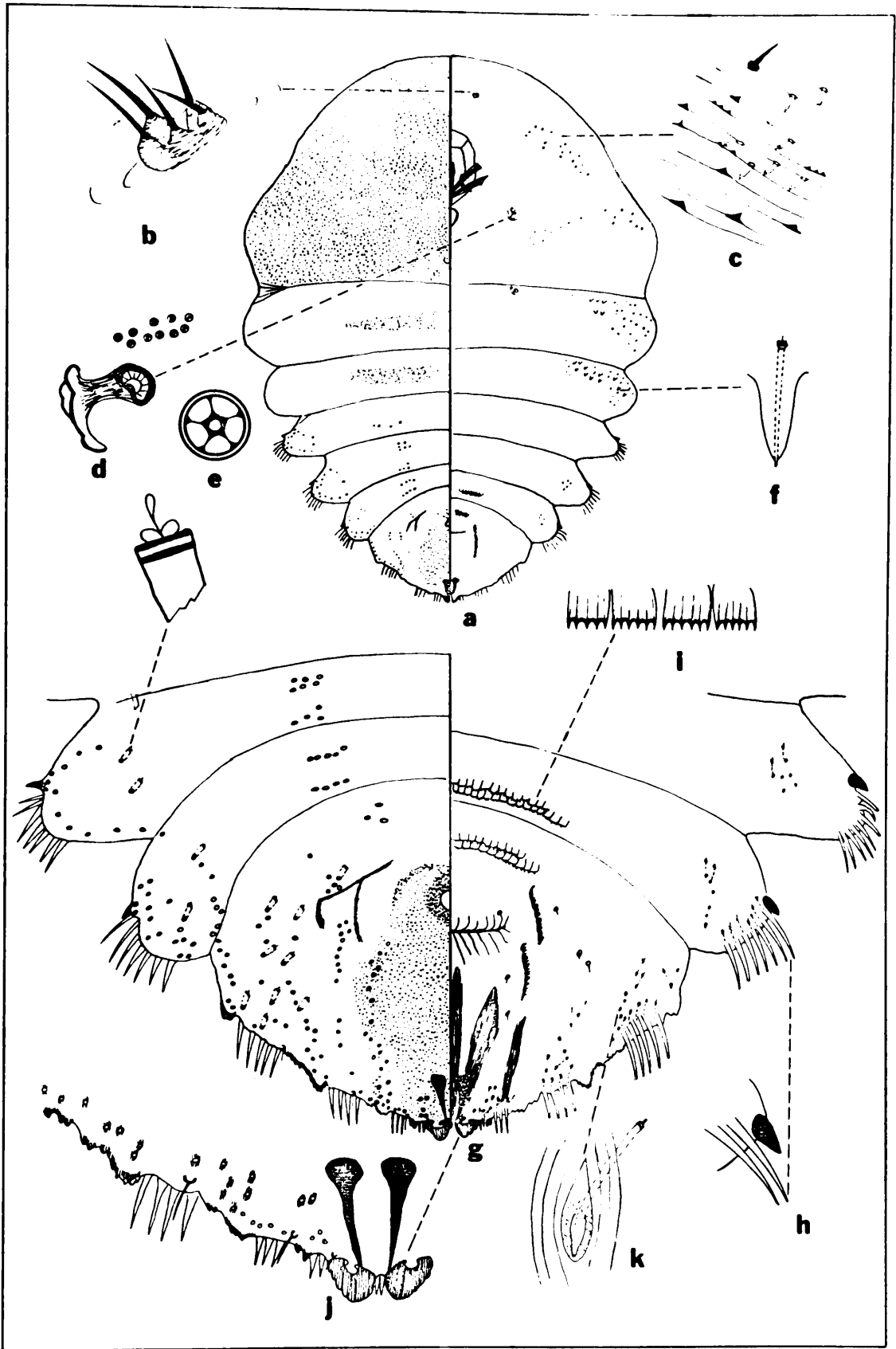


Plate 35. - *Howardia biclavis* (Comstock)

Adult female

Body turbinate (fig. a) 2214 (1802 to 2924) long, 1623 (1403 to 2009) wide. Derm heavily sclerotized at maturity especially on the dorsum.

Prosoma

Dorsum: Microducts lacking, few small setae, 12 long, on the submarginal area.

Ventrum: Antenna (fig. b) a crenulated sclerotization, with 5 or 6 setae, each about 20 long, and surrounded by a few thorn-like sclerotizations. Clypeolabral shield 310 long and 160 wide. Numerous thorn-like sclerotizations and openings of microducts (fig. c) on derm, around mouthparts and between antennae and spiracles. Anterior spiracle (fig. d) with 10 (8 to 15) associated quinquelocular pores (fig. e). Posterior spiracle same size and shape as anterior spiracle, with 4 (3 to 6) associated quinquelocular pores. Two bands of numerous microducts extending from spiracles toward the margin; in the metathoracic band, in addition, 5 or more small gland spines present.

Prepygidial segments of abdomen (fig. g)

Dorsum: Segment II to IV with clusters of microducts submarginally and submedially. First segment more sclerotized than the others.

Ventrum: Segment I with a band of numerous microducts and 10 or more small gland spines, this band extends from the margin toward the submedian area. Segments II to IV with spur-like sclerotization (fig. h) on the anterior margin; posterior of this structure 7 or 8

gland spines. Clusters of 6 or 7 microducts submarginally. Segment IV with median rows of serrate squamations (fig. i) weakly sclerotized.

Pygidium

Dorsum: Median lobes (fig. j) prominent dentate each with a club-shaped paraphysis extending diagonally inward from the mesal angle. Other pygidial lobes absent, indicating their position by sclerotizations on the margin. A continuous row of microducts, 20 long, along the margin. Rows of microducts extending anteriorly from pygidial margin. First row between L_1 - L_2 , made of few microducts, never extending over the club-shaped paraphyses. Second row longer and narrower, reaching the level of anal opening. Third row is wide and longer extending close to anterior margin of pygidium. Anal opening circular, 23 in diameter, placed about 11 times this diameter from the base of L_1 ; slightly anterior to the vulva on the venter. Area around the anal opening more sclerotized than the rest of pygidium.

Ventrum: Gland spines, 1 pair between median lobes; 2 between L_1 - L_2 ; beyond L_2 gland spines much longer, located 3 on segment VII, 4 on VI and 5 on V. Clusters of minute gland spines (fig. k) submarginally on Segments VII, VI and V. Perivulvar pores lacking; paravulvar scleroses well developed. Conical setae, 3 pairs submarginally, 1 pair anterior to vulva and 2 posteriorly. Row of serrate squamations (fig. i) anterior to vulva.

Illustration based on material from Tabernamontana coronaria,

Caracas, D. F., Venezuela.

Recognition characteristics

The large body size, prominent median lobes with the pair of club-shaped paraphyses and the absence of perivulvar pores makes this species distinct.

Notes

This polyphagous species is found in many countries in the tropical and subtropical regions of the world.

Genus Ischnaspis Douglas

Type of the genus: Ischnaspis filiformis Douglas, 1887 - Mytilaspis longirotris Signoret, 1882.

Ischnaspis: Douglas, 1887:21; MacGillivray, 1921:275; Ferris, 1937: SI-66; Schmutterer, 1959:169; Borchsenius, 1966:78; Morrison and Morrison, 1966:98.

Description of the genus

Referable to the tribe Diaspidini, two-barred ducts; median lobes well developed and non-zygotic; L_2 bilobed. Body elongated. Antennae one-segmented with a single seta. Trilocular pores associated with the anterior spiracle. Only two pairs of macroducts, one between L_1 and L_2 , other between L_2 and L_3 . Gland spines present, none between median lobes. Anal opening surrounded by a coarse reticulation. Perivulvar pores present.

Ischnaspis longirostris (Signoret)

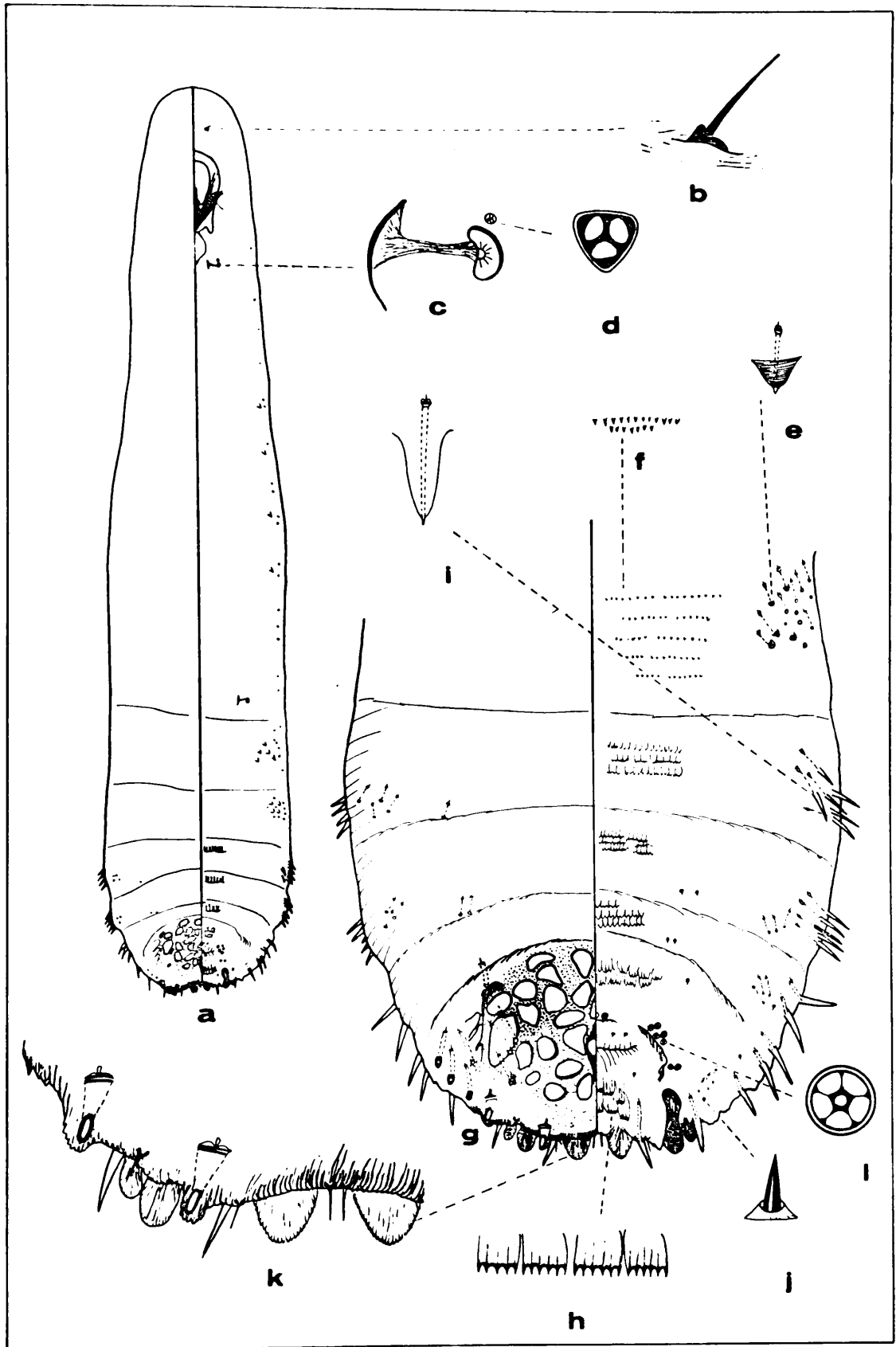


Plate 36. - *Ischnaspis longirostris* (Signoret)

Mytilaspis longirostris Signoret, 1882:35. Ischnaspis filiformis Douglas, 1887:21; Newstead, 1901:210; Ischnaspis longirostris Hempel, 1900:509; Fernald, 1903:37; MacGillivray, 1921:291; Hall, 1922:37; Ferris, 1937:SI-67; Costa Lima, 1942:273; Ballou, 1945:93; Zimmerman, 1948:404; Balachowsky, 1954:135; Fernandez-Yepez et. al., 1957:2; Schmutterer, 1959:170; Borchsenius, 1966:78.

Material studied

On Allamanda catharica, Apocynaceae, Las Delicias, 20-VI-68 (AD & SC). Asparagus sp., Lilaceae, Venezuela (Quarantine), 4-IV-41. Citrus aurantium, Rutaceae, Las Delicias, 20-VI-68 (AD & SC). Coffea arabica, Rubiaceae, El Limon, 29-VIII-69 (AD); Venezuela (Quarantine), 18-XII-41 (USNM). Elaeis guineensis, Palmae, Cagua, 2-V-61 (MC) (SSPA & USNM); El Limon, 4-XII-65 (FFY); El Limon, 4-VI-69 (Notz). Ficus prinoides, Moraceae, Las Delicias, 20-VI-68 (AD & SC); Maracay, 5-I-67 (AD). Kigelia pinnata, Bignonaceae, El Limon, 23-V-68 (AD). Livistonia chinensis, Palmae, El Hatillo, Miranda, 6-IV-41 (CHB) (IZA & USNM). Lonchocarpus sericus, Leguminosae, El Limon, 30-VIII-69 (AD). Mangifera indica, Anacardiaceae, Las Delicias, (AD & SC), Valera, Trujillo, 8-III-43 (Rendon). Monstera sp. Araceae, Venezuela (Quarantine), 9-XI-48 (USNM). Musa sapientum, Musaceae, Maracay, 14-VIII-68 (JCN). Persea americana, Lauraceae, El Limon, 8-VI-68 (AD & SC); El Limon, (Notz). Philodendron sp. Araceae, Cagua, 30-VIII-69 (AD); El Limon, 10-XI-58 (FFY). Phoenix dactylifera, Palmae Ciudad Universitaria, Caracas, 23-XI-66 (FFY). Roystonea regia, Palmae, Caracas, 19-X-66 (FFY). Switenia candollei, Meliaceae, Caracas, 28-

VIII-69 (AD).

Scale of the female

Black, elongated, very slender, exuviae terminal.

Adult female

Body elongate (fig. a), 1282 (1182 to 1492) long 279 (251 to 295) wide. Derm membranous at maturity except for a weak sclerotization on the pygidium.

Prosoma

Ventrum: Antenna (fig. b) reduced to a small flat sclerotized tubercle with one seta, 15.6 long. Clypeolabral shield 175 long and 74 wide. Anterior spiracle (fig. c) with one associated trilocular pore (fig. d); posterior spiracle of same size and shape, without associated pore. A continuous marginal row of 20 to 22 microducts, from the area of the anterior spiracle to the posterior spiracle, with 4 or 5 gland tubercles (fig. e) close to this row of microducts. Derm of the venter with a row of spine-like sclerotization (fig. f) giving a striated appearance.

Prepygidial segments of abdomen

Dorsum: Segments II and III with submarginal clusters of 4 to 6 microducts.

Ventrum: Segment I with a submarginal cluster of 10 to 12 microducts and 5 to 7 gland tubercles (fig. e); median row of slightly sclerotized serrate squamations (fig. h). Segment II and III with clusters of 5 to 7 marginal gland spines (fig. i) and median rows of sclerotized serrate squamations; segment IV with 3 marginal

gland spines; submarginal group of 3 microducts and 1 conical seta (fig. j); a pair of conical setae submedially and median rows of serrate squamations.

Pygidium

Dorsum: Median lobes (fig. k) well developed, semicircular, non-zygotic, 16 wide; separated from each other about the distance of their width. L_2 bilobed, its shape resembles a fishtail; L_3 reduced to small sclerotization on the margin. Two marginal macroducts, one between L_1 - L_2 other beyond L_2 . Two rows of microducts, one submarginally, the other submedially. Area around anal opening with a coarse reticulation. Anal opening circular, 12 in diameter, placed about 4 times its diameter from the base of L_1 ; located at the level of vulva on the venter.

Ventrum: One robust gland spine between L_1 - L_2 , 4 beyond L_2 . A horse-shoe-shaped invaginated sclerotization, extending into the pygidium from L_2 . Conical setae (fig. j) 3 pairs submarginally, 2 pairs anterior to vulva and 1 posteriorly. Five groups of quincloocular perivulvar pores (fig. l), formula 2-3,(4-5),2. Paravulvar scleroses well defined. Rows of serrate squamations anterior and posterior to vulva, latter ones larger and heavily sclerotized.

Illustration based on material from Elaeis guineensis, Cagua, Aragua, Venezuela.

Recognition characteristics

The elongated body, coarse reticulation on the dorsum of pygidium, large and widely separated median lobes and the invaginated ventral

scleroses at the base of L_2 , make this species distinct.

Notes

This extremely polphagous species is found in most of the countries of the subtropical and tropical regions of the world.

Genus Lepidosaphes Shimer

Type of the genus: Lepidosaphes conchiformis Shimer 1868 = Coccus ulmi Linnaeus 1758.

Lepidosaphes Shimer, 1868:373; Fernald, 1903:304; MacGillivray, 1921:274; Ferris, 1937:SI-70; Zimmerman, 1948:374; Balachowsky, 1954:28; McKenzie, 1956:29; Schmutterer, 1959:45; Borchsenius, 1963:1164; Kosztarab, 1964:32; Morrison and Morrison, 1966:107. Mytilococcus Amerling, 1858:29. Mytilaspis Targioni-Tozzetti 1868:737. Cornuaspis MacGillivray, 1921:274. Cephalaspis MacGillivray, 1921:274. Insulaspis Mamet 1950:32.

Description of the genus

Referable to the tribe Diaspidini; with two-barred ducts; median lobes well developed and non-zygotic: L_2 bilobed; L_3 reduced to sclerotization on the margin or absent; anal opening anterior to vulva on venter and located close to anterior margin of pygidium; trilocular pores associated with the spiracles; perivulvar pores present; gland spines and gland tubercles numerous. Body form elongated.

Key to species of Lepidosaphes

1. Abdominal segments I, II and IV with dorsal bosses on the submargin; pygidium with a submedian

- row of 18 or more microducts. beckii (Newman)
- Abdominal segments without dorsal bosses;
 pygidium with a submedian row of 4 or
 5 microducts. 2
2. Segments II, III and IV with a sclerotized spur
 at each anterior lateral angle; dorsum of
 prosoma sclerotized at maturity, this
 sclerotization forming plates gloverii (Packard)
- Abdominal spurs absent; dorsum of prosoma
 membranous; associated with Croton and
 Codiaeum. tokionis (Kuwana)

Lepidosaphes beckii (Newman)

Plate 37

- Coccus beckii Newman, 1869:217. Mytilaspis falvescens Targioni-
 Tozzetti, 1876. Mytilaspis citricola Comstock, 1881a:321.
Mytilaspis fulva Berlese, 1893:152. Mytilaspis beckii Cockerell,
 1899b:275. Mytilaspis pinnaeformis Newstead, 1901:204. Lepido-
saphes pinnaeformis Kirkaldy, 1902:110. Lepidosaphes beckii
 Fernald, 1903:305; Hempel, 1904:322; Dietz and Morrison, 1916:
 280; Ferris, 1937:SI-71; Ballou, 1945:93; Zimmerman 1948:418;
 Balachowsky, 1954:61; Fernandez-Yepez, et. al., 1957:2; Labrador,
 1958:10; Doreste and Cermeli, 1961:39; Lepidosaphes pinniformis
 Lindinger, 1910:45. Lepidosaphes citricola Vayssiere, 1921:356.
Mytilococcus pinniformis Lindinger, 1936:149. Mytilococcus beckii
 Lupo, 1939:80; Costa Lima, 1942:273. Cornuaspis beckii Borch-

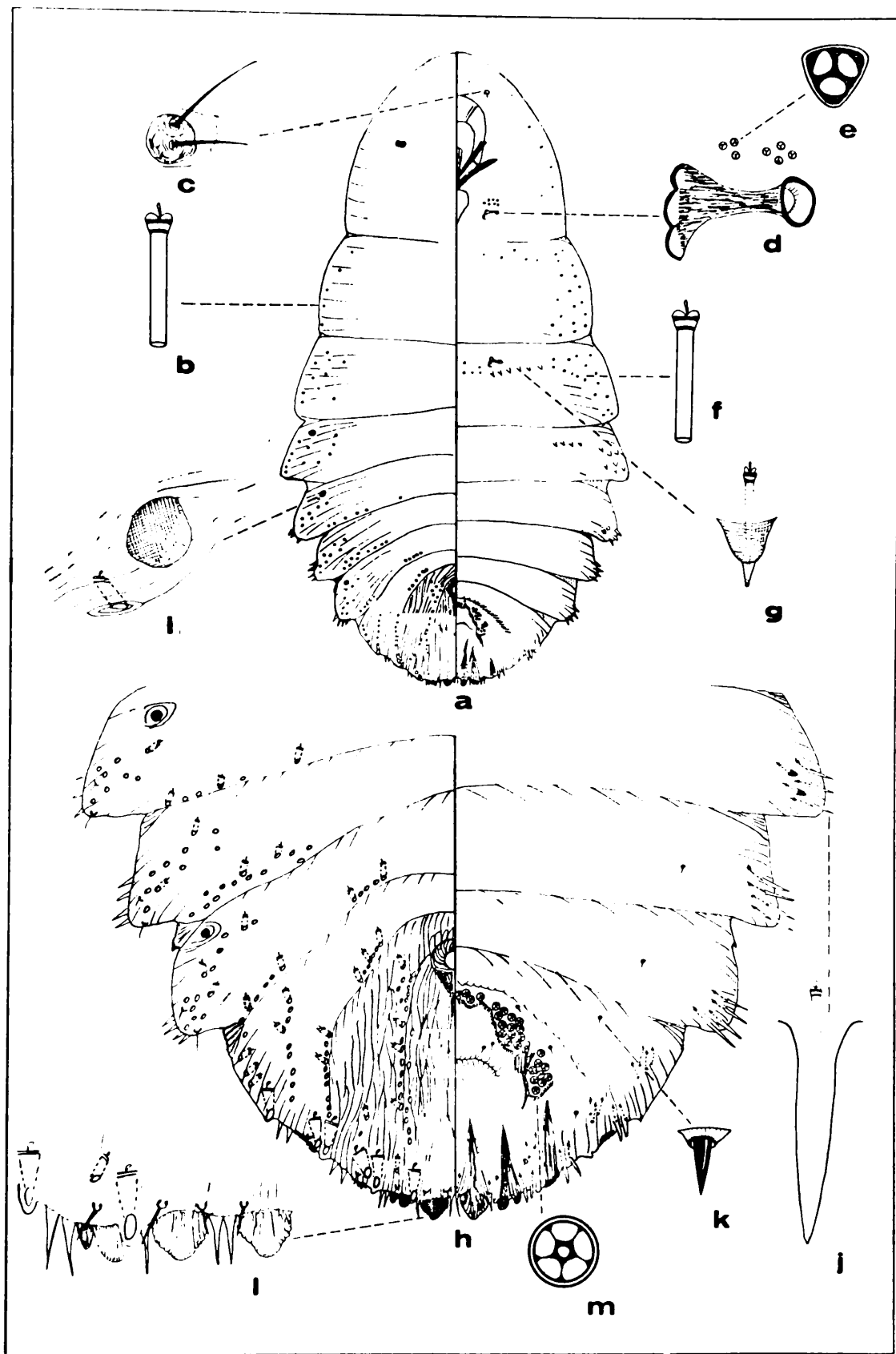


Plate 37. - *Lepidosaphes beckii* (Newman)

senius; 1966:55.

Material studied

On Citrus aurantifolia, Rutaceae, Caracas, D. F., 7-II-40 (CHB).
Citrus aurantium, Rutaceae, Baruta, Miranda, 4-V-40 (CHB) (CIA);
 Caracas, D. F., 7-VI-39 (CHB) (IZA & CIA); Cumana, Sucre, 9-VII-43,
 (FFY); El Hatillo, Miranda, 4-V-40, (CHB) (CIA); El Limon, 10-V-65
 (FFY); 10-V-68 (AD); Maracay 1-IX-39 (CHB) (CIA); 5-X-65 (AD);
 Palo Negro, 22-V-68 (AD & SC). Citrus limonia, Rutaceae, Caracas,
 D. F., 5-IV-41 (Gonzalez). Citrus nobilis, Rutaceae, Cumana, Sucre,
 19-VI-43 (FFY). Murraya paniculata; Rutaceae, Caracas, D. F., 23-
 IV-39 (CHB) (USNM & IZA).

Scale of the female

Brown or purplish; elongated, oystershell-shaped, broadening posteriorly; exuviae terminal and yellow.

Adult female

Body fusiform (fig. a); 1172(871 to 1447) long; 590 (502 to 708) wide. Derm at maturity slightly sclerotized.

Prosoma

Slightly 3 segmented, into head and prothorax, mesothorax and metathorax.

Dorsum: Head with a submedian pair of dorsal bosses. Mesothorax, with a submarginal row of microducts (fig. b). Metathorax with a submarginal band of microducts.

Ventrum: Antenna (fig. c) as a flat, sclerotized tubercle, with 2 setae about 23 long. Clypeolabral shield 203 long and 109 wide;

anterior spiracle (fig. d) with 6 to 8 associated trilocular pores (fig. e); posterior spiracle same size and shape as anterior spiracle, without associated pores. Head and prothorax with an irregular row of submarginal microducts. Mesothorax with a band of microducts (fig. f) which extends across the anterior margin of the segment and submarginally. Metathorax with a submarginal band of microducts on the anterior margin of the segment and below the spiracle 5 or 6 gland tubercles (fig. g) present, a cluster of microducts medially.

Prepygidial segments of abdomen

Dorsum: Segment I with a submarginal cluster of microducts and a pair of dorsal bosses on the anterior half of the segment. Segment II (fig. h) with a pair of dorsal bosses, (fig. i) a band of microducts submarginally and a row on the posterior margin of the segment. Segment III usually without dorsal bosses; with a submarginal band of microducts and a row on the posterior margin. Segment IV with a pair of dorsal bosses, a band of submarginal microducts, and two rows of microducts on the posterior margin, one submarginal the other submedian.

Ventrum: Segment I with a cluster of gland tubercles (fig. g) submarginally and a submedian row on the anterior half. Segments II to IV with 3 or 4 marginal gland spines (fig. j) and a pair of conical setae (fig. k), submedially.

Pygidium

Dorsum: Median lobes (fig. l) well developed and separated, subtriangular, longer than wide; the margins slightly crenulated on both

sides; L_2 bilobed being the inner lobe the larger; L_3 and L_4 represented by a small sclerotization on the margin; 6 marginal macroducts, about 23 long, with oral scleroses located 1 between L_1-L_2 ; 2 between L_2-L_3 , 2 between L_3-L_4 and 1 on segment V. The pygidium with 3 parallel rows of microducts each from 10 to 20 microducts, these rows can be considered on segments V, VI and VI. Anal opening circular, 16 in diameter, placed about 10 times this diameter from the base of L_1 ; located anterior to vulva on the venter; the area around the anus is somewhat more sclerotized than the rest of the pygidium.

Ventrum: Gland spines (fig. j), located 1 pair between median lobes; 1 between L_1-L_2 ; 2 between L_2-L_3 ; 2 between L_3-L_4 and 2 on segment V. A row of 3 conical setae (fig. k) submarginally, 2 pairs anterior to vulva and 2 pairs laterad of perivulvar pores. Three groups of slender microducts submarginally on segments VII, VI and V. Quinquelocular (fig. m) perivulvar pores in 5 groups, formula 6-11, (10-16), 4-8. Ventral scleroses extending forward from the base of L_1 , L_2 and L_3 .

Illustration based on material from Murraya paniculata, Caracas, Venezuela.

Recognition characteristics

The bilobed L_2 , reduction of L_3 , 4 pairs of dorsal bosses, numerous microducts on the dorsum of pygidium, and the fusiform body makes this species distinct.

Notes

This polyphagous and cosmopolitan species is usually one of the important pests of Citrus sp. throughout the world; it is usually found associated with Lepidosaphes gloverii to be described next.

Lepidosaphes gloverii (Packard)

Plate 38

Aspidiotus gloverii Packard, 1870:527. Mytilaspis gloverii Comstock, 1881:323; Green, 1896b:83. Lepidosaphes gloverii Kirkaldy, 1902: 111; Fernald, 1903:309; Dietz and Morrison, 1916:281; MacGillivray, 1921:283; Ferris, 1937:SI-74; Balachowsky, 1955:51; Doreste and Cermeli, 1961:39; Mytilaspis (Aspidiotus) gloverii Frogatt, 1914: 677. Mytiella sexspina Hoke, 1921:341. Mytilococcus gloverii Lindinger, 1936:149. Opuntiaspis sexspina Lindinger, 1937:191. Insulaspis gloverii Borchsenius, 1966:63.

Material studied

On Citrus aurantium, Rutaceae, El Limon, 4-V-66 (AD & SC); 10-V-68 (AD); Maracay, 5-X-65 (AD). Citrus reticulata, Rutaceae, El Limon, 22-V-68 (AD & SC).

Scale of the female

Brown, elongated not broadening posteriorly; exuviae terminal and yellow.

Adult female

Body elongated (fig. a); 1169 (989 to 1225) long; 345 (339 to 354) wide. Derm at maturity heavily sclerotized on the thoracic region and segment I of the abdomen, all the intersegmental lines

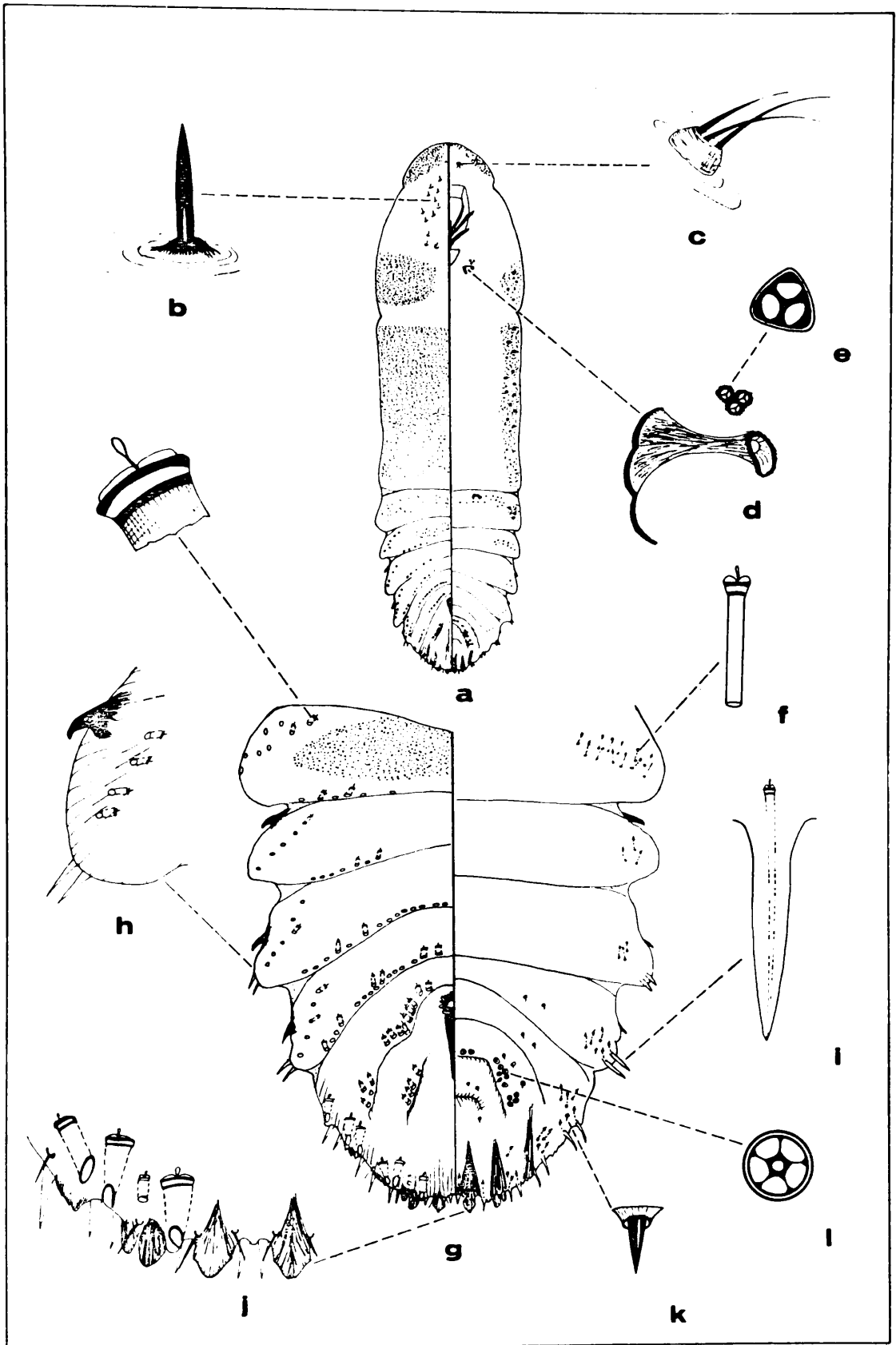


Plate 38.- *Lepidosaphes gloverii* (Packard)

remaining membranous as distinct joints.

Prosoma

Half or more of the body length comprised by the prosoma.

Dorsum: Head with a distinct lobe-like process, few scattered setae (fig. b) on the submedian area of the head.

Ventrum: Antenna (fig. c) is a flat, sclerotized tubercle, with 2 or 3 setae about 23 long. Clypeolabral shield 183 long and 105 wide. Anterior spiracle (fig. d) with 3 or 4 associated trilocular pores (fig. e); prothorax and metathorax with a band of microducts (fig. f) on the sclerotized area of the segment. Metathorax, with a band of microducts parallel to the anterior margin of the segment and a submarginal cluster of the same type of microducts; posterior spiracle same size and shape as the anterior spiracle, without associated pores.

Prepygidial segments of abdomen (fig. g)

Dorsum: Segment I with sclerotized area in the middle of the segment, row of microducts submarginally on the anterior portion of the segment, a submedian row along the posterior margin of the segment; segment II to IV membranous; each with a marginal sclerotized spur in the anterior lateral angle, row of microducts submarginally at the anterior portion of the segment, a continuous row of microducts on the posterior margin of each segment.

Ventrum: Segment I with a band of submarginal microducts; segment II with a small cluster of microducts submarginally; segments III and IV with 2 pairs of marginal gland spines (fig. i) and a submarginal

cluster of microducts.

Pygidium

Dorsum: Median lobes (fig. j) well developed and separated, subtriangular, longer than wide; the margins are smooth; L_2 bilobulate, mesal lobe larger; L_3 and L_4 represented by a small sclerotization on the margin; 6 marginal macroducts, about 20 long with oral sclerites, located 1 between L_1-L_3 , 2 between L_2-L_3 , 2 at base of L_4 and 1 on segment V. The pygidium with 2 parallel rows of microducts, the inner row with only 4 to 5 microducts. Anal opening circular, 16 in diameter, placed about 10 times this diameter from the base of L_1 ; located anterior to the vulva on the venter; area round the anus is somewhat more sclerotized than the rest of the pygidium.

Ventrum: Gland spines (fig. i), located 1 pair between median lobes; 1 between L_1-L_2 ; 2 between L_3-L_4 and 2 on segment V; a row of 5 conical setae (fig. k) submarginally, 3 pairs lateral of perivulvar pores, 2 pairs anterior to vulva and 1 pair posteriorly. Quinquelocular perivulvar pores (fig. l) in 5 groups, formula 3-4,(5-10),3-4; ventral sclerites extending anteriorly from L_1 , L_2 and L_3 .

Illustration based on material from Citrus reticulata, El Limon, Aragua, Venezuela.

Recognition characteristics

The bilobed L_2 , reduction of L_3 , sclerotized band of the prosoma, spurs on the margin of segment II, III and IV of the abdomen and elongated body makes this species distinct.

Notes

This polyphagous and cosmopolitan species is usually one of the important pests of Citrus sp. throughout the world. It is usually found associated with Lepidosaphes beckii, from which is easily differentiated by the characters mentioned above.

Lepidosaphes tokionis (Kuwana)

Plate 39

Mytilaspis newsteadi var. tokionis Kuwana, 1902:81. Lepidosaphes newsteadi tokionis Fernald, 1903:312. Mytilaspis auriculata Green, 1907:205. Lepidosaphes auriculate Sanders, 1909:56. Lepidosaphes tokionis Takahashi, 1935:21; Ferris, 1942:SIV-398; Zimmerman, 1948:426; Balachowsky, 1954:92. Lepidosaphes losianthi Ferris, 1938:SII-145. Insulaspis tokionis Borchsenius, 1966:67.

Material studied

On Codiaeum variegatum, Euphorbiaceae, El Limon, 8-IV-59 (FFY & MC); 23-V-68 (AD); Guataparo, Carabobo, 19-III-69 (JT); Los Ocunitos, D.F., 25-IX-67 (FFY & DV); Maracay, no date (CHB).

Scale of the female

Brown, elongated, not broadening posteriorly; exuviae terminal.

Adult female

Body elongated (fig. a); 945 (842 to 1241) long; 401 (354 to 473) wide. Derm at maturity membranous.

Prosoma

Dorsum: Head with a lobe-like process, few submarginal microducts (fig. b) on the mesothorax, metathorax with a band of microducts

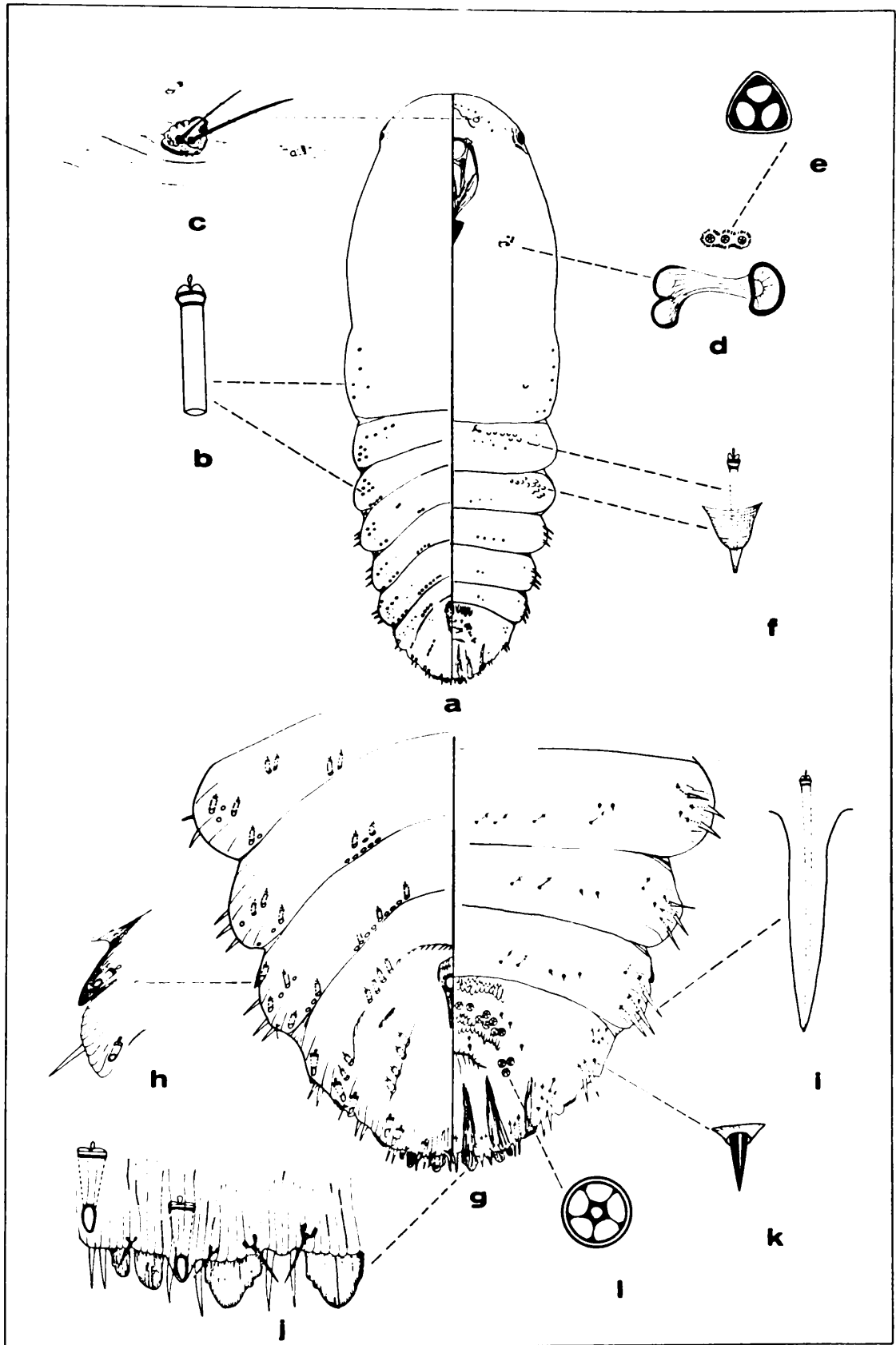


Plate 39. - *Lepidosaphes tokionis* (Kuwana)

submarginally.

Ventrum: Antenna (fig. c) as a sclerotized tubercle with 2 setae about 18 long, few microducts close to antennae. Clypeolabral shield 164 long and 82 wide; anterior spiracle (fig. d) with 2 to 4 associated trilocular pores (fig. e); posterior spiracle same size and shape, without associated pores; mesothorax with a submarginal row of microducts; metathorax with a submedian row of gland tubercles (fig. f) and some microducts associated.

Prepygidial segments of abdomen

Dorsum: Segment I with a submarginal cluster of microducts (fig. b); segments II to IV (fig. g) with a submarginal and a submedian cluster of microducts; margin of segment IV with a spur-like sclerotization (fig. h) and a microduct associated.

Ventrum: Segment I with a submarginal cluster of gland tubercles (fig. f); segments II to IV with 3 submarginal gland spines (fig. i), a submedian row of microducts and 2 or 3 pairs of conical setae submedially.

Pygidium

Dorsum: Median lobes (fig. j) well developed and separated, longer than wide, inner margin slightly crenulated; L_2 bilobed lobe inner larger; L_3 and L_4 represented by a small sclerotization on the margin. Marginal macroducts, about 23 long, located 1 between L_1 - L_2 ; 2 between L_2 - L_3 ; 2 marginal at base of L_4 , and 1 on segment V; 2 parallel rows of microducts submedially, these rows with 2 to 4 microducts each. Anal opening circular, 8 in diameter, placed

about 15 times this diameter from the base of L_1 ; located anterior to vulva of the venter; area around the anus is somewhat more sclerotized than the rest of the pygidium.

Ventrum: Gland spines (fig. i) located, 1 pair between median lobes; 2 between L_1 - L_2 ; 2 between L_3 - L_4 and 2 on segment V. A row of 3 conical setae (fig. k) submarginally, 3 laterad of perivulvar pores, 2 pairs anterior to vulva. Quinquelocular pores (fig. l) in 5 groups, formula 4-5,(6-8),3-4; ventral scleroses extending from the base of L_1 , L_2 and L_3 .

Illustration based on material from Codiaeum variegatum, El Limon, Aragua, Venezuela.

Recognition characteristics

The bilobed L_2 , reduction of L_3 , few macroducts on the pygidium, membranous derm and the association with Codiaeum and Croton makes this species distinct.

Notes

This species is found in many countries of the tropical and subtropical regions of the world. It is a new addition to the Venezuelan coccid-fauna.

Genus Lopholeucaspis Balachowsky

Type of the genus: Leucaspis japonica Cockerell, 1897.

Lopholeucaspis Balachowsky, 1953:753; 1956:335; Schmutterer, 1959:

150. Borchsenius 1966:216; Morrison and Morrison, 1966:112.

Description of the genus

Referable to the tribe Diaspidini with short, two-barred ducts.

Pupillarial species, the adult female being retained within the enlarged and sclerotized exuviae of the second instar. Body elongate; median lobes lanceolate, widely separated, L_2 not bilobed. Perivulvar pores present in 5 groups, in addition quinquelocular pore groups are found on segments III and IV of abdomen. Numerous short gland spines in a continuous row from the head to the pygidium. Derm at maturity membranous.

Lopholeucaspis cockerelli (Grandpre et Charmoy)

Plate 40

Fiorinia cockerelli Grandpre and Charmoy, 1899:37; Fernald, 1903:246. Leucaspis cockerelli Leonardi, 1906:15; Lindinger, 1908:122; MacGillivray, 1921:267; Ferris 1941:SIII-289; Lopholeucaspis cockerelli Balachowsky 1953:758; 1958:336; Schmutterer, 1959:152; Borchsenius, 1966:217.

Material studied

On Livistonia chinensis, Palmae, El Hatillo, Miranda, 6-IV-41 (CHB). Bromeliad, Venezuela (Quarantine), 9-IX-46 (USNM). Palm fruit, Venezuela (Quarantine) ?-III-1902 (USNM).

Scale of the female

Not seen, described by Ferris, 1941, as "very elongate and slender, composed almost entirely of the greatly elongated and sclerotized second exuvia which is covered merely by a thin film of wax. Color some shade of brown."

Adult female

Body elongate (fig. a), 640 (576 to 723) long, 260 (251 to 265)

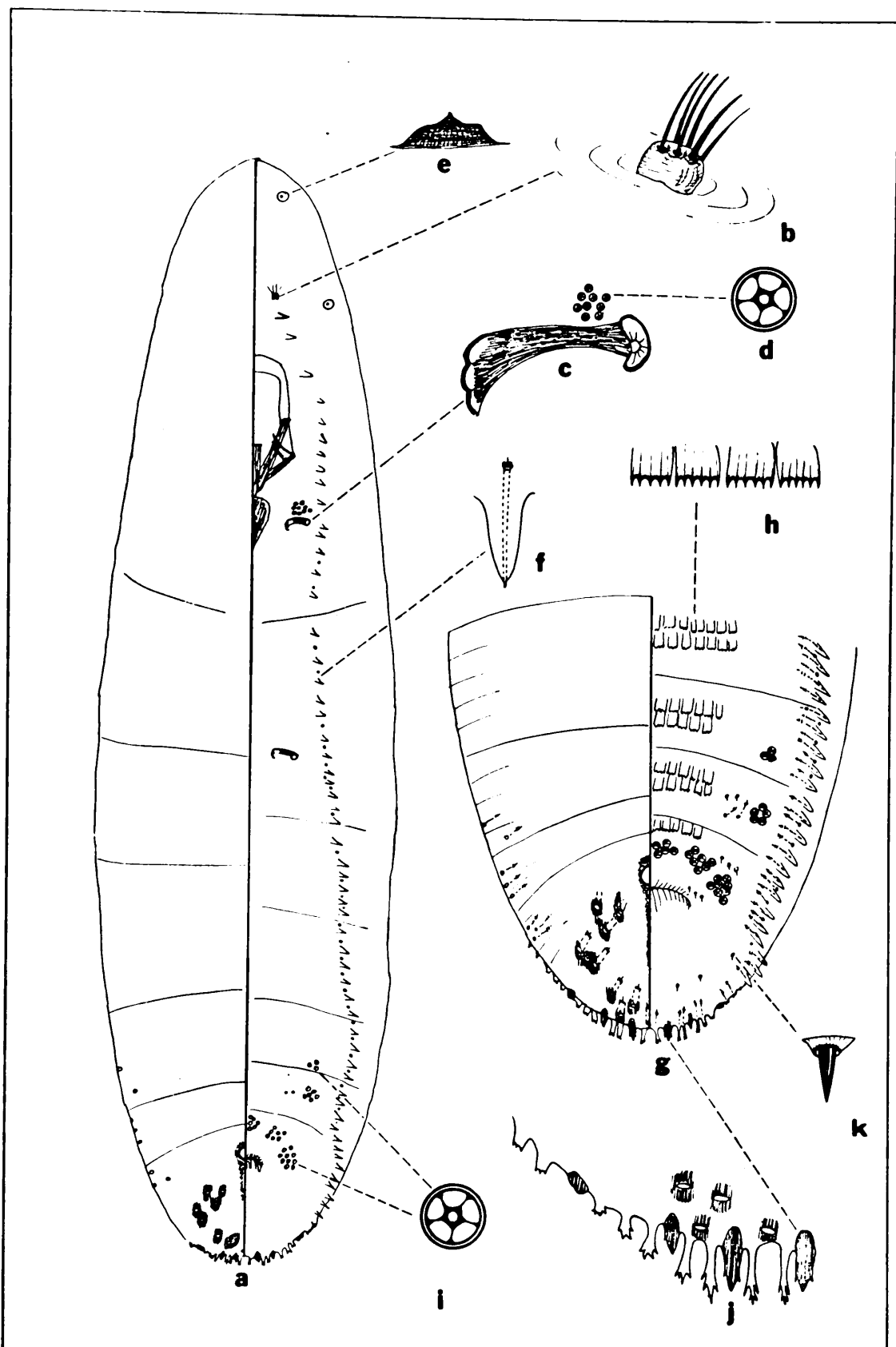


Plate 40. - *Lopholeucaspis cockerelli* (Grandpre & Charmoy)

wide. Derm at maturity membranous.

Prosoma

Ventrum: Antenna (fig. b) a sclerotized tubercle with 5 or 6 setae, about 20 long. Clypeolabral shield 195 long and 97 wide. Anterior spiracle (fig. c) with 8 to 12 associated quinquelocular pores (fig. d); posterior spiracle same size and shape as anterior spiracle, without associated pores. Cephalic region anterior to the antennae with 2 small sclerotizations (fig. e) on each side, each of these being produced into a minute point. Submarginal row of closely set short gland spines (fig. f) with minute ducts among them, extending from the antennae to the pygidium.

Prepygidial segments of abdomen

Dorsum: Segments III and IV with 2 or 3 marginal microducts.

Ventrum: Segments I to IV with the continuous row of gland spines and microducts described above. Median rows of weakly sclerotized serrate squamations (fig. h). Segments III and IV with a submarginal cluster of 3 to 7 quinquelocular pores (fig. i), typical of this genus.

Pygidium

Dorsum: Median lobes (fig. j) tooth-like, with 1 or 2 lateral notches, very slender, 8 wide, and widely separated. L_2 same shape of L_1 , but smaller, with 1 notch. L_3 represented by a minute marginal sclerotization. Microducts very few, 1 with the opening between median lobes, a group of 3 submarginally between L_1 - L_2 , group of 6 submedially on the pygidium. Area around the opening of macroducts is sclerotized.

Anal opening circular, 20 in diameter; placed about 4 times this diameter from the margin, located at the level of vulva on the venter. Area around the anal opening sclerotized.

Ventrum: Plates slender, apically brush-like, longer than the lobes, located, a pair between median lobes, and 1 pair between L_1-L_2 . Between L_2-L_3 3 plates of varying form and length. Beyond L_3 starts a row of gland spines which extends to the head. Conical setae (fig. k) 3 pairs submarginally, 3 pairs laterad of perivulvar pores and 3 pairs anterior to vulva. Quinquelocular perivulvar pores (fig. i) in 5 groups, formula 7-8,(8-10),17-22. A row of serrate squamations anterior to perivulvar pores.

Illustration based on material from Livistonia chinensis, El Hatillo, Miranda, Venezuela.

Recognition characteristics

Pupillarial female; rows of gland spines from the antennae to the pygidium; quinquelocular pores on prepygidial segments; and the tooth-like lobes and brush-like plates makes this species distinct.

Notes

This species is restricted to monocotyledons; known from various tropical contries of the old and new world.

Genus Niveaspis MacGillivray

Type of the genus: Mytiltaspis argentata Cockerell, 1899.

Niveaspis MacGillivray, 1921:276; Ferris, 1941:SIII-302; Borch-

senius, 1966; Morrison and Morrison, 1966:136. Lyraspis Ferris,

1938:SII-149.

Description of the genus

Referable to the tribe Diaspidini, two-barred ducts, L_2 bilobed. Body elongate and slender, half or more comprised by the prosoma. All known species with a fold or lobe-like process between the antennae. Pores associated with spiracles, trilocular. Median lobes non-zygotic and well developed. Gland spines few, confined to the pygidium. Marginal macroducts arranged in a row. Anal opening anterior to the vulva on the venter. Perivulvar pores lacking; two pairs of elongate well defined dorsal sclerotizations.

Niveaspis cattleyae Lepage

Plate 41

Niveaspis cattleyae Lepage, 1942:174; Lepage & Figueiredo, 1947:43.

Borchsenius, 1966:36.

Material studied

Two females on Cattleya sp., Orchidaceae, Venezuela (Quarantine) 15-IV-48 (USNM). One female on wild orchid, Orchidaceae, Venezuela (Quarantine), 28-III-36 (USNM).

Scale of the female

Not seen, described by Lepage (1942) as "long and straight sometimes slightly curved, white in color, exuviae terminal, of a yellowish color, 1.5 to 2.0 mm long, .15 to .20 mm wide."

Adult female

Body narrow, elongate (fig. a), 1730 (1550 to 2082) long, 310 wide. Derm at maturity membranous except for areas of the pygidium.

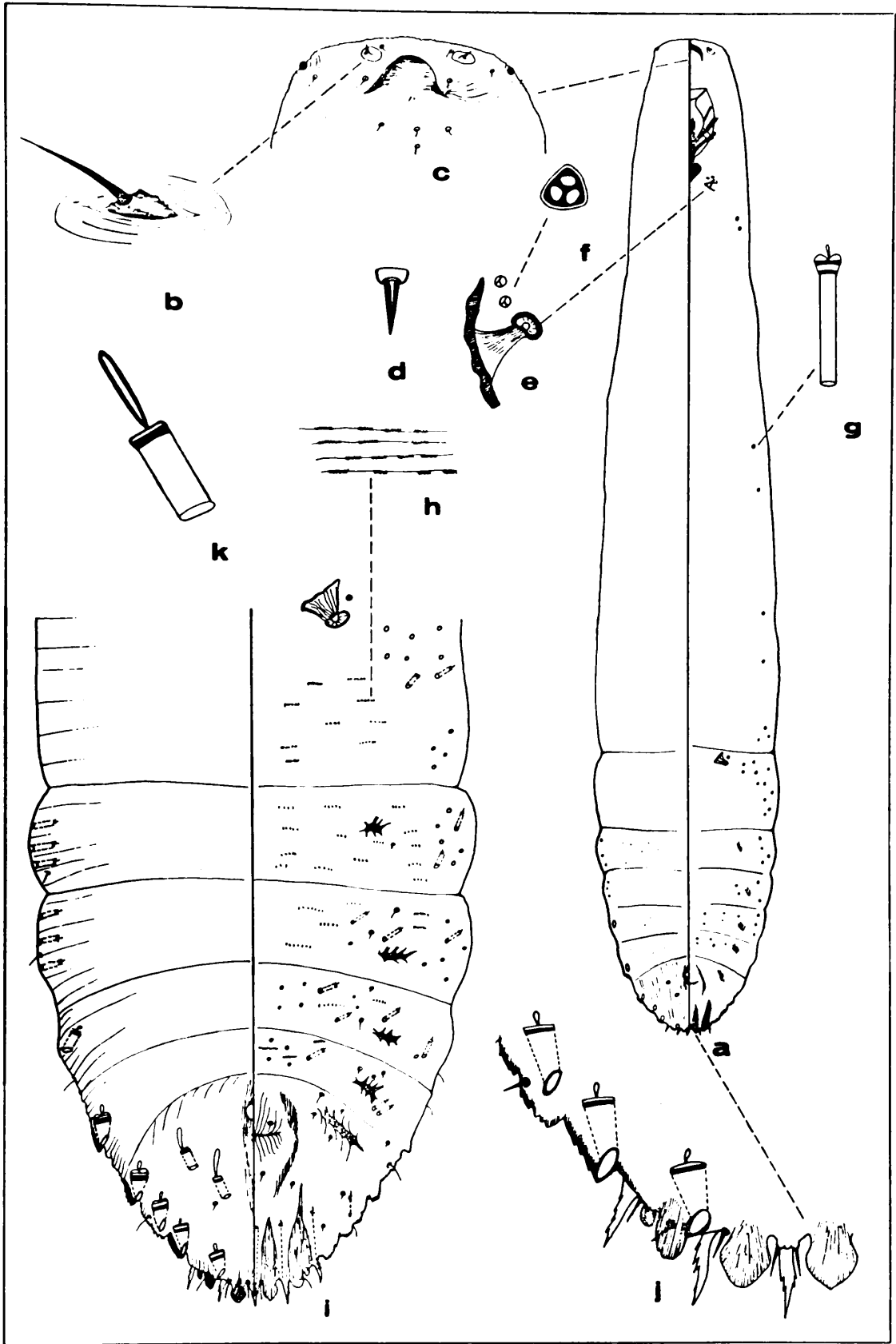


Plate 41. - *Niveaspis cattleyae* Lepage

Prosoma

Dorsum: Eye spot marginal well defined and sclerotized, no other structure on the dorsal side of the prosoma.

Ventrum: Antenna (fig. b) a sclerotized flat tubercle with 1 seta about 20 long, and a small pit with 2 small setae. Area between the antennae with a lobe-like process (fig. c) about 40 wide at the base, about 20 long. The process is round, with 3 pairs of conical setae (fig. d) anteriorly and 2 pairs posteriorly.

Clypeolabral shield 156 long and 78 wide. Anterior spiracle (fig. e) with 2 associated trilocular pores (fig. f). Posterior spiracle same shape and size with one associated trilocular pore. Metathorax with a cluster of 12 to 14 microducts (fig. g) extending from the posterior spiracle toward the margin; rows of submedian weak serrate squamations (fig. h) give a striate appearance.

Prepygidial segments of abdomen (fig. i)

Dorsum: Segments I and II with 3 marginal microducts on each side. Segments III and IV with one marginal macroduct about 20 and 28 long respectively. Marginal setae one on each segment.

Ventrum: Segment I with a submarginal cluster of microducts and a ventral scar. Segment II with a submarginal cluster of microducts and ventral scar, medially with 2 microducts and 2 conical setae. Segment III with 2 submarginal and 2 submedian microducts. Segment IV with 2 microducts submarginally, 3 conical setae anterior of the scar and a median cluster of microducts.

Pygidium

Dorsum: Median lobes (fig. j) non-zygotic, well developed, about 16 wide, apex rounded; L_2 bilobed; L_3 and L_4 absent. Marginal macroducts about 27 long, one in each segment of the pygidium. Two pairs of microducts about 20 long with unusually long inner filament (fig. k), which is about the same length as the microduct. Anal opening circular, 12 in diameter, placed about 10 times this diameter from the base of L_1 and slightly anterior to the vulva on the venter. Anal apophyses well sclerotized extending posteriorly almost to the margin.

Ventrum: A single serrate gland spine between the median lobes; one between L_1 and L_2 and one laterad at L_2 , all serrate on the outer margin. A pair of submarginal microducts on segment VI. Submarginal row of 3 conical setae. Two ventral scleroses, extending from the lobes anteriorly to the middle of the pygidium. Ventral scar large, with 2 conical spines anteriorly. Paravulvar scleroses well developed and continuous, 3 pairs of conical setae between the scar and the paravulvar sclerosis. One pair of conical setae anteriorly to the vulva and one pair posteriorly.

Illustration based on material from Cattleya sp. Venezuela (Quarantine).

Recognition characteristics

The elongate body, lobe-like process between the antennae, the unusual macroducts in the submedial area of the pygidium and ventral scars on all the prepygidial segments makes this species

distinct.

Notes

This species is restricted to Orchidaceae; previously known only from Brazil. This new record for the Venezuelan coccid-fauna, extends northward the range of the species.

Genus Parlatoria Targioni-Tozzetti

Type of the genus: Parlatoria orbicularis Targioni-Tozzetti, 1868.

Aspidiotus proteus Curtis, 1843. Parlatoria Targioni-Tozzetti, 1868: 735; Newstead, 1901:139; Fernald, 1903:318; MacGillivray, 1921: 248, Ferris, 1937:SI-34; Zimmerman, 1948:394; Balachowsky, 1958: 320; Schmutterer, 1959:131; Borchsenius, 1966:186; Morrison and Morrison, 1966:148. Apteronidia Berlese, 1896:80. Euparlatoria Leonardi, 1903:15. Parlatorea Lindinger, 1905:131.

Description of the genus

Referable to the tribe Diaspidini, two-barred ducts with a sclerotic oral ring; gland spines short, broad and fimbriate; gland tubercles present; body usually broadly oval.

Parlatoria proteus (Curtis)

Plate 42

Aspidiotus proteus Curtis, 1843:676. Diaspis parlatoris Targioni-Tozzetti, 1867:14. Parlatoria orbicularis Targioni-Tozzetti, 1868: 735. Parlatoria proteus Signoret, 1869:450; Newstead, 1901:140; Dietz and Morrison, 1916:315; Ferris, 1937:SI-89; Zimmerman, 1948: 396; Schmutterer, 1959:132; Borchsenius, 1966:196. Parlatoria selenipedii Signoret, 1869:450. Parlatorea proteus Lindinger,

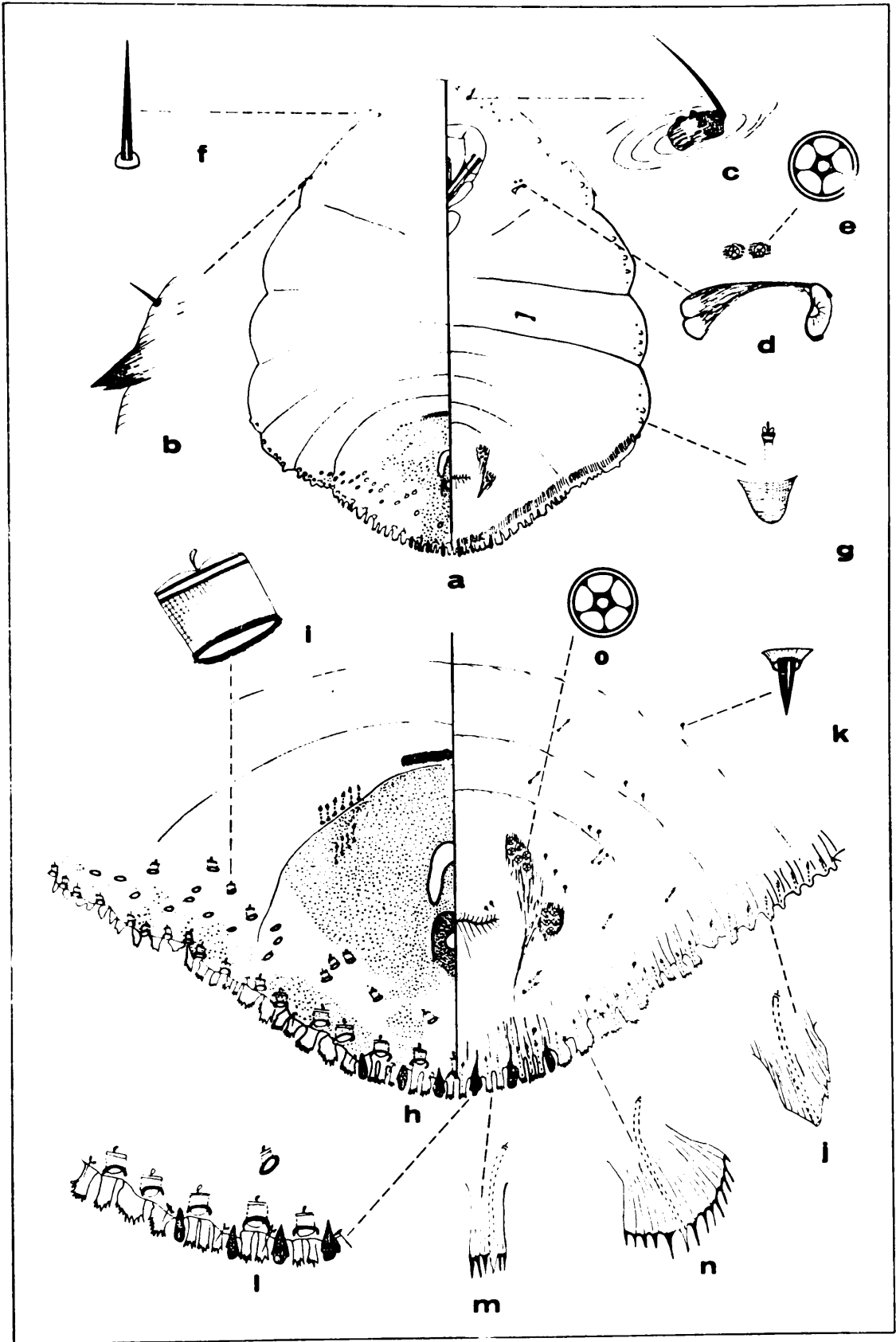


Plate 42.- *Parlatoria proteus* (Curtis)

1912:112. Parlatoria potens Leonardi, 1920:149. Syngenaspis proteus MacGillivray, 1921:251.

Material studied

On Cattleya sp., Orchidaceae, Venezuela (Quarantine), 16-XI-65 (USNM). "Orchids", Orchidaceae, 3 slides with 4 females, Venezuela (Quarantine), 1934 to 1953 (USNM).

Scale of the female

Transparent whitish; elongated oval; exuviae terminal, large, yellow.

Adult female

Body broadly oval (fig. a); 630 (516 - 723) long; 510 (443 - 561) wide. Derm at maturity membranous with the exception of the pygidial area.

Prosoma

Dorsum: Thoracic tubercle (fig. b) sclerotized, marginal and bifid; few setae submarginally.

Ventrum: Antenna (fig. c) as a sclerotized tubercle with one seta about 12 long. Clypeolabral shield 156 long and 98 wide. Anterior spiracle (fig. d) with 2 associated quinquelocular pores (fig. e); posterior spiracle same size and shape, without associated pores. Submarginal row of setae (fig. f) extending from the antenna to the thoracic tubercles; a continuous submarginal row of microducts and gland tubercles (fig. g) extending from the first spiracle to the abdomen, being more abundant in the meso and metathorax.

Prepygidial segments of abdomen (fig. a & h)

Dorsum: Segment I with 1 or 2, segment II with a row of marginal microducts. Segment III in addition to the marginal row of microducts with some submarginal ducts. On segment IV the submarginal microducts become a cluster of 8 to 12; additional row of microducts, submedially.

Ventrum: Segment I with a marginal row of microducts and few gland tubercles; one flat and broad gland spine (fig. j). Segment II with 1 or 2 of the same type of gland spines. Segment III with 5 to 7 flat and broad gland spines (fig. j); two pairs of conical setae (fig. k) and a pair of microducts submedially. Segment IV with 6 or 7 gland spines slightly fimbriated; one pair of submarginal microducts, 2 pairs of submedian conical setae and a pair of microducts.

Pygidium

Dorsum: Median lobes (fig. l) well developed, and notched at the apex; L_2 notched on outer margin; L_3 tongue-like; L_4 absent. Marginal macroducts about 12 long, located 1 between median lobes; 1 between L_1 - L_2 ; 1 between L_2 - L_3 and 4 beyond L_3 . Five to 10 submarginal macroducts. A row of 4 or 5 microducts submedially toward the anterior part of the pygidium. Anal opening circular, 12 in diameter, placed about 6 times its diameter from the base of L_1 , located slightly posterior to the vulval on the venter; area around anal opening more sclerotized than the rest of the pygidium. Anal apophysis present. Anterior to anal opening a horse shoe-shaped

membranous area.

Ventrum: Gland spines on the interlobular spaces flat and fimbriate (fig. m). Two between median lobes; 2 between L_1 and L_2 ; 3 between L_2 - L_3 ; 6 beyond L_3 , flatter and more fimbriate (fig. n) than the latter. Conical setae, 3 pairs submarginally. A row of microducts laterad of perivulvar pores and 2 anterior to vulva. Quinquelocular perivulvar pores (fig. o) in 4 groups, formula 4-6,(508),0. Paravulvar scleroses present.

Illustration based on material from Orchidaceae, Venezuela (Quarantine).

Recognition characteristics

The very peculiar flat and fimbriated gland spines, 3 pairs of lobes and the body form make this species distinct.

Notes

This polyphagous species is found in many countries of the tropical and subtropical regions of the world.

Genus Pinnaspis Cockerell

Type of the genus: Mytilaspis pandani Comstock 1881 = Aspidiotus buxi Bouche, 1851.

Pinnaspis Cockerell, 1892b:136; Fernald, 1903:242; MacGillivray, 1921:275; Ferris, 1937:SI-96; Zimmerman, 1948:373. Balachowsky, 1954:275; Schmutterer, 1959:214; Borchsenius, 1966:109; Morrison and Morrison, 1966:156. Hemichionaspis Cockerell, 1897:592. Jaapia Lindinger, 1914:158. Lepidaspidis MacGillivray, 1921:275. Lepidaspis Lindinger, 1937:188.

Description of the genus

Referable to the tribe Diaspidini, with two-barred ducts; lateral margins of the prepygidial segments of the abdomen strongly lobed; median lobes partially fused, strongly zygotic; L_2 bilobed; marginal macroducts present on the pygidium; gland spines always present; perivulvar pores present in 5 groups; trilocular pores associated with spiracles.

Key to species of Pinnaspis

Dorsal submarginal ducts reduced in number, 1 on segments

V and IV; gland spines reduced in number on the

prepygidial segments, 1 or 2 on segments IV and

III entirely lacking on II and I. buxi (Bouche)

Dorsal submarginal ducts more numerous, 2 on

segment V, 2 or 3 on segments IV and III;

gland spines more numerous, 3 pairs on

segments IV, III, and II. strachani (Cooley)

Pinnaspis buxi (Bouche)

Plate 43

Aspidiotus buxi Bouche, 1851:111. Mytilaspis pandani Comstock, 1883:

118. Pinnaspis pandani Cockerell 1892b:136. Fiornia pondomiana

Del Guercio, 1894:181. Fiornia buxi Del Guercio, 1894:182.

Pinnaspis buxi Newstead, 1901:207; Fernald, 1903:242; MacGillivray

1921:290; Ferris, 1937:SI-98; Balachowsky, 1954:277; Schmutterer,

1959:215; Borchsenius, 1966:111. Pinnaspis siphonodontis Cockerell

and Robinson, 1915:110. Hemichionaspis pseudaspidiastre Green,

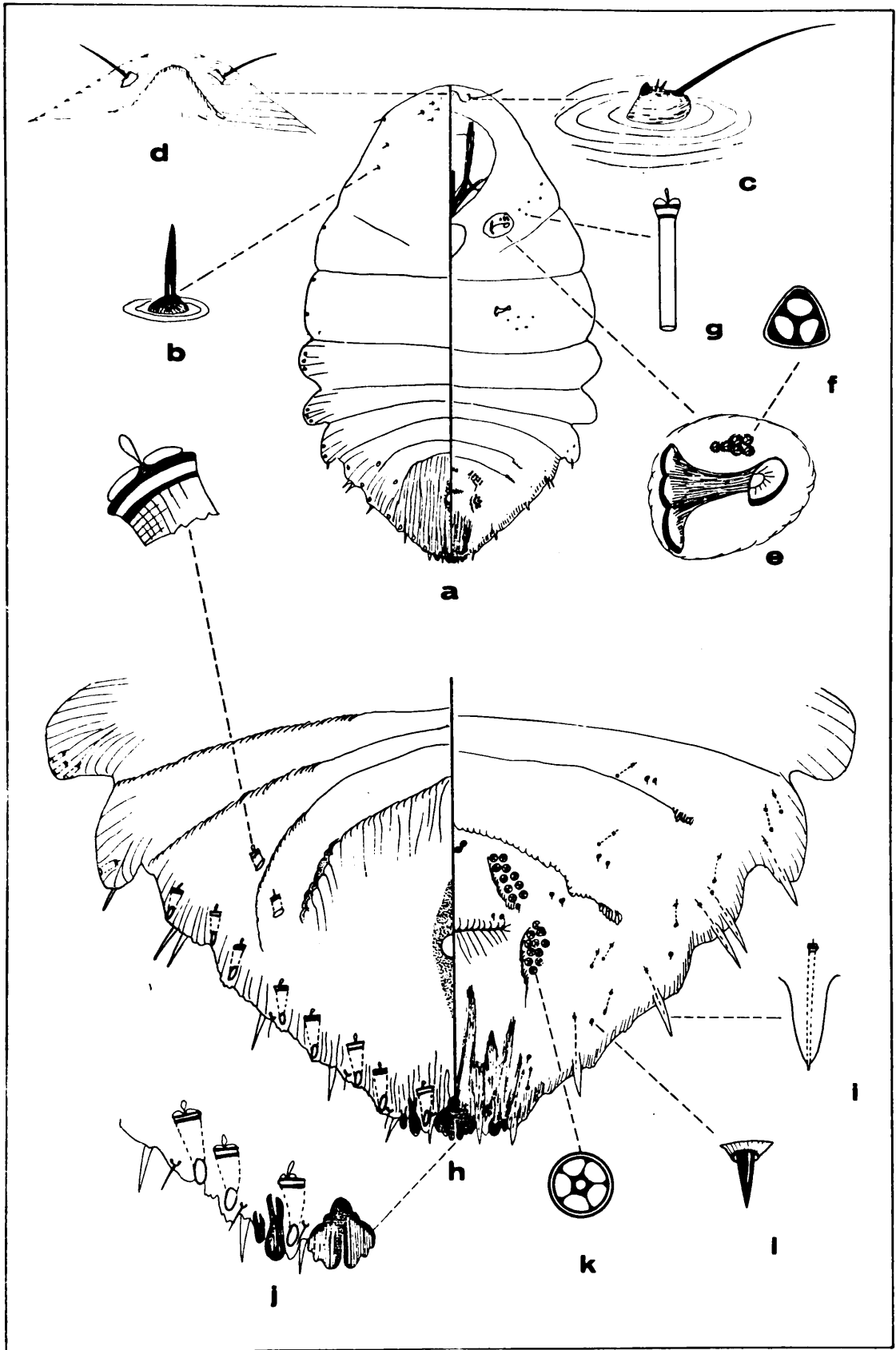


Plate 43.- *Pinnaspis buxi* (Bouché)

1916:58.

Material studied

On Livistonia chinensis Palmae, El Hatillo, Miranda, 6-IV-41 (CHB) (IZA & USNM); Bromeliaceae, Venezuela (Quarantine), 9-IX-46 (USNM) Araceae, Cagua, 18-V-68 (MC) (IZA & SSPA); 28-VIII-69 (AD).

Scale of the female

Brown, elongate, exuviae terminal; about 1 mm long.

Adult female

Body somewhat fusiform (fig. a), 505 (472 to 561) long, 289 (265 to 324) wide; derm at maturity membranous except for some sclerotization on the pygidium.

Prosoma

Dorsum: Few small setae (fig. b) on cephalic area; one marginal microduct on mesothorax; 2 marginal microducts on metathorax.

Ventrum: Antenna (fig. c) as a sclerotized tubercle with one seta about 39 long, and a small pit with 2 short sensory setae. A lobe-like projection (fig. d) in the area between the antennae. Clypeo-labral shield 144 long, and 97 wide; anterior spiracle (fig. e) with associated trilocular pores (fig. f); posterior spiracle same size and shape but with no associated pores; from the anterior spiracle a band of microducts (fig. g) extends toward the margin; the band of microducts arising from the posterior spiracles do not reach the margin.

Prepygidial segments of abdomen (fig. a and h)

Dorsum: Segments I and II with 3 marginal microducts. Segment

III with one marginal microduct. Segment IV with 3 marginal microducts and one submarginally.

Ventrum: Segment III with one marginal gland spine (fig. i); 2 submarginal microducts and 2 submedian conical setae with an associated microduct; segment IV with 2 marginal gland spines; 2 submarginal microducts and 2 submedian conical setae with an associated microduct.

Pygidium

Dorsum: Median lobes (fig. j) with their mesal margin contiguous, yoked at the base, strongly zygotic, about 8 wide; L_2 bilobed with the mesal lobe larger. Marginal macroducts about 20 long with oral sclerotization, located one between L_1-L_2 ; 2 on segment VI and on segment V; no other ducts are found on the dorsum of the pygidium. Anal opening circular, 12 in diameter, placed about 5 times this diameter from the base of L_1 ; located at the level of the vulva. Area around anal opening more sclerotized than rest of pygidium; ventral scar present.

Ventrum: Gland spines (fig. h) located, one between L_1-L_2 , segments VII, VI and V with one each; a submarginal row of microducts; 5 groups of quinquelocular perivulvar pores (fig. k), formula 11-12, (10-11), 3-4. Paravulvar scleroses weakly sclerotized. Conical setae (fig. l) located in a submarginal row; 2 pairs laterad of perivulvar pores and 2 pairs anterior to vulva.

Illustration based on material from Bromeliaceae, Venezuela (Quarantine).

Recognition characteristics

The reduction of submarginal ducts on the dorsum of the pygidium, median lobes yoked basally and lobe-like projection between the antennae, makes this species distinct.

Notes

This polyphagous species is known from many countries in the world; this is a new addition to the Venezuelan coccid-fauna.

Pinnaspis strachani (Cooley)

Plate 44

Hemichionaspis minor var. strachani Cooley, 1899:54. Hemichionaspis marchali Cockerell, 1902:82. Hemichionaspis townsendi Cockerell, 1905a:135. Chionaspis (Hemichionaspis) aspidistrae var. gossypii Newstead, 1906:74. Hemichionaspis aspidistrae gossypii Sanders, 1909:49. Chionaspis (Hemichionaspis) minor Newstead, 1917:133. Hemichionaspis minor Wilson, 1917:35. Pinnaspis minor Kuwana, 1926:40; Pinnaspis minor strachani Kuwana 1926:40. Pinnaspis temporaria Ferris, 1942:SIV-407; Ballou, 1945:94. Pinnaspis marchali Hall, 1946:550. Pinnaspis strachani, Ferris and Raoy, 1947:39. Zimmerman, 1948:387; Balachowsky, 1954:284; Schmutterer, 1959:218; Borchsenius, 1966:114.

Material studied

On Anona muricata, Anonaceae, Los Delicias, 3-II-69 (JT); Venezuela (Quarantine), 24-V-50 (USNM). Cajanus cajan, Leguminosae, Las Delicias, 13-X-43 (CHB) (IZA & USNM). Cordia cylindrostachya Boraginaceae, Caracas, 12-VII-26 (Box). Dacus carota, Umbelliferae, 30-IV-62

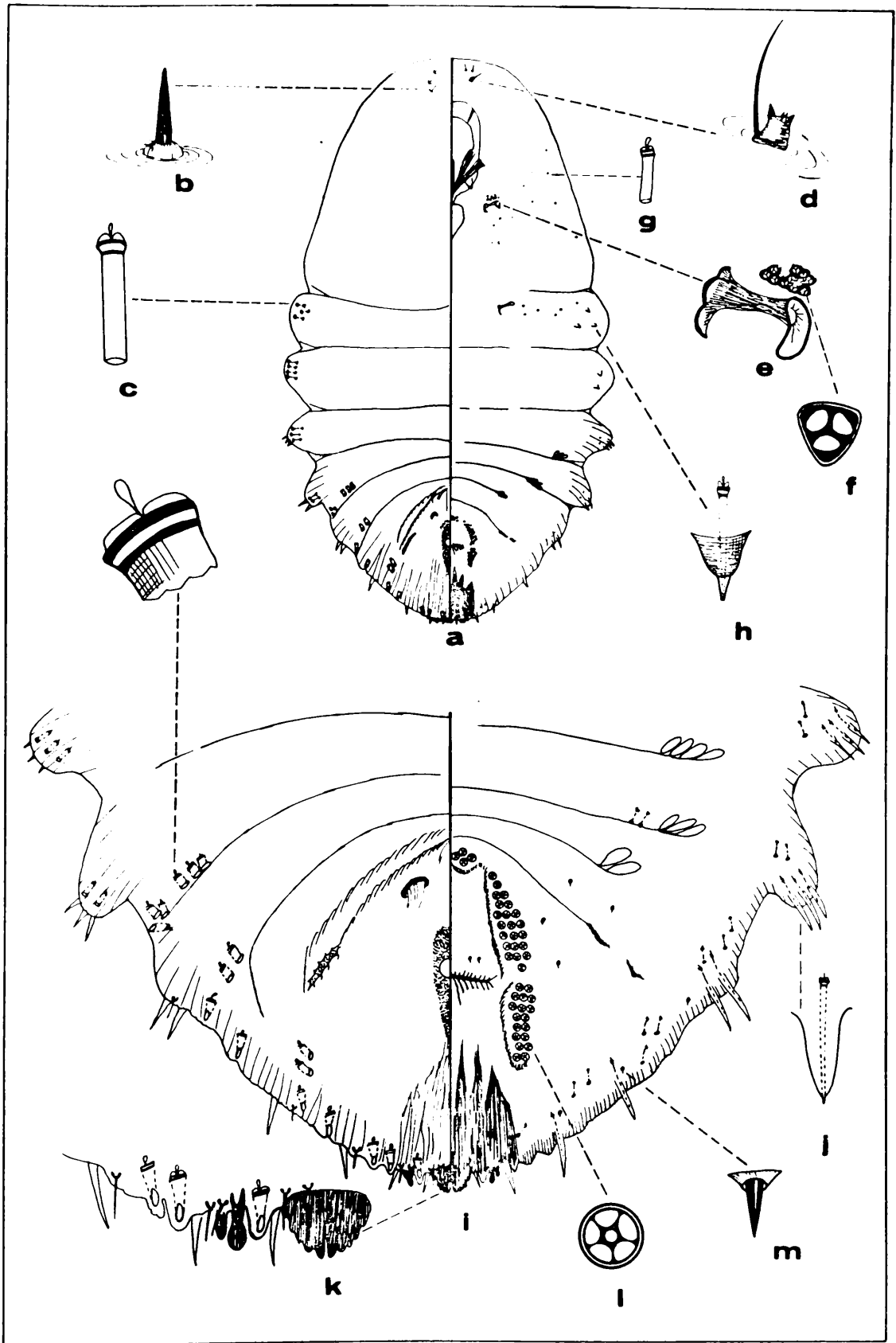


Plate 44.- *Pinnaspis strachani* (Cooley)

(Salinas). Gossypium hirsutum, Malvaceae, El Limon, 7-VI-68 (AD).
Gossypium purpurascens, Malvaceae, Cataniapo, T.F.A., 13-IV-67
 (FFY). Guzauma ulmifolia, Sterculiaceae, Las Adjuntas, Miranda,
 12-VII-26 (Box). Hibiscus sp., Malvaceae, Caracas, 28-V-26 (Box).
Lycopersicum esculentum Solanaceae, Maracay, 28-V-54 (Angeles);
Melia azedarach, Meliaceae, Maracay 29-IV-43 (CHB) (IZA & USNM).
Persea americana, Lauraceae, El Limon, 8-VI-68 (AD & SC). Pitheco-
lobium saman, Leguminosae, El Limon, 20-IX-68 (JT). Ricinus comunis,
 Euphorbiaceae, Guatire, Miranda, 20-VI-26 (Box). Thesphesia populnea,
 Malvaceae, Caiguire, Sucre, 10-VII-43 (FFY) (IZA & USNM); Ocumare
 de la Costa, Aragua, 30-VIII-69 (AD). Palm seed, Venezuela (Quar-
 antine) 21-II-41 (USNM).

Scale of the female

White, opaque; elongated and broad posteriorly; exuviae
 terminal.

Adult female

Body somewhat fusiform (fig. a), 862 (709 to 1241) long, 435
 (384 to 532) wide; derm at maturity membranous except for some
 sclerotization on the pygidium.

Prosoma

Dorsum: Few small setae (fig. b) on cephalic area; 3 marginal micro-
 ducts (fig. c) on each margin of metathorax.

Ventrum: Antenna (fig. d) as a sclerotized tubercle with one seta
 about 20 long, and a small pit with 2 short sensory setae. Few
 setae in area between antennae; clypeolabral shield 172 long, and

93 wide. Anterior spiracle (fig. e) with 7 to 9 associated trilocular pores (fig. f); posterior spiracle same size and shape, with no associated pores; a band of microducts (fig. g) extends toward the margin from the anterior spiracle; band of microducts from the posterior spiracle with 2 or 3 gland tubercles (fig. h).

Prepygidial segments of abdomen (fig. i)

Segments I and II with 3 marginal microducts (fig. c). Segment III with 2 or 3 marginal microducts and a row of 5 or 6 submarginal microducts. Segment IV with 2 marginal microducts and two submarginal microducts.

Ventrum: Segment I with 2 or 3 gland tubercles (fig. h) submarginally. Segments II and III with 3 marginal gland spines (fig. j). Two microducts submarginally; segment IV with 2 marginal gland spines, 3 microducts submarginally; 2 conical setae submedially.

Pygidium

Dorsum: Median lobes (fig. k) large and conspicuous, mesal margin contiguous, basally yoked, their outer margins with four notches, about 12 wide; L_2 bilobed, the size of the components varies from small sclerotized points to well developed, spatulate lobes. Marginal macroducts about 20 long, located one between L_1 - L_2 ; 2 on segment VI and 2 on segment V; 2 submarginal macroducts on the pygidium; anal opening circular, 12 in diameter, placed about 6 times this diameter from the base of L_1 ; located at the level of the vulva. Area around the anal opening more sclerotized than rest of pygidium; ventral scar present; in addition a pair of

crescent-shaped scleroses anterior to the anal opening.

Ventrum: Gland spines (fig. j) located one between L_1 - L_2 , and one each on the other segments; a submarginal row of microducts. Quinquelocular perivulvar pores (fig. l) in 5 groups, formula 18-21,(20-23),8-12. Paravulvar scleroses weakly sclerotized. Conical setae (fig. m) located in a submarginal row, in addition 2 pairs laterad of the perivulvar pores and 2 pairs anterior to the vulva.

Illustration based on material from palm seed, Venezuela (Quarantine).

Recognition characteristics

The crescent-shaped scleroses on the pygidium submarginal microducts on segments III, IV and V, yoked median lobes and the gland tubercles, make this species distinct.

Notes

This polyphagous species is known from many parts of the world.

Genus Pseudaulacaspis MacGillivray

Type of the genus: Diaspis pentagona Targioni-Tozzetti, 1886.

Pseudaulacaspis: MacGillivray, 1921:305; Ferris, 1937:SI-108;

Schmutterer, 1959:200; Kosztarab, 1963:99; Borchsenius, 1966:174;

Morrison and Morrison, 1966:164.

Description of the genus

Referable to the tribe Diaspidini, two-barred ducts; median lobes zygotic, large; L_2 bilobed or reduced to 2 sclerotized points. Gland spines large and numerous, some are bifid and bear more than

one microduct. Perivulvar pores in five large groups.

Key to the species of Pseudaulacaspis

Second pygidial lobe reduced to a sclerotized

point; macroducts with an oral rim. major (Cockerell)

Second pygidial lobe well developed, distinct-

ively bilobed; macroducts without oral

rim pentagona (Targioni-Tozzetti)

Pseudaulacaspis major (Cockerell)

Plate 45

Chionaspis major Cockerell, 1894c:43. Aulacaspis flacourtiae Rutherford, 1914:259. Pseudaulacaspis flacourtiae, MacGillivray, 1921:316. Unachionaspis major MacGillivray, 1921:337. Aulacaspis major Morrison, 1924:232; Ballou, 1945:90. Diaspis major Takahashi, 1929:71. Pseudaulacaspis major Mamet, 1941:28; Zimmerman, 1948:381; Mamet, 1953:152; Borchsenius, 1966:175.

Material studied

On Salix humboldtiana, Salicaceae, Cagua, 5-I-68 (AD); El Hatillo, Miranda, 6-VIII-40 (CHB); Maracay, 3-V-48 (FFY).

Scale of the female

Straw colored, circular, convex, exuviae submarginal.

Adult female

Body broadly oval (fig. a); 1329 (1108 to 1477) long; 1194 (931 to 1285) wide. Derm at maturity membranous except for the pygidial area.

Prosona

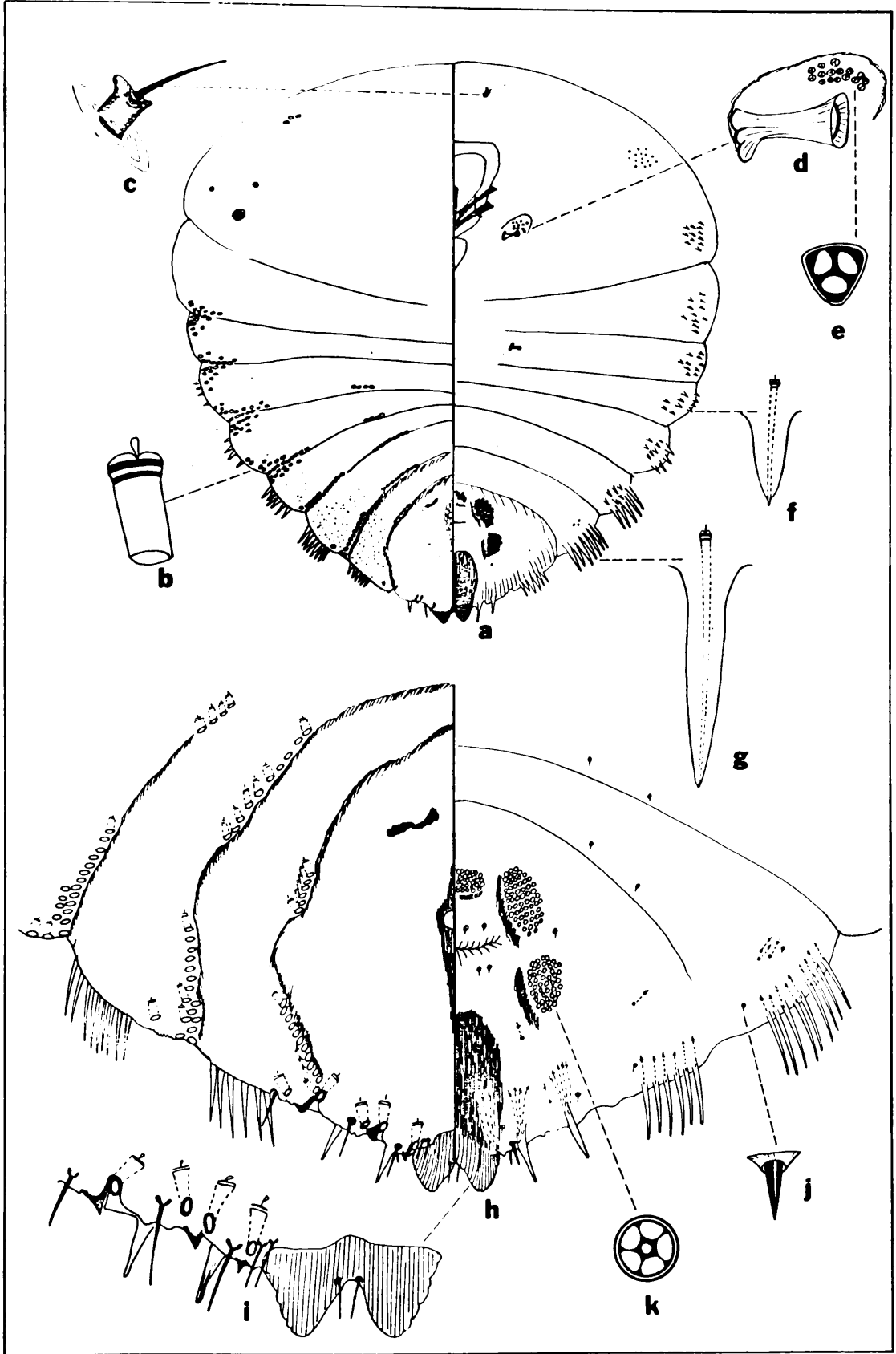


Plate 45. - *Pseudaulacaspis major* (Cockerell)

Dorsum: Head with a small cluster of microducts submarginally. Clusters of microducts (fig. b) submarginally on the intersegmental areas between meso and metathorax, and metathorax and first abdominal segments. Three or more bosses in the submarginal area on each half.

Ventrum: Antenna (fig. c) a sclerotized tubercle, with 1 seta about 16 long. Clypeolabral shield 250 long and 129 wide. Anterior spiracle (fig. d) with 19 to 26 associated trilocular pores (fig. e); posterior spiracle same size and shape, without associated pores. Submarginally on the head a cluster of small microducts. Each segment of the thorax with a submarginal cluster of short gland spines (fig. f).

Prepygidial segments of abdomen

Dorsum: Segments I to III with clusters of microducts submarginally in the intersegmental areas, additional rows of 4 to 6 submedian microducts in the posterior intersegmental areas. Segment IV with 2 rows of numerous microducts along the intersegmental membrane bordering the pygidium, one submarginal, other submedian.

Ventrum: Segment I to III with submarginal clusters of short gland spines (fig. f) and marginal rows of gland spines (fig. g), which are progressively longer toward the posterior. Segment IV with 8 or 9 long gland spines and a submarginal cluster of microducts.

Pygidium (fig. h)

Dorsum: Median lobes (fig. i) well developed, prominent, zygotic slightly crenulated on both margins, about 32 wide. Other lobes

reduced to sclerotizations on the margin. Marginal macroducts openings 1 at the base of L_1 ; 2 at the base of the remnant of L_3 ; 1 at the base of the remnant of L_4 . In the intersegmental area of segments V and VI, 2 rows of microducts, a submarginal with 12 and a submedian with 6. Anal opening circular, 16 in diameter, placed about 12 times this diameter from the base of L_1 ; located at the level of vulva on venter.

Ventrum: An opening for 4 microducts laterad of the base of L_1 . This is the vestige of gland spine usually present between L_1 and L_2 in the Diaspidini. Two large gland spines each bearing 4 or 5 microducts on segments VII and VI. Segment V with 6 long gland spines, bearing 1 microduct each. Conical setae (fig. j) 3 pairs submarginally, 1 pair laterad of perivulvar pores, 2 pairs anterior to vulva and 2 posteriorly. Quinquelocular perivulvar pores (fig. k) in 5 groups, formula 30-50, (31-50), 32-54. Ventral scleroses arising from L_1 , wide and reaching the level of posterior groups of perivulvar pores.

Illustration based on material from Salix humboltiana, Maracay, Aragua, Venezuela.

Recognition characteristics

The zygotic L_1 ; reduction of L_2 and L_3 ; long and conspicuous gland spines; numerous short gland spines on the prepygidial and thoracic segments; and the large number of dorsal microducts makes this species distinct.

Notes

This tropical species is known from the representatives of a few plant families in Venezuela. It was collected only from Salix in the past.

Pseudaulacaspis pentagona (Targioni-Tozzetti)

Plate 46

Diaspis pentagona Targioni-Tozzetti, 1886:1. Aulacaspis pentagona Fernald, 1903:234, Ballou, 1945:91. Pseudaulacaspis pentagona MacGillivray, 1921:315, Ferris, 1937:SI-109; Balachowsky, 1954:236; Schmutterer, 1959:200; Kosztarab, 1963:99; Borchsenius, 1966:175.

Material studied

On Angelonica salicariaefoliae, Scrophulariaceae, El Limon, 18-III-67 (FFY). Calotropis procera, Asclepiadaceae, Cata, Aragua, 10-1-67 (AD). Carica papaya, Caricaceae, Cagua, 4-VII-69 (MC) (IZA & SSPA); El Limon, 10-III-67 (AD). Morus multicaulis, Moraceae, El Limon, 14-IV-66 (AD). Nerium oleander, Apocynaceae, Cagua, 25-VII-60 (MC) (IZA & SSPA); Caracas, 17-VI-59 (Agostini); 28-I-71 (AD) Valencia, Carabobo, 6-VI-66; Pelargonium zonale, Geraniaceae, Caracas, 25-II-50 (FFY); Maracay, 15-VI-68 (AD); Valencia, Carabobo, 15-XII-68 (JCM). Prunus persica, Rosaceae, Caracas, D. F. 24-VI-62 (AD). Verbena rigida, Verbenaceae, Cagua, 13-VII-68 (Salinas) (IZA & SSPA).

Scale of the female

White to yellowish white, circular or subcircular, flat, exuviae marginal or submarginal.

Adult female

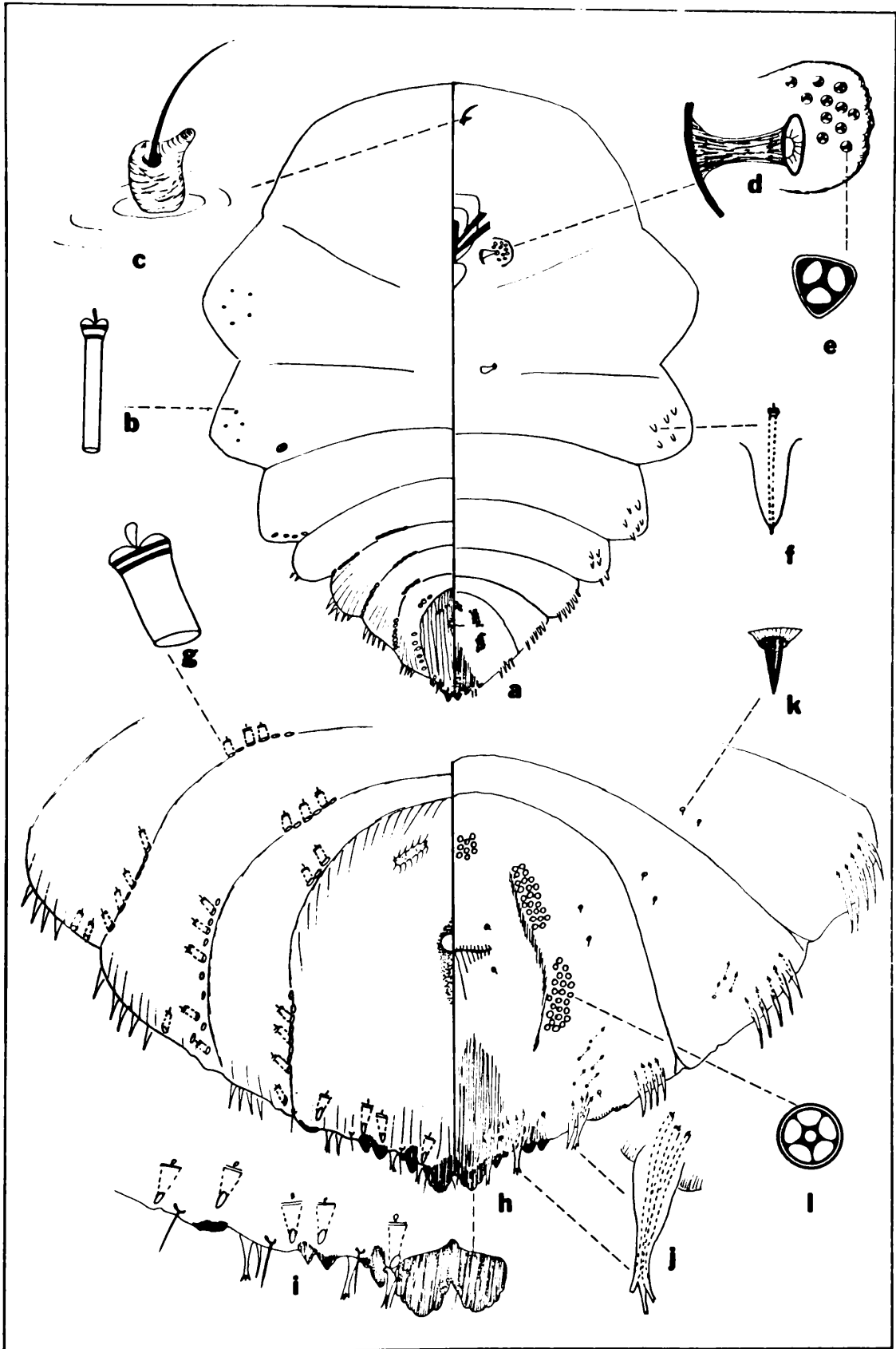


Plate 46.- *Pseudaulacaspis pentagona* (Targioni-Tozzetti)

Body broadly oval (fig. a); 1052 (886 to 1167) long; 972 (679 to 1004) wide. Derm at maturity membranous except for the pygidial area.

Prosoma

Dorsum: Meso and metathorax with small group of two-barred microducts (fig. b).

Ventrum: Antenna (fig. c) a sclerotized tubercle, with 1 seta about 20 long. Clypeolabral shield 235 long and 133 wide. Anterior spiracle (fig. d) with to associated trilocular pores (fig. e); posterior spiracle same size and shape as anterior spiracle but without associated pores. Metathorax with a submarginal cluster of small gland spines (fig. f), and 1 boss.

Prepygidial segments of abdomen

Dorsum: Segment I with a submarginal row of microducts (fig. g), those slightly wider than those on prosoma. Segments II to IV with 2 rows of microducts on the posterior intersegmental areas, one submarginal, the other submedial.

Ventrum: Segments I and II with submarginal groups of 5 or 6 short gland spines (fig. f). Segments III and IV with 5 marginal gland spines (fig. f). Segments III and IV with 5 marginal gland spines about twice as long as the ones on the preceding segments.

Pygidium (fig. h)

Dorsum: Median lobes (fig. i) well developed, prominent, zygotic, crenulated on both margins, about 24 wide. L_2 and L_3 bilobed, sclerotized, but slightly developed. Marginal macroducts openings,

1 between L_1 - L_2 , 2 at the base of L_3 and one beyond the remnant of L_4 . On the intersegmental area of segments V and VI, 2 rows of microducts, a submarginal with 7 to 10 and a submedian with 3 to 6. Anal opening circular, 16 in diameter, placed about 10 times this diameter from the base of L_1 ; located at the level of vulva on the venter. Area around the anal opening sclerotized.

Ventrum: Gland spines reduced in number, bearing 2 or 3 microducts, most bifurcate or trifurcate (fig. j); 1 located between L_1 - L_2 ; 1 between L_2 - L_3 ; 1 single and 1 trifurcate beyond L_3 . Gland spines on segment V are similar to the ones on prepygidial segments. Submarginal cluster of microducts on segment VI. Conical setae (fig. k) 3 pairs submarginal, 2 pairs laterad of perivulvar pores, 1 pair on each side of vulva. Quinquelocular perivulvar pores (fig. l) in 5 groups, formula 32-45,(22-42),15-22. Sometimes a 6th group present with 6 to 16 pores, on the prepygidial segment. Ventral scleroses arising from base of median lobes and L_2 .

Illustration based on material from Pelargonium zonale, Maracay, Aragua, Venezuela.

Recognition characteristics

The zygotic L_1 ; reduction of L_2 and L_3 ; small number of microducts and gland spines on prepygidial and thoracic segments, and the bifurcate and trifurcate gland spines on the pygidium makes this species distinct.

Notes

This cosmopolitan species is found on a large variety of hosts,

and is an important pest on several economic plants, including papaya, peaches and ornamentals.

Genus Pseudoparlatoria Cockerell

Type of the genus: Pseudoparlatoria ostreata Cockerell, 1892.

Pseudoparlatoria Cockerell, 1892b:136; Hempel, 1900:497; Fernald, 1903:300; MacGillivray, 1921:305; Ferris, 1937:SI-116; Balachowsky, 1954:254; Schmutterer, 1959:206; Borchsenius, 1966:162; Morrison and Morrison, 1966:167. Pseudoparlatoarea Lindinger, 1907:20.

Description of the genus

Referable to the tribe Diaspidini, two-barred ducts, L_2 and L_3 bilobed; median lobes non-zygotic, with a pair of gland spines between them; marginal macroducts of the pygidium present, gland spines present but very short; perivulvar pores present; no pores associated with the spiracles.

Pseudoparlatoria parlatorioides (Comstock)

Plate 47

Aspidiotus parlatorioides Comstock, 1883:64; Pseudoparlatoria parlatorioides Hempel 1900:511; Fernald, 1903:301; Leonardi, 1920:176; Ferris, 1947:SIIV-417; Lepage and Figueiredo, 1947:43; Balachowsky, 1954:256; Schmutterer, 1959:207. Borchsenius, 1966:164. Pseudoparlatoarea parlatorioides Lindinger, 1907; Pseudoparlatoria pusilla Green, 1922:1010.

Material studied

On Cattleya gaskelliana, Orchidaceae, Venezuela (Quarantine),

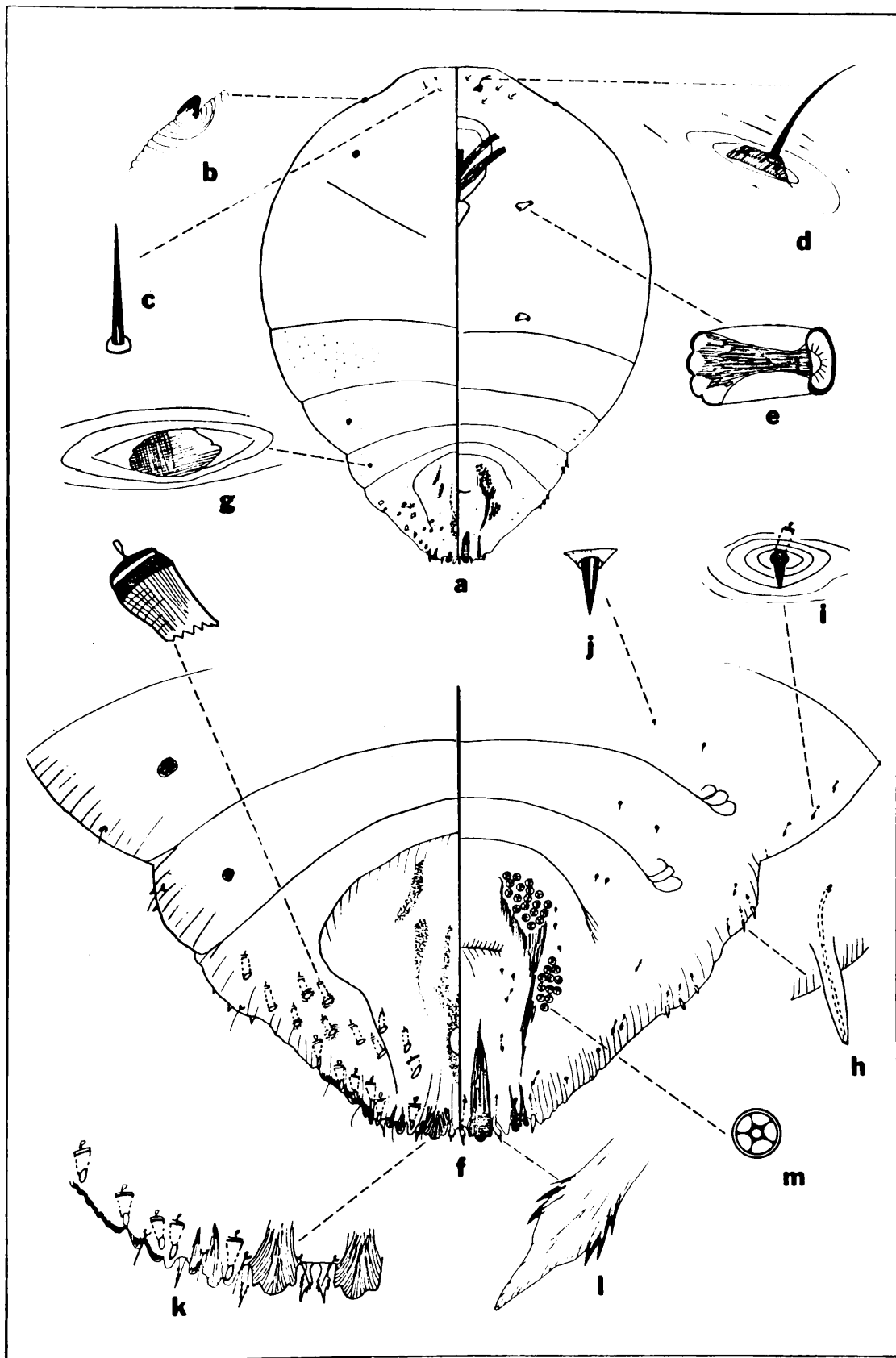


Plate 47. - *Pseudoparlatoria parlatorioides* (Comstock)

30-VIII-39 (USNM). Cattleya mossiae, Orchidaceae, Venezuela (Quarantine), 26-VI-35 (USNM). Cattleya perciviana, Orchidaceae, Venezuela (Quarantine), 28-VIII-45 (USNM). Six collections on Cattleya sp. Orchidaceae, Venezuela (Quarantine) (USNM). Melicocca bijuga, Sapindaceae, Humocaró Alto, Lara, 7-IV-42 (Sojo) (IZA, CIA & USNM). Oncidium sp., Orchidaceae, Venezuela (Quarantine) 20-II-40 (USNM).

Scale of the female

Circular or oval; flat; yellow or yellowish brown; exuviae submarginal.

Adult female

Body turbinate (fig. a), 1033 (945 to 1137) long 753 (546 to 901) wide. Derm at maturity membranous except for the pygidium.

Prosoma

Dorsum: Eye spot marginal (fig. b) well developed and sclerotized. One pair of dorsal bosses submarginally. Few setae (fig. c) of about 8 long on the submarginal one of the head.

Ventrum: Antenna (fig. d) is a sclerotized tubercle with 1 or 2 setae about 16 long. Clypeolabral shield 168 long and 106 wide. Anterior and posterior spiracles (fig. e) similar, without associated pores.

Prepygidial segments of abdomen (fig. f)

Dorsum: Segments II and III with a pair of dorsal bosses (fig. g) each. Segment IV with 1 to 3 submarginal microducts about long.

Ventrum: Segments II and III with 2 or 3 microducts which end in

a very short gland spine (fig. i). All the prepygidial segments with 2 pairs of submedian conical setae (fig. j).

Pygidium

Dorsum: Median lobes (fig. k) non-zygotic, well developed about 16 wide, notched on each margin; L_2 bilobed and well developed; L_3 bilobed but very reduced; L_4 absent. Marginal macroducts about long, one between L_1 - L_2 ; 2 between L_2 - L_3 ; 3 or 4 beyond L_3 . There is a submarginal macroduct on segment VII. An irregular row of 5 to 10 microducts submarginally on each half. Anal opening oval, 24 in diameter, placed about twice its diameter from the base of L_1 , posterior to the vulva of the venter. Area around anal opening more sclerotized than rest of pygidium, also some other areas sclerotized.

Ventrum: A pair of serrate gland spines (fig. l) between the median lobes; one between L_1 and L_2 and one between L_2 - L_3 . A row of submarginal microducts from segment VII to V. Ventral scleroses arising from the base of L_1 and L_2 . Quinquelocular perivulvar pores (fig. m) in 4 groups, formula 10-15,(15-20),0. Paravulvar scleroses well developed. Conical setae (fig. i) in a submarginal row; 3 pairs anterior to the perivulvar pores and 2 pairs posterior to the vulva. Two pairs of microducts on segment VIII, between the paravulvar scleroses.

Illustration based on material from Cattleya sp. Venezuela (Quarantine).

Recognition characteristics

The small number of dorsal microducts restricted to the pygidium and abdominal segment IV; the bilobed L_2 and L_3 ; the presence of perivulvar pores and short gland spines make this species distinct.

Notes

This polyphagous species is found in most of the tropical and subtropical regions of the new world, and these are a few records from other areas. It is a new record for the Venezuelan coccid-fauna.

Genus Unaspis MacGillivray

Type of the genus: Chionaspis acuminata Green, 1896.

Unaspis MacGillivray, 1921:308; Ferris, 1936:91; 1937:SI-128;

Balachowsky, 1954:288; Schmutterer, 1959:222; Kosztarab, 1963:101; Borchsenius, 1966:104; Morrison and Morrison, 1966:201.

Graphaspis MacGillivray, 1921:310. Ametrochaspis MacGillivray, 1921:311. Prontaspis MacGillivray, 1921:311.

Description of the genus

Referable to the tribe Diaspidini; two-barred ducts, numerous in the dorsum, especially on pygidial area; median lobes non-zygotic, L_2 and L_3 bilobed; trilocular pores associated with the spiracles; body fusiform.

Unaspis citri (Comstock)

Plate 48

Chionaspis citri Comstock, 1883:100; Fernald, 1903:214; Lindinger,

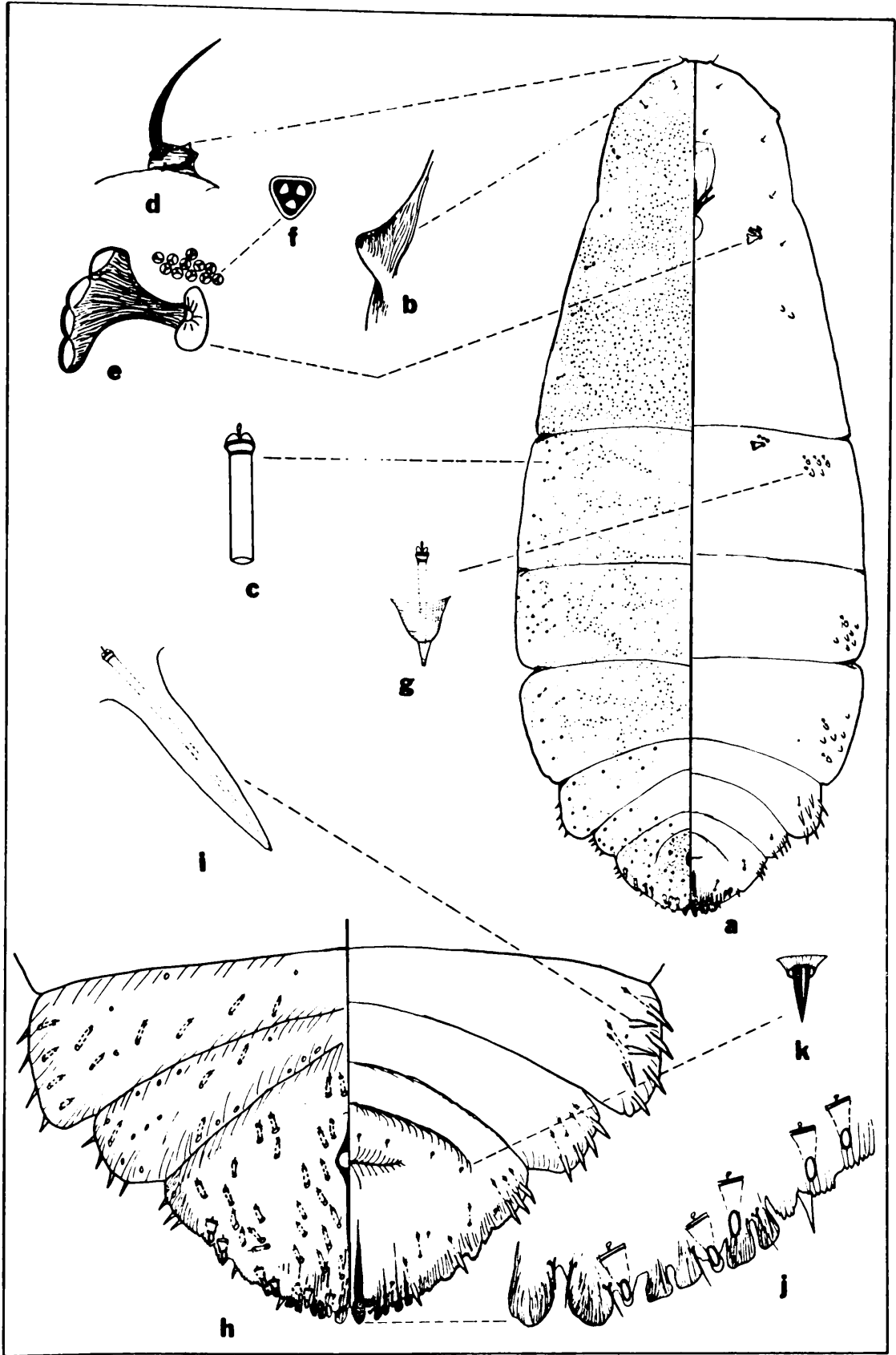


Plate 48. - Unaspis citri (Comstock)

1912:106; Merrill and Chaffin, 1923:214. Howardia citri Berlese and Leonardi, 1896:348. Dinaspis annae Malenotti, 1916b:188. Prontaspis citri MacGillivray, 1921:359. Dinaspis veitchi Green and Laing, 1923:123. Trichomytilus veitchi Lindinger, 1934:64. Diaspis annae Wu, 1935:204. Unaspis citri Ferris, 1937:SI-129; Costa Lima, 1942:272; Ballou, 1945:96; Fernandez-Yepez et. al., 1957:2; Labrador, 1958:10; Doreste and Cermeli, 1961:40; Borchsenius, 1966:105.

Material studied

On Citrus aurantium, Rutaceae, Baruta, D.F., 13-III-40 (CHB) (IZA & CIA); El Limon, 22-X-66 (AD); 28-VIII069 (AD); Citrus grandis, Rutaceae, Maracay, 28-VI-41 (CHB) (IZA & CIA); Palo Negro, 4-VII-68 (AD & SC). Citrus limon, Rutaceae, Maracay, 28-VI-41 (CHB) (IZA & CIA). Citrus medica, Rutaceae, El Limon, 28-V-68 (AD & SC). Murraya paniculata, Rutaceae. Caracas, 19-VI-39 (CHB).

Scale of the female

Brown or purplish; elongated, broadening posteriorly; exuviae terminal; with a slightly central ridge.

Adult female

Body fusiform (fig. a); 1460 (1033 to 1772) long; 570 (472 to 664) wide. Derm at maturity heavily sclerotized, especially the prosoma.

Prosoma

Dorsum: Eye spot (fig. b) on a protuberance at the margin of the head; a continuous row of microducts (fig. c) submarginally.

Ventrum: Antenna (fig. d) as a sclerotized tubercle, marginal, with one seta about 25 long. Clypeolabral shield 175 long and 85 (78 to 97) wide. Anterior spiracle (fig. e) with 12 to 14 associated trilocular pores (fig. f); posterior spiracle same size and shape, with 3 associated pores. Gland tubercles (fig. g) 2 submarginally on the mesothorax; a cluster of 5 submarginally on the metathorax.

Prepygidial segments of abdomen (fig. h)

Dorsum: Segments I and II with a submarginal cluster of microducts (fig. c) about 16 long; segments III and IV with numerous microducts scattered over the segment.

Ventrum: Segments I and II with a cluster of gland tubercles (fig. g) submarginally. Segments III and IV with a cluster of marginal gland spines and one microduct each, submarginally.

Pygidium

Dorsum: Median lobes (fig. j) well developed, non-zygotic, inner side serrate, about 12 wide; L_2 and L_3 bilobed; L_4 absent. Marginal macroducts about 20 long with oral sclerotization, located 1 between L_1 - L_2 ; 2 between L_2 - L_3 , 2 on segments VI and V. Numerous microducts scattered on the rest of pygidium. Anal opening circular, 16 in diameter, placed about 7 times this diameter from the base of L_1 ; located at the same level of the vulva on the venter. Anal apophysis well developed, extends from anterior of the anal opening to the apex of the pygidium.

Ventrum: Gland spines present, 1 on segment VII, 1 on segment VI and 3 on segment V. Row of 3 conical setae (fig. k) submarginally and

4 pairs anterior to vulva. Perivulvar pores and paravulvar sclerites absent.

Illustration based on material from Citrus medica, El Limon, Aragua, Venezuela.

Recognition characteristics

The bilobed L_2 and L_3 , sclerotization of the body at maturity and the absence of perivulvar pores make this species distinct.

Notes

This species is restricted to plants of the family Rutaceae and principally to the genus Citrus; it is found on almost all the areas of the world in which citrus is cultivated.

Genus Velataspis Ferris

Type of the genus: Scobinaspis dentata Hoke, 1921.

Velataspis Ferris, 1937:SI-31; Balachowsky, 1954:351; Borchsenius, 1966:59; Morrison and Morrison, 1966:202.

Description of the genus

Referable to the tribe Diaspidini, two-barred ducts; L_2 bilobed. Body elongate. Median lobes non-zygotic, marginal macropores large, perivulvar pores present, gland spines and gland tubercles present, sclerotic tubercles of different shapes on the head between the antennae.

Velataspis dentata (Hoke)

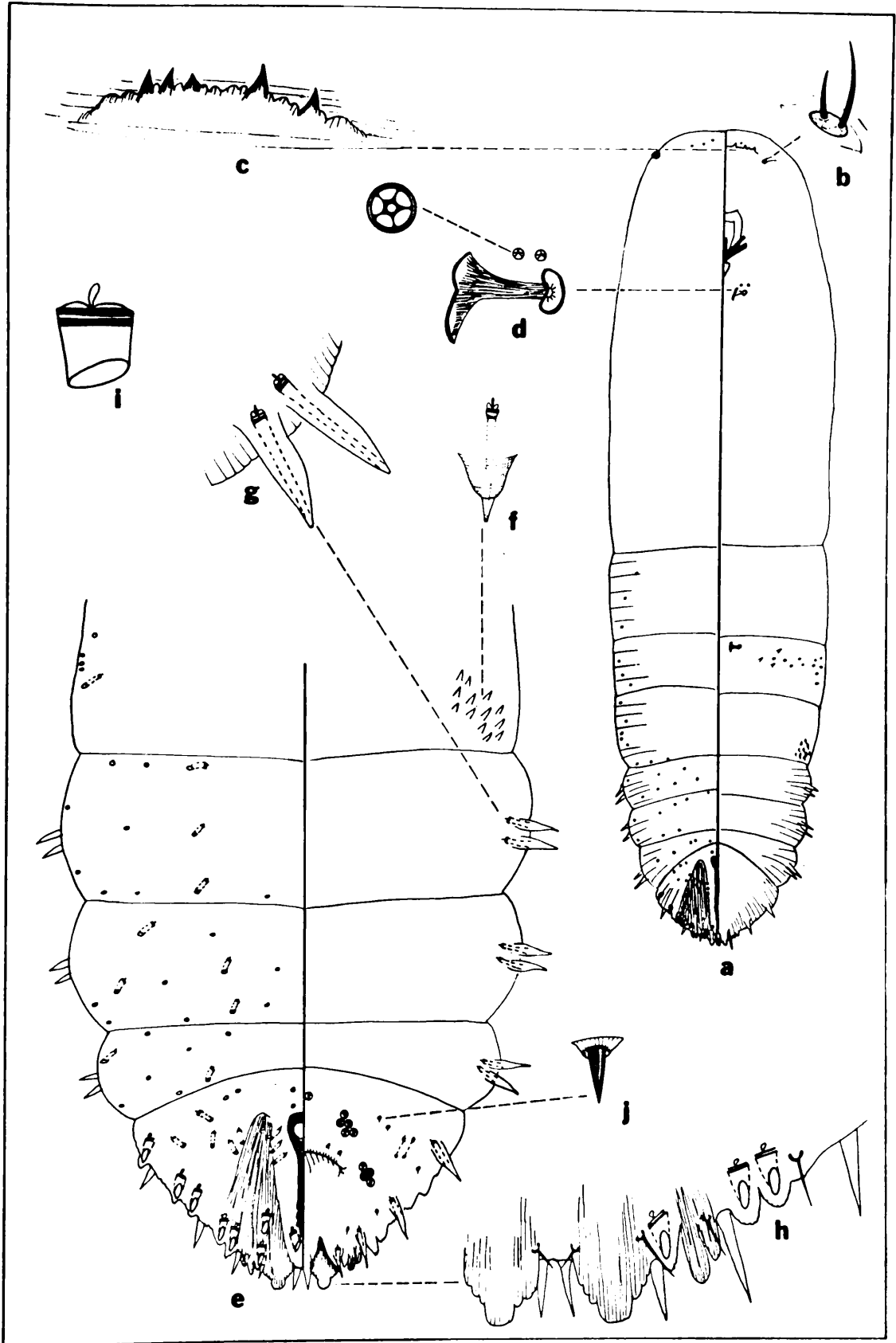


Plate 49. - *Velataspis dentata* (Hoke)

Scobinaspis dentata Hoke, 1921:340. Lepidosaphes dentata

Merrill and Chafin, 1923:242. Velataspis dentata Ferris, 1937:

SI-133; Borchsenius, 1966:60.

Material studied

Three females on Spondias mombin, Anacardiaceae, El Limon, 26-V-66 (AD) (IZA).

Scale of the female

Yellowish or silvery-brown, elongate; exuviae terminal; up to 2mm long.

Adult female

Body elongate (fig. a), 1363 (1256 to 1431) long, 380 (340 to 399) wide. Derm at maturity membranous, except for areas of the pygidium.

Prosoma

Dorsum: Row of few microducts, 8 long, in the submarginal area of the head. Eye spot well defined and sclerotized. Few small setae, on the margin of the prosoma. Few microducts in the submarginal area of meso and metathorax.

Ventrum: Antennae (fig. b) a sclerotized tubercle with 2 setae each about 12 long. Between antennae and just anterior to these a number of irregular sclerotic tubercles (fig. c), 6 or 7 small microducts associated with these tubercles. Clypeolabral shield 195 long, and 86 wide. Anterior spiracle (fig. d) with 1 or 2 associated quinquelocular pores (fig. e); posterior spiracle same shape and size without associated pores; from latter spiracle a

cluster of microducts and gland tubercles extend toward the margin of metathorax.

Prepygidial segments of abdomen (fig. e)

Dorsum: Segment I with few marginal microducts of about 16 long; segments II, III, and IV in addition to the marginal microducts with scattered microducts on the rest of the segment.

Ventrum: Segment I with a cluster of 10 to 15 gland tubercles (fig. f); segments II, III, and IV each with a pair of well developed gland spines (fig. g).

Pygidium

Dorsum: Median lobes (fig. h), well developed, about 27 wide, with both margins dentate, apex rounded; L_2 bilobed; L_3 and L_4 absent; marginal macroducts (fig. i) 20 long, one between L_1 and L_2 ; 2 on segment VII; 2 on segment VI; 1 on segment V. Each macroduct with its opening in a small evagination on margin. Two macroducts submarginally on segment VII and VIII; in the rest of the pygidium few scattered microducts. Anal opening circular, 16 in diameter, placed about 7 times this diameter from the base of L_1 ; located anterior to vulva on venter. Anal apophysis well sclerotized, around anal opening and extending posteriorly almost to the margin.

Ventrum: Two gland spines between the median lobes; 1 between L_1 and L_2 ; 1 beyond L_2 on each segment of pygidium. Median lobes with a conspicuous, inverted-V-shaped scleroses; a pair of microducts submarginally in segment V. Quinquelocular perivulvar pores

in 5 groups, formula 4-5,(6-8),2-3. Conical setae, 3 submarginally; 3 pairs laterally of perivulvar pores, 2 pairs anterior to vulva.

Illustration based on material from Spondias mombin, El Limon, Aragua, Venezuela.

Recognition characteristics

The elongated body, tubercles between the antennae, narrow sclerotized areas of the pygidium and the inverted-V-shaped scleroses on the ventral side of the median lobes make this species distinct.

Notes

This polyphagous species was previously known only from the United States and Panama. This new addition for the Venezuelan coccid-fauna, extends the range of the species to South America.

TRIBE ODONASPIDINI

Genus Odonaspis Leonardi

Type of the genus: Aspidiotus secretus Cockerell, 1896.

Odonaspis Leonardi, 1897b:285; MacGillivray, 1921:388, Ferris, 1938: SII-161; Zimmerman, 1948:426; Balachowsky, 1953:299; Borchsenius, 1966:223; Morrison and Morrison, 1966:137. Dycryptaspis Leonardi, 1897a:375. Spatheaspis Leonardi, 1897c:115. Ligulaspis MacGillivray 1921:388. Bakeraspis MacGillivray, 1921:395.

Description of the genus

Referable to the tribe Odonaspidini; plates and gland spines absent; short-two-barred microducts very abundant dorsally and ventrally; perivulvar pores very numerous and forming a continuous arch; abdominal segments sharply divided on paratergal and mesotergal areas; paired median lobes never present in the adult female, the eight segment being entirely fused across the meson. Intersegmental scleroses on the pygidium present. Derm membranous except for the pygidium and marginal paratergal areas.

Key to the species of Odonaspis

- Submarginal cluster of dorsal microducts present on thoracic segments; 20 or more quinquelocular pores associated with anterior spiracles. . . . saccharicaulis (Zehntner)
- Submarginal cluster of dorsal microducts absent from thorax; 9 or less quinquelocular pores associated with anterior spiracle guaduae n. sp.

Odonaspis guaduae n. sp.

Plate 50

Material studied

On Bambusa (Guadua) latifolia Gramineae, San Martin de Loba, Dept. Bolivar, Columbia, May, 1916 (H. M. Curran) (3 slides). Guadua probably, latifolia, Gramineae, Orinoco river above Napire, Guarico, Venezuela, 14-X-43 (F. A. McClure). Quarantine material: On Bamboo Costa Rica, 31-VII-42 (P. Gladish) (San Pedro 4037); Mexico at Laredo, 29-VIII-46 (Trotter) (Laredo 40861); Mexico at Nogales, 2-XII-44 (Algert) (Nogales 60735); Venezuela at San Juan, 10-X-41 (Chapman) (San Juan 8016). All the above material is deposited in the Collection of Coccoidea, USNM. N. H. Holotype female is the marked centrally located specimen on the slide from Mexico at Nogales (Nogales 60735). No dry material was available for the study of larger series and the scale of the female.

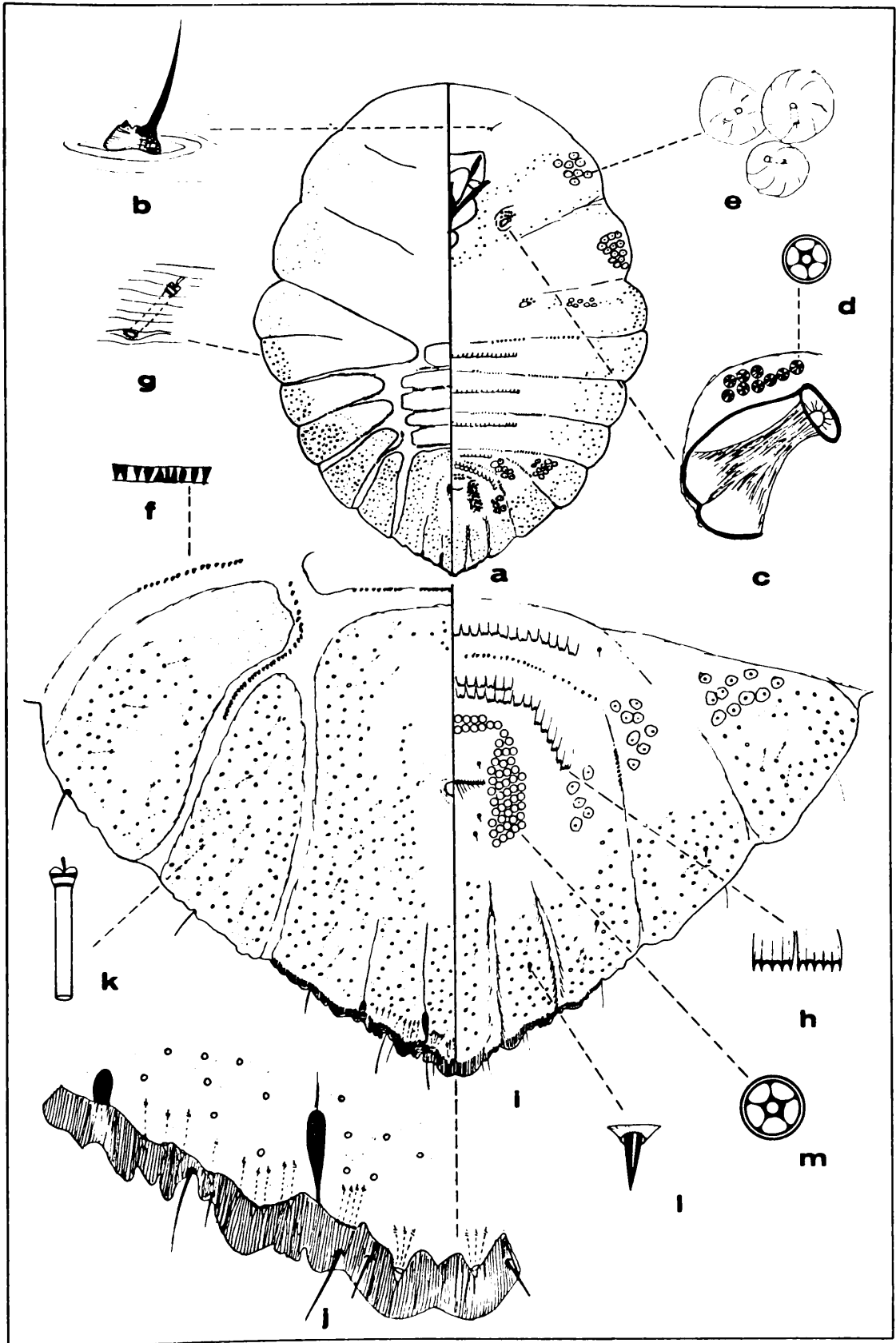
Adult female

Body oval (fig. a); 1077 (886 to 1343) long, 841 (664 to 930) wide; derm membranous except for the pygidium and marginal paratergal areas.

Prosoma

Dorsum: No microducts present on this surface, segmentation visible.

Ventrum: Antenna (fig. b) as a sclerotized tubercle with 1 seta, about 23 long. Clypeolabral shield 222 long and 140 wide. Anterior spiracle (fig. c) with 5 to 11 associated quinquelocular pores



(fig. d); posterior spiracle same size and shape as anterior spiracle, but with 3 to 8 associated pores. Area between the anterior spiracle and mouthparts with numerous microducts arising from this area and following the intersegmental membrane to the margin, 2 bands of microducts present, one on each side of anterior spiracle. Submarginal clusters of 8 to 16 gland tubercles (fig. e) on the pro and mesothorax. From the areas of atrium of posterior spiracle toward the body margin extends a band of microducts and gland tubercles.

Prepygidial segments of abdomen

Dorsum: Paratergal areas sharply separated from mesotergal areas; intersegmental membranes with series of small scleroses (fig. f). Segments I to IV with numerous microducts (fig. g) on the paratergal areas; mesotergal areas without microducts.

Ventrum: Segments I to III with numerous microducts on the submargin, and a continuous row of serrate squamations (fig. h) medially. Segment IV with numerous submarginal microducts, changing to gland tubercle toward the submedial area.

Pygidium (fig. i)

Dorsum: Median lobes (fig. j) fused as characteristic of the genus, margin with several indentations up to segment VI. Intersegmental scleroses, one well developed between segments VII and VIII, a short and sometimes absent between VI and VII. Microducts (fig. k) short, extremely numerous, present on all the pygidial segments, especially on segments V and VI. Anal opening circular, 12 in diameter; placed

20 times from the margin; located at the level of vulva of the venter. Area around anal opening clerotized.

Ventrum: Microducts covering the submarginal area of each segment; submedian clusters of gland tubercles on segments V and VI. Conical setae (fig. l), 3 pairs submarginally, 1 pair anterior to vulva and 2 posteriorly. Band of 130 to 166 quinquelocular perivulvar pores (fig. m). Rows of serrate squamations (fig. h) anterior to vulva on segments V and VI.

Illustration based on material from bamboo, Mexico at Nogales.

Recognition characteristics

O. guadae can be separated from the closely related species O. saccharicaulis by the absence of dorsal microducts on the thorax, fewer pores associated with spiracles, short development or absence of intersegmental scleroses between segments VI and VII of pygidium.

Notes

Harold Morrison, while studying the adult females of this material, found them distinct, and suggested the manuscript name, O. gada, probably because the host on which is found; this manuscript with minor change is kept to be used for this new species.

Odonaspis saccharicaulis (Zehnutner)

Plate 51

Aspidiotus sacchari-caulis Zehnter, 1897:599. Aspidiotus secretus var.

saccharicaulis Cockerell, 1899b:274. Odonaspis secreta sacchari-caulis Fernald, 1903:300. Odonaspis saccharicaulis Green and Laing, 1923:129; Lindinger, 1937:184; Balachowsky, 1958:302.

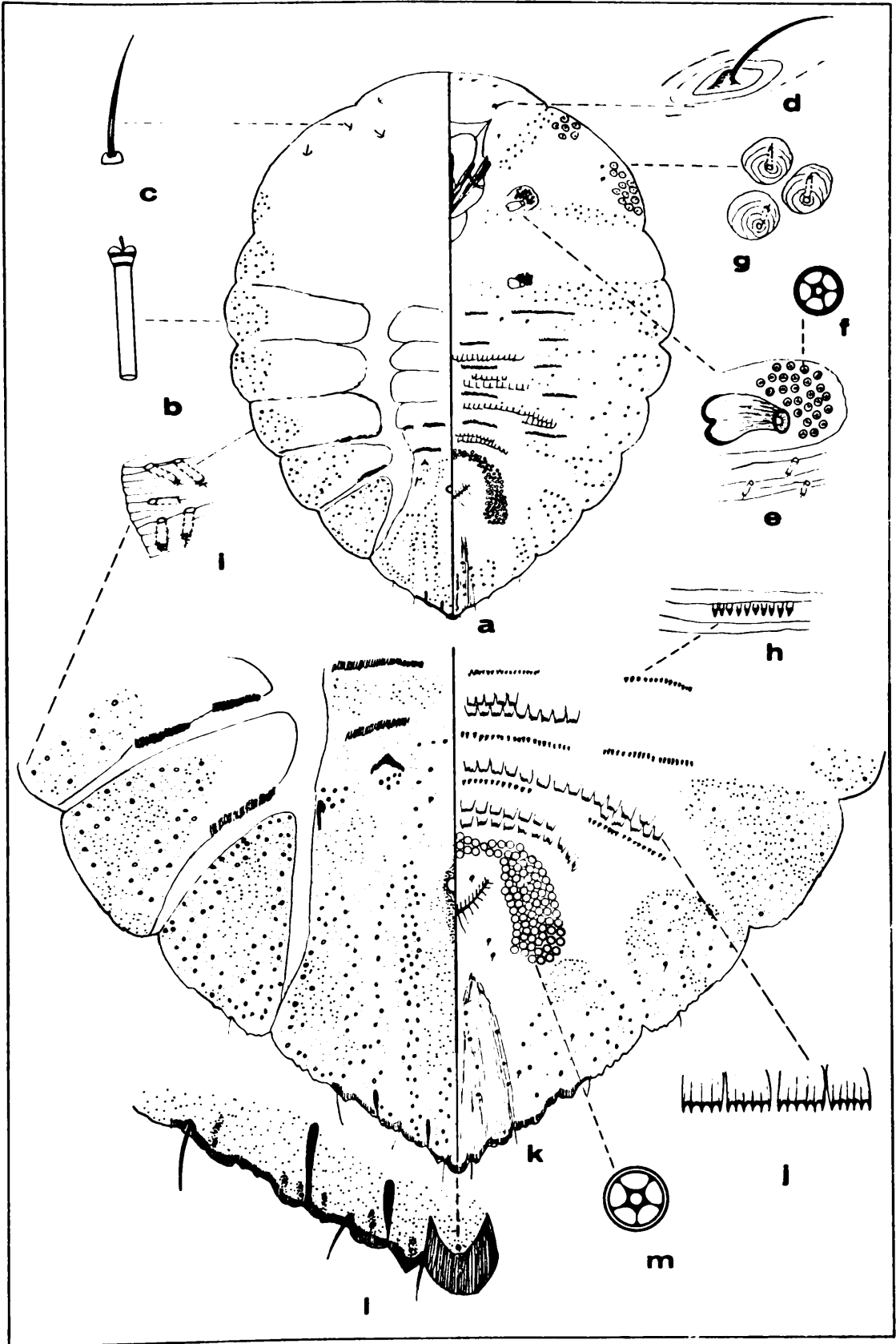


Plate 51. - *Odonaspis saccharicaulis* (Zehntner)

Material studied

On Panicum barbinoides, Graminea, Urena, Tachira, 18-V-49 (FFY) (IZA & USNM).

Scale of the female

Not seen, described by Balachowsky, 1958, as "white, bivalve circular, exuviae central or subcentral."

Adult female

Body oval (fig. a); 1104 (1048 to 1211) long, 797(694 to 812) wide. Derm at maturity membranous except for the pygidium and marginal paratergal areas.

Prosoma

Dorsum: Submarginal cluster of microducts (fig. b) on the meso and metathorax. Few scattered setae (fig. c) submarginally on the head.

Ventrum: Antenna (fig. d) a sclerotized tubercle with 1 seta, about 23 long. Clypeolabral shield 236 long and 162 wide. Anterior spiracle (fig. e) with 22 to 31 associated quinquelocular pores (fig. f); posterior spiracle same size and shape as anterior spiracle, but with 15 to 20 associated pores. Area between the anterior spiracle and mouthparts with numerous microducts; 2 bands of microducts are extending from this area toward the margin, one on each side of anterior spiracle. Submarginal clusters of 5 to 12 gland tubercles (fig. g) on the prothorax. From the atrium of posterior spiracle toward the margin a wide band of microducts present.

Prepygidial segments of abdomen

Dorsum: Paratergal areas sharply separated from mesotergal areas, intersegmental membranes with series of small scleroses (fig. h). Segments I to IV with numerous microducts (fig. i) on the paratergal areas.

Ventrum: Segments I to IV with numerous microducts in the submarginal areas with continuous rows of serrate squamations (fig. j); medially and series of small scleroses (fig. h) on intersegmental membranes.

Pygidium (fig. k)

Dorsum: Median lobes (fig. l) low and rounded, on each side a small point, beyond this the margin is slightly crenulated up to seta of segment VI. Intersegmental scleroses long and slender, one pair between segments VII and VIII, other between segments VI and VII. Microducts short, numerous present on all pygidial segments. Anal opening circular, 12 in diameter; placed 20 times from the margin; located at level of vulva of the venter. Area around anal opening sclerotized.

Ventrum: Submarginal microducts on segments VII and VIII restricted to a few rows, more numerous on segment V and VI. Conical setae, 3 pairs submarginally, 1 anterior to vulva and 2 posterior. Band of 150 or more quinquelocular perivulvar pores (fig. m). Rows of serrate squamations (fig. j) anterior to vulva on segments V and VI.

Illustration based on material from Panicum barbinoides, Urena, Tachira, Venezuela.

Recognition characteristics

The fused median lobes, many perivulvar pores, numerous quinquelocular pores associated with spiracles, presence of dorsal microducts on thoracic segments and the 2 well developed inter-segmental sclerosis of pygidium make this species distinct.

Notes

This species is restricted to Gramineae, known previously from the Oriental Region and U.S.A. It is a new addition to the Venezuelan coccid-fauna.

LITERATURE CITED

- Amerling, C. 1858. Einige Physiokratische Beobachtungen an den Obstbaumen in der umgegend von Prag. Lotos 8:27-30.
- Ashmead, W. H. 1880. On the Red or Circular Scale of The Orange. Amer. Ent. 3:267-269 (see also p. 275-276), illus.
- Balachowsky, A. 1948. Les Cochenilles de France, d'Europe, du Nord de l'Afrique, et du Bassin Mediterranee. IV. Monographie des Coccoidea; Classification--Diaspidinae (Premiere Partie). Actualities Sci. et Indus., Ent. Appl. 1054:243-394, illus.
- Balachowsky, A. 1951. Les Cochenilles de France, d'Europe, du Nord de l'Afrique et du Bassin Mediterranee. VI. Monographie des Coccoidea; Diaspidinae (Troisieme Partie) Aspidiotini (Fin). Actualities Sci. et Indus., Ent. Appl. 1127:561-720, illus.
- Balachowsky, A. S. 1953. Les Cochenilles de France, d'Europe, du Nord de l'Afrique et du Bassin Mediterranee. VII. Monographie des Coccoidea; Diaspidinae IV., Odonaspidini-Parlatorini. Actualities Sci. et Indus. Ent. Appl. 1202:725-929, illus.
- Balachowsky, A. 1954. Les Cochenilles Palearctic de la Tribu des Diaspidini. Inst. Pasteur (Paris) Mem. Sci., 450 p., illus.
- Balachowsky, A. 1956. Les Cochenilles du continent African Noir. V. 1-Aspidiotini (1^{ere} Partie). Mus. Roy. du Congo Belge (Tervuren) Ann. (n.s.) Sci. Zool. 4:149-356 illus.
- Balachowsky, A. S. 1958. Les Cochenilles du continent African Noir. v.2-Aspidiotine (2^{me} Partie), Odonaspidini and Parlatorini. Mus. Roy. du Congo Belge (Tervuren) Ann. (n.s.) Sci. Zool. 4:149-356, illus.
- Balachowsky, A. S. 1959. Nuevas Cochinillas de Colombia. Acad. Colombiana Cien. Exact. Fis. y Nat. Rev. 10:337-361, illus.
- Ballou, C. H. 1945. Notas sobre insectos daninos obsevados en Venezuela, 1938-43. 3^a. Conferencia Interamericana de Agricultura, Caracas. 34:151 p. (spec. p. 90-97).
- Banks, C. S. 1906. New Philippine Insects. Philippine Jour. Sci. 1:229-236, illus.

- Berlese, A. 1893. Le Cocciniglie Italiane Viventi Sugli Agrumi. Parte I.-I. Dactylopius. Riv. di Patol. Veg. 2:70-109, 129-193, illus.
- Berlese, A. 1896. La Cocciniglie Italiane Viventi Sugli Agrumi. Parte III.-I. Diaspiti (Cap. II.) Osservazioni Anatomiche. Cap. III. Cenni Di Biologia E Danni Che I Diaspiti Recano Arli Agrumi.) Riv. di Patol. Veg. 4(1895-96):195-292; 5:3-83, illus.
- Bodenheimer, F. S. 1952. The Coccoidea of Turkey. I. Istanbul. Univ. Facult. des. Sci. Rev. Ser. B. 17:315-351, illus.
- Boisduval, A. M. 1868. Conference Faite le 18 Aout Par Le Dr. Boisduval, Au Palais De L'Industrie, Sur les Insectes qui ont Ravage les Plantes Exposee Par MM. Burel et Riviere. L'Insectologie Agr. 2:266-283. (279-283).
- Berchsenius, N. S. 1966. A Catalog of the Armored scale insects (Diaspidoidea) of the World. (In Russian.) Akad. Nauk. SSR Zool. Inst. 449 p.
- Bouche, P. F. Naturgeschichte der Schadlichen und Nutzlichen Garteninsekten. Berlin, Nicolai. 176 p. (49-54).
- Bouche, P. F. 1851. Neue Arten der Schildlaus-Familie. Stettin. Ent. Ztg. 12:110-112.
- Chamberlin, J. C. 1927. Status and Synonymy of the Dictospermum Scale. Calif. Dept. Agr. Monthly Bul. 16:484-491, illus.
- Charmoy, D. d'Emmerez De. 1898. Description d'une Espece Nouvelle D'Aspidiotus (Hemipt.) Soc. Ent. de France Bul. 1898, No. 14: 278-279, illus.
- Cockerell, T.D.A. 1892a. List of Coccidae Observed in Jamaica. Insect Life 4:333-334.
- Cockerell, T.D.A. 1892b. Museum Notes. Inst. Jamaica Jour. 1: 134-137 (136-137).
- Cockerell, T.D.A. 1893a. Museum Notes. Coccidae. Inst. Jamaica Jour. 1:180.
- Cockerell, T.D.A. 1893b. West Indian Coccidae. Ent. Monthly Mag. 29:38-41, 80, illus.
- Cockerell, T.D.A. 1893c. A List of West Indian Coccidae. Inst. Jamaica Jour. 1:252-256, illus.

- Cockerell, T.D.A. 1893d. Coccidae, or Scale Insects, which Live on Orchids. Gard. Chron. 13:548, illus.
- Cockerell, T.D.A. 1894a. Liste des Coccides Trouves sur les Cactacees, Avec Description D'Une Spece Nouvelle. Soc. Client. "Antonio Alzate" Mem. y Rev. 7:461-462.
- Cockerell, T.D.A. 1894b. Notes in Some Scale Insects of the Subfamily Diaspidinae. Canad. Ent. 26:127-132.
- Cockerell, T.D.A. 1894c. Diaspis Lanatus. Ent. News 5:43.
- Cockerell, T.D.A. 1895. IV. New Species of Coccidae. Psyche 7 (1894-1896) (sup.):7-8.
- Cockerell, T.D.A. 1896. Coccidae or Scale Insects.-IX. Jamaica Bot. Dept. Bul. (n.s.) 3:256-259.
- Cockerell, T.D.A. 1897a. The San Jose Scale and its nearest allies. U.S. Dept. Agr., Div. Ent., Tech. Ser. 6: 31 p., illus.
- Cockerell, T.D.A. 1897b. Some New and Little-known Coccidae Collected by Prof. C. H. T. Townsend in Mexico. Canad. Ent. 29:265-271.
- Cockerell, T.D.A. 1897c. Contributions to Coccidology.-II. Amer. Nat. 31:588-592.
- Cockerell, T.D.A. 1899a. First Supplement to the Checklist of Coccidae. Ill. Nat. Hist. Survey Bul. 5:389-398.
- Cockerell, T.D.A. 1899b. Some Notes on Coccidae. Acad. Nat. Sci. Phila. Proc. 1899:259-275.
- Cockerell, T.D.A. 1899c. Aleurodidae and Coccidae. Biol. Centr. Amer. 2 Pt. 2:1-37, illus.
- Cockerell, T.D.A. 1900. Note on Chrysomphalus dictyospermi, A Scale Insect from Cannes. Ent. Monthly Mag. 36:157.
- Cockerell, T.D.A. 1902. Note sur le Genre Hemichionaspis (Coccid.) et Description d'une espece Nouvelle. Soc. Ent. de France Bul. 1902 (No.4):81-82.
- Cockerell, T.D.A. 1905a. Tables for the Identification of Rocky Mountain Coccidae (Scale Insects and Mealybugs). Colo. Univ. Studies 2:189-203.

- Cockerell, T.D.A. 1905b. Tables for the Identification of Rocky Mountain Coccidae (Scale Insects and Mealybugs). Colo. Univ. Studies 2:189-203.
- Cockerell, T.D.A., and E. Robinson. 1915. Article II. Descriptions and Records of Coccidae. Amer. Mus. Nat. Hist. Bul. 34:105-113, illus.
- Comstock, J. H. 1881a. Notes on Coccidae. Canad. Ent. 13:8-9.
- Comstock, J. H. 1881b. Report of the Entomologist. Part II. Report on Scale Insects. In U.S. Dept. Agr., Comnr. Agr. Rept., 1880: 276-349, illus.
- Comstock, J. H. 1883. Second Report on Scale Insects. Including a Monograph of the Sub-Family Diaspinae of the Family Coccidae and a List, with Notes, of the other species of Scale Insects Found in North America. In Cornell Univ. Agr. Expt. Sta., Dept. Ent. Rpt. 2 (1882-83):47-142, illus.
- Cooley, R. A. 1899. The Coccid Genera Chionaspis and Hemichionaspis. Mass. Agr. Expt. Sta. Spec. Bul., 57 p., illus.
- Costa, O. G. 1835. Fauna Del Regno Di Napoli, Famiglia de'Coccinigliiferi, O De'Gallinsetti. Emitteri Napoli. 23 p., illus.
- Costa, Lima A. 1942. Insectos Do Brasil. 3(Homopteros), 327 p., illus.
- Curtis, J. 1943. The Small Brown Scale? *Aspidiotus Proteus* Nobis. Gard. Chron. No. 39:676.
- Davison, J. A. 1964. The genus *Abgrallaspis* in North America (Homoptera:Diaspididae). Ent. Soc. Amer. Ann. 57:638-643, illus.
- De Gregorio, A. 1915. Caratteri e biologia del *Chrysomphalus Dictyospermi* Morg. auctorum (an potius *Aspidiotus agrumincola* de greg?) e del suo parassita distruttore *Aphelinus Chrysomphali* gar. merc. var. *silvestrii* de greg. con cenni di due ragni submicroscopici (*Licosa*). Il Nat. Siciliano 22 (1914): 125-190, illus.
- Del Guercio, G. 1894. La Cocciniglia Del *Pandanus Utilis* Bory (*Fiorinia* (=Pinnaspis) *Buxi* Bouche) Con Un Cenno Sullo Studio Monografico Del Gen *Fiorinia* Targ. Tozz. R. Soc. Toscana di Ortic. Bul. 19 (ser. 2, Xv. 9):177-183, illus.
- Dietz, H. F., and H. Morrison. 1916. The coccidae or scale insects of Indiana. Ind. State Ent. Ann. Rpt. 8 (1914-1915):195-321, illus.

- Doane, R. W. and E. Hadden. 1909. Coccidae from the Society Islands. *Canad. Ent.* 41:296-300, illus.
- Doreste, E., and M. Cermeli. 1961. Plagas de las citricas, *Bol. Fund. Shell Ser. A*, 17:19-56, illus.
- Douglas, J. W. 1887. Note on Some British Coccidae (No. 7). *Ent. Monthly Mag.* 24:21-28, illus.
- Fernald, M. E. 1903. A Catalogue of the Coccidae of the World. *Mass. Agr. Expt. Sta. Spec. Bull.* 88:360p.
- Ferris, G. F. 1936. Contributions to the Knowledge of the Coccoidea (Homoptera). II. (Contribution No. 2). *Microentomology* 1:17-92, illus.
- Ferris, G. F. 1937. Atlas of the Scale Insects of North America (Ser. 1) v.1 Serial Nos. SI-1 to SI-136, illus. Calif., Stanford Univ. Press.
- Ferris, G. F. 1938. Atlas of the Scale Insects of North America (Ser. 2) v.2 Serial Nos. SII-1a, SII-2a, and SII-137 to SII-268, illus. Calif., Stanford Univ. Press.
- Ferris, G. F. 1941. Atlas of the Scale Insects of North America (Ser. 3) v.3 Serial Nos. SIII-2b and SIII-384, illus. Calif. Stanford Univ. Press.
- Ferris, G. F. 1942. Atlas of the Scale Insects of North America (Ser. 4) v.4 Serial Nos. SIV-2c and SIV-385 to SIV-448 (SIV-445, 11 p., SIV-446, 70 p., SIV-447, 4 p., SIV-448, 7 p.) Calif, Stanford Univ. Press.
- Ferris, G. F., and V. P. Rao. 1947. The Genus *Pinnaspis* Cockerell (Homoptera: Coccoidea: Diaspididae). (Contribution No. 54). *Microentomology* 12:25-58, illus.
- Fernandez-Yepez, F., et al. 1957. Lista de algunos insectos daninos de Venezuela, Facultad Agronomia, U.C.V. Maracay, 7 p.
- Froggatt, W. W. 1914. A Descriptive Catalogue of the Scale Insects ("Coccidae") of Australia. (Part I.) *Agr. Gaz. N.S. Wales* 25:127-136, 311-319, 559-610, 677-684, 875-882, 983-989, illus.
- Gomez-Menor Ortega, J. 1941. Coccidos de la Republica Dominicana (Hem. cocc.) *Eos.* 16 (1940):125-143, illus.

- Grandpre, A. and D. Charmoy. 1899. List raisonnee des especes Mauriciennes of coccids . Soc. Amicale Sci. Pub. Maurice, The Planters and Commercial Gazette, p. 20-49, illus.
- Green, E. E. 1896a. Catalogue of Coccidae collected in Ceylon. Indian Mus. Notes 4 (1896-1900):2-10.
- Green, E. E. 1896b. The Coccidae of Ceylon. Part I. London, Dulau. p. i-xi, 1-103, illus. (col.).
- Green, E. E. 1905. Supplementary Notes on the Coccidae of Ceylon. Bombay Nat. Hist. Soc. Jor. 16:340-357, illus. (cont.)
- Green, E. E. 1907. XII. Notes on the Coccidae Collected by the Percy Sladen Trust Expedition to the Indian Ocean: Supplemented by a Collection Received from Mr. R. DuPont, Director of Agriculture, Seychelles. Linn. Soc. London, Trans., Zool. 12:197-207, illus.
- Green, E. E. 1916. Remarks on coccidae from northern Australia. II. Bul. Ent. Res. 7:53-65.
- Green, E. E. 1919. Notes on Indian Coccidae of the Subfamily Diaspidinae, with Descriptions of New Species. Indian Mus. Rec. 16:433-449, illus.
- Green, E. E. 1922. Supplementary Notes on the Coccidae of Ceylon. Part IV. Bombay Nat. Hist. Soc. Jour. 28:1007-1037, illus. (Concl.)
- Green, E. E., and F. Laing. 1923. Descriptions of some New Species and Some New Records of Coccidae. I. Diaspidinae. Bul. Ent. Res. 14:123-131, illus.
- Hall, W. J. 1922. Observations on the Coccidae of Egypt. Egypt Min. Agr. Tech. and Sci. Serv. Bul. 22, 54p., illus.
- Hall, W. J. 1946. On the Ethiopian Diaspidini (Coccoidae). Roy. Ent. Soc., London, Trans. 97:497-592, illus.
- Hart, J. H. 1896. Coccidae, New. Sp. and Var. Trinidad, Roy. Bot. Gard. Misc. Inform. Bul. 2:156.
- Hempel, A. 1900. As Coccidas Brasileiras. Rev. Mus Paulista Sao Paulo 4:365-537, illus.
- Hempel, A. H. 1904. Resultado do exame de divensas coleccoes de coccidos enviados ao Instituto Agronomico pelo Sr. Carlos Moreira do Museum Nacional, Rio Janeiro. Bol. de Agri. Sao Paulo (ser. 5) 1:311-323.

- Hempel, A. 1920. Coccidas que Infestam as Nossas Arvores Fructiferas. Rev. Mus. Paulista Sao Paulo 12, Pt. 2:109-173, illus.
- Hempel, A. 1932. Descripcao de Vinte e Duas especies Novas de Coccideos (Hemiptera-Homoptera). Rev. de Ent. 2:310-339.
- Hoke, G. 1921. Observations on the Structure of the Oraceratubae and some New Lepidosaphine Scales (Hemiptera). Ent. Soc. Amer. Ann. 14:337-342, illus.
- Houser, J. S. 1918. The Coccidae of Cuba. Ent. Soc. Amer. Ann. 11:157-172, illus.
- Kirkaldy, G. W. 1902. Hemiptera. Fauna Hawaiiensis 3:93-174 (102-112), illus.
- Komosinska, H. 1969. Studies on the genus *Abgrallaspis* Balachowsky, 1948, (Homoptera: Coccoidea : Diaspididae). Acta Zool. Cracovien-sia 14:43-85, illus.
- Kosztarab, M. 1956. Parasitologische Untersuchungen an Schildlausen. Acta Agronomica Budapest, 6:393-410, illus.
- Kosztarab, M. 1959. Biological notes on the scale insects of Hungary. Ent. Soc. Amer. Ann. 52:401-420, illus.
- Kosztarab, M. 1964. The armored scale insects of Ohio (Homoptera: Coccoidea: Diaspididae). Ohio Biol. Survey Bul. 2:120 p., illus.
- Kuwana, I. 1902. Coccidae (Scale Insects) of Japan. Calif Acad. Sci. Proc. (Ser. 3, Zool.) 3:43-98, illus.
- Kuwana, I. 1926. The Diaspine Coccidae of Japan, IV. Genera *Cryptoparlatoria*, *Howardia*, *Sasakiaspis* (n. gen.), *Diaspis*, *Aulacaspis*, *Pinnaspis*, and *Prontaspis*. (Japan) Dept. Finance Imp. Plant Quar. Serv. Tech. Bul. 4:44, illus.
- Labrador, J. R. 1958. pagas de las citricas en Venezuela. Bol. Serv. Shell para el Agric. 12:13p., illus.
- Leonardi, G. 1897a. Intorno al genere *Aspidiotus*. Riv. di patol. Veg. 5 (Nov. 1896 - Feb. 1897):375.
- Leonardi, G. 1897b. Monografia de genere *Aspidiotus* (Nota preventiva). Riv. di patol. Veg. 5 (Nov. 1896 - Feb. 1897): 283-286.
- Leonardi, G. 1897c. Generi E Specie Diaspiti. Saggio Di Sistematica Degli *Aspidiotus*. Riv. di patol. Veg. 6:102-134, illus.

- Leonardi, G. 1898. Generi E Specie Di Diaspiti. Saggio Di Sistematica Degli Aspidiotus. Riv. di patol Veg. 6 (1897: 48 (208)-78 (236), illus. (cont.).
- Leonardi, G. 1899. Generi E Specie Di Diaspiti. Saggio Di Sistematica Degli Aspidiotus. Riv. di patol. Veg. 7:173-225, illus. (cont.).
- Leonardi, G. 1906. Generi E Specie Di Diaspiti. Saggio Di Sistematica Della Leucaspides. Portici. R. Scuola Super. Agr. Ann. (Ser. 2) 6:32p., illus.
- Leonardi, G. 1903. Sulla Leucaspis riccae Targ. Portici. R. Scuola Super. Agr. Ann. (Ser. 2) 5 (1904), 19p.
- Leonardi, G. 1911. Contributo all Conoscenza Delle Cocciniglie Della Republica Argentina. Portici. R. Scuola Super. Agr. Lab. Zool. Gen. e Agr. Bol. 5:237-284, illus.
- Leonardi, G. 1914. Contributo Alla Conoscenza Delle Cocciniglie Dell'Africa Occidentale E Meridionale. Portici. R. Scuola Super. Agr. Lab. Zool. Gen. e Agr. Bol. 8:187-224, illus.
- Leonardi, G. 1920. Monografia Delle Cocciniglie Italiane. Portici, Della Torre. 555p., illus. Appendix by F. Silvestri, p. 501-539. (Posthumous work edited by Silvestr.) Reviewed by G. F. Ferris, Ent. News 32:157.
- LePage, H. S. 1942. Descricao de onze Especies Novas de Coccideos do Brasil (Homoptera-Coccoidea.) Inst. Biol. Sao Paulo Arg. 13:173-189, illus.
- LePage, H. S. and E. R. De Figueiredo, Jr. 1947. As Pragas Das Orquidaceas. Inst. Biol. Sao Paulo , Ostrensky. 49p., illus. (col.)
- Lindinger, L. 1905. Zwei neue schildlause aus asien. Insekten Borse 22:131-132.
- Lindinger, L. 1907. Betrachtungen uber die Cocciden-Nomenklatur. Ent. Wochenblatt 24 (5):19-20; (6):22-23.
- Lindinger, L. 1908. Coccidenstudien. I. Zur Systematik der Diaspinen. II. Kritische Notizen. Berlin. Ent. Ztschr. 52 (1907):96-106.
- Lindinger, L. 1909. Die Schildlausgattung Selenaspilus. Jahrb. der Hamburg. Wiss. Anst. 26 (1908) Beih. 3:1-12, illus. Also in Hamburg. Bot Staatsinst. Abt. f. Pflanzenschutz 11 (1908/1909):1-12, illus.

- Lindinger, L. 1910. Afrikanische Schildlaus. III (Cocciden des Ostlichen Afrikas.) Jahrb. der Hamburg. Wiss. Anst. 27 Beih. 3:33-48a, illus. Also in Hamburg. Bot. Staatsinst. Abt. f. Pflanzenschutz 12:16p.
- Lindinger, L. 1912. Die Schildlaus (Coccidae) Europas, Nordafrikas, und Vorderasiens, Einschliesslich der Azoren, der Kanaren und Madeiras. Stuttgart, Ulmer. 388p., illus.
- Lindinger, L. 1913. Afrikanische Schildlaus. V. (Die Schildlaus Deutschostafrikas.) Jahrb. der Hamburg. Wiss. Anst. 30 (1912) Beih. 3:59-95, illus.
- Lindinger, L. 1914. Die Cocciden-Literatur des Jahres 1909. Ztschr. f. Weiss. Insektenbiol. 10:114-120, 155-160, 243-249.
- Lindinger, L. 1921. Tätigkeitsbericht Der Schadlingsabteilung Des Instituts Für Angewandte Botanik Zu Hamburg Für Die Zeit Vom 14. Februar Bis Zum 30. Juni 1920. Ztschr. f. Angew. Ent. 7:424-440 (426-429, 432-436, 439-440).
- Lindinger, L. 1924. Die Schildlaus der mitteleuropäischen gewächshäuser. Ent. Jahrb. 33/34:167-191.
- Lindinger, L. 1932. Beiträge zur Kenntnis der Schildlaus. Konowia 11:177-205.
- Lindinger, L. 1934. Beiträge zur Kenntnis der Schildlaus (Homopt. -Homopt., Coccid.). Ent. Anz. 14:15-16, 26-27, 36-37, 72-64. (cont.).
- Lindinger, L. 1936. Neue Beiträge zur Kenntnis der Schildlaus (Coccidae). Ent. Jahrb. 45:148-167. (cont.).
- Lindinger, L. 1937. Verzeichnis der Schildlaus-Gattungen. (Homoptera-Coccoidea Handlirsch 1903). Ent. Jahrb. 46:178-198.
- Lindinger, L. 1943. Die Schildlausnamen in Fulmeks Wirtsindex 1943. Arb. über Morph. u. Taxonom. Ent. 10:145-152.
- Linnaeus, C. 1758. Insecta Hemiptera. Coccus. Systema Nature (Ed. 10) 1:455-457.
- Lupo, V. 1939. Revisione Delle Cocciniglie Italiane. III. Mytilococcus. Portici. R. Ist. Super. Agr. Lab. Zool. Gen. e Agr. Bol. 31:69-136, illus.
- Lupo, V. 1938. Revisione Delle Cocciniglie Italiane. I Portici. R. Ist. Super. Agr. Lab. Zool. Gen. e Agr. Bol. 30:121-162, illus.

- MacGillivray, A. D. 1921. The Coccidae. Urbana, Ill., Scarab, 502p.
- McKenzie, H. L. 1937. Morphological differences distinguishing California Red Scale, Yellow Scale, and Related Species (Homoptera, Diaspididae). Calif., Univ. Pubs., Ent. 6:323-335, illus.
- McKenzie, H. L. 1938. The Genus *Aonidiella* (Homoptera; Coccidea: Diaspididae). (Contribution No. 8). Microentomology 3:1-36, illus.
- McKenzie, H. L. 1939. A Revision of the Genus *Chrysomphalus* and supplementary Notes on the Genus *Aonidiella* (Homoptera: Coccidae: Diaspididae). Microentomology 4:51-77, illus.
- McKenzie, H. L. 1944. Miscellaneous diaspid scale studies (Homoptera; Coccoidea; Diaspididae). Calif. Dept. Agr. Bul. 33:53-57, illus.
- McKenzie, H. L. 1947. Diaspid Scale Studies, with Notes on California Species (Homoptera; Coccoidea; Diaspididae). Calif. Dept. Agr. Bul. 36:31-36, illus.
- McKenzie, H. L. 1956. The Armored Scale Insects of California. Calif. Insect Survey Bul. 5:209p., illus.
- Malenotti, E. 1916a. Specie Nove E Critiche Di Diaspiti. Redia 11:309-321, illus.
- Malenotti, E. 1916b. Nuovi Diaspiti, Redia 12(1917):183-194.
- Malenotti, E. 1916c. Sulle Pretese Varieta Del "*Chrysomphalus Dictyospermi*" (Morg.) Leon. Redia 12(1917):109-123, illus.
- Mamet, R. 1936. New Species of Coccidae (Hemipt. Homopt.) from Mauritius. Roy. Ent. Soc., London, Proc. Ser. B: Taxonomy 5: 90-96, illus.
- Mamet, R. 1941. On some Coccidae (Hemipt. Homopt.) described from Mauritius by De Charmoy. Mauritius Inst. Bul. 2:23-37, illus.
- Mamet, R. 1950. Notes on the Coccoidea of Madagascar. I. Inst. Sci. De Madagascar Mem., Ser. A: 4:17-38, illus.
- Mamet, R. 1953. The authorship of the species of Coccoidea (Hemiptera) described from Mauritius in 1899. Roy. Ent. Soc., London, Proc. Ser. A: Gen. Ent. 23:149-152, illus.

- Mamet, R. 1958. The *Selenapidus* Complex (Homoptera Coccoidea). Mus. Ro. du Congo Belge Tervuren Ann. (n.s.) Sci. Zool. 4: 359-429, illus.
- Marlatt, C. L. 1899. Some Common Sources of Error In Recent Work on Coccidae. Science 9:835-837.
- Marlatt, C. L. 1908a. The Genus *Pseudaonidia*. Ent. Soc. Wash. Proc. 9(1907):131-141, illus.
- Marlatt, C. L. 1908b. New Species of Diaspine Scale Insects. U. S. Dept. Agr., Bur. Ent., Tech. Ser. 16:11-32, illus.
- Maskell, W. M. 1879. On some Coccidae in New Zealand. New Zeal. Inst. Trans. and Proc. 11 (1878):187-228, illus.
- Maskell, W. M. 1891. Further Coccid Notes: With Descriptions of New Species from New Zealand, Australia, and Fiji. New Zeal. Inst. Trans. and Proc. 23 (1890):1-36, illus.
- Maskell, W. M. 1895. Further Coccid Notes, with Descriptions of New Species from New Zealand, Australia, Sandwich Islands and Elsewhere, and Remarks on Many Species Already Reported. New Zeal. Inst. Trans. and Proc. 27(1894):36-75, illus.
- Maskell, W. M. 1897. On a Collection of Coccidae, Principally from China and Japan. Ent. Monthly Mag. 33:239-244.
- Maxwell-Lefroy, R. 1903. The Scale Insects of the Lesser Antilles. Part II. West Indies Imp. Dept. Agr. (Pam. Ser.) 22:50p., illus.
- Merrill, G. B. 1953. A revision of the Scale Insects of Florida. Fla. State Plant Bd. Bul. 1:143p., illus.
- Merrill, G. B., and J. Chaffin. 1923. Scale Insects of Florida. Fla. State Plant Bd. Quart. Bul. 7:177-298, illus.
- Morgan, A. C. F. 1889. Observations on Coccoidae (No. 5) Ent. Monthly Mag. 25:349-353.
- Morrison, H. 1924. Synonymical Notes on Two Species of *Aulacaspis* (Hemiptera: Coccidae). Ent. Soc. Wash. Proc. 26:231-232.
- Morrison, H., and E. Morrison. 1966. An annotated list of generic names of the scale insects (Homoptera: Coccoidea). U. S. Dept. Agr. Misc. Pub. 1015:206p.

- Newell, W. 1899. On the North American Species of the Sub-Genus *Diaspidiotus* and *Hemiberlesia*, of the Genus *Aspidiotus*. Iowa State Col., Dept. Zool. And Ent. Contrib. 3:31p., illus.
- Newman, E. 1859. *Coccus Beckii*, A New British Hemipteron of the Family Coccidae. *Entomologist* 4:217-218.
- Newstead, R. 1893a. Observations of Coccidae (No. 5). *Ent. Monthly Mag.* 29:185-188, illus.
- Newstead, R. 1893b. Observations on Coccidae (No. 7). *Ent. Monthly Mag.* 29:279-280. (Errata, p.281), illus.
- Newstead, R. 1894. Scale Insects in Madras. *Indian Mus. Notes* 3(5):21-32, illus.
- Newstead, R. 1901. Monograph of the Coccidae of the British Isles, v. 1 (1900). London, Ray Society. 220p., illus.
- Newstead, R. 1906. Report on Insects sent from Der Kaiserliche Biologische Anstalt Fur Land--Und Forstwirtschaft. Dahlem, Berlin. Liverpool Univ., Inst. Com. Res. in Tropics Quart. Jour. 1:73-74.
- Newstead, R. 1908. On a Collection of Coccidae and other Insects Affecting some Cultivated and Wild Plants in Java and in Tropical Western Africa. *Jour. Econ. Biol.* 3:33-42, illus.
- Newstead, R. 1911. Observations on African Scale Insects (Coccidae). (No. 3). *Bul. Ent. Res.* 2:85-104, illus.
- Newstead, R. 1917. Observations on Scale-Insects (Coccidae). *V. Bul. Ent. Res.* 8:125-134.
- Packard, A. J. 1869. Guide to Study of Insects. 527p. (not seen).
- Paoli, G. 1916. Contributo Alla Conoscenza Della Cocciniglie Della Sardegna. *Redia* 11(1916):239-268, illus.
- Ramakrishna Ayyar, T. V. 1919. A Contribution to our Knowledge of South Indian Coccidae. *Pusa Agr. Res. Inst. Bul.* 87:50p., illus.
- Ramakrishna Ayyar, T. V. 1921. A Check List of the Coccidae of the Indian Region. *Ent. Mtg., (Pusa 1921) Proc.* 4:336-362.
- Riley, C. V. and L. O. Howard. Leeward Island Coccidae. *Insect Life* 6:50-51.

- Rutherford, A. 1914. Some Ceylon Coccidae. *Bul. Ent. Res.* 5: 259-268.
- Sasscer, E. R. 1912. Catalogue of Recently Described Coccidae. IV. U.S. Dept. Agr. Bur. Ent. Tech. Ser. 17:83-97.
- Sanders, J. G. 1909. Catalogue of Recently Described Coccidae. II. U.S. Dept. Agr. Bur. Ent. Tech. Ser. 16:33-60.
- Schmutterer, H. 1959. Schildlaus oder Coccoidea. 1. Deckelschildlaus oder Diaspididae. In *Die Tierwelt Deutschlands und der Angrenzenden Meeresteile*. Jena, Fischer 45:260p., illus.
- Scott, C. L. 1952. The Scale Insect Genus *Aulacaspis* in Eastern Asia (Homoptera: Coccoidea: Diaspididae). *Microentomology* 17:33-60, illus.
- Shimer, H. 1868. Notes on the "Apple Bark-Louse" (*Lepidosaphes conchiformis*, Gmelin sp.) with a description of a Supposed New *Acarus*. *Amer. Ent. Soc. Trans.* 1868:361-374.
- Signoret, V. 1869. Essai sur les Cochenilles ou Gallinsectes (Homopteres -- Coccides). (Parts 3 to 5) *Soc. Ent. de France Ann.* (Ser. 4) 9:97-104; 109-138; 431-452, illus.
- Signoret, V. 1882. (Observations on Various Coccids.) *Soc. Ent. de France Ann.* (Bul. Ent.) (Ser. 6) 2:35-36.
- Takahashi, R. 1929. Observations on the Coccidae of Formosa. Part I. Formosa Govt. Res. Inst. Dept. Agr. Rept. 40:82p, illus.
- Takahashi, R. 1935. Observations on the Coccidae of Formosa. Part V. Formosa Govt. Res. Inst. Dept. Agr. Rpt. 66:1-37, illus.
- Targioni-Tozzetti, A. 1867. *Studi sulle Cocciniglie*. *Soc. Ital. di Sci. Nat. Mem.* 3(3):1-87, illus.
- Targioni Tozzetti, A. 1868. *Introduzione Alla Seconda Memoria Per Gli Studi Sulle Cocciniglie, E Catalogo Dei Generi E Delle Famiglia Dei Coccidi*. *Soc. Ital. di Sci. Nat. Atti.* 11:694-738.
- Targioni Tozzetti, A. 1876. *Mytilaspis Flavescens* sp. n., On Orange and Citron, Italy. *Min. di Agr., Indus e Com., Ann. di Agr.*, 1876, p.36.

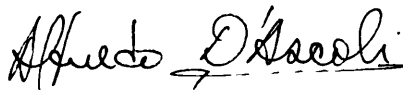
- Targioni Tozzetti, A. 1881. Relazione intorno Ai Lavori Della R. Stazione di Entomologia Agraria di Firenze Per Gli Anni 1877-78. Parte Scientifica. Fam. Coccidi. In (Italy) Min. d'Agr., Indus e Com., Ann. di Agr. 1881 (No. 34), p.134-161, illus.
- Targioni Tozzetti, A. 1886. Sull'insetto che danneggia I gelsi. Riv. di Bachicoltura. 18(1885):1-3.
- Targioni Tozzetti, A. 1888. Relazione Intorno Ai Lavori Delli R. Stazione di Entomologia Agraria di Firenze Per Gli Anni 1883-84-85. Article VI. Ord. Eterotteri-Omotteri. Hemiptera, 1. Pars, Rhyngota, F., Rhyncota, Fieb. (Sottord. Coccidi). In (Italy) Min. di Agr. Indus. e Com., Ann. di Agr., 1888 (Nos. 145-146):415-437, illus.
- Thiem, H., and Gerneck, R. 1934. Untersuchungen an Deutschen Austernschildlausen (Aspidiotini) im Vergleich mit der San Jose-Schildlaus (Aspidiotus perniciosus Comst.) Arb. uber Physiol. u. Angew. Ent. 1:130-158; 208-238, illus.
- Townsend, C.H.T., and T.D.A. Cockerell. 1898. Coccidae Collected in Mexico by Messrs. Townsend and Koebele in 1897. N. Y. Ent. Soc. Jour. 6:165-180.
- Vayssiere, P. 1921. Les Insectes Nuisibles Aux Cultures Du Maroc. Ann. des Epiphyt. 7:339-370, illus.
- Vernalha, M. M. 1953. Coccideos Da Colecao I.B.P.T. (Inst. de Biol. E Pesquisas Technol.) Arq. de Biol. e Technol. (Brazil) 8:111-304.
- Williams, D. J. 1961. Changes in Nomenclature Affecting some Coccoidea (Homoptera). Ent. Monthly Mag. 97:92-93.
- Wilson, C. E. 1917. Some Florida Scale-Insects. Fla. State. Plant Bd. Quart. Bul. 2:2-65, illus.
- Wu, C. F. 1935. Family Coccidae. In His Catalogus Insectorum Sinensium 2:169-252.
- Zahradnick, J. 1959. Borchseniaspis novum genus, Typus *Aspidiotus palmae* Morgan et Cockerell, 1893 (Homoptera, Diaspididae). Acta Faunistica Mus. Nat. Pragae. 5:65-67.
- Zehntner, L. 1897. Overzicht. Van De Ziekten Van Het Suikerriet Op Java 2^e Deel, Vijanden Uit Het Dierenrijk. Arch. v. Java-Suikerindustrie 5(1):525-575 (559-564).

Zimmerman, E. C. 1948. Insects of Hawaii. Vol. 5 Homoptera:
Sternorhyncha. Honolulu, Univ. of Hawaii Press, 464p., illus.

VITA

The author, son of Alfredo and Rosa D'Ascoli, was born in Caracas, Venezuela, on May 18, 1942. He graduated from Santiago de Leon High School in July, 1959 and in September of that year he enrolled in the Universidad Central de Venezuela, from where he received the degree of Ingeniero Agonomo in December, 1964. He accepted a research position at the Departamento de Ecologia, Instituto Venezolano de Investigaciones Cientificas, in January, 1965. In February, 1965, he was employed as Instructor in Entomology at the Facultad de Agronomia, Universidad Central de Venezuela. In August 1968 he was granted a leave of absence from the Universidad Central de Venezuela and enrolled in the Graduate School, Department of Entomology, Virginia Polytechnic Institute and State University.

On December 21, 1963 the author married Flavia, daughter of Jesus and Alicia Brinceno of Maracay, Venezuela. The author and wife have two daughters, Adriana and Ingrid, and one son, Oscar.



Alfredo D'Ascoli

THE ARMORED SCALE INSECTS OF VENEZUELA
(HOMOPTERA: COCCOIDEA: DIASPIDIDAE)

by

Alfredo D'Ascoli

ABSTRACT

Scale insects are among the most serious plant pests throughout the world. The Diaspididae is the largest scale insect family and probably the most important economically. No comprehensive taxonomic study dealing with the scale insects of Venezuela has been conducted in the past.

Forty-nine species are described and illustrated in this study, of which 2 are new species. Twenty-seven additional species are recorded from Venezuela for the first time. Keys are provided for determination of the 49 species. The material studied was borrowed from several institutions. Mounting techniques are given.

The description of each species is based on females, since males and nymphs were available only in a few species. While this is essentially a taxonomic and faunistic study, the hosts on which the scale insects were found are listed.

It is hoped that this study would be used as basis for future research in Venezuela. More collections need to be made throughout the many ecologically different areas of the country; especially from non-cultivated plants. The accumulation of additional

distributional and biological records, and will lead to a better understanding of the Venezuelan armored scale insect fauna.