

MORPHOLOGY AND TAXONOMY OF THE FIRST
INSTARS OF THE GENUS CEROCOCCUS COMSTOCK
(HOMOPTERA: COCCOIDEA: CEROCOCCIDAE)

by

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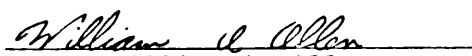
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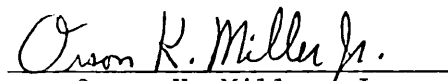
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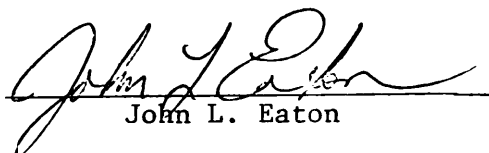
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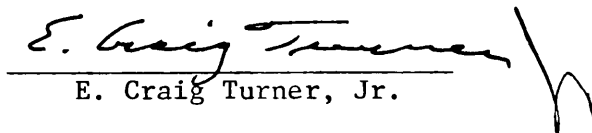
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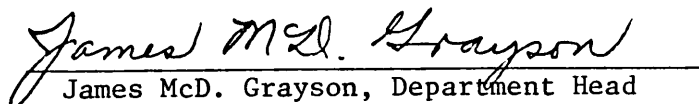

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LIST OF ABBREVIATIONS

(Collections, with names of curators in charge)

- BM - British Museum (National History); London, England
(L. M. Huddleston, and D. J. Williams).
- DPI - Department of Primary Industries; Brisbane, Australia
(T. Passlow).
- OSU - Oklahoma State University; Stillwater, Oklahoma
(W. A. Drew).
- PPRI - Plant Protection Research Institute; Pretoria, S. Africa
(G. De Lotto and Y. Ben-Dov).
- UCD - University of California at Davis (R. O. Schuster).
- USNM - United States National Museum (Natural History);
Washington, D. C. (D. R. Miller).
- VPI & SU - Virginia Polytechnic Institute and State University;
Blacksburg, Virginia (M. Kosztarab).
- WC - Wye College; Kent, England (C. J. Hodgson).

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I. INTRODUCTION AND LITERATURE REVIEW

The genus Cerococcus is world wide in distribution and several species are injurious to economic plants. Host plant species belong to approximately 50 plant families (Lambdin and Kosztarab In Press). In the original species descriptions the first instars are seldom mentioned. The notable exceptions are C. albospicatus Green (1909), C. baccharidis (Hempel) (1900), C. badius Leonardi (1911), C. bryoides Maskell (1894), C. cycliger Goux (1932), C. dekelei Kosztarab and Vest (1966), C. froggatti Morrison and Morrison (1927), C. tuberculus Hempel (1900). In many cases these original descriptions were incomplete and consisted of only four or five sentences. The single more detailed original description is of C. dekelei (Kosztarab and Vest 1966). Only a few first instar descriptions appear in the literature subsequent to the original descriptions, e.g., Howell et al (1971) on C. parrotti (Hunter).

Comstock (1882) erected the genus Cerococcus with C. quercus as the type, but he failed to mention the first instars. According to Riley (1894) C. quercus eggs overwintered and hatched indoors on March 18. Patterson (1901) described the first instar C. quercus, but her description was incomplete and incorrect on many points (see Note p. 124). Steinweden (1929) described the dorsal 8-shaped pore, but gave no further description.

Maskell (1894) described the first instar of Planchonia bryoides (misplacing the species) which Green (1908a) later transferred to the genus Cerococcus. Morrison and Morrison (1927) redescribed this species and gave measurements of body structures. Subsequent to this Steinweden

(1920) described the dorsal 8-shaped pores of C. bryoides.

Hempel (1900) described the first instar of Solenococcus baccharidis (=C. baccharidis) and S. tuberculus (=C. tuberculus as exactly the same except for the body length. Green (1917) transferred both species to the genus Cerococcus. Leonardi (1911) described and illustrated the first instar of C. badius and gave measurements of body, antennae, and leg length. Green (1909) wrote a short description of C. albosicatus and was the first person to mention only three digitules on the prothoracic legs, which is the actual case.

Morrison and Morrison (1927) described C. froggatti, and indicated it was very similar to C. stellatus. They also described C. stellatus as "very closely resembling the larvae of bryoides. . . ." They described C. paradoxus as "very similar to this stage of other species . . ." and presented some general measurements of the species.

Goux (1932) gave a general description of C. cycliger first instar, and Sulc (1953) described the first instar in detail and illustrated the wax strands as they are secreted. Vayssiere (1946) published a short general description and illustrations of the first instar of his new species C. coffeae which was later synonymized with C. theydoni by Lambdin and Kosztarab (In Press).

Kosztarab and Vest (1966) comprehensively described the first instar of C. deklei. C. indicus was originally described by Maskell (1897) as a variety of Eriococcus paxadoxus. Green (1910) correctly placed Maskell's variety as C. indicus, but mistakenly thought he was the author. The first instar of C. indicus was described by Ali (1967) as "very ac-

tive and crawl also on the leaves."

In this study, I have described, or redescribed, and illustrated the first instars of 31 species. In cases when only a few specimens were available for study it is indicated in the "Material Studied" section. No first instars were available for study C. alluandi (Marchal) (1904), C. ankaratrae Mamet (1954), C. asparagi Joubert (1925), C. camarai Neves (1954), C. catenarius da Fonseca (1957), C. cliffortiae Joubert (1925), C. fradei Castel-Branco (1952), C. gallicolus Mamet (1959), C. indigoferae (Borchsenius) (1960), C. indonesiensis Lambdin and Kosztarab (In Press), C. laniger Goux (1932), C. longipilosus Archangelskaya (1931), C. madagascariensis Mamet (1950), C. multipororum Lambdin and Kosztarab (In Press), C. oranensis Balachowsky (1941), C. pacilliferus Neves (1954), C. perowskiae Archangelskaya (1931), C. philippiea Lambdin and Kosztarab (In Press), C. pileae Mamet (1950), C. pyriformis Froggatt (1921), C. royenae Brain (1920), C. russellae Kosztarab and Vest (1966), or C. steppicus Balachowsky (1941).

A key to the first instars which were studied is presented for their separation. A reference listing for the original descriptions and the first instar is given at the beginning of each description.

II. MATERIALS AND METHODS

Materials: Slice mounted specimens and dry materials were borrowed from several institutions, government agencies and private collections. Each source of material is given in the "Acknowledgements" section. Nymphs were collected by taking adult females into the laboratory after egg deposition and allowing the eggs to hatch indoors. They were then preserved in hot 70% ethyl alcohol. Dry preserved materials were a good source for obtaining nymphs. In most cases a few nymphs either died on the twig or were trapped under dead females, and these were removed and mounted on microscope slides. The repositories of individual slides appear in the "Material Studied" section at the beginning of each description. Also given in this section is the number of slides followed by the number of specimens in parenthesis. The locality, collector, date of collection and host are also given in "Material Studied".

Mounting methods: Specimens, preserved either dry or in 70% ethyl alcohol, were mounted on microscope slides with the aid of a binocular dissecting microscope.

Dry and alcohol preserved specimens were mounted according to the following procedures:

1. The specimens were transferred into 10% KOH at room temperature and allowed to remain there for 2 to 4 days.
2. All body contents were expelled while in KOH by slightly pressing in the insect.
3. After the specimens became transparent they were transferred into 70% ethyl alcohol.

4. The specimens were then transferred to Essig's Aphid Fluid (formula given under note losted below), in a small watch glass (27x8mm) for additional clearing.
5. Two to three drops of staining soluction (Wilkey's modified double stain, see under note) were added to the Essig's Aphid Fluid and the specimens were allowed to remain in it for 24 hours.
6. Specimens were dehydrated in graded alcohols; 70% 5-15 mon., 95% 5 min. and transferred to clove oil for 10 min. to several days.

If large amounts of wax were present the specimens were placed in tetrahydrofuran ($\text{CH}_3(\text{CH}_2)_2\text{CH}_2\text{O}$) for 5 minutes before being placed in clove oil.
7. After clearing specimens were mounted in Canada balsam under a diamond tipped pencil.
8. The slides were placed in a drying oven at 40°C for approximately 2 weeks and labeled.

Note: Heat was seldom used (with the exception of No. 8) during this procedure. When heat was necessary it was applied gently (less than boiling) at steps No. 1 and No. 5 for 20 to 60 minutes. Unstained or badly mounted speciments were often removed from the slides and re-mounted. Old slides mounted in Canada balsam were soaked in xylene, while Euparol mounted slides were soaked in distilled water, until the cover glass could be removed. The Canada balsam mounted specimens were passed through a series of decreasing alcohol concentrations to distill-

ed water, until the cover glass could be removed. The Canada balsam mounted specimens were passed through a series of decreasing alcohol concentrations to distilled water. The specimens were remounted according to the above procedure. The formula used to prepare Essig's Aphid Fluid (modified) Wilkey, 1962, is as follows:

Lactic acid (85%)	20 parts
Phenol (Saturated in distilled water)	2 parts
Glacial acetic acid	4 parts
Distilled water	1 part

Wilkey's modified double stain was obtained from Arthropod Slidemounts, Bluffton, Indiana 46714, it contains the following:

Essig's Aphid Fluid (modified)	100 ml.
Acid Fuchsin	25 drops of 5% aqueous solution
Lignin Pink	25 drops of 5% aqueous solution

Measurements: All measurements are in microns unless otherwise stated.

They were made with a Zeiss RA phase contrast microscope with a magnification ranging from 63x to 2000x. Measurements given in the text are the averages followed by the range in parentheses. When many specimens of a species were studied, the range recorded should include the range of variation, but when few specimens were studied, it is probable that the quantitative limits will be expanded with additional material. Measurements for the length and width were made at the longest and widest points of each morphological structure, except the anal plate width was measured just posterior of the anterolateral projections. A summation of the numerical data is given in Tables 1,2, and 3 which follows the last species description.

Illustrations: Drawings were outlined by using a Leitz Prado 500 or a Ken-A-Vision model Tech-A microslide projector. The details and enlargements were drawn by using a Zeiss phase contrast microscope. 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. Drawings were not made to scale and the enlargements were not in proportion with each other. Therefore, the reader is urged to consult the measurements within the descriptions when questions of size are encountered.

III. TAXONOMY AND DISTRIBUTION OF CEROCOCCUS COMSTOCK

The genus Cerococcus was originally described by Comstock (1882) with C. quercus as the type species. It was placed in the family Asterolecaniidae and maintained there until Koteja (1974) placed it in the new family Cerococcidae, based on the morphology of the adult female labium. In recent studies on the adult females Lambdin and Kosztarab (In Press) also recognized the family Cerococcidae.

At one time or another the genera Antecerococcus Green, Cercococcus Scott, Coricoccus Mahdihassan, and Phenacobryum Cockerell were considered synonyms of Cerococcus Comstock by Green (1908), Lindinger (1910), Balachowsky (1930), Ferris (1955), Ali (1970), and Lambdin and Kosztarab (In Press) included Amelococcus Marchal as a synonym of Cerococcus. Presently placed in the family Cerococcidae are the genera Cerococcus Comstock, Solenophora Maskell, and Asterococcus Borchsenius. The genus Mycetococcus Ferris may also belong to the family.

A. Key to the first instar nymphs of Cerococcidae

1. About 60 large dorsal 8-shaped pores distributed along body margin only, and with submarginal and submedial longitudinal rows of much small 8-shaped pores; 4 quinquelocular pores associated with each anterior spiracle Solenophora
Large dorsal 8-shaped pores present, but never distributed along body margin only, and never with smaller 8-shaped pores in submarginal and submedial longitudinal rows; 2 or 3 quinquelocular or 7-locular pores associated with each anterior spiracle 2
2. Quinquelocular (sometimes 7-locular) pores distributed along ventral

or dorsal margin of abdomen; a group of quinquelocular pores dorsad of anterior spiracles Asterococcus

Quinquelocular or 7-locular pores absent from ventral or dorsal margin of abdomen; never a group of quinquelocular pores dorsal of anterior spiracles Cerococcus

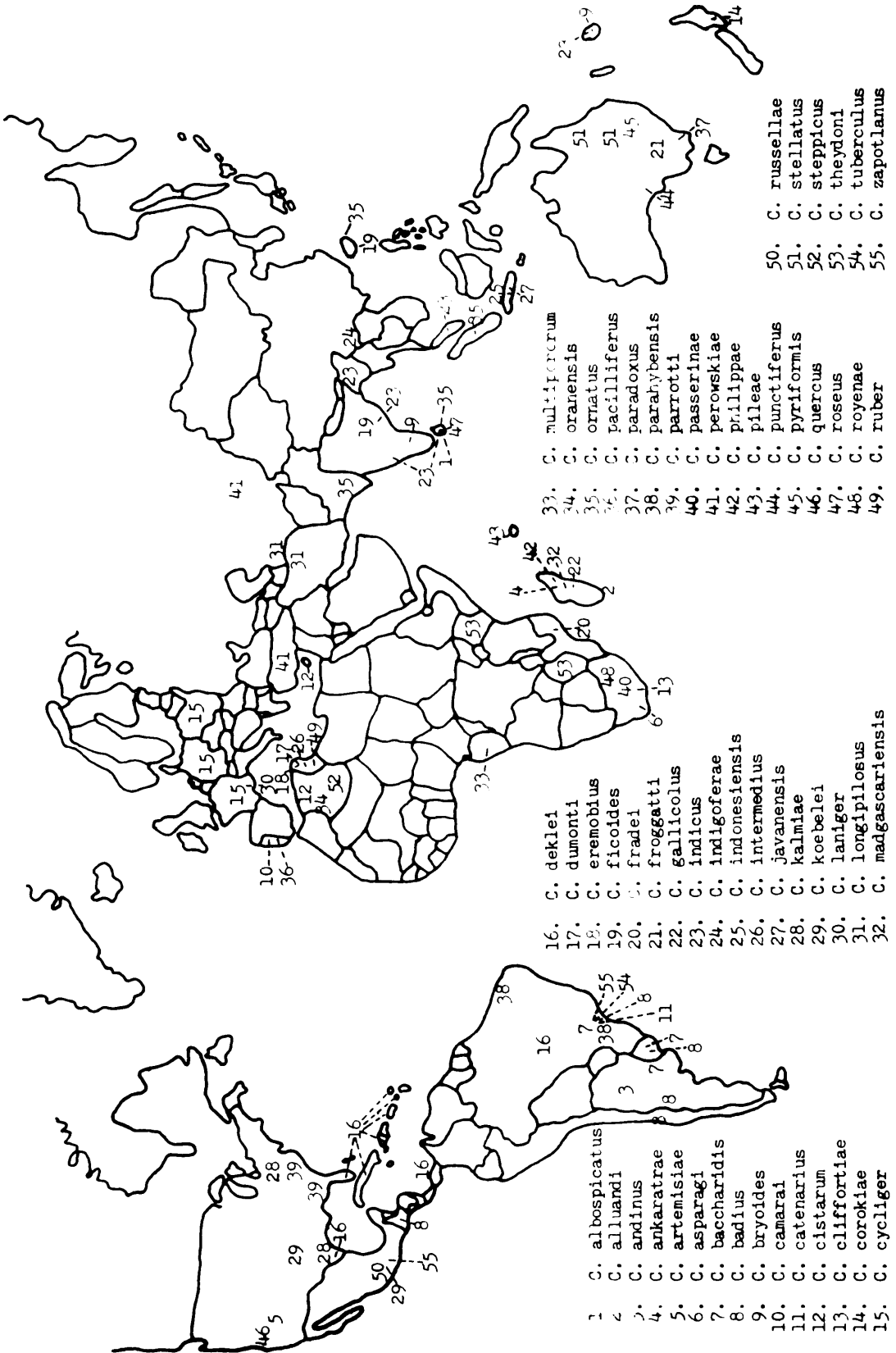
The genera are distinctive and easily separated by the characters in the key. They possess the same type of dorsal 8-shaped pores, but their size and arrangement are distinctive. They have an elliptical body which tapers posteriorly to the anal lobes. However, the anal lobes of Solenophora are not as well developed as the anal lobes of Asterococcus and Cerococcus.

B. Distribution of Cerococcus species

Species of Cerococcus are present in all major zoogeographical regions, but have not been found in Canada. Large geographical discontinuities exist between species and ample collections need to be made before the radiation of the genus can be determined.

The number of species represented from zoogeographical region are as follows: Australian eight, Ethiopian thirteen, Nearctic six, Neotropical ten, Oriental nine, and Palearctic thirteen. From the island areas of these regions four species occur on Ceylon, one on Cuba, one on Cyprus, two on Fiji, two on Formosa, one on Hispaniola, three on Java, five on Madagascar, one on Mauritius, one on New Zealand, one on Puerto Rico, one on St. Croix, and one on St. Thomas. The distribution of Cerococcus species is represented on Map 1.

Map 1. Distribution of Cerococcus species



IV. TAXONOMIC AND ECONOMIC IMPORTANCE OF FIRST INSTARS

The taxonomy of coccids generally has been based on morphological characters of adult females. However, some generic revisions were supplemented by studies on first instars (Williams and Kosztarab, 1970). Recently more emphasis has been placed on morphological studies of all stages. Studies of immature stages are important in establishing an overall view of taxa and enable workers to understand better the systematics and phylogeny of taxa. In the words of van Emden (1957), "it has been known for a long time that characters of immature insects very often define the same groups as are obtained by unrelated characters of the adult. . . ."

Females of several species of Cerococcus damage plants, by removing sap, forming pits and producing honeydew on which sooty molds grow. Some species are host specific at the family level, e. g. C. quercus; while others are polyphagous and feed on a wide variety of hosts, e. g. C. indicus. Tomlinson (1957) reported that C. kalmiae damaged cranberry in Massachusetts bogs where winter flooding did not occur. Heinrich (1959) reported damage to coffee plants by C. caterarius in the states of Sao Paulo and Parana, Brazil.

It is likely that the number of first instars present on any given host will be greater than the number of adults. Therefore, it is possible that the first instars may cause a significant amount of damage to the host. First instars are also very important in dispersal of the species as it is the only state which can move about, except for the winged adult male. The adult female is enclosed within a waxy test

which is nearly impenetrable by insecticides, however, the first instars are unprotected and susceptible to insecticides.

V. GENERAL MORPHOLOGY OF THE FIRST INSTAR NYMPHS

Plate 1

The body (fig. A) is ovoid to elliptical, and flattened dorso-ventrally. It is generally widest at the mesothorax and tapers posteriorly to well developed anal lobes. The average length is 435(286-647) and the width is 206(128-312).

Segmentation: Body segmentation is easily seen on the venter of the abdomen. The head, thorax, and abdomen are closely fused and separation of these regions is by identifying structures known to occur on each body region.

Antennae: The antennae (fig. B) are six-segmented with the third or sixth segment longest and the scape widest. The number of setae on each segment are as follows: I-2; II-2 or 3; III-2; IV-1; V-3 or 4; VI-8 or 9. Segment VI has four stout sensory setae and four or five long hairlike setae. Segment II has a sensory pore (fig. c) at the distal margin and segment VI has a y-shaped sensory pore near the apex.

Eyes: The eyes (fig. d) are of a single facet and are located laterad of the antennae on the ventral body margin.

Mouthparts (fig. e): The mouthparts are between the anterior coxae. The large anterior structure, with a pair of setae near the medial anterior surface, is the clypeolabral shield and its internal framework of the tentorium. The labium is triangular-shaped and 3-segmented according to Koteja (1974), but the basal segment is very small and indistinct in most specimens. The basal segment is without setae and is generally not shown in the drawings. One pair of setae is present on the large medial segment and five pairs are on the pointed apical segment. The stylet loop

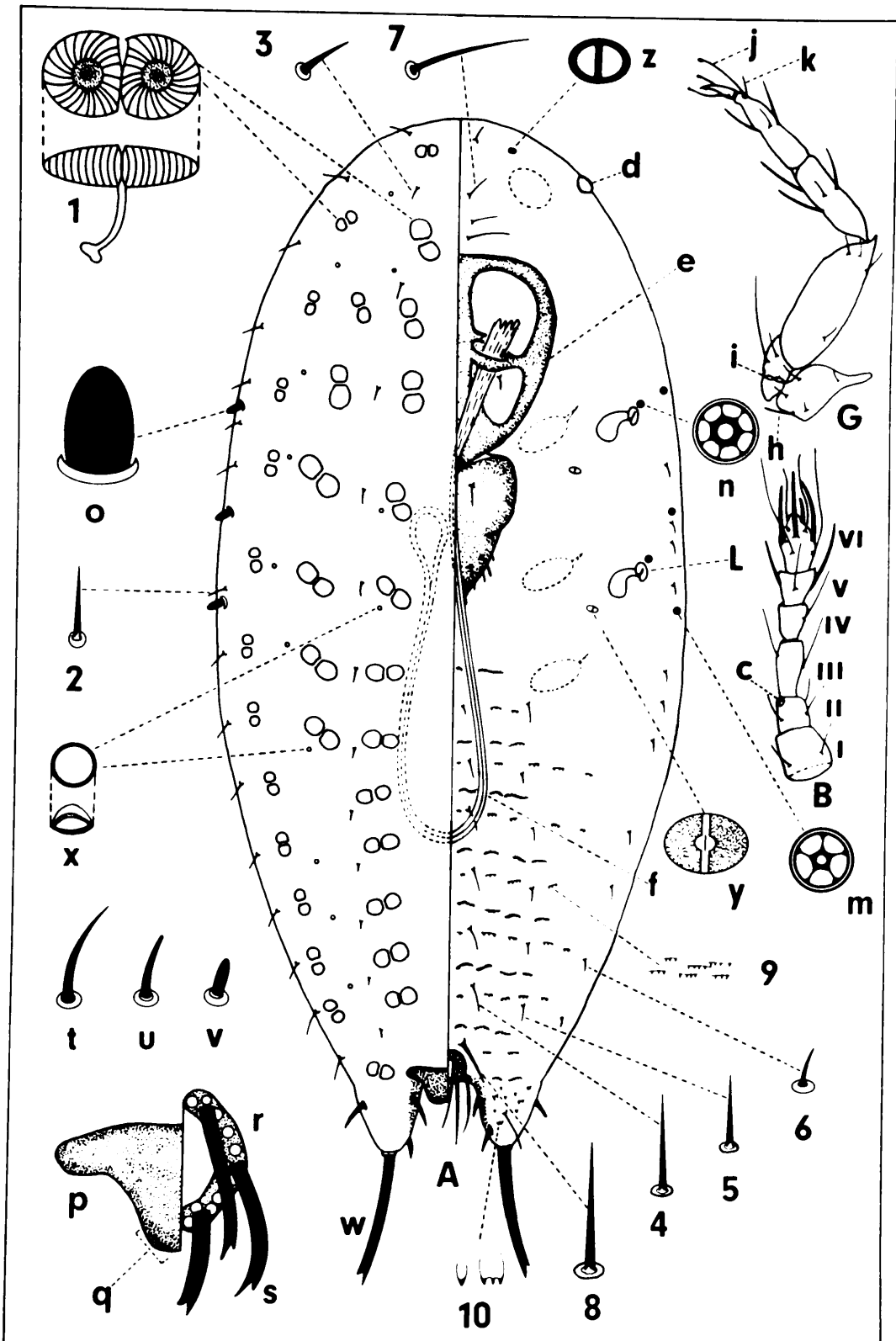


Plate 1.- General morphology of the first instar nymphs

(fig. f) is of doubtful use in taxonomy and is not included on the illustrations to avoid obscuring useful characters.

Legs: The legs (fig. G) are always well developed. The coxa has four smaller setae and a stout seta (fig. h) near the medial margin. There are four sensory pores (fig. i) on the trochanter, and a long and short seta near the apex. The femur has one proximal and three or four distal setae. Stout spine-like setae are on the tibia and tarsus in varying numbers. Tarsal digitules (fig. j) are slender and terminally knobbed. One tarsal digitule is reduced to a short spine (fig. k) on the prothoracic tarsi of all Cerococcus species. The claw has a denticle near the apex and two knobbed digitules arising from its base.

Spiracles (fig. L): The spiracles are located submarginally on the thorax. The number of quinquelocular pores (fig. m) and sometimes 7-locular pores (fig. n) is of taxonomic importance.

Spiracular setae (fig. o): Acorn-shaped or not differing from dorsal marginal setae. If they are acorn-shaped the anterior setae may be single or double on each side of the body, and the posterior are generally single, one before and one after the spiracle. The presence or absence of acorn-shaped spiracular setae is of taxonomic importance.

Anal plate (fig. p): Trapezoidal in shape with anterolateral projections that sometimes curve posteriorly. The posterolateral margins (fig. q) may be acute or rounded and this is of taxonomic importance. The plate is usually positioned slightly posterior of the anal ring which is ventral in relation to the anal plate.

Anal ring (fig. r): The anal ring is circular to subcircular, and is

positioned almost vertical to the longitudinal axes of the anal lobes. It has six anal ring setae (fig. s) and a complete row of translucent pores near the outer margin. The total number of pores is generally 26.

Anal lobes: The anal lobes are the posteriorly protruding remnants of the ninth abdominal segment. They are membranous except for the inner margin, which is slightly sclerotized. Each lobe has two spines on the inner margin. These spines may be long, curved and sharp pointed (fig. t); curved slightly with a blunt point (fig. u); or short, slightly curved and acorn-shaped (fig. v). There is also a ventral medial (sometimes lateral) seta, and a dorsal lateral seta on each lobe. Each lobe is terminated by a long apical seta (fig. w).

Pores: Simple pores (fig. x) are on the dorsum in submarginal and submedial longitudinal rows. Bilocular pores (fig. y) are on the venter of the thorax and their number is of taxonomic importance. A very small bilocular pore (fig. z) of a different type is located anterior of each antenna and in C. deklei it is replaced by a trilocular pore. Quinquelocular pores (fig. m) are associated with the spiracles. Occasionally some of these are 7-locular pores (fig. n), e.g. C. corokiae. The number of quinquelocular pores (infrequently 7-locular) in each spiracular furrow is of taxonomic importance. The dorsum has 8-shaped pores (fig. l) in longitudinal rows and may be of one or two sizes, which is also of taxonomic importance.

Body setae: Those dorsal body setae that occur along the margin are called marginal setae (fig. 2). They are generally hairlike, straight, or slightly curved. In some species they are longer anterior of the spiracular setae. Other dorsal body setae (fig. 3) are in submedial

longitudinal rows on the cephalothorax and sometimes on the abdomen.

Ventral setae are in submedial (fig. 4), submarginal (fig. 5) and marginal (fig. 6) longitudinal rows on the abdomen. In some species the submarginal row is absent. Two submedial rows of three to five setae are anterior of the clypeolabral shield (fig. 7). A pair of stout setae (fig. 8) are located ventrad and just anterior of the anal ring.

Microspines: These are small sclerotized dermal projections which are in transverse rows on the venter of the abdomen (fig. 9). In some species large microspines (fig. 10) occur on the anal lobes. The presence or absence of microspines on the abdomen is of taxonomic importance.

VI. KEY TO SPECIES OF CEROCOCCUS FIRST INSTARS

1. Spiracular setae acorn-shaped, very different from marginal setae
. 2
Spiracular setae not acorn-shaped, not different from marginal setae
. 9
2. Eighty-six dorsal 8-shaped pores; 14 bilocular pores on ventrum of
thorax andinus, p. 29
Seventy-four to 80 dorsal 8-shaped pores; 10 to 12 bilocular pores
on ventrum of thorax 3
3. Twelve bilocular pores on ventrum of thorax; 78 dorsal 8-shaped
pores; known only from Formosa and India ficoides, p. 75
Ten bilocular pores on ventrum of thorax; 80 dorsal 8-shaped pores
. 4
4. Anterior spiracular setae always double; anterior setae of posterior
spiracle frequently double kalmiae, p. 91
Anterior spiracular setae always single; never more than 2 setae
associated with each posterior spiracle 5
5. One trilocular pore anterior of each antenna; average length of legs
less than 171; known only from Florida, Texas, Caribbean Islands,
and Brazil deklei, p. 63
One bilocular pore anterior of each antenna; average length of legs
more than 194 6
6. Body usually under 500 long; dorsal lateral seta of anal lobe over
14 long; known only from U.S. artemisiae, p. 33
Body over 500 long; dorsal lateral seta of anal lobe under 14 long

- 7
7. Spiracular setae over 10 long; body always over 600 long
 parrotti, p. 112
- Spiracular setae under 10 long; body always under 600 long . . 8
8. Spiracular setae 7 long; antennal segment VI over 27 long; apical
 setae over 230 long; prothoracic legs over 231; on...Baccharis
 sp.; known only from Brazil tuberculus, p. 144
- Spiracular setae over 8 long; antennal segment VI under 27 long;
 apical setae under 230 long; prothoracic legs under 231; on
 shrubs and trees other than Baccharis; known from U.S. and
 Mexico koebelei, p. 95
- 9(1). Dorsal 8-shaped pores of one size or nearly so 10
- Dorsal 8-shaped pores of 2 distinct sizes 15
10. Ninety-two dorsal 8-shaped pores; complete submarginal longitu-
 dinal rows of 8-shaped pores; 10 bilocular pores on ventrum
 of thorax quercus, p. 124
- Less than 92 dorsal 8-shaped pores; at least three dorsal 8-
 shaped pores absent from posterior of submarginal longitudinal
 rows; 4 bilocular pores on ventrum of thorax 11
11. One quinquelocular pore associated with each anterior spiracle;
 five 8-shaped pores absent from posterior of submarginal longi-
 tudinal rows. dumonti, p. 67
- Two quinquelocular pores associated with each anterior spiracle;
 four 8-shaped pores absent from posterior of submarginal longi-
 tudinal rows 12

12. One quinquelocular pore (occasionally 7-locular) associated with each posterior spiracle; known from New Zealand
 corokiae, p. 55
 Three quinquelocular pores associated with each posterior spiracle 13
13. Seventy-two dorsal 8-shaped pores; 4 longitudinal rows of ventral abdominal setae; known from South Africa
 passerinae, p. 116
 Seventy-four or 76 dorsal 8-shaped pores; 6 longitudinal rows of ventral abdominal setae; known from South America 14
14. Seventy-four dorsal 8-shaped pores; prothoracic legs usually under 200 long badius, p. 41
 Seventy-six dorsal 8-shaped pores; prothoracic legs usually 220 long baccharidis, p. 37
- 15(9). One quinquelocular pore associated with each spiracle; always 6 longitudinal rows of ventral abdominal setae; distribution Mediterranean 16
 Two quinquelocular pores associated with each anterior spiracle and 3 with each posterior spiracle; 4 or 6 longitudinal rows of ventral abdominal setae 19
16. Three dorsal 8-shaped pores absent from posterior of submarginal longitudinal rows; known host family Labiatae
 intermedius, p. 87
 Four or five dorsal 8-shaped pores absent from posterior of submarginal longitudinal rows 17

17. Mesothoracic legs over 240 in length, 2 stout setae anterior of anal ring over 40 long; spines on inner margins of anal lobes average over 17; known host family Cistaceae eremobius, p. 71
- Mesothoracic legs under 240 in length; 2 stout setae anterior of anal ring under 40 long; spines on inner margins of anal lobes average under 17 18
18. Sixty-four dorsal 8-shaped pores; five dorsal 8-shaped pores absent from posterior of submarginal longitudinal rows; known host family Cistaceae cistarum, p. 51
- Seventy dorsal 8-shaped pores; four dorsal 8-shaped pores absent from posterior of submarginal longitudinal rows; known host family Compositae ruber, p. 132
- 19(15). Four dorsal 8-shaped pores absent from posterior of submarginal longitudinal rows 20
- Five dorsal 8-shaped pores absent from posterior of submarginal longitudinal rows 21
20. Mesothoracic legs over 190 long; ventral abdominal setae over 7 long in submarginal and over 9 long in submedial rows; known from Mexico zapotlanus, p. 148
- Mesothoracic legs under 190 long; ventral abdominal setae under 5 long in submarginal and usually under 9 long in submedial rows; known from Asia ornatus, p. 99
- 21(19). Dorsal 8-shaped pores in submedial rows on abdomen obviously different in size 22

- Dorsal 8-shaped pores in submedial rows on abdomen nearly equal
in size 25
22. Second, third, and fourth dorsal 8-shaped pores in submedial
longitudinal rows on abdomen (counting from posterior end)
of similar sizes 23
- Second, third, and fourth dorsal 8-shaped pores in submedial
longitudinal rows on abdomen (counting from posterior end)
of different sizes 27
23. Four longitudinal rows of ventral abdominal setae; known from
Asia and Fiji Islands bryoides, p. 46
- Six longitudinal rows of ventral abdominal setae; known from
Africa and South America 24
24. Seventy dorsal 8-shaped pores; known from Africa
. theydoni, p. 140
- Seventy-two dorsal 8-shaped pores; known from South America . .
. parahybensis, p. 108
- 25(21) Six longitudinal rows of ventral abdominal setae 26
- Four longitudinal rows of ventral abdominal setae 28
26. Anal lobes short, about as long as wide; mesothoracic legs under
190 long; known family Compositae in Australia
. froggatti, p. 79
- Anal lobes normally developed, about twice as long as wide;
mesothoracic legs over 190 long; not known from family Composi-
tae; from S. Asia and Fiji Islands indicus, p. 83
- 27(22). Prothoracic legs under 220 long; clypeolabral shield under 90

- long; antennal segment III under 27 long; known from Europe
 cycliger, p. 59
- Prothoracic legs over 220 long; clypeolabral shield over 90
 long; antennal segment III over 27 long; known from Ceylon
 and Java albospicatus, p. 25
- 28(25). Setae on inner margin of anal lobes blunt, not sharp pointed;
 known only from Australia stellatus, p. 136
- Setae on inner margin of anal lobes sharp pointed 29
29. Stout setae anterior of anal ring under 19 long; known only from
 Ceylon roseus, p. 128
- Stout setae anterior of anal ring over 19 long; two very closely
 related species both known from New South Wales, Australia on
 Pittosporaceae 30
30. Medial setae on ventrum of anal lobes over 12 long; average
 length of anal ring setae 35 paradoxus, p. 103
- Medial setae on ventrum of anal lobes under 12 long; average
 length of anal ring setae 41 punctiferus, p. 120

Cerococcus albospicatus Green

Plate 2

Cerococcus albospicatus Green, 1909:308.

MATERIAL STUDIED: On Symplocos obtusa (Symplocaceae), 1(10), Newera Eliya, Ceylon, (BM).

DESCRIPTION: Body (fig. a) elliptical, widest at mesothorax, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 537 (498-559) long, 244(211-257) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-two of 2 sizes arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores 25.7(23.2-27.8) long, 15.2(13.9-18.6) wide; small pores 15.2(13.9-17.5) long, 9.1(7.8-9.3) wide.

Simple pores (fig. c): About 34 in 4 longitudinal rows, diameter ca. 1.9.

Marginal setae (fig. d): From 36 to 40, slender, hairlike, 6.8(4.6-11.6) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, 7.7 (7.0-9.3) long.

Anal lobes: Well developed, membranous, sclerotized on inner margin; 2 spines on inner margin of each anal lobe, anterior 13.1(9.3-17.5), posterior 9.6(9.3-11.6) long. Apical setae 240(195-271) long. Lateral seta 11.3(7.0-13.9) long.

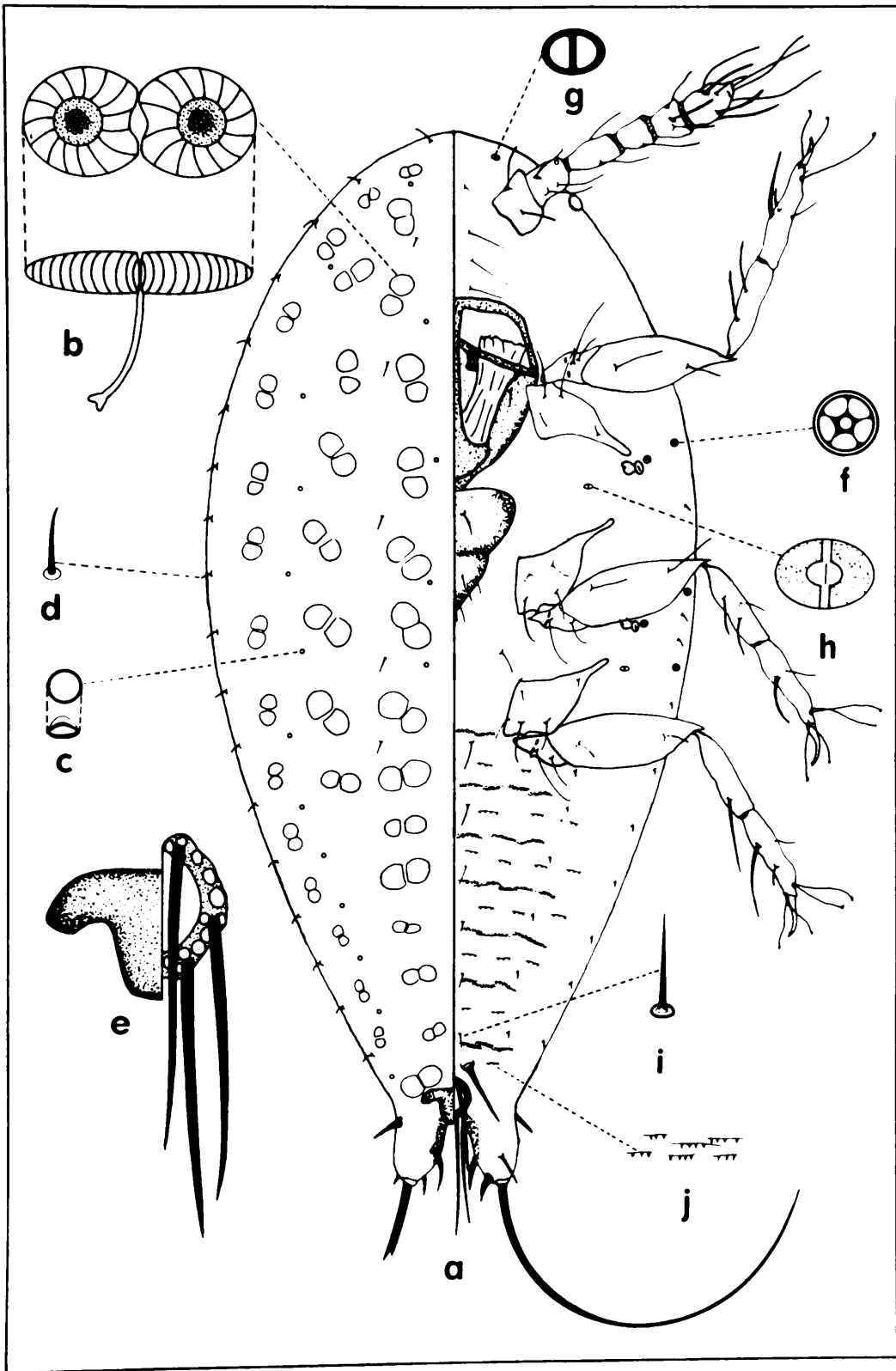


Plate 2.- *Cerococcus albospicatus* Green

Anal plate (fig. e): Trapezoid-shaped 16.2(16.2) long, 26.7(18.6-34.8) wide.

VENTRAL SURFACE

Antennae: Total length 136(128-144), scape 20.7(18.6-25.5) long, 25.5 (20.9-32.5) wide. Segments II to VI: 22.4(18.6-25.5), 30.6(27.8-33.0), 16.1(13.9-18.6), 18.7(16.2-21.4), 27.8(25.2-34.8) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Oblong, 105(92.8-118) long, 88.2(67.3-102) wide.

Labium: Triangular, 68.3(62.6-81.2) long, 65.8(51.0-99.8) wide; with 12 slender setae, each 19.9(16.2-27.8) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	26.6(23.2-32.5)	26.1(23.2-27.8)	27.3(23.2-30.2)
Trochanter	29.6(27.8-30.2)	28.5(27.8-30.2)	28.9(27.8-30.2)
Femus	75.7(70.0-83.5)	73.1(68.0-78.9)	72.9(69.6-76.6)
Tibia	50.0(34.8-55.7)	52.7(46.6-58.0)	50.8(48.6-53.4)
Tarsus	42.7(30.2-46.4)	45.2(44.1-51.0)	44.2(39.4-53.4)
Tarsal dig.	30.6(25.1-32.5)	30.6(25.1-32.5)	30.6(25.1-32.5)
Claw	20.9(18.6-23.3)	20.3(18.6-23.2)	20.1(18.6-20.9)
Claw dig.	24.4(18.6-27.8)	24.4(18.6-27.8)	24.4(18.6-27.8)
Entire leg	245(227-260)	246(234-260)	244(234-255)

Spiracles: Anterior 15.8(7.0-18.6) long, peritreme 8.4(7.0-9.4) wide, diameter of atrial orifice 2.9(1.2-4.6); with 2 quinquelocular pores (fig. f), diameter 4.6(3.5-5.8). Posterior 17.7(16.2-18.7) long, peritreme 8.9(7.0-9.4) wide, diameter of atrial orifice 3.3(2.4-4.7); 3 quinquelocular pores (fig. f) in bifid furrow, diameter 4.5(3.5-5.8).

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each 4.8(3.9-5.8) long, 4.7(4.7) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 32.3(23.3-44.5) long. Six rows of slender hairlike setae on abdomen, submedial (fig. i) 12.6(9.3-13.9), submarginal 5.5(3.9-7.0), marginal 6.8(4.6-11.6) long, respectively. A pair of stout setae anterior of anal ring, 22.7(18.6-25.5) long.

Anal lobes: With midlateral seta 10.1(6.9-11.6) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, oval, 25.7(23.2-27.8) long, 18.6(16.2-20.9) wide; 6 anal ring setae, each 42.9(36.9-46.4) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. j): In transverse rows on abdomen.

Affinities: This species is near C. cycliger, but they are different because C. albospicatus has prothoracic legs over 220 long, clypeolabral shield over 90 long, and antennal segment III over 27 long. The known geographical distribution of C. albospicatus is Ceylon and Java, while C. cycliger is known only from Europe. Their hosts also belong to different plant families.

Note: Green (1909) described the first instars of this species as "... narrow, pointed at the two extremities. Antennae six-jointed. Anterior feet with 3 digitules (two unguis and one tarsal); the others with 4 digitules. Caudal setae half length of body. Dorsum with six longitudinal series of large 8-shaped glands, the submarginal series on each side absent on the abdominal segments. Margin with very small inconspicuous hairs. Anal ring with 6 hairs. Length 0.65mm."

Cerococcus andinus Leonardi

Plate 3

Cerococcus andinus Leonardi, 1911:245.

MATERIAL STUDIED: On Tricycla "cacheuta" (Nyctaginaceae), 1(2), Cacheuta, Argentina, II-15-1909, (USNM).

DESCRIPTION: Body (fig. a) ovoid, widest at mesothorax; tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 491(483-498) long, 235(227-242) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Eighty-six of 1 size arranged in 4 to 6 longitudinal rows on abdomen, 8 rows on thorax, each ca. 7.0 long, and 4.6 wide.

Simple pores (fig. c): About 16 in submarginal row, diameter ca. 1.0.

Marginal setae (fig. d): From 34 to 36, hairlike, 5.8(4.6-7.0) long.

Spiracular setae (fig. e): Acorn-shaped; 1 anterior, 2 posterior, each 5.7(4.8-6.6) long.

Body setae: On cephalothorax and abdomen in 2 submedial longitudinal rows, ca. 4.6 long.

Anal lobes: Well developed, membranous, sclerotized on inner margin; 2 stout, acorn-shaped spines on inner margin of each anal lobe, each 7.0 long. Apical setae 174(153-195) long. Lateral seta on each lobe 12.8(11.6-13.9) long.

Anal plate (fig. f): Trapezoid-shaped 5.8(4.6-7.0) long, 22.0(18.6-25.5) wide.

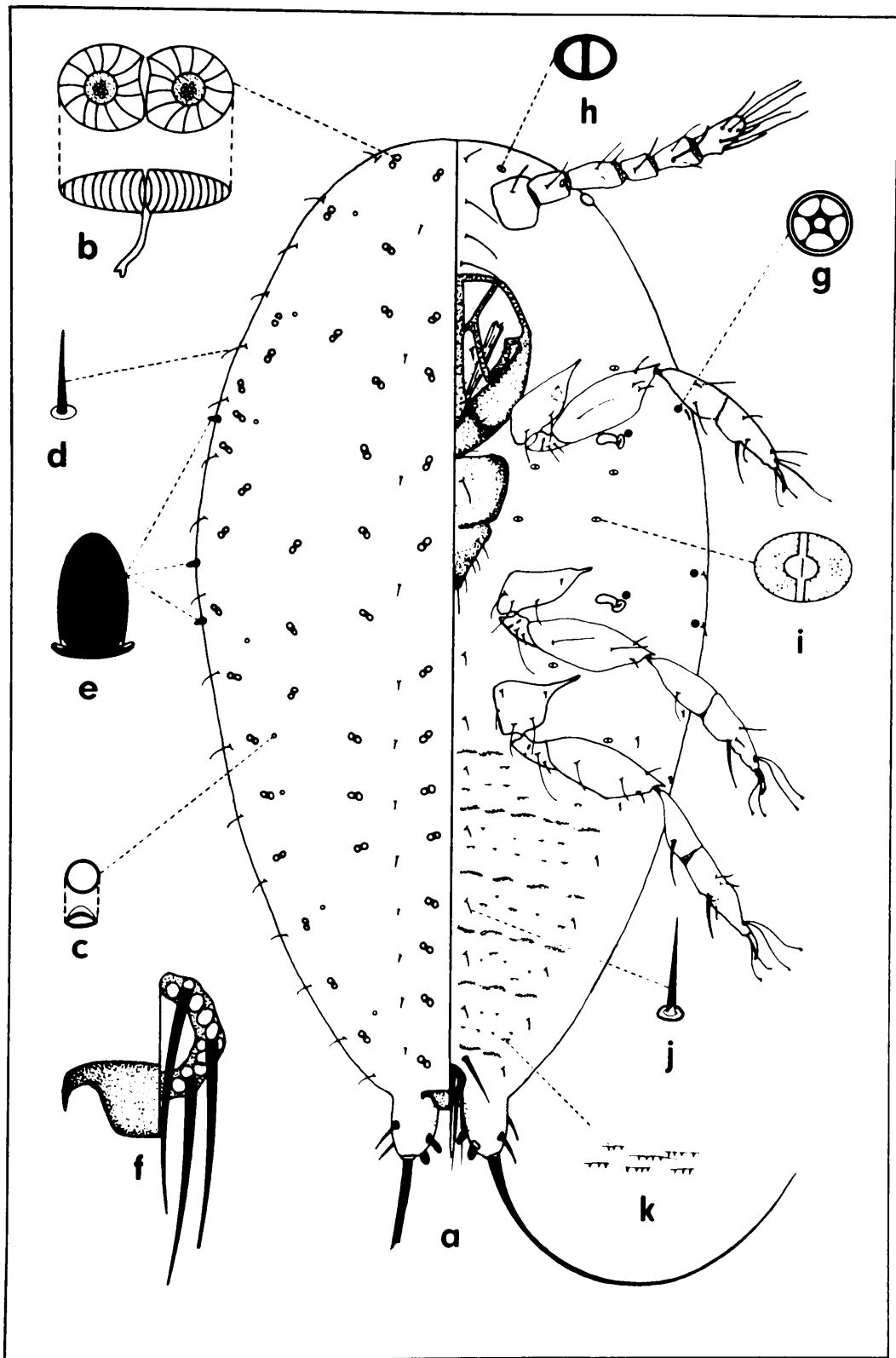


Plate 3.- Cerococcus andinus Leonardi

VENTRAL SURFACE

Antennae: Total length ca. 128, scape ca. 20.9 long, 23.2(20.9-25.5) wide. Segments II to VI: 16.2(16.2), 30.2(30.2), 15.0(13.9-16.2), 19.8(18.6-20.9), 25.5(25.5) long, respectively. Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 88.2(83.5-92.8) long, 72.0(65.0-78.9) wide.

Labium: Triangular, 68.4(67.3-69.6) long, 62.6(58.0-67.3) wide; with 12 slender setae, each 17.4(13.9-20.9) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	22.0(20.9-23.2)	22.0(20.9-23.2)	22.0(20.9-23.2)
Trochanter	24.4(23.2-25.5)	23.2(20.9-25.5)	24.4(23.2-25.5)
Femur	63.8(62.6-65.0)	59.2(58.0-60.3)	63.8(62.6-65.0)
Tibia	38.2(37.1-39.4)	34.8(34.8)	37.1(37.1)
Tarsus	34.8(32.5-37.1)	37.1(34.8-39.4)	41.8(34.8-48.7)
Tarsal dig.	34.8(32.5-37.1)	34.8(32.5-37.1)	34.8(32.5-37.1)
Claw	17.4(16.2-18.6)	18.6(16.2-20.9)	18.6(18.6)
Claw dig.	20.9(20.9)	20.9(20.9)	20.9(20.9)
Entire leg	201(192-209)	195(186-204)	208(197-218)

Spiracles: Anterior 12.8(11.4-14.3) long, peritreme 8.1(7.6-8.6) wide, diameter of atrial orifice 3.3(2.8-3.8); with 2 quinquelocular pores (fig. g), diameter 2.4(1.9-2.8). Posterior 13.4(12.4-14.3) long, peritreme 8.1(7.6-8.6) wide, diameter of atrial orifice ca. 3.8; 3 quinquelocular pores (fig. g) in bifid furrow.

Pores: Two small biloculars (fig. h) anterior of antennae; 14 biloculars (fig. i) on thorax, each 4.3(3.8-4.8) long, 3.3(2.8-3.8) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4, each 25.6(18.6-32.5) long. Four rows of slender hairlike setae on abdomen, submedial (fig. j) 10.4(9.3-11.6), marginal ca. 4.6 long, respectively. A pair of stout setae anterior of anal ring, 23.2(20.9-25.5) long.

Anal lobes: The midlateral seta ca. 9.3 long.

Anal ring (fig. f): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular 19.8(18.6-20.9) long, 18.5(16.2-20.9) wide; 6 anal ring setae, each 40.6(39.4-41.8) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. k): In transverse rows on abdomen

Affinities: This species is closely aligned to C. tuberculus in geographical distribution, but C. andinus has 86 dorsal 8-shaped pores and 14 bilocular pores on the venter, where as C. tuberculus has 80 dorsal 8-shaped pores and 10 bilocular pores on the venter.

Cerococcus artemisiae (Cockerell)

Plate 4

Lecaniodiaspis artemisiae Cockerell, 1897:514; Cerococcus artemisiae, Ferris, 1955:31; Solenophora coloradensis Cockerell, 1898a:262; Cerococcus artemisiae, Lambdin and Kosztarab In Press.

MATERIAL STUDIED: On Arctostaphylos pungens (Ericaceae), 2(11), (VPI&SU No. ABH-01b&f), Yavapai County, Arizona, coll. T. Halstead, VI-17-1973, (VPI&SU).

ADDITIONAL MATERIAL STUDIED: On Artemisia sp. (Compositae), 1(1), Embudo, New Mexico, coll. T.D.A. Cockerell, (USNM); 1(10), on Atriplex canescens (Chenopodiaceae), Canon City, Colorado, coll. E. Bethel, (USNM).

DESCRIPTION: Body (fig. a) elliptical, gradually tapering posteriorly to anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 482(453-513) long, 239(226-257) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Eighty of 1 size, arranged in 4 longitudinal rows on posterior of abdomen, 6 rows on thorax and anterior of abdomen, each 11.8(11.6-13.9) long, 8.0(7.0-9.3) wide.

Simple pores (fig. c): About 30 in submarginal and submedial longitudinal rows, diameter c. 1.9.

Marginal setae (fig. d): From 34 to 36, slender, hairlike, 12.2(9.3-16.2) long.

Spiracular setae (fig. e): Acorn-shaped; 1 anterior, 2 posterior (occasionally shaped like marginal setae), each 7.4(7.0-9.3) long.

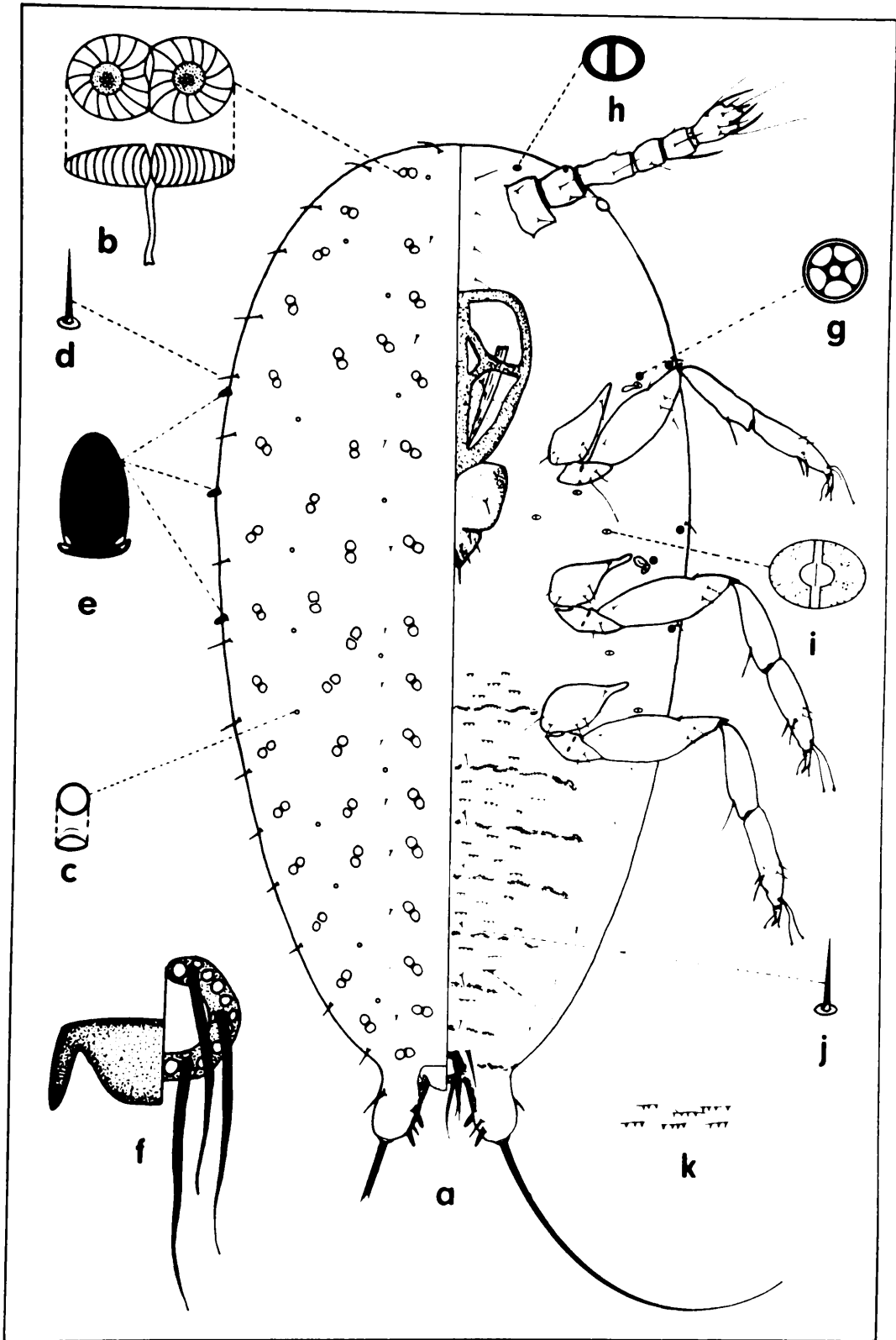


Plate 4.- *Cerococcus artemisiae* (Cockerell)

Body setae: On cephalothorax and abdomen in 2 submedial longitudinal rows, each 3.4(1.9-4.8) long.

Anal lobes: Well developed, membranous, sclerotized on inner margin; 2 strong, curved spines on inner margin of each anal lobe, anterior 10.1(9.3-11.6), posterior 11.2(9.3-11.6) long. Apical setae 202(177-242) long. Lateral seta 15.8(13.9-20.9) long.

Anal plate (fig. f): Trapezoid-shaped 15.4(13.9-18.6) long, 22.3(18.6-25.5) wide.

VENTRAL SURFACE

Antennae: Total length 125(118-135), scape 20.1(16.2-20.9) long, 23.2(18.6-25.5) wide. Segments II to VI: 18.8(16.2-20.9), 31.0(25.5-32.5), 13.9(11.6-16.2), 17.3(13.9-20.9), 24.5(23.2-25.5) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Elliptical, 89.0(82.6-84.4) long, 68.7(59.0-82.6) wide.

Labium: Triangular, 55.8(47.2-70.8) long, 48.8(47.2-53.1) wide; with 12 slender setae, each 19.0(13.9-23.2) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	24.3(23.3-25.5)	22.9(18.6-25.5)	23.5(20.9-25.5)
Trochanter	24.1(20.9-25.5)	22.8(20.9-25.5)	23.7(20.9-27.8)
Femur	67.6(55.7-72.0)	66.5(62.6-69.6)	66.8(55.7-72.0)
Tibia	44.4(39.4-46.4)	42.9(39.4-46.4)	44.7(39.4-46.4)
Tarsus	43.8(37.1-46.4)	46.0(44.1-48.7)	45.8(44.1-46.4)
Tarsal dig.	34.5(30.2-37.1)	34.5(30.2-37.1)	34.5(30.2-37.1)
Claw	22.8(20.9-23.2)	22.8(20.9-23.2)	22.6(20.9-25.5)
Claw dig.	24.2(20.9-25.5)	24.2(20.9-25.5)	24.2(20.9-25.5)
Entire leg	226(197-237)	224(218-234)	226(211-237)

Spiracles: Anterior 17.5(16.2-18.6) long, peritreme 9.1(7.0-9.3) wide, diameter of atrial orifice ca. 2.3; with 2 quinquelocular pores (fig. g), diameter ca. 3.8. Posterior 17.1(13.9-18.6) long, peritreme 9.1(7.0-9.3) wide, diameter of atrial orifice ca. 2.3; 3 quinquelocular pores (fig. g) in bifid furrow, diameter ca. 3.8.

Pores: Two small biloculars (fig. h) anterior of antennae; 10 biloculars (fig. i) on thorax, each 4.4(3.8-4.8) long, 3.5(2.8-3.8) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 15.5(11.4-16.2) long. Four rows of slender hairlike setae on abdomen, submedial (fig. j) 18.4(14.2-23.8), submarginal 12.9(5.7-16.2) long, respectively. A pair of stout setae anterior of anal ring, 24.0(20.9-27.8) long.

Anal lobes: With medial seta 13.9(12.4-17.1) long.

Anal ring (fig. f): Placed almost vertical to the longitudinal axes of the anal lobes, slightly anterior of anal plate; circular, diameter 20.9(18.6-23.2); anal ring setae, each 35.0(30.2-42.0) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. k): In transverse rows from submargin to submargin.

Affinities: This species is near C. deklei and C. parrotti, but unlike C. deklei it has longer legs and a bilocular pore anterior of each antenna, where as C. parrotti is different because it has a much longer body than C. artemisiae.

Cerococcus baccharidis (Hempel)

Plate 5

Solenococcus baccharidis Hempel, 1900:393; Cerococcus baccharidis, Green, 1917:81.

MATERIAL STUDIED: On Baccharis sp. (Compositae), 1(7), Ypiranga, Brazil, coll. A. Hempel, 1900, (labeled type) (USNM); 1(3), (VPI&SU No. ABH-02e), Ypiranga, Brazil, (USNM).

ADDITIONAL MATERIAL STUDIED: On Baccharis sp. (Compositae), 5(36), (VPI&SU No. ABH-02a-d and f), Ypiranga, Brazil, (USNM).

DESCRIPTION: Body (fig. a) elliptical, widest at mesothorax, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 379(302-453) long, 174(136-196) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-six of 1 size arranged in 4 longitudinal rows on abdomen, 6 rows on thorax, each 10.4(7.0-11.6) long, 7.1(4.6-9.3) wide.

Simple pores (fig. c): About 38 in submarginal and submedial longitudinal rows, diameter ca. 1.0.

Marginal setae (fig. d): From 34 to 36 hairlike, 5.6(4.6-7.0) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each 7.2(4.6-11.6) long.

Anal lobes: Well developed, membranous, sclerotized slightly on inner margin; 2 stout spines on inner margin of each anal lobe, anterior 10.2

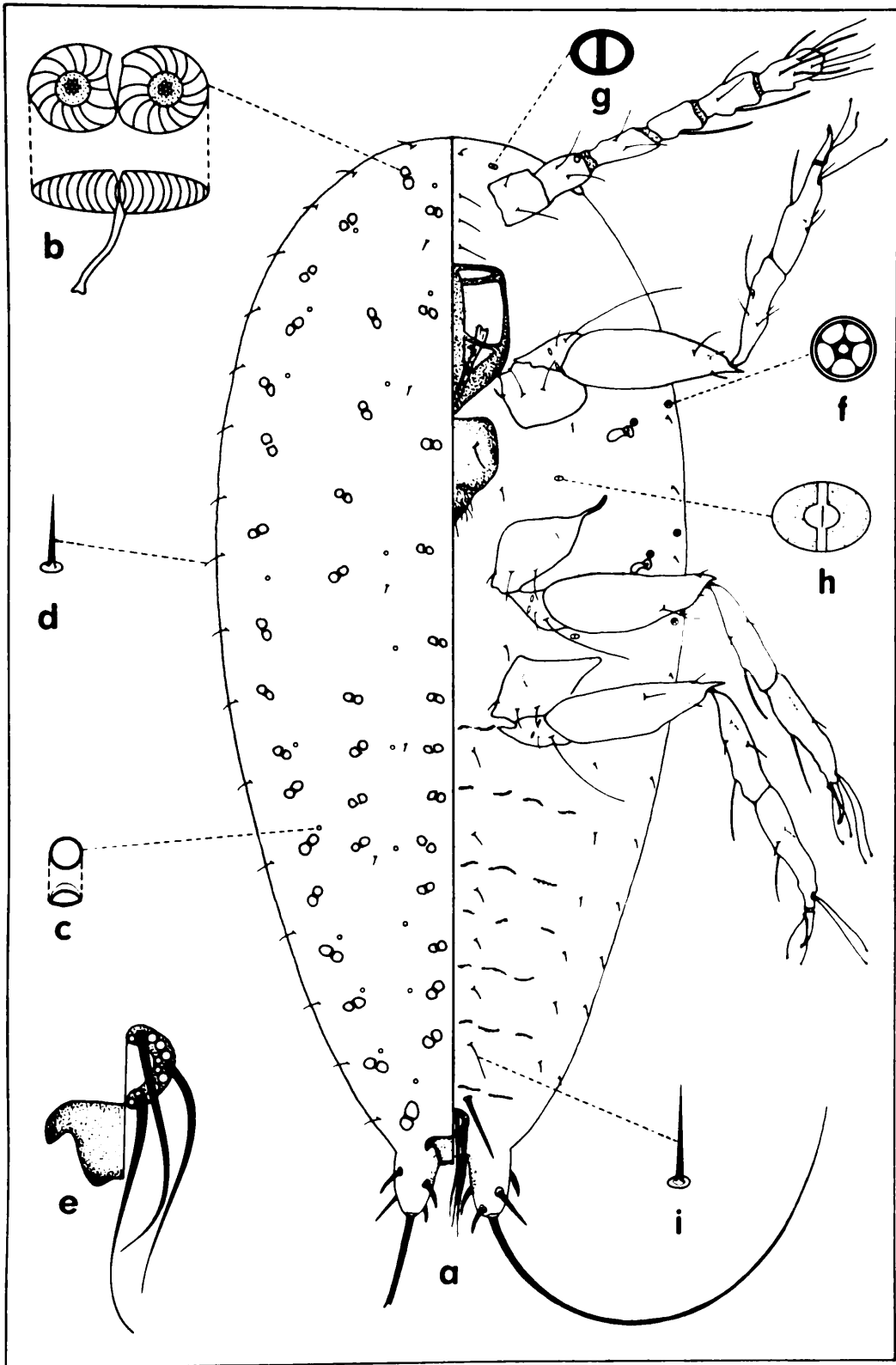


Plate 5.- *Cerococcus baccharidis* (Hempel)

(7.0-13.9), posterior 11.0(9.3-13.9) long. Apical setae 184(136-242) long. Lateral seta 8.2(5.0-9.3) long.

Anal plate (fig. e): Trapezoid-shaped, 20.4(18.6-23.2) long, 19.6(16.2-25.5) wide.

VENTRAL SURFACE

Antennae: Total length 130(114-139), scape 17.4(16.2-18.6) long, 20.4(18.6-23.2) wide. Segments II to VI: 19.1(16.2-20.9), 26.0(23.2-30.2), 17.6(13.9-20.9), 20.9(16.2-23.2), 26.0(20.9-32.5) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 69.6(60.3-76.6) long, 62.2(48.7-69.6) wide.

Labium: Triangular, 46.4(39.4-51.0) long, 40.5(22.0-44.1) wide; with 12 slender setae, each 10.6(7.0-13.9) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	23.7(20.9-25.5)	22.5(20.9-25.5)	23.0(18.6-25.5)
Trochanter	27.0(25.5-30.2)	27.1(23.2-30.2)	26.9(25.5-27.8)
Femur	71.7(69.6-71.9)	70.8(67.6-76.6)	68.7(60.3-76.6)
Tibia	46.9(44.1-51.0)	50.1(46.4-58.0)	48.5(44.1-53.4)
Tarsus	44.1(39.4-46.4)	44.1(39.4-48.7)	44.8(37.1-48.7)
Tarsal dig.	26.7(16.2-30.2)	26.7(16.2-30.2)	26.7(16.2-30.2)
Claw	18.2(11.6-25.5)	16.5(13.9-18.6)	16.0(13.9-20.9)
Claw dig.	21.6(18.6-23.2)	21.6(18.6-23.2)	21.6(18.6-23.2)
Entire leg	233(218-244)	231(216-237)	228(209-241)

Spiracles: Anterior 11.9(11.6-12.9) long, peritreme 7.6(7.0-9.3) wide, diameter of atrial orifice 2.4(2.3-3.5); with 2 quinquelocular pores (fig. f), diameter ca. 3.8. Posterior 12.8(9.3-16.2) long, peritreme 7.7(4.6-11.6) wide, diameter of atrial orifice 2.6(2.3-4.6); 3 quinque-

ocular pores (fig. f) in bifid furrow, diameter ca. 3.8.

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each ca. 4.8 long, ca. 3.8 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 3, each 25.5(16.2-44.1) long. Six rows of slender hairlike setae on abdomen, submedial (fig. i) 7.4(4.6-11.6), submarginal 5.6(4.6-7.0), marginal 5.6(4.6-7.0) long, respectively. A pair of stout setae anterior of anal ring, 15.2(11.7-17.6) long.

Anal lobes: A medial seta 8.4(7.0-9.3) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, circular, diameter 19.0(16.2-20.9); 6 anal ring setae, each 30.2(20.9-46.4) long; complete outer row of translucent pores with incomplete inner row.

Microspines: Not evident.

Affinities: This species is near C. badius in morphology, geographical distribution and host. However, C. badius has 74 dorsal 8-shaped pores and its prothoracic legs are shorter.

Note: Hempel (1900) described the first instar as; elliptical in form, 6 antennal segments, anal ring with 6 setae, 6 longitudinal rows of 8-shaped glands and 0.44mm long.

Cerococcus badius Leonardi

Plate 6

Cerococcus badius Leonardi, 1911:243.

MATERIAL STUDIED: On Baccharis rosmarinifolia (Compositae), 1(3), Cacheuta, Argentina, coll. Leonardi, III-17-1909, (USNM): on Baccharis sp. (Compositae), 4(14), Santa Amaro, Brazil, coll. J. Melzer, (BM).

DESCRIPTION: Body (fig. a) elliptical, widest at mesothorax, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 432 (407-453) long, 191(148-212) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-four of 1 size arranged in 4 longitudinal rows on abdomen, 6 rows on thorax, 12.6(9.3-16.2) long, 8.8(4.6-11.6) wide.

Simple pores (fig. c): About 30 in submarginal and submedial longitudinal rows, diameter ca. 1.7.

Marginal setae (fig. d): From 36 to 38, hairlike, 6.7(4.6-7.0) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each ca. 7.0 long.

Anal lobes: Well developed, membraneous, sclerotized slightly on inner margin; 2 spines on inner margin of each anal lobe, anterior 9.3 (7.0-13.9), posterior 10.1(7.0-16.2) long. Apical setae 221(136-260) long. Lateral seta 6.7(4.6-7.0) long.

Anal plate (fig. e): Trapezoid-shaped, 15.6(8.3-20.9) long. 20.0

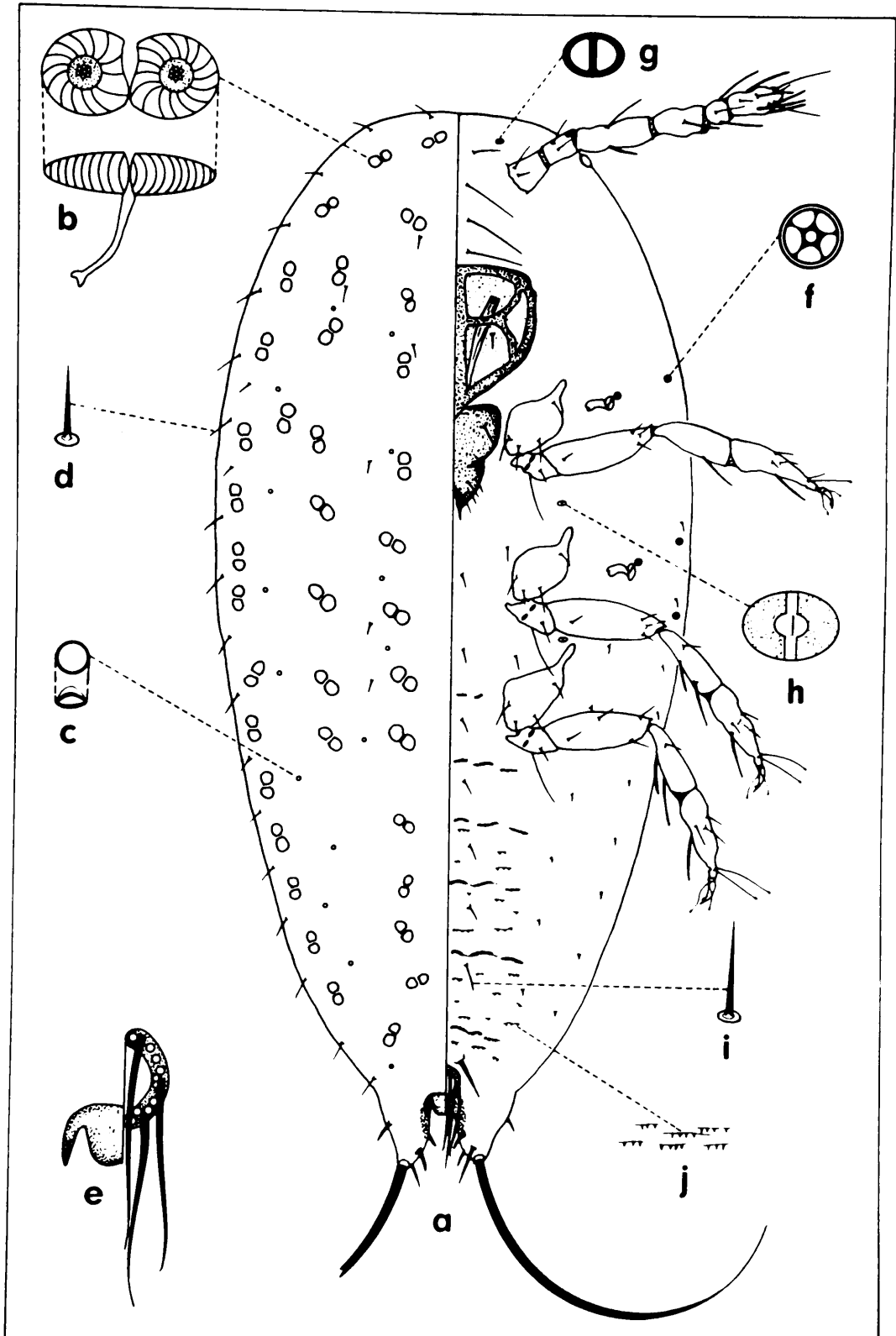


Plate 6.- *Cerococcus badius* Leonardi

(16.2-27.8) wide.

VENTRAL SURFACE

Antennae: Total length 136(118-146), scape 17.6(13.9-20.9) long, 22.9(20.9-25.5) wide. Segments II to VI: 18.6(13.9-20.9), 26.9(23.2-30.2), 18.4(13.9-20.9), 22.7(20.9-25.5), 31.6(27.8-32.5) long, respectively. Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 75.3(65.0-83.5) long, 59.6(51.0-67.3) wide.

Labium: Triangular, 43.8(34.8-60.3) long, 42.0(34.8-60.3) wide; with 12 slender setae, each 13.2(9.3-16.2) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	22.3(16.2-25.5)	22.3(16.2-25.5)	21.9(13.9-25.5)
Trochanter	21.2(18.6-25.5)	22.0(18.6-25.5)	22.7(18.6-25.5)
Femur	63.2(46.4-69.6)	66.8(46.4-72.0)	67.0(55.7-69.6)
Tibia	39.8(20.9-51.0)	44.3(27.8-51.0)	43.8(25.5-51.0)
Tarsus	35.5(20.9-51.0)	39.4(27.8-48.7)	37.4(23.2-46.4)
Tarsal dig.	28.5(23.2-32.5)	28.5(23.2-32.5)	28.5(23.2-32.5)
Claw	19.0(16.2-20.9)	18.1(16.2-20.9)	18.1(16.2-20.9)
Claw dig.	19.3(13.9-20.9)	19.3(13.9-20.9)	19.3(13.9-20.9)
Entire leg	191(144-223)	213(165-230)	211(162-234)

Spiracles: Anterior 12.2(9.3-13.9) long, peritreme 8.0(7.0-9.5) wide, diameter of atrial orifice 2.3(1.0-3.8); with 2 quinquelocular pores (fig. f), diameter ca. 4.7. Posterior 13.8(12.3-16.2) long, peritreme 7.5(7.0-9.3) wide, diameter of atrial orifice ca. 2.3; 3 quinquelocular pores (fig. f) in bifid furrow, diameter ca. 4.7.

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each ca. 4.7 long, ca. 3.5 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 28.1(16.2-34.8) long. Six rows of slender hairlike setae on abdomen, submedial (fig. i) 11.3(7.0-13.9), submarginal 5.8(4.6-11.6), marginal 6.4(4.5-7.0) long, respectively. A pair of stout setae anterior of anal ring, 25.1(20.9-30.2) long.

Anal lobes: With medial seta 14.3(13.9-16.2) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular 24.4(23.2-27.8) long, 21.7(20.9-25.5) wide; 6 anal ring setae, each 37.0(25.5-46.4) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. j): In transverse rows on abdomen.

Affinities: This species is closely aligned to C. baccharidis in morphology, geographical distribution, and host. They are separated because C. baccharidis has 76 dorsal 8-shaped pores, whereas C. badius has only 74.

NOTE: Leonardi (1911) described the first instar as follows: "Body elongate oval, rounded at anterior, restricted at posterior. The maximum body width is at the insertion of the second pair of legs. Antennae rather short, of 6 segments of which the 3rd, 5th and 6th are nearly equal in length; the 4th to the contrary is the shortest of all. The first three segments are nude, the 4th and 5th each have a single hair, inserted more or less toward the apex. Legs well developed with tarsi and tibia the same length, and the apex a pointed claw. Present on the dorsum of the body numerous outlets of 8-shaped pores, distributed in longitudinal rows and paralleled to the margin of the body..... Anal

ring with 6 setae. Each lobe provided at the apex, a long robust setae."

Cerococcus bryoides (Maskell)

Plate 7

Planchonia bryoides Maskell, 1894:84; Cerococcus bryoides, Green, 1908a: 41; Cerococcus bryoides, Morrison and Morrison, 1927:18; Steinweden, 1929:219.

MATERIAL STUDIED: On Euphorbia sp. (Euphorbiaceae), 2(17), Suva, Fiji, coll. A. Koebele, X-19-1899 (Kotinsky coll. No. 263), (USNM); on wild bush, 1(4), Suva, Fiji, coll. G. Compere, (Compere coll. No. 261), (USNM).

ADDITIONAL MATERIAL STUDIED: On Euphorbia "sienna", 1(4), Suva, Fiji, coll. A. Koebele, X-1899, (Kotinsky coll. No. 40.), (USNM).

DESCRIPTION: Body (fig. a) elliptical, widest between spiracles, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous, with 8-shaped pores on dorsum; 393(362-423) long, 181(166-196) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-two of 2 sizes arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores 21.4(18.6-23.3) long, 12.8(11.6-13.9) wide; small pores 12.5(11.6-13.9) long, 7.4(7.0-9.3) wide.

Simple pores (fig. c): About 34 in submarginal and submedial longitudinal rows, diameter ca. 1.9.

Marginal setae (fig. d): From 34 to 36, relatively short, spinelike, 5.6(4.6-7.0) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each

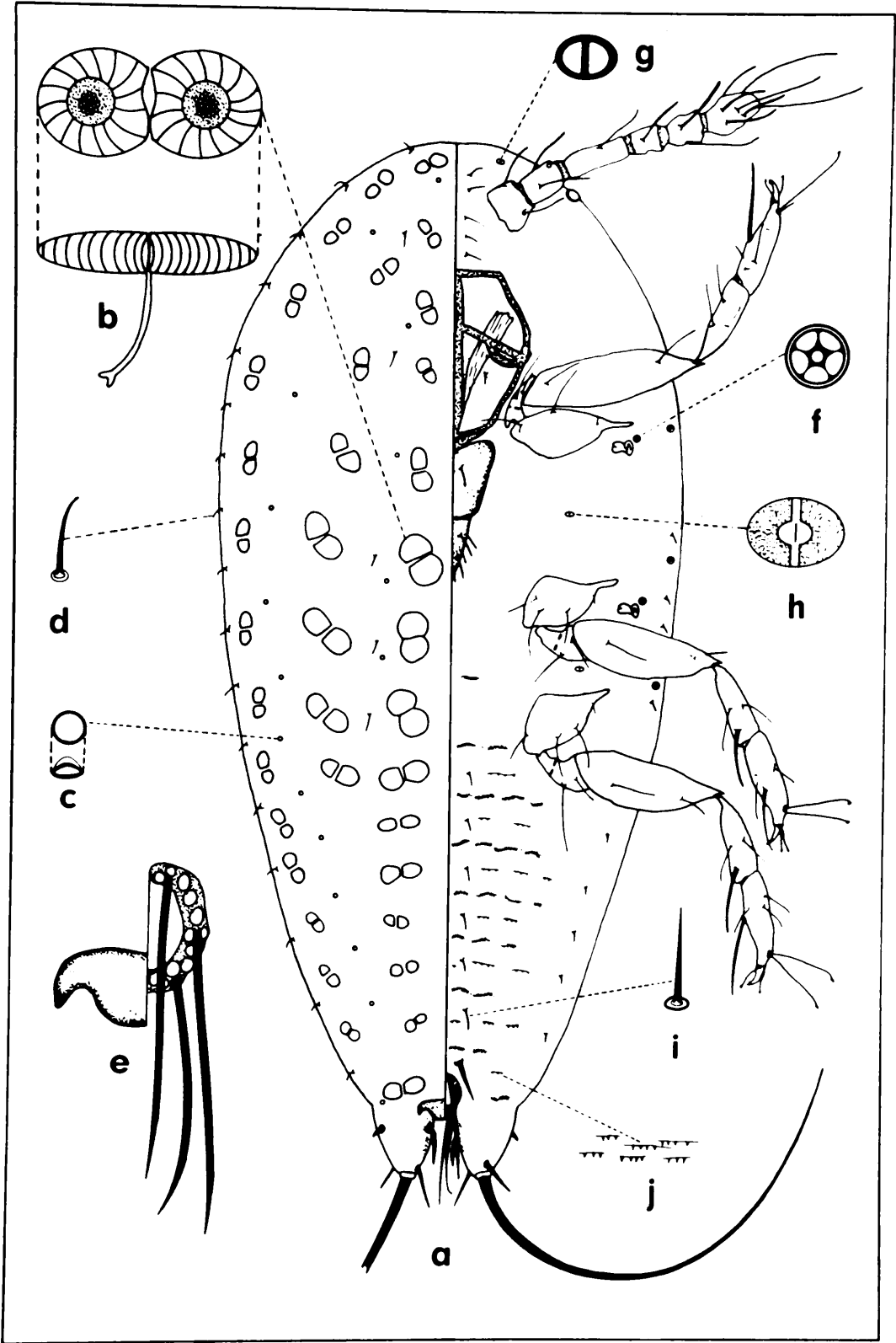


Plate 7.- *Cerococcus bryoides* (Maskell)

5.7(4.6-7.0) long.

Anal lobes: Well developed, membranous, sclerotized on inner margin; 2 spines on inner margin of each anal lobe, anterior 10.9(9.3-13.9), posterior 9.5(9.3-11.6) long. Apical setae 157(136-171) long. Lateral seta 6.1(4.6-11.6) long.

Anal plate (fig. e): Trapezoid-shaped 8.1(4.6-9.3) long, 22.9(18.6-25.5) wide.

VENTRAL SURFACE

Antennae: Total length 109(104-111), scape 16.9(16.2-18.6) long, 20.4(18.6-20.9) wide. Segments II to VI: 16.9(16.2-20.9), 26.0(25.5-27.8), 13.0(11.6-16.2), 14.2(13.9-16.2), 20.6(18.6-20.9) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular 71.9(65.0-81.2) long, 63.6(55.7-69.6) wide.

Labium: Triangular, 51.0(39.4-62.6) long, 42.9(34.8-48.7) wide; with 12 slender setae, each 10.6(4.6-23.2) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	18.1(13.9-23.2)	20.4(18.6-20.9)	21.1(18.6-25.5)
Trochanter	24.1(18.6-25.5)	23.2(23.2)	23.0(20.9-23.2)
Femur	58.0(55.7-60.3)	56.4(53.4-58.0)	55.0(51.0-58.0)
Tibia	36.8(34.8-37.1)	36.4(34.8-37.1)	35.3(34.8-37.1)
Tarsus	33.3(32.5-34.8)	32.5(30.2-34.8)	31.8(30.2-34.8)
Tarsal dig.	22.9(20.9-23.2)	22.9(20.9-23.2)	22.9(20.9-23.2)
Claw	13.0(11.6-13.9)	14.1(11.6-18.6)	13.4(11.6-13.9)
Claw dig.	17.4(13.9-20.9)	17.4(13.9-20.9)	17.4(13.9-20.9)
Entire leg	184(174-195)	183(179-188)	180(174-190)

Spiracles: Anterior 11.1(9.3-12.4) long, peritreme 8.6(7.0-9.5) wide,

diameter of atrial orifice 2.6(1.9-4.6); with 2 quinquelocular pores (fig. f), diameter 3.4(2.3-3.8). Posterior 11.4(7.6-12.4) long, peritreme 7.4(5.7-8.6) wide, diameter of atrial orifice 2.3(1.9-2.8); 3 quinquelocular pores (fig. f) in bifid furrow, diameter 3.4(2.3-3.8).

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each 4.7(3.8-4.8) long, 4.0(3.8-4.8) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 5 each, 23.2(16.2-30.2) long. Four rows of slender hairlike setae on abdomen, submedial (fig. i) 8.6(7.0-9.3), marginal 4.6(2.3-7.0) long, respectively. A pair of stout setae anterior anal ring, 19.7(13.9-23.2) long.

Anal lobes: With a medial seta 7.7(4.6-11.6) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular, 20.9(18.6-23.2) long, 20.4(18.6-20.9) wide; 6 anal ring setae, each 38.0(32.5-41.8) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. j): In transverse rows on abdomen

Affinities: This species is morphologically similar to C. theydoni and C. parahybensis, but can be separated from either because of the 4 rows of ventral abdominal setae on C. bryoides, C. theydoni and C. parahybensis have 6 rows.

Note: Maskell (1894) originally described this species as Planchonia bryoides as follows: "larvae brown, elongated, elliptical slightly tapering posteriorly; the abdomen is conspicuously segmented, and ends in two conspicuous anal tubercles bearing long setae. Antennae of six-

joints, of which the third is the longest, the last three short and confused, indeed, I am not sure that there may not be seven joints. Feet offering no distinctive characters. The whole dorsum bears transverse rows of large figure-of-eight spinnerets. A larvae extracted from the body of the mother is very soft and whitish, with a length of about $1/60$ in.; after emergence it becomes darker, and attains $1/50$ in."

Later Morrison and Morrison (1927) gave measurements of some of these morphological characters.

Cerococcus cistarum Balachowsky

Plate 8

Cerococcus cistarum Balachowsky, 1927:202.

MATERIAL STUDIED: On Helianthemum sp. (Cistaceae), 2(4), (VPI&SU No. ABH-15a-b), Famagusta, Cyprus, coll. E.E. Green, III-16-1932, (BM).

DESCRIPTION: Body (fig. a) elliptical, widest at mesothorax, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 389 (347-438) long, 196(181-211) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Sixty-four of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores 16.8(16.2-18.6) long, ca. 9.3 wide; small pores 12.2(11.6-13.9) long, 5.2(4.6-7.0) wide.

Simple pores (fig. c): About 24 in submarginal and submedial longitudinal rows, diameter ca. 1.9.

Marginal setae (fig. d): From 34 to 36 hairlike, 8.1(7.0-9.3) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each 8.1(7.0-9.3) long.

Anal lobes: Well developed, membraneous, sclerotized slightly on inner margin; 2 spines on inner margin of each anal lobe, anterior 7.7(4.6-9.3), posterior 8.7(7.0-9.3) long. Apical setae 171(153-183) long. Lateral seta 10.1(9.3-11.6) long.

Anal plate (fig. e): Trapezoid-shaped 18.6(11.6-25.5) long, 24.0(18.6-27.8) wide.

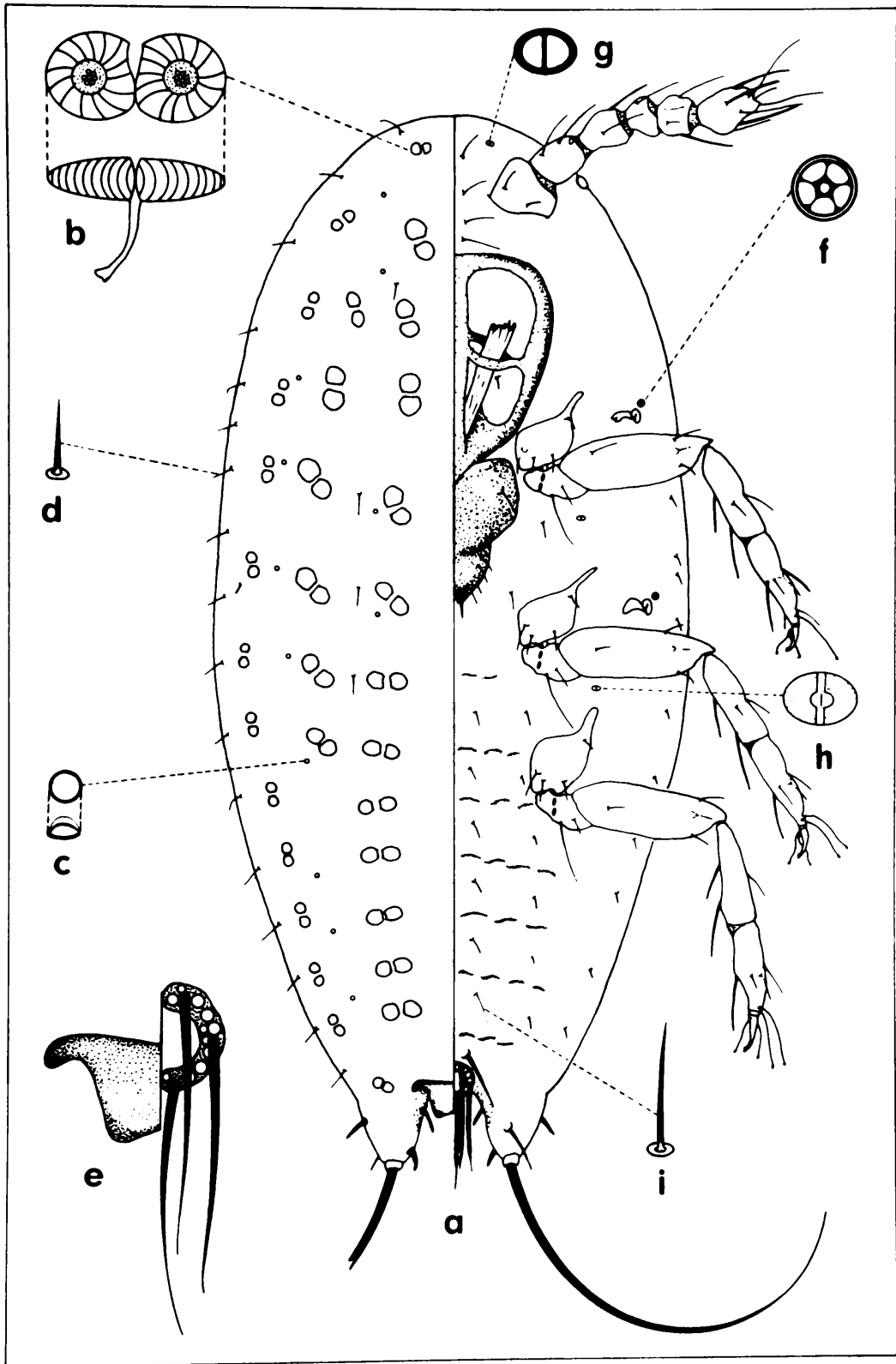


Plate 8.- *Cerococcus cistarum* Balachowsky

VENTRAL SURFACE

Antennae: Total length 98.0(93.0-102), scape 20.1(18.6-23.2) long, 19.4(18.6-20.9) wide. Segments II to VI: 17.0(13.9-20.9), 18.6(18.6), 10.4(9.3-11.6), 12.8(11.6-13.9), 19.8(18.6-20.9) long, respectively. Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular 71.9(69.6-76.6) long, 60.9(48.7-65.0) wide.

Labium: Triangular 51.6(46.4-58.0) long, 41.2(34.8-46.4) wide; with 12 slender setae, each ca. 9.3 long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	19.7(13.9-23.2)	19.2(16.2-23.2)	22.1(20.9-23.2)
Trochanter	25.6(20.9-30.2)	23.2(23.2)	24.9(23.2-27.8)
Femur	62.7(58.0-67.3)	58.0(58.0)	59.5(58.0-60.3)
Tibia	42.9(37.1-48.7)	41.8(39.4-44.1)	39.5(37.1-41.8)
Tarsus	36.0(30.2-41.3)	33.7(32.5-34.8)	32.5(32.5)
Tarsal dig.	24.9(23.2-25.5)	24.9(23.2-25.5)	24.9(23.2-25.5)
Claw	15.1(11.6-18.6)	17.4(16.8-18.6)	17.4(16.2-18.6)
Claw dig.	18.6(16.2-20.9)	18.6(16.2-20.9)	18.6(16.2-20.9)
Entire leg	206(181-230)	192(188-195)	194(190-197)

Spiracles: Anterior 12.0(9.4-16.2) long, peritreme 8.6(6.2-10.5) wide, diameter of atrial orifice 4.7(2.3-7.0); with 1 quinquelocular pore (fig. f), diameter ca. 3.8. Posterior 13.6(11.6-15.2) long, peritreme 7.4(7.0-8.2) wide, diameter of atrial orifice 3.5(2.3-4.6); 1 quinquelocular pore (fig. f) near spiracle, diameter ca. 3.8.

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each ca. 4.8 long, ca. 3.8 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4

each, 16.8(11.6-25.5) long. Six rows of slender hairlike setae on abdomen, submedial (fig. i) 7.5(4.5-9.3), submarginal 7.0(4.6-9.3), marginal 8.1(7.0-9.3) long, respectively. A pair of stout setae anterior of anal ring, 29.4(24.7-33.2) long.

Anal lobes: With a medial seta 13.9(11.6-16.2) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular ca. 20.9 long, ca. 18.6 wide; 6 anal ring setae, each 31.9(27.8-37.1) long; complete outer row of translucent pores with incomplete inner row.

Microspines: Not observed in material studied.

Affinities: This species is near C. eremobius by host, geographical distribution, and morphology. They are different because C. cistarum has mesothoracic legs under 240 long and the 2 stout spines anterior of the anal ring under 40 long, whereas C. eremobius has mesothoracic legs over 240 long and the 2 stout spines anterior of the anal ring over 40 long.

Cerococcus corokiae (Maskell)

Plate 9

Solenophora corokiae Maskell, 1890:141; Cerococcus corokiae, Green, 1917:87.

MATERIAL STUDIED: On unknown host, 2(4), (VPI&SU No. ABH-29b-c), coll. W.W. Maskell, New Zealand, (USNM); 1(3), (VPI&SU No. ABH-30c), coll. W.W. Maskell No. 46, (USNM).

DESCRIPTION: Body (fig. a) ovoid, widest at mesothorax, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 400 (336-453) long, 221(206-242) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy of 1 size, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax, each 13.2(11.6-13.9) long, 10.3(9.3-11.6) wide.

Simple pores (fig. c): About 35 in submarginal and submedial longitudinal rows, diameter ca. 2.3.

Marginal setae (fig. d): From 34 to 36, hairlike, unevenly distributed along anterior margin, each 6.2(4.6-9.3) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax and abdomen in submedial longitudinal rows, each ca. 7.0 long.

Anal lobes: Well developed, membraneous, sclerotized slightly on inner margin; 2 spines on inner margin of each anal lobe, anterior 8.9 (7.0-9.3), posterior 9.7(9.3-11.6) long. Apical setae 169(159-177) long.

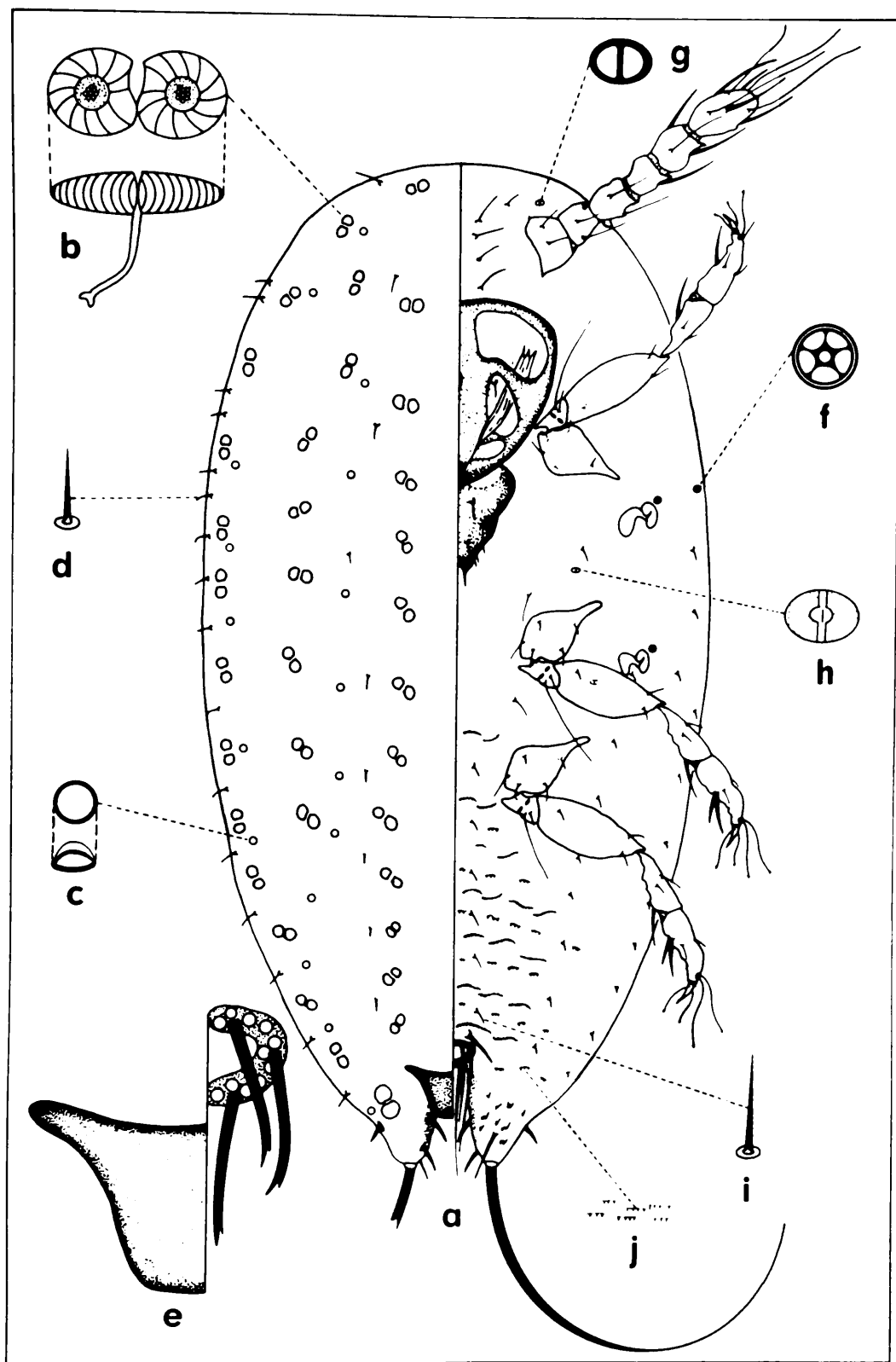


Plate 9.- *Cerococcus corokiae* (Maskell)

Lateral seta 5.1(4.6-7.0) long.

Anal plate (fig. e): Trapezoid-shaped, 15.6(13.9-16.2) long, 18.6(16.2-20.9) wide.

VENTRAL SURFACE

Antennae: Total length 108(95.0-118), scape ca. 16.2 long, 21.3(18.6-25.5) wide. Segments II to VI: 15.4(13.9-16.2), 22.1(18.6-23.2), 14.3(11.6-18.6), 16.2(13.9-18.6), 24.0(18.6-25.5) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Ovoid 80.4(76.6-85.8) long, 65.0(53.4-69.6) wide.

Labium: Triangular, 40.6(39.4-41.8) long, 42.4(41.8-44.1) wide; with 12 slender setae, each 14.7(11.6-16.2) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	19.1(18.6-20.9)	19.6(18.6-20.9)	19.4(18.6-20.9)
Trochanter	21.5(20.9-23.2)	22.1(20.9-23.2)	22.4(20.9-23.2)
Femur	57.6(53.4-65.1)	57.2(53.4-65.0)	56.5(53.4-58.0)
Tibia	31.3(27.8-32.5)	32.1(27.8-39.4)	30.6(25.5-34.8)
Tarsus	35.4(32.5-41.8)	34.0(30.2-39.4)	35.3(30.2-39.4)
Tarsal dig.	25.1(20.9-27.8)	25.1(20.9-27.8)	25.1(20.9-27.8)
Claw	16.2(13.9-18.6)	15.6(11.6-18.6)	15.8(11.6-18.6)
Claw dig.	16.7(13.9-20.9)	16.7(13.9-20.9)	16.7(13.9-20.9)
Entire leg	178(174-183)	182(174-190)	180(172-188)

Spiracles: Anterior 15.1(13.9-16.2) long, peritreme 8.5(7.0-9.3) wide diameter of atrial orifice ca. 2.3; with 2 quinquelocular pores (fig. f), diameter 4.5(3.5-4.7). Posterior 14.7(11.6-18.6) long, peritreme 8.5(7.0-9.3) wide, diameter of atrial orifice ca. 2.3; 1 quinquelocular pore (occasionally 7-locular) associated with spiracle ca. 4.7 in diameter.

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars

(fig. h) on thorax, each 4.7 long, 4.0(3.5-4.7) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 26.7(20.9-32.5) long. Six rows of slender hairlike setae on abdomen, submedial (fig. i) 13.0(9.3-16.2), submarginal ca. 4.6, marginal ca. 2.3 long, respectively. A pair of stout setae anterior of anal ring, 17.2(13.9-20.9) long.

Anal lobes: With medial seta 8.5(7.0-9.3) long. Derm is papillose with microspines somewhat larger than on abdomen.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular 23.2(20.9-25.5) long, 21.8(20.9-23.2) wide; 6 anal ring setae, each 33.5(30.2-34.8) long; complete outer row of translucent pores with incomplete row.

Microspines (fig. j): From submargin to submargin in transverse rows, smaller than those on anal lobes.

Affinities: This species is different from all other species of Cerococcus because it has 2 quinquelocular (sometimes 7-locular) pores associated with each anterior spiracle and only 1 associated with each posterior spiracle. The other species with 2 quinquelocular pores associated with each anterior spiracle will always have 3 associated with each posterior spiracle.

Cerococcus cycliger Goux

Plate 10

Cerococcus cycliger Goux, 1932:140; Sulc, 1953:10.

MATERIAL STUDIED: On Thymus sp. (Labiatae), 3(10), (VPI&SU No. ABH-35 b-d), Czechoslovakia, coll. K. Sulc, VII-18-1932, (BM).

DESCRIPTION: Body (fig. a) oval, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 447(423-483) long, 204(177-241) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores 19.5(18.6-20.9) long, 10.9(9.3-11.6) wide, small pores 14.8(11.6-16.2) long, 7.5(7.0-9.3) wide.

Simple pores (fig. c): About 26 in submarginal and submedial longitudinal rows, diameter ca. 2.0.

Marginal setae (fig. d): From 30 to 32, hairlike, 5.3(4.6-7.0) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each 6.0(4.6-7.0) long.

Anal lobes: Well developed, membranous, sclerotized slightly on inner margin; 2 spines on inner margin of each anal lobe, anterior 10.2(7.0-11.6), posterior 9.8(7.0-13.9) long. Apical setae 175(153-224) long. Lateral seta 9.6(7.0-13.9) long.

Anal plate (fig. e): Trapezoid-shaped ca. 11.6 long, and 16.2 wide, with acute posterolateral projections.

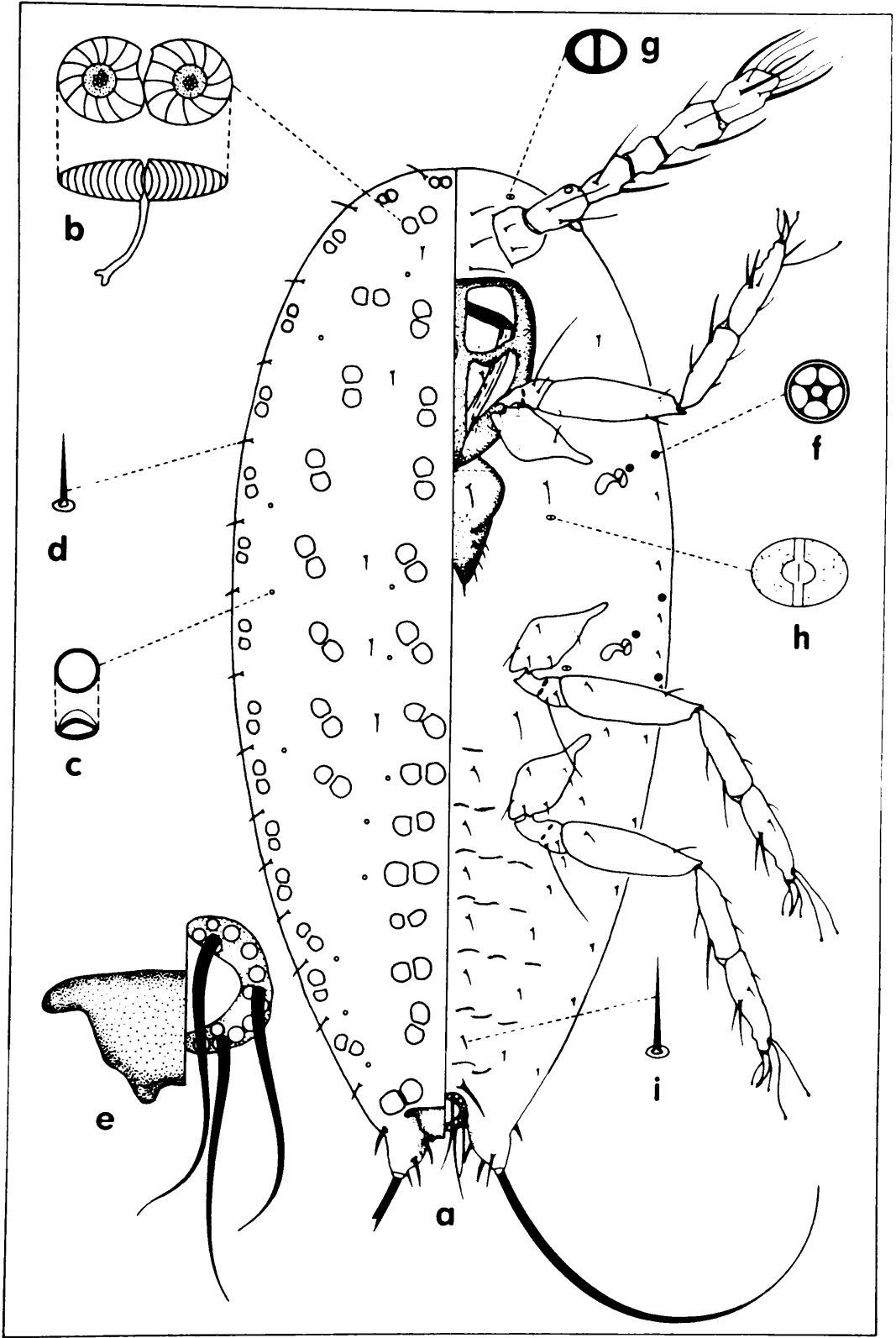


Plate 10.- *Cerococcus cycliger* Goux

VENTRAL SURFACE

Antennae: Total length 114(104-125), scape 17.5(13.9-18.6) long, 20.9(18.6-23.2) wide. Segments II to VI: 20.0(18.6-20.9), 22.7(20.9-25.5), 12.1(9.3-16.2), 17.0(13.9-20.9), 24.5(20.9-27.8) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 75.6(69.6-81.2) long, 64.0(53.4-69.6) wide.

Labium: Triangular, 46.2(41.8-51.0) long, 38.7(37.1-41.8) wide; with 12 slender setae, each 12.1(9.3-16.2) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	19.2(16.2-20.9)	18.3(13.9-23.2)	18.6(16.2-20.9)
Trochanter	22.4(20.9-23.2)	21.8(16.2-23.2)	22.0(20.9-23.2)
Femur	62.2(60.3-65.0)	63.5(58.9-67.3)	63.2(41.8-69.6)
Tibia	46.4(41.8-51.0)	45.5(41.8-48.7)	47.7(44.1-53.4)
Tarsus	38.0(32.5-41.8)	39.4(37.1-44.1)	41.0(39.4-46.4)
Tarsal dig.	26.3(23.2-27.8)	26.3(23.2-27.8)	26.3(23.2-27.8)
Claw	17.6(16.2-18.6)	18.6(18.6)	18.0(16.2-18.6)
Claw dig.	18.6(16.2-20.9)	18.6(16.2-20.9)	18.6(16.2-20.9)
Entire leg	208(200-214)	207(197-218)	210(183-232)

Spiracles: Anterior 12.6(11.6-13.9) long, peritreme 9.1(7.0-9.3) wide, diameter of atrial orifice ca. 2.3; with 2 quinquelocular pores (fig. f), diameter 4.2(3.6-4.7). Posterior 13.2(11.6-13.9) long, peritreme 9.1(7.0-9.3) wide, diameter of atrial orifice ca. 2.3; 3 quinquelocular pores (fig. f) in bifid furrow, diameter 4.2(3.5-4.7)

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each 4.0(3.5-4.7) long, 3.1(2.3-3.5) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 3 each,

20.9(13.9-25.5) long. Six rows of slender hairlike setae on abdomen submedial (fig. i) 14.5(11.6-20.9), submarginal 6.1(4.6-7.0), marginal ca. 5.0 long, respectively. A pair of stout setae anterior of anal ring, 22.7(18.6-30.2) long.

Anal lobes: With a medial seta 11.6(9.3-13.9) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular 22.2(18.6-25.5) long, 20.1(18.6-20.9) wide; 6 anal ring setae, each 34.3(27.8-44.1) long; complete outer row of translucent pores with incomplete row.

Microspines: Not evident on material studied.

Affinities: This species is morphologically near C. albospicatus and they are different because C. cycliger has prothoracic legs under 220, a clypeolabral shield under 90, and antennal segment III under 27 long. The known geographical distribution of C. cycliger is Europe, while C. albospicatus is from Ceylon and Java.

Note: Goux (1932) described the first instar as follows: "First stage larva is oval. Length 400-500 . Eyes visible. 6-segmented antennae with insertions close together. Labium pointed. Rostral hair bent back into hooks. Anal lobes well developed, 6 anal ring setae. Dorsal 8-shaped pores each 11-18 long in 4 longitudinal rows on abdomen, 6 on cephalothorax. Ventrums with setae and a few disc pores on cephalothorax. Legs well developed, digitules imperceptibly expanded at their tips."

Cerococcus deklei Kosztarab and Vest

Plate 11

Cerococcus deklei Kosztarab and Vest, 1966:369.

MATERIAL STUDIED: On Hibiscus rosa-sinensis (Malvaceae), 1(5), Havana, Cuba, coll. C.H. Ballou, III-17-1922, No. 107, (USNM); 1(2), Miami, Florida, coll. R.E. Brown, No. Fla-3u, (UCD). On Hibiscus sp. 1(3), Curitgha, Brazil, coll. A. Hempel, (Ferris No. 9), IX-25-1930, (UCD). On Malvaviscus arboreus (Malvaceae), 1(2), Cuba, coll. F.T. Kenworthy (Washington 7402), III-16-1960, (USNM).

DESCRIPTION: Body (fig. a) elliptical, widest at mesothorax, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 411(378-438) long, 192(166-226) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Eighty of 1 size, arranged in 4 longitudinal rows at extremities, 6-8 rows on thorax, each ca. 9.3 long, 6.0(4.6-7.0) wide.

Simple pores (fig. c): About 36 in submarginal and submedial longitudinal rows, diameter ca. 1.0.

Marginal setae (fig. d): From 36 to 40, short, straight or slightly curved, 7.9(4.6-9.3) long.

Spiracular setae (fig. e): Acorn-shaped, 1 anterior, 2 posterior, each ca. 7.0 long.

Anal lobes: Well developed, membraneous, sclerotized slightly on inner margin; 2 strong, slightly curved spines on inner margin of each anal

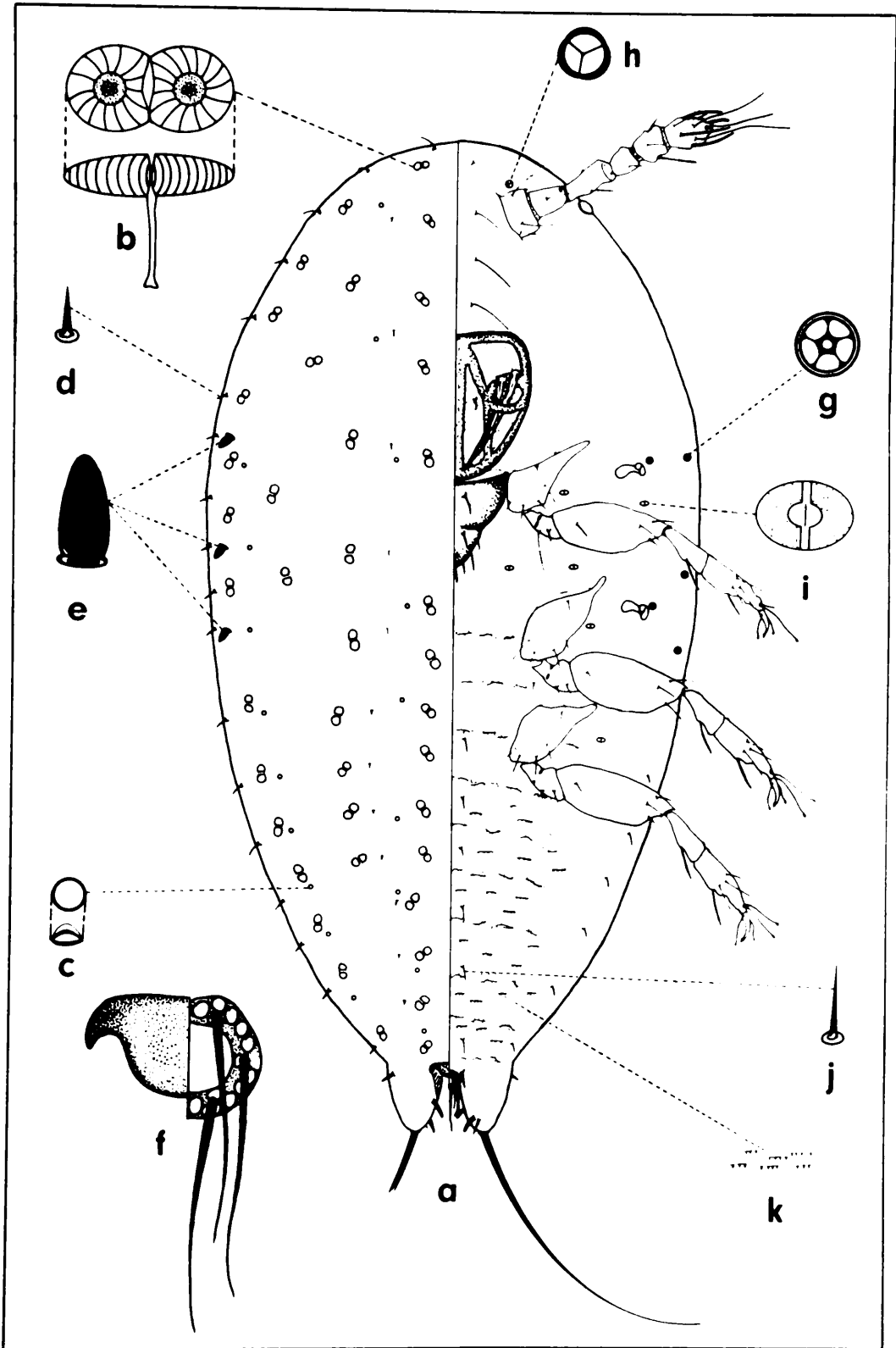


Plate 11.- *Cerococcus deklei* Kosztarab and Vest

lobe, anterior 8.9(7.0-9.3), posterior 7.5(7.0-9.3) long. Apical setae 150(132-174) long. Lateral seta ca. 9.3 long.

Anal plate (fig. f): Trapezoid-shaped 10.6(9.3-11.6) long, 15.4(11.6-18.6) wide.

VENTRAL SURFACE

Antennae: Total length 106(97.4-121), scape 16.0(13.9-18.6) long, 19.0(16.2-20.9) wide. Segments II to VI: 15.4(13.9-18.6), 25.1(23.2-32.5), 13.9(11.6-16.2), 14.5(11.6-16.2), 21.3(18.6-23.2) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 79.7(70.8-94.4) long, 63.1(53.1-70.8) wide.

Labium: Triangular, 47.8(47.2-53.1) long, 43.7(41.3-47.2) wide; with 12 slender setae, each 15.1(12.4-20.9) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	22.1(20.9-23.2)	20.9(18.6-23.2)	21.7(20.9-23.2)
Trochanter	21.7(18.6-23.2)	20.3(18.6-23.2)	20.1(18.6-23.2)
Femur	54.1(51.0-60.3)	52.2(51.0-55.7)	51.6(46.4-55.7)
Tibia	27.8(23.2-34.8)	28.1(25.5-34.8)	28.6(25.5-34.8)
Tarsus	31.9(30.2-39.4)	29.9(25.5-32.5)	32.8(30.2-34.8)
Tarsal dig.	26.7(23.2-27.8)	26.7(23.2-27.8)	26.7(23.2-27.8)
Claw	16.2(13.9-18.6)	15.6(13.9-18.6)	17.2(16.2-18.6)
Claw dig.	17.4(16.2-18.6)	17.4(16.2-18.6)	17.4(16.2-18.6)
Entire leg	171(162-176)	168(158-176)	168(160-176)

Spiracles: Anterior 11.4(9.3-13.9) long, peritreme 6.7(4.6-9.3) wide, diameter of atrial orifice 2.6(2.3-4.6); with 2 quinquelocular pores (fig. g), diameter ca. 2.8. Posterior 11.3(9.3-11.6) long, peritreme

7.2(4.6-9.3) wide, diameter of atrial orifice 2.6(2.3-4.6); 3 quinquelocular pores (fig. g) in bifid furrow, diameter ca. 2.8.

Pores: Two small triloculars (fig. h) anterior of antennae; 10-12 biloculars (fig. i) on thorax, each 4.0(2.8-4.7) long, 2.8(2.0-3.8) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 22.6(14.2-30.4) long. Four rows of slender hairlike setae on abdomen, submedial (fig. j) 9.5(7.6-10.4), submarginal 6.6(4.7-7.6) long, respectively. A pair of stout setae anterior of anal ring, 13.7(7.6-19.0) long.

Anal lobes: With medial seta 7.0(4.6-9.3) long.

Anal ring (fig. f): Placed almost vertical to the longitudinal axes of the anal lobes; subcircular 15.3(13.9-18.6) long, 15.8(11.6-18.6) wide; 6 anal ring setae, each 29.2(25.5-32.5) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. k): In transverse rows from submargin to submargin on abdomen.

Affinities: This species is closely aligned with C. artemisiae, but is different because it has a trilocular pore anterior of each antenna instead of a bilocular pore and it having legs with an average length of less than 171.

Cerococcus dumonti Vayssiere

Plate 12

Cerococcus dumonti Vayssiere, 1927:107.

MATERIAL STUDIED: On Helianthemum kahiricum (Cistaceae), 5(15), VPI&SU No. ABH-06a-e), Nefta, Tunisia, coll. C. Dumont, II-1927, (USNM).

DESCRIPTION: Body (fig. a) elliptical, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 527(472-559) long, 265 (248-287) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy of 1 size, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; each 14.2(9.7-18.6) long, 7.8(4.6-9.7) wide.

Simple pores (fig. c): About 32 in submarginal and submedial longitudinal rows, diameter ca. 1.9.

Marginal setae (fig. d): From 30 to 32, hairlike, 7.6(4.6-16.2) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each 8.0(4.6-13.9) long.

Anal lobes: Well developed, membranous, sclerotized, on inner margin; 2 stout spines on inner margin of each anal lobe, anterior 21.7(15.5-39.4), posterior 21.6(18.6-25.5) long. Apical setae 234(181-266) long. Lateral seta 24.1(16.2-32.5) long.

Anal plate (fig. e): Trapezoid-shaped 14.2(9.3-18.6) long, 18.2(9.3-

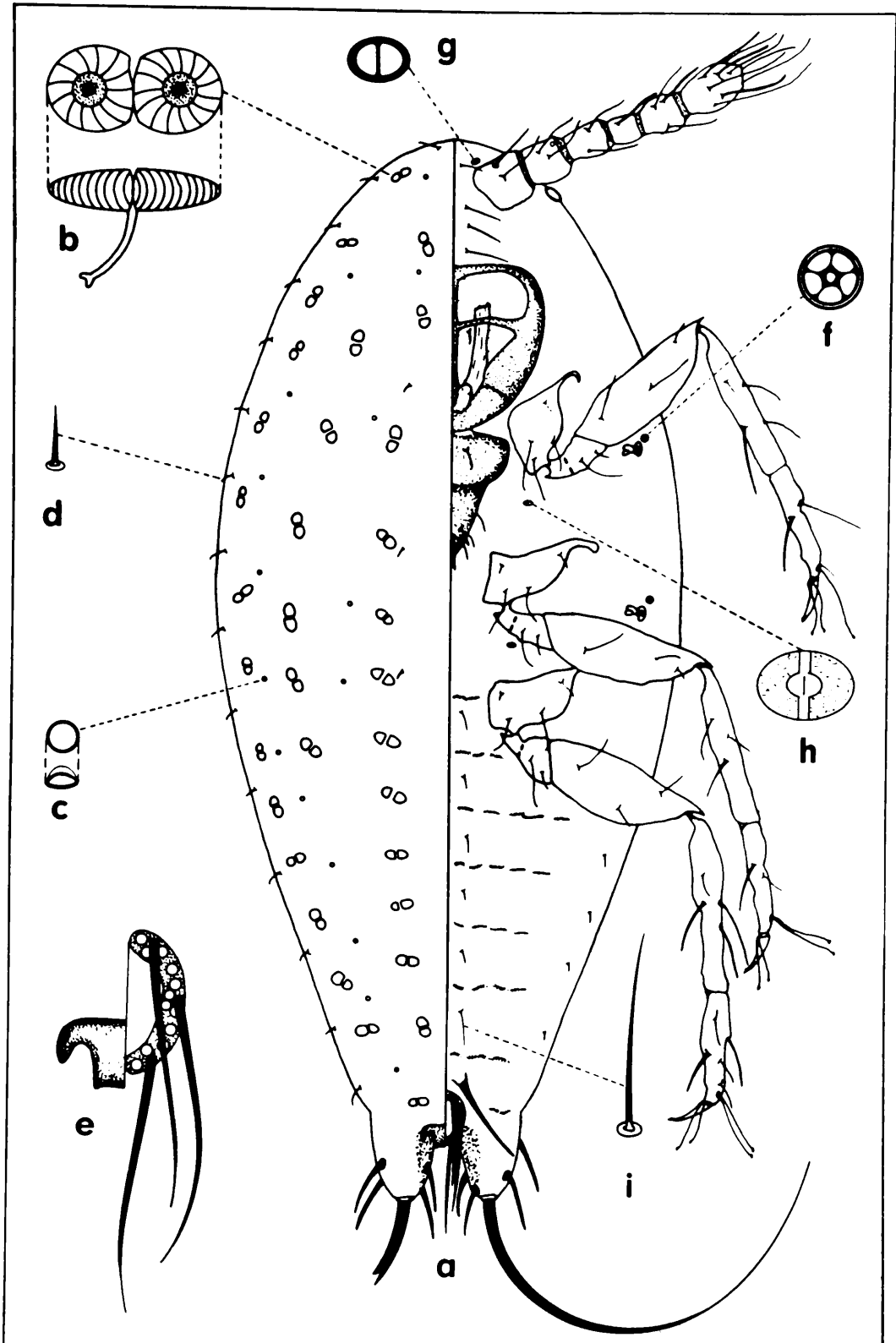


Plate 12.- *Cerococcus dumonti* Vayssiere

30.2) wide.

VENTRAL SURFACE

Antennae: Total length 136(123-144), scape 22.4(18.6-25.5) long, 26.7(23.3-31.1) wide. Segments II to VI: 21.6(20.9-23.2), 27.4(23.2-30.2), 13.5(11.6-13.9), 21.9(18.6-23.3), 29.0(27.8-31.1) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 86.1(79.6-95.1) long, 82.5(58.3-95.1) wide.

Labium: Triangular, 79.5(71.9-90.5) long, 58.1(53.4-67.3) wide; with 12 slender setae, each 16.0(9.3-19.4) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	23.7(18.6-30.2)	23.8(18.6-27.8)	25.3(20.9-29.1)
Trochanter	30.6(23.2-32.5)	32.0(30.2-34.8)	32.3(25.5-34.8)
Femur	84.0(81.2-87.4)	86.3(81.2-89.3)	84.0(76.6-88.2)
Tibia	71.6(67.3-74.2)	80.8(77.7-85.8)	80.5(68.0-89.3)
Tarsus	48.4(39.4-55.7)	50.1(48.6-51.0)	50.3(44.1-55.7)
Tarsal dig.	37.0(34.8-39.4)	37.0(34.8-39.4)	37.0(34.8-39.4)
Claw	23.2(20.9-25.5)	24.5(23.2-25.5)	24.6(20.9-27.8)
Claw dig.	24.9(20.9-27.2)	24.9(20.9-27.2)	24.9(20.9-27.2)
Entire leg	281(269-292)	301(295-311)	297(281-311)

Spiracles: Anterior 17.4(15.2-19.0) long, peritreme 8.7(7.6-10.5) wide, diameter of atrial orifice 3.4(1.9-5.7); with 1 quinquelocular pore (fig. f), diameter 3.8(2.8-4.8). Posterior 17.2(16.2-19.0) long, peritreme 8.9(7.6-10.5) wide, diameter of atrial orifice 3.6(1.9-4.8); 1 quinquelocular pore (fig. f) near each spiracle, diameter 3.8(2.8-4.8).

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each 5.4(4.8-6.6) long, 4.9(4.8-5.7) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4, each 19.6(13.6-30.2) long. Four rows of slender hairlike setae on abdomen, submedial (fig. i) 11.3(9.3-16.2), marginal 7.3(4.6-11.6) long, respectively. A pair of stout setae anterior of anal ring, 45.0 (39.4-51.1) long.

Anal lobes: With lateral seta 23.8(18.6-32.5) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, slightly anterior of anal plate; subcircular 27.3(23.2-29.1) long, 26.4(23.2-30.2) wide; 6 anal ring setae, each 49.0(44.1-53.4) long; complete outer row of translucent pores with incomplete inner row.

Microspines: Not evident on material studied.

Affinities: This species is near C. cistarum and C. eremobius in geographical distribution and host. All three species are known only from the family Cistaceae. C. dumonti is different from these species because it has dorsal 8-shaped pores on only one distinct size. It is near C. ruber and C. intermedius in geographical distribution, also but their host families are different.

Cerococcus eremobius (Scott)

Plate 13

Cercococcus eremobius Scott, 1907:455; 1930:7; Cerococcus eremobius, Green, 1908a:41.

MATERIAL STUDIED: On Helianthemum kahiricum (Cistaceae), 1(10), Maknassy, S. Tunisia coll. C. Dumont, IV-20-1929, (USNM).

DESCRIPTION: Body (fig. a) elliptical, widest across mesothorax; tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 498(468-513) long, 224(211-242) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores 19.5(18.6-20.9) long, 10.4(9.3-11.6) wide, small pores 12.1(11.6-13.9) long, 7.2(7.0-9.3) wide.

Simple pores (fig. c): About 36 in submarginal and submedial longitudinal rows, diameter ca. 1.9.

Marginal setae (fig. d): From 32 to 34, hairlike, 7.0(4.6-11.6) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each 7.0(4.6-9.3) long.

Anal lobes: Well developed, membranous, sclerotized on inner margin; 2 stout spines on inner margin of each anal lobe, anterior 27.8(16.2-32.5), posterior 17.5(16.2-20.9) long. Apical setae 249(230-271) long. Lateral seta 19.2(16.2-23.2) long.

Anal plate (fig. e): Trapezoid-shaped 12.4(9.3-13.9) long, 28.6(20.9-

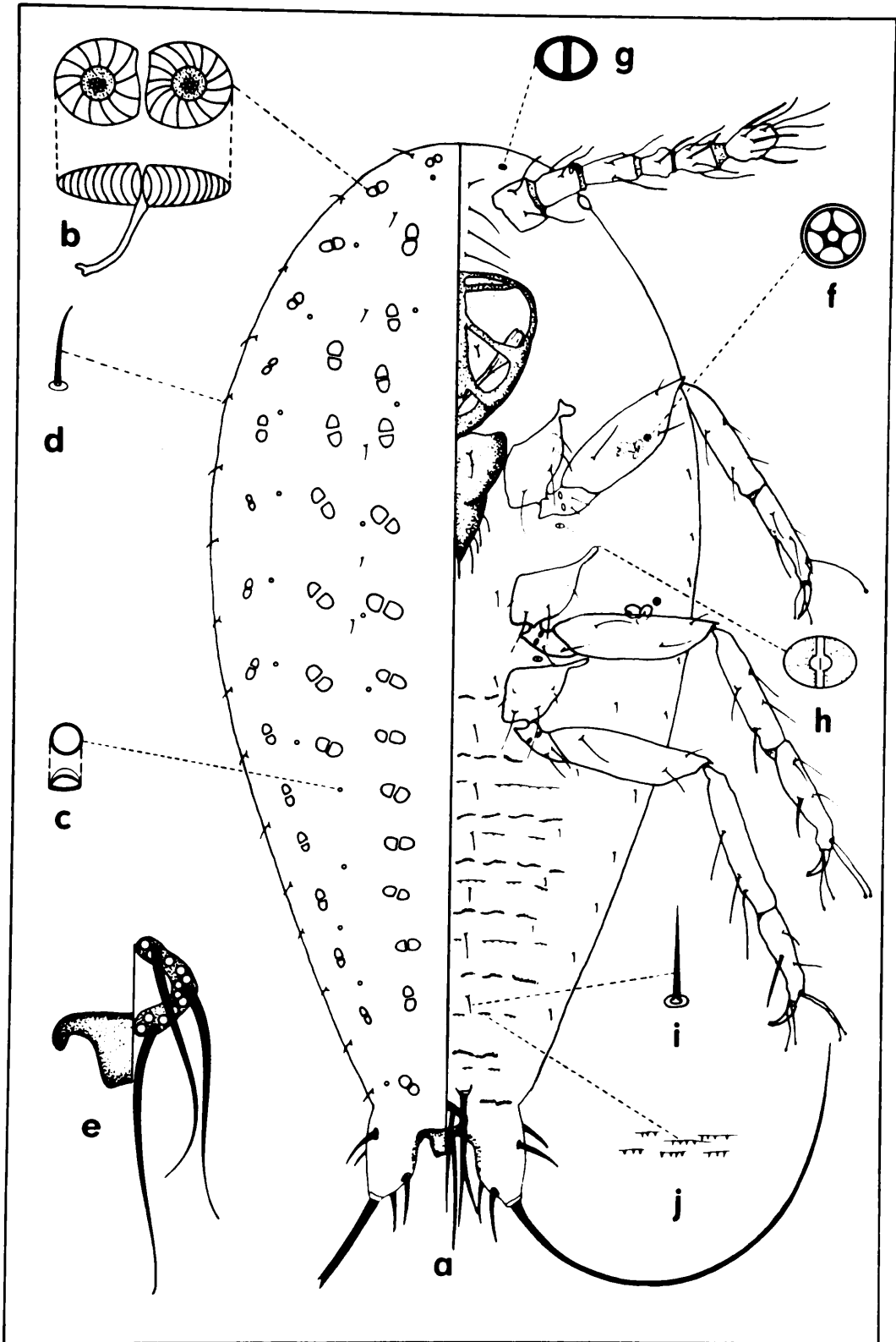


Plate 13.- *Cerococcus eremobius* (Scott)

41.8) wide.

VENTRAL SURFACE

Antennae: Total 142(128-156), scape 24.2(20.9-30.2) long, 27.3(23.2-30.2) wide. Segments II to VI: 22.4(20.9-23.2), 29.7(25.5-32.5), 14.4(11.6-18.6), 21.6(18.6-25.5), 29.7(27.8-30.2) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 85.6(69.6-95.1) long, 80.5(60.3-90.5) wide.

Labium: Triangular, 75.2(69.6-81.2) long, 56.6(51.0-60.3) wide; with 12 slender setae, each 17.6(13.9-20.9) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	26.0(23.2-30.2)	26.7(25.5-27.8)	26.4(23.2-30.2)
Trochanter	28.5(20.9-32.5)	30.4(30.2-32.5)	29.7(25.5-32.5)
Femur	78.4(76.6-81.2)	80.7(76.6-85.8)	80.9(78.9-83.5)
Tibia	67.1(60.3-71.9)	70.3(62.6-76.6)	68.3(65.0-71.9)
Tarsus	46.4(44.1-51.0)	47.1(44.1-51.0)	48.9(44.1-51.0)
Tarsal dig.	32.5(30.2-34.8)	32.5(30.2-24.8)	32.5(30.2-34.8)
Claw	23.2(20.9-25.5)	22.7(20.9-25.5)	22.9(20.9-25.5)
Claw dig.	25.0(23.2-25.5)	25.0(23.2-25.5)	25.0(23.2-25.5)
Entire leg	270(255-283)	273(248-290)	277(262-285)

Spiracles: Anterior 11.2(7.0-13.9) long, peritreme 10.8(8.2-11.7) wide, diameter of atrial orifice 3.0(2.3-5.8); with 1 quinquelocular pore (fig. f), diameter 3.8(2.3-4.6). Posterior 12.7(9.3-18.6) long, peritreme 10.7(9.3-11.7) wide, diameter of atrial orifice 4.6(2.3-7.0); 1 quinquelocular pore (fig. f) near spiracle, diameter 3.8(2.3-4.6).

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each 5.8(4.6-7.0) long, 4.7(4.6-5.8) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 19.5(16.2-27.8) long. Six rows of slender hairlike setae on abdomen, submedial (fig. i) 12.0(9.3-16.2), submarginal 7.9(4.6-11.6), marginal 7.0(4.6-11.6) long, respectively. A pair of stout setae anterior of anal ring, 51.3(48.7-58.0) long.

Anal lobes: With lateral seta 17.6(14.2-23.2) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular 30.2(27.8-32.5) long, 23.2(20.9-25.5) wide; 6 anal ring setae, each 49.4(41.8-58.0) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. j): In transverse rows from submargin to submargin on abdomen.

Affinities: This species is near to C. cistarum by host, geographical distribution, and morphology. It is distantly aligned with C. dumonti by host and distribution, but they are different in morphology.

Cerococcus ficoides Green

Plate 14

Cerococcus ficoides Green, 1899:225.

MATERIAL STUDIED: On tea plant (Theaceae), 2(10) Duars, India, coll. G. Watt, VIII-7-1905), (USNM).

DESCRIPTION: Body (fig. a) elliptical, widest at mesothorax; tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 433(392-498) long, 212(196-227) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-eight of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6-8 rows on thorax; large pores 13.4(11.6-13.9) long, 8.9(7.0-9.3) wide; small pores 8.7(7.8-9.7) long, 6.2(4.6-7.0) wide.

Simple pores (fig. c): About 38 in submarginal and submedial longitudinal rows, diameter ca. 1.9.

Marginal setae (fig. d): From 36 to 38, hairlike, 6.3(4.5-11.6) long.

Spiracular setae (fig. e): Acorn-shaped; 2 anterior close together, each 6.6(4.6-9.3) long; posterior 6.7(5.8-7.0) long.

Body setae: On cephalothorax and abdomen in 2 submedial longitudinal rows, each 6.0(4.6-9.3) long.

Anal lobes: Well developed, membraneous, sclerotized on inner margin; 2 stout spines on inner margin of each anal lobe, anterior 10.2(7.8-13.9), posterior 8.3(7.0-9.3) long. Apical setae 185(171-207) long. Lateral seta 7.8(7.0-9.7) long.

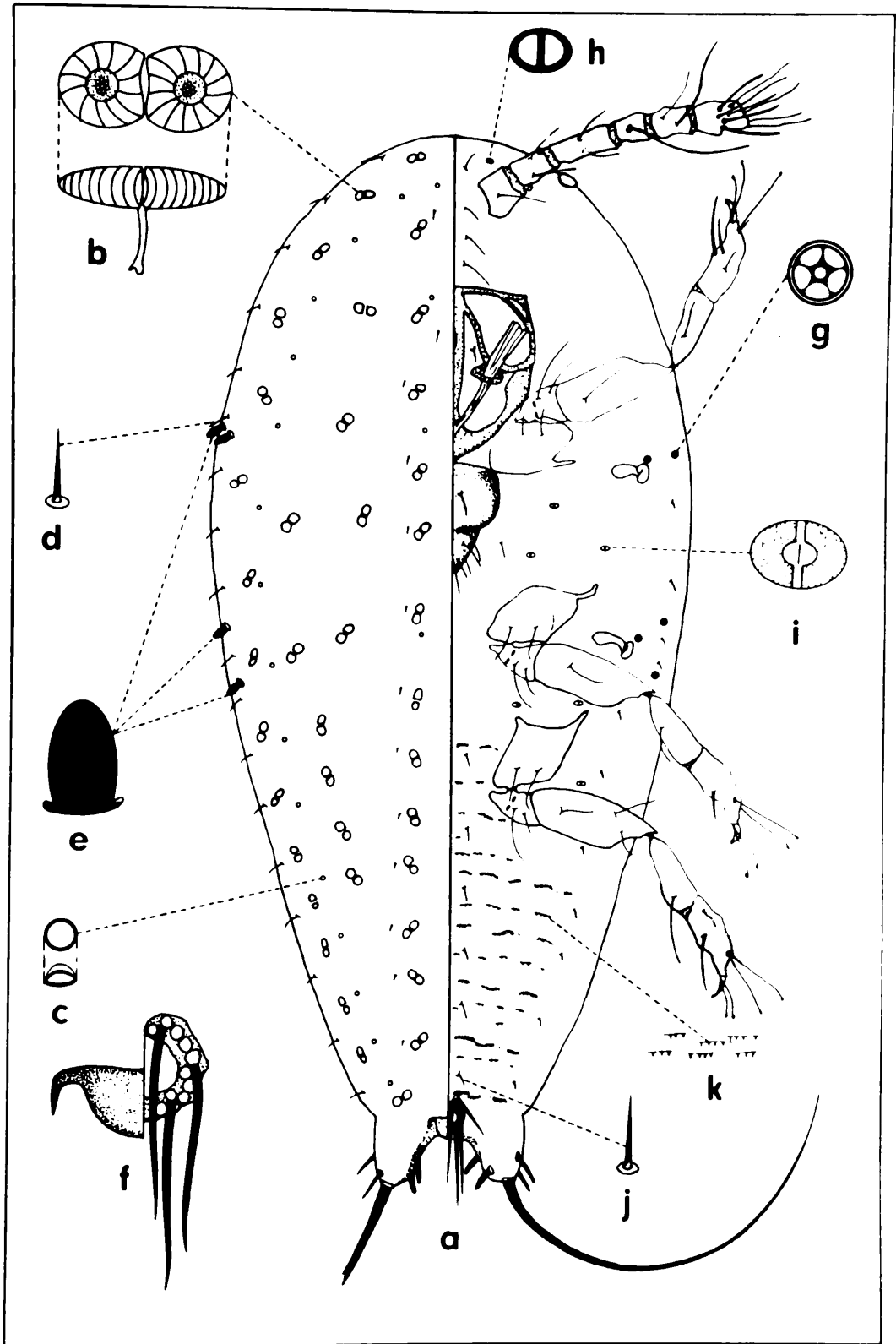


Plate 14.- *Cerococcus ficoides* Green

Anal plate (fig. f): Trapezoid-shaped 11.7(11.6-11.8) long, 17.7(16.2-18.6) wide.

VENTRAL SURFACE

Antennae: Total length 123(118-136), scape 18.2(13.9-23.2) long, 21.3(13.9-25.5) wide. Segments II to VI: 19.9(18.6-25.2), 27.6(25.2-30.2), 17.1(13.9-18.6), 17.9(15.5-20.9), 22.6(17.5-23.2) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 69.5(60.3-78.9) long, 61.1(53.4-69.6) wide.

Labium: Triangular, 59.6(46.4-81.2) long, 50.2(34.8-60.3) wide; with 12 slender setae, each 15.1(11.6-20.9) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	23.9(16.2-33.0)	24.6(19.4-29.1)	25.8(23.3-27.8)
Trochanter	22.9(17.5-25.5)	22.4(17.5-25.5)	22.7(15.5-27.8)
Femur	55.3(50.5-62.9)	53.5(35.0-62.6)	54.3(46.4-62.6)
Tibia	28.9(27.2-51.0)	33.2(29.1-37.1)	33.4(29.1-39.4)
Tarsus	29.3(25.5-37.1)	28.9(17.5-34.8)	29.8(25.2-32.5)
Tarsal dig.	26.8(25.2-31.1)	26.8(25.2-31.1)	26.8(25.2-31.1)
Claw	18.0(15.5-30.2)	18.4(16.2-27.1)	16.7(11.6-21.4)
Claw dig.	20.7(17.5-25.5)	20.7(17.5-25.5)	20.7(17.5-25.5)
Entire leg	179(165-227)	179(150-197)	183(171-204)

Spiracles: Anterior 15.2(10.5-27.8) long, peritreme 7.8(5.8-9.4) wide, diameter of atrial orifice 3.1(1.2-4.6); with 2 quinquelocular pores (fig. g), diameter 3.2(2.3-4.6). Posterior 11.8(8.1-13.9) long, peritreme 7.2(7.0-8.2) wide, diameter of atrial orifice 3.5(2.3-5.8); 3 quinquelocular pores (fig. g) in bifid furrow.

Pores: Two small biloculars (fig. h) anterior of antennae; 12 biloculars

(fig. i) on thorax, each 3.6(2.3-4.7) long, ca. 2.8 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 29.9(16.2-39.4) long. Four rows of slender hairlike setae on abdomen, submedial (fig. j) 6.5(4.6-7.0), marginal 4.9(2.3-7.0) long, respectively. A pair of stout setae anterior of anal ring, 24.0(18.6-27.8) long.

Anal lobes: With lateral seta 7.8(5.8-9.3) long.

Anal ring (fig. f): Placed nearly vertical to the longitudinal axes of the anal lobes, subcircular 19.0(18.6-19.4) long, 19.1(17.5-20.9) wide; 6 anal ring setae, each 35.9(27.2-56.3) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. k): In more or less transverse rows from submargin to submargin on abdomen.

Affinities: This species is very similar to C. kalmiae by frequently having the acorn-shaped anterior spiracular setae double, but it is different from C. kalmiae because it has fewer dorsal 8-shaped pores and is only known from Formosa and India, whereas C. kalmiae is from North America.

Note: This is the only species with acorn-shaped spiracular setae which does not occur in North or South America.

Cerococcus froggatti Morrison and Morrison

Plate 15

Cerococcus froggatti Morrison and Morrison, 1927:17.

MATERIAL STUDIED: On Helichrysum diosmaefolium (Compositae), 1(3), Mittagong, N.S.W., Australia, coll. W.W. Froggatt, IV-9-1901, (USNM).

DESCRIPTION: Body (fig. a) elliptical, widest at mesothorax, tapering posteriorly to relatively short anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 383(362-393) long, 201(196-211) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-two of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores 20.0(18.6-20.9) long, 10.8(9.3-11.6) wide; small pores ca. 11.6 long, ca. 7.0 wide.

Simple pores (fig. c): About 20 in submarginal row, diameter ca. 1.9.

Marginal setae (fig. d): From 30 to 32, hairlike, ca. 7.0 long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax and abdomen in 2 submedial longitudinal rows, each ca. 4.6 long.

Anal lobes: Shorter than most species, membraneous, sclerotized slightly on inner margin; 2 spines on inner margin of each anal lobe, anterior c. 11.6, posterior 10.1(9.3-11.6) long. Apical setae 171(158-181) long. Lateral seta ca. 7.0 long.

Anal plate (fig. e): Shape and length not accurately determined, ca. 20.9 wide.

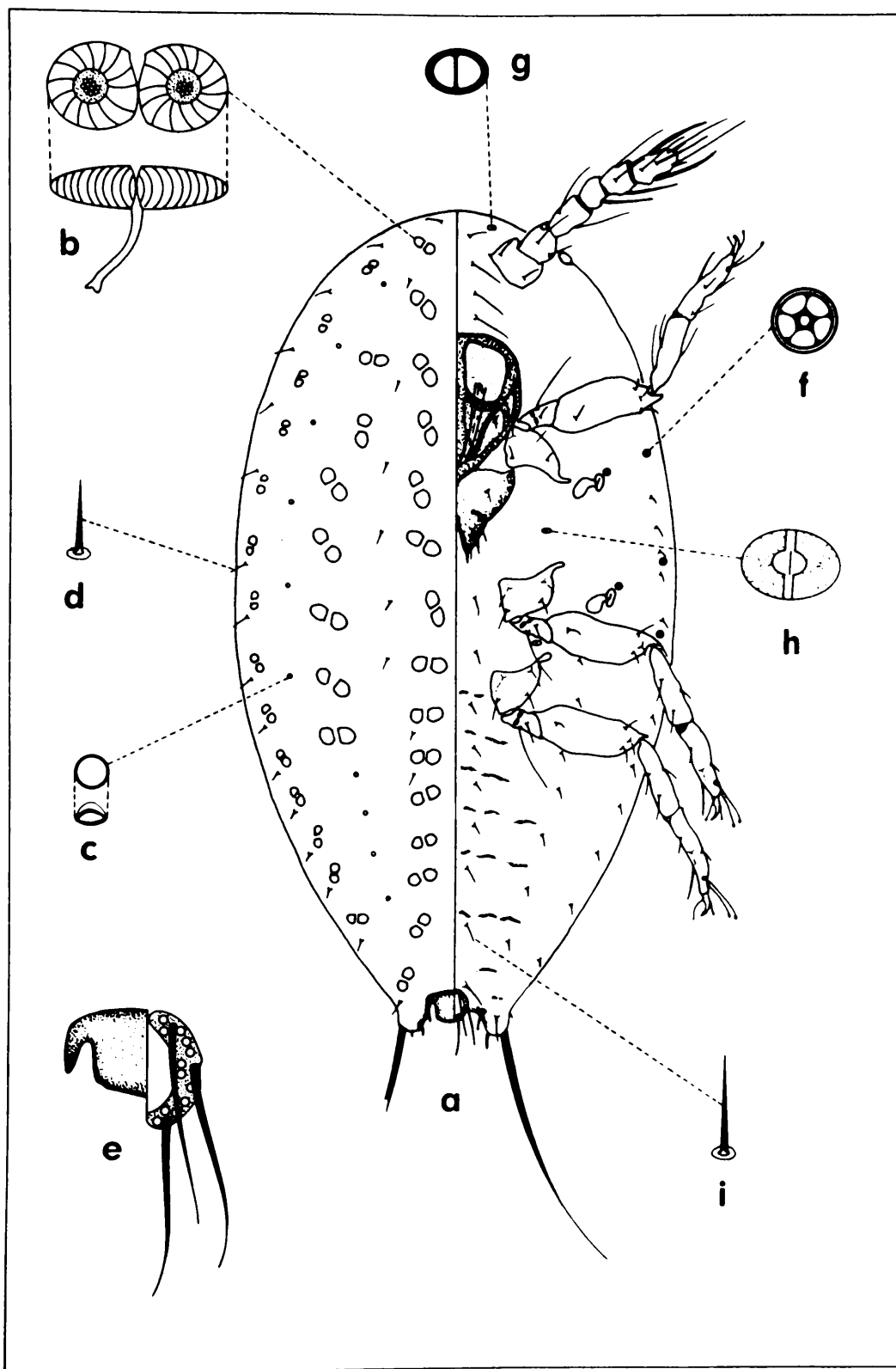


Plate 15.- *Cerococcus froggatti* Morrison and Morrison

VENTRAL SURFACE

Antennae: Total length 104(100-109), scape 15.4(13.9-16.2) long, ca. 23.2 wide. Segments II to VI: ca. 16.2(20.1(18.6-23.2), 10.8(9.3-11.6), 16.2(13.9-18.6), 24.7(23.2-25.5) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 74.3(69.6-76.6) long, 62.0(60.3-65.0)

Labium: Triangular, 41.0(39.4-41.8) long, 51.0(48.7-53.4) wide; with 12 slender setae, each ca. 13.9 long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	17.8(16.2-18.6)	17.8(16.2-18.6)	17.8(16.2-18.6)
Trochanter	19.4(18.6-20.9)	20.1(18.6-20.9)	18.6(18.6)
Femur	56.5(53.4-58.0)	54.9(53.4-55.7)	55.0(51.0-60.3)
Tibia	34.8(32.5-39.4)	32.5(32.5)	37.1(34.8-39.4)
Tarsus	33.3(30.2-37.1)	34.0(30.2-37.1)	34.0(27.8-39.4)
Tarsal dig.	25.5(25.5)	25.5(25.5)	25.5(25.5)
Claw	17.0(16.2-18.6)	17.8(16.2-18.6)	17.0(16.2-18.6)
Claw dig.	17.8(16.2-18.6)	17.8(16.2-18.6)	17.8(16.2-18.6)
Entire leg	179(172-188)	177(172-183)	179(169-192)

Spiracles: Anterior ca. 13.9 long, peritreme 7.7(7.0-9.3) wide, diameter of atrial orifice ca. 2.3; with 2 quinquelocular pores (fig. f), diameter 3.5(2.8-3.8). Posterior 10.8(7.0-13.9) long, peritreme 8.5(7.0-9.3) wide, diameter of atrial orifice ca. 2.3; 3 quinquelocular pores (fig. f) in bifid furrow, diameter 3.5(2.8-3.8).

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each ca. 4.8 long, ca. 3.8 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 26.3(18.6-34.8) long. Six rows of slender hairlike setae on

abdomen, submedial (fig. i) 10.8(9.3-11.6), submarginal 6.2(4.6-7.0), marginal ca. 4.6 long, respectively. A pair of stout setae anterior of anal ring, 21.7(16.8-23.2) long.

Anal lobes: With medial seta 13.1(11.6-13.9) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular ca. 23.2 long, ca. 20.9 wide; 6 anal ring setae, each 40.2(34.8-46.4) long; complete outer row of translucent pores with incomplete inner row.

Microspines: Not visible on specimens studied.

Affinities: This species is closely related to C. stellatus by morphology, host and geographical distribution. C. froggatti has slightly shorter anal lobes.

Note: Morrison and Morrison (1927) described this species as follows:

"Very similar to that of stellatus more conspicuous differentiating character than is exhibited by the adults: the cauda in stellatus, as described, relatively long and strongly protruding, with rounded apex; in this species merely a rather narrow thickened band bearing one or two denticulae on each side."

Cerococcus indicus (Maskell)

Plate 16

Eriococcus paradoxus var. indicus Maskell, 1897:318; Cerococcus indicus, Green, 1910:5; Cerococcus hibisci, Ali, 1967:29; Lambdin and Kosztarab, In Press.

MATERIAL STUDIED: On unknown host, 3(12), (VPI&SU No. ABH-26a-c), Rangoon, Burma, coll. F.J. Maggitt, VII-26-1927), (USNM).

DESCRIPTION: Body (fig. a) elliptical, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 378(347-408) long, 177(166-196) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-two of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores 19.1(18.6-20.9) long, 11.4(9.3-11.6) wide; small pores ca. 11.6 long, ca. 7.0 wide.

Simple pores (fig. c): About 30 in submarginal rows, diameter ca. 1.0.

Marginal setae (fig. d): From 32 to 34, hairlike, 7.8(4.6-9.3) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each ca. 9.3 long.

Anal lobes: Well developed, membranous, sclerotized on inner margin; 2 spines on inner margin of each anal lobe, anterior 12.0(9.3-16.2), posterior 9.5(7.0-11.6) long. Apical setae 198(166-218) long. Lateral seta 8.7(7.0-13.9) long.

Anal plate (fig. e): Trapezoid-shaped, with broad projecting posterior

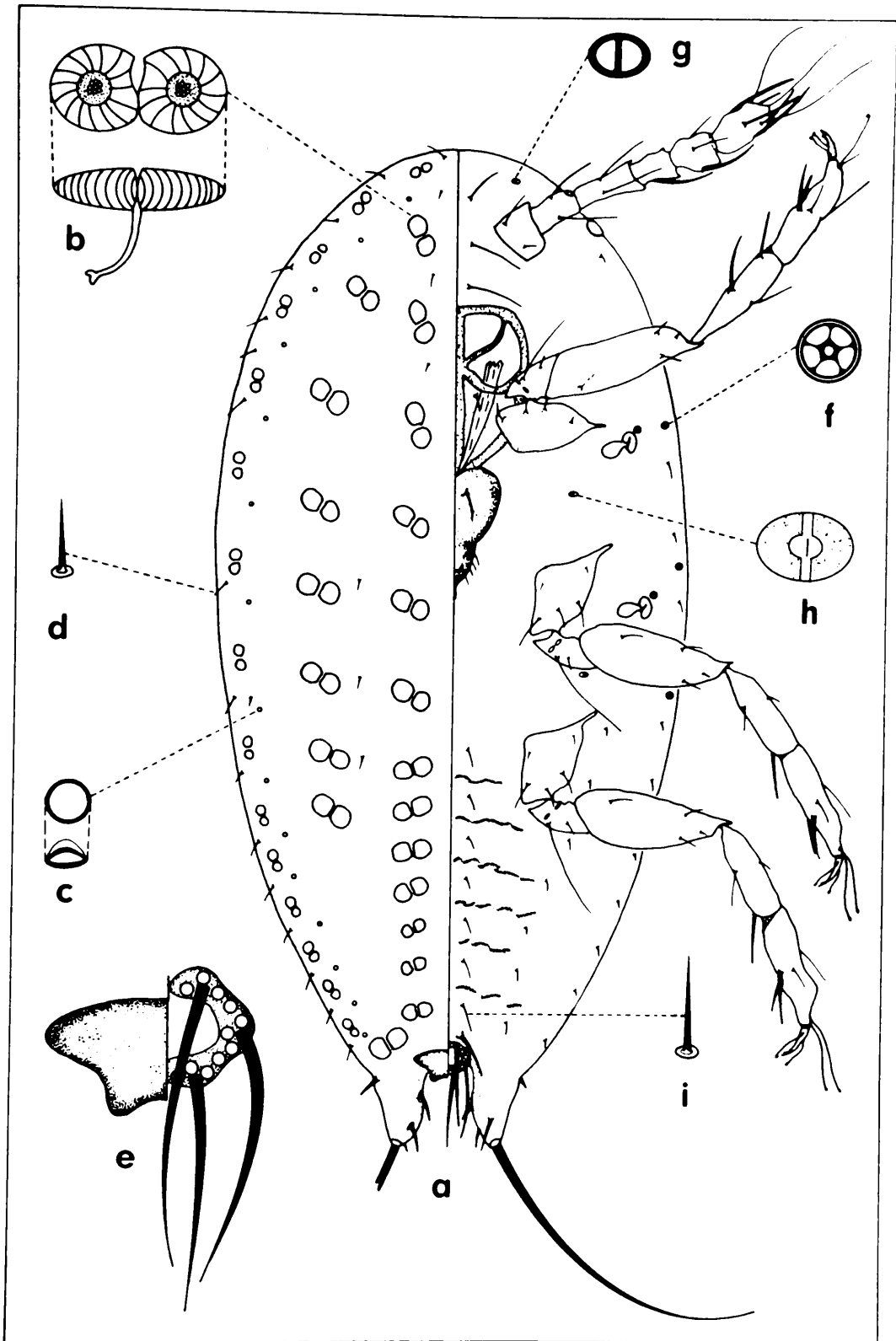


Plate 16.- *Cerococcus indicus* (Maskell)

corners, ca. 18.6 long, 18.6(16.2-20.9) wide.

VENTRAL SURFACE

Antennae: Total length 118(107-128), scape 15.8(11.6-18.6) long, 19.9(16.2-23.2) wide. Segments II to VI: 19.3(16.2-20.9), 25.7(23.2-27.8), 15.4(13.9-16.2), 16.8(16.2-18.6), 24.5(23.2-25.5) long, respectively. Segment II with sensory pore at outer margin.

Clypeolabral shield: Ovoid, 77.6(74.2-81.2) long, 53.1(46.4-62.6) wide.

Labium: Triangular, 43.6(37.1-48.7) long, 43.0(39.4-51.0) wide; with 12 slender setae, each 9.0(8.2-9.4) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	22.1(18.6-23.2)	22.0(18.6-23.2)	21.5(16.2-23.2)
Trochanter	21.5(18.6-23.2)	21.1(16.2-23.2)	21.5(16.2-25.5)
Femur	61.8(48.7-71.9)	59.6(53.4-71.9)	59.8(51.0-65.7)
Tibia	45.4(34.4-53.4)	45.6(41.8-53.4)	43.9(39.4-51.0)
Tarsus	44.7(41.8-48.7)	43.3(39.4-48.7)	42.1(37.1-46.4)
Tarsal dig.	29.0(25.5-32.5)	29.0(25.5-32.5)	29.0(25.5-32.5)
Claw	15.4(11.6-20.9)	16.4(13.9-18.6)	16.6(11.6-18.6)
Claw dig.	19.6(16.2-23.2)	19.6(16.2-23.2)	19.6(16.2-23.2)
Entire leg	209(181-220)	208(193-239)	205(186-221)

Spiracles: Anterior (length not determined), peritreme ca. 9.3 wide, (diameter of atrial orifice not determined); with 2 quinquelocular pores (fig. f), diameter ca. 3.5. Posterior ca. 11.6 long, peritreme ca. 9.3 wide, diameter of atrial orifice 3.4(2.3-4.6); 3 quinquelocular pores (fig. f) in bifid furrow, diameter ca. 3.5.

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each ca. 4.5 long, ca. 3.5 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 3

each, 17.5(9.4-23.2) long. Six rows of slender hairlike setae on abdomen, submedial (fig. i) 12.6(9.4-16.4), submarginal 4.9(3.5-7.0), marginal ca. 4.6 long, respectively. A pair of stout setae anterior of anal ring, 19.1(16.4-22.2) long.

Anal lobes: With medial seta 15.3(11.6-18.6) long

Anal ring (fig. e): Placed almost vertical of the longitudinal axes of the anal lobes, subcircular ca. 20.9 long, 20.2(18.6-20.9) wide; 6 anal ring setae, each 37.9(34.8-41.8) long; complete outer row of translucent pores with incomplete inner row.

Microspines: Not observed on specimens studied.

Affinities: This species has been described as a variety of C. paradoxus. The known host range of this species is more diverse than in any other species of Cerococcus. It is closely related to C. froggatti, but C. indicus can be distinguished by the longer anal lobes and longer mesothoracic legs.

Cerococcus intermedius Balachowsky

Plate 17

Cerococcus intermedius Balachowsky, 1930:310.

MATERIAL STUDIED: On Marrubium deserti (Labiatae), 1(5), Bordj-bou-Hedma (near Maknsaay), Tunisia, coll. C. Dumont, 1928, (USNM).

DESCRIPTION: Body (fig. a) elliptical; tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 414(393-438) long, 177(151-196) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-four of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax, large pores 17.9(16.2-19.7) long, 11.6(9.3-13.9) wide; small pores 13.2(11.6-16.2) long, 7.9(7.0-9.3) wide.

Simple pores (fig. c): About 28 in submarginal and submedial longitudinal rows, diameter ca. 1.0.

Marginal setae (fig. d): From 30 to 34, short, straight with sharp points, 5.6(4.6-9.3) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each 5.6(4.6-9.3) long.

Anal lobes: Well developed, membranous, sclerotized on inner margin; 2 spines on inner margin of each anal lobe, anterior 13.0(11.6-13.9), posterior 12.1(9.3-13.9) long. Apical setae 210(183-242) long.

Lateral seta 12.8(9.3-18.6) long.

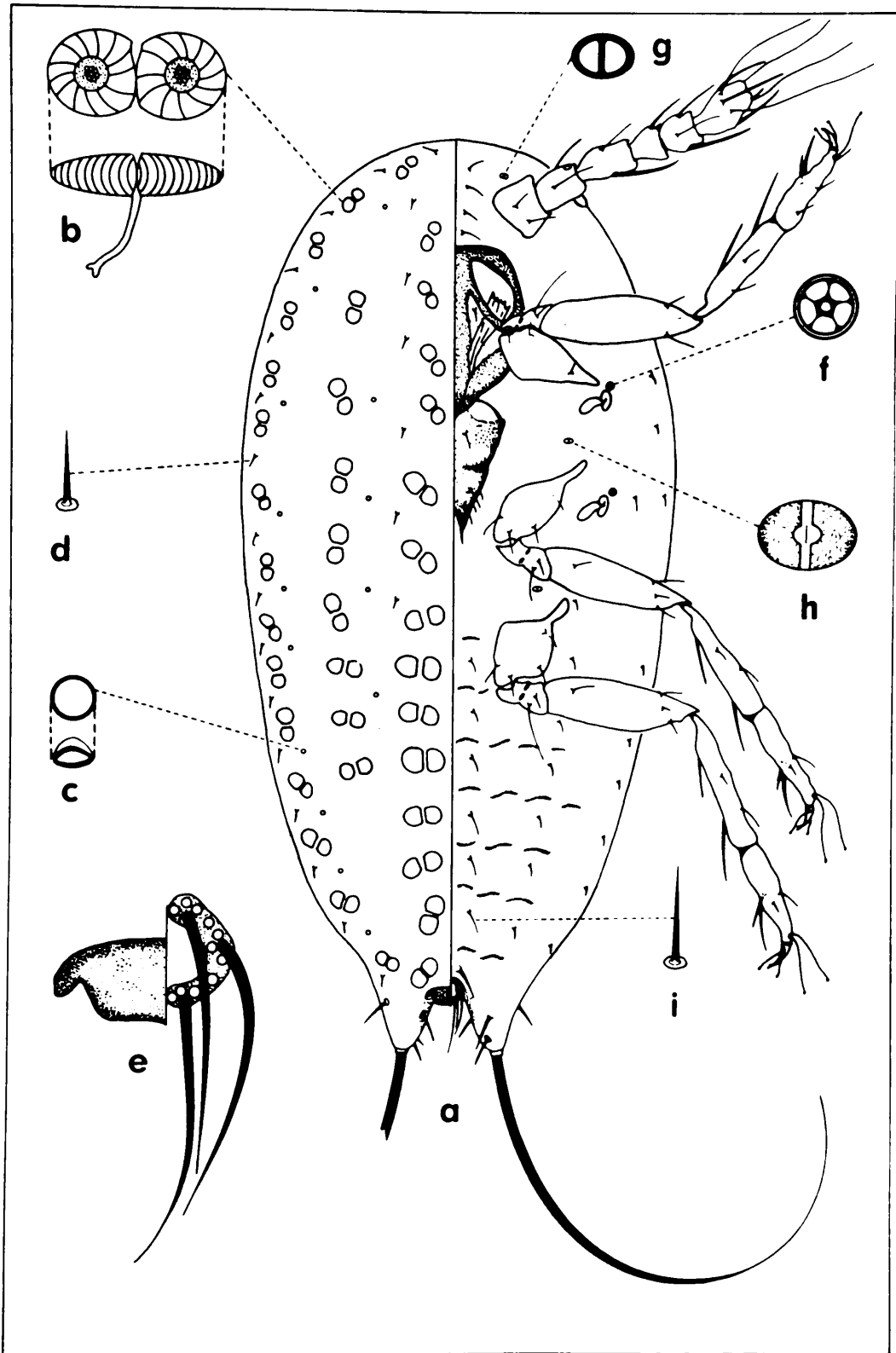


Plate 17.- *Cerococcus intermedius* Balachowsky

Anal plate (fig. e): Trapezoid-shaped, 17.4(16.2-18.6) long, 19.8(18.6-20.9) wide.

VENTRAL SURFACE

Antennae: Total length 107(102-111), scape 17.2(13.9-18.6) long, 21.8(18.6-23.2) wide. Segments II to VI: 17.6(16.2-18.6); 22.3(20.9-25.5), ca. 11.6, 15.3(13.9-16.2), 22.7(20.9-25.5) long, respectively.

Segment II with sensory pore at outer margin

Clypeolabral shield: Oval, 72.0(70.8-76.7) long, 63.7(59.0-64.9) wide.

Labium: Triangular, ca. 47.2 long, 37.8(35.4-41.3) wide; with 12 slender setae, each ca. 13.9 long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	22.3(20.9-23.2)	22.7(20.9-25.5)	22.3(20.9-23.2)
Trochanter	23.7(23.2-25.5)	22.7(20.9-23.2)	23.6(23.2-25.5)
Femur	66.8(60.3-69.6)	66.4(60.3-71.9)	67.7(62.6-71.9)
Tibia	52.2(48.7-55.7)	52.4(46.4-58.0)	52.9(46.4-58.0)
Tarsus	40.0(37.1-41.8)	42.2(39.4-46.4)	40.4(34.8-44.1)
Tarsal dig.	31.1(27.8-34.8)	31.1(27.9-34.8)	31.1(27.8-34.8)
Claw	21.1(20.9-23.2)	21.9(20.9-23.2)	22.3(20.9-23.2)
Claw dig.	20.4(18.6-23.2)	20.4(18.6-23.2)	20.4(18.6-23.2)
Entire leg	229(218-234)	228(211-246)	229(211-239)

Spiracles: Anterior 15.7(13.9-18.6) long, peritreme 8.7(7.0-9.3) wide, diameter of atrial orifice 2.0(1.0-2.3); with 1 quinquelocular pore (fig. f), diameter 3.4(2.8-3.8). Posterior 15.7(13.9-16.2) long, peritreme 8.8(7.0-9.3) wide, diameter of atrial orifice ca. 2.3; 1 quinquelocular pore (fig. f) near spiracle, diameter 3.4(2.8-3.8).

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each ca. 4.8 long, 3.3(2.8-3.8) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 24.5(20.0-26.6) long. Six rows of slender hairlike setae on abdomen, submedial (fig. i) 20.9(15.2-23.8), submarginal 7.7(6.6-9.5), marginal 5.6(4.5-9.3) long, respectively. A pair of stout setae anterior of anal ring, 24.6(23.2-27.8) long.

Anal lobes: With medial seta 17.6(13.9-20.9) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, circular ca. 25.5 in diameter; 6 anal ring setae, each 39.5(34.8-41.8) long; complete outer row of translucent pores with incomplete inner row.

Microspines: Absent

Affinities: This species is known from the same general geographical area as C. eremobius, C. cistarum, and C. ruber, but their known hosts do not overlap with those of C. intermedius. They are all similar in having only one quinquelocular pore associated with each spiracle.

Separation of these four species is given in the key.

Cerococcus kalmiae Ferris

Plate 18

Cerococcus kalmiae Ferris, 1955:31,36.

MATERIAL STUDIED: On Kalmia latifolia (Ericaceae), 2(14), Haverford, PA, coll. E.P. Felt, 1-29-1938, (USNM).

DESCRIPTION: Body (fig. a) elliptical, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 425(362-483) long, 206(166-242) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Eighty of 1 size, arranged in 4 longitudinal rows on abdomen, 6-8 rows on thorax, ca. 11.6 long, 7.3(5.9-9.3) wide.

Simple pores (fig. c): About 36 in submarginal and submedial longitudinal rows, diameter 1.6(1.0-2.0).

Marginal setae (fig. d): From 34 to 36, tacklike, 8.6(4.6-11.6) long.

Spiracular setae (fig. e): Acorn-shaped; anterior double 9.1(7.0-11.6) long; posterior single or double 8.8(7.0-9.3) long.

Body setae: On cephalothorax and abdomen in 2 submedial longitudinal rows, each 3.3(2.3-4.6) long.

Anal lobes: Well developed, membraneous, sclerotized slightly on inner margin; 2 strong, slightly curved spines on inner margin of each anal lobe, anterior 11.8(9.3-13.9), posterior 8.6(7.0-11.4) long. Apical setae 194(148-230) long. Lateral seta ca. 7 long.

Anal plate (fig. f): Trapezoid-shaped 13.5(11.6-16.2) long, 18.0(16.2-20.9) wide.

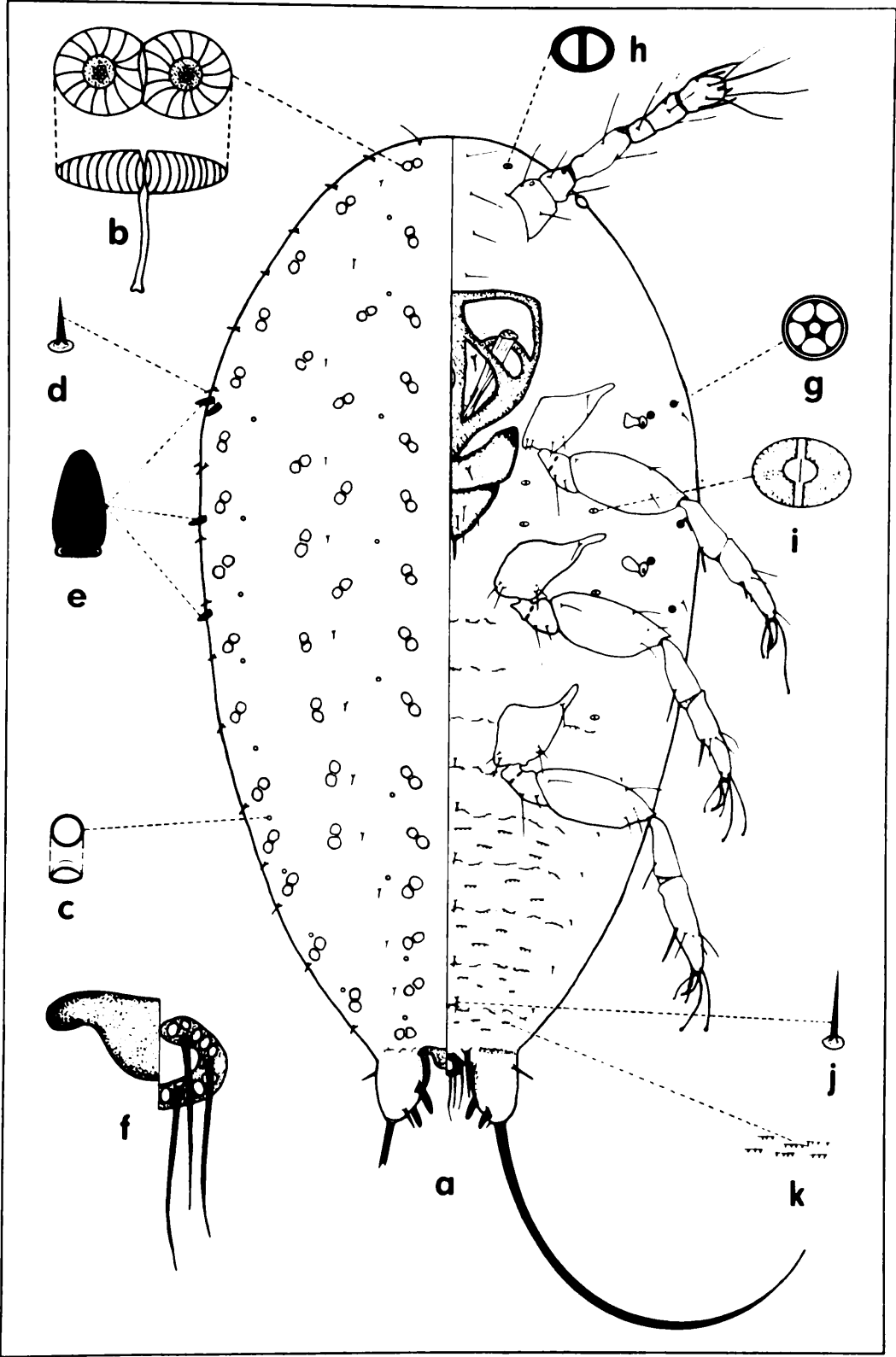


Plate 18.- *Cerococcus kalmiae* Ferris

VENTRAL SURFACE

Antennae: Total length 122(104-135), scape 20.0(18.6-23.2) long, 23.0 (20.9-25.5) wide. Segments II to VI: 17.2(13.9-20.9), 33.4(30.2-37.1), 15.1(13.9-16.2), 16.0(11.6-18.6), 22.7(18.6-25.5) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 78.1(70.8-88.2) long, 67.4(59.0-83.5) wide.

Labium: Triangular, 46.1(25.5-53.4) long, 38.5(25.5-46.4) wide; with 12 slender setae, each 16.4(13.9-18.6) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	23.9(23.2-25.5)	24.3(20.9-25.5)	24.9(20.9-27.8)
Trochanter	23.2(20.9-27.8)	23.0(18.6-23.2)	23.6(20.9-25.5)
Femur	59.6(53.4-67.3)	60.5(48.7-65.0)	62.2(53.4-67.3)
Tibia	33.9(25.5-41.8)	36.7(27.8-41.8)	38.0(32.5-41.8)
Tarsua	38.5(32.5-44.1)	38.4(32.5-44.1)	42.0(37.1-46.4)
Tarsal dig.	34.0(30.2-39.4)	34.0(30.2-39.4)	34.0(30.2-39.4)
Claw	19.3(18.6-20.9)	19.2(16.2-20.9)	19.8(16.2-20.9)
Claw dig.	23.4(20.9-25.5)	23.4(20.9-25.5)	23.4(20.9-25.5)
Entire leg	198(176-227)	194(169-218)	208(190-223)

Spiracles: Anterior 12.5(9.3-13.9) long, peritreme 8.8(7.0-9.3) wide, diameter of atrial orifice 3.0(2.3-4.6); with 2 quinquelocular pores (fig. g), diameter ca. 3.8. Posterior 11.6(9.3-13.9) long, peritreme 8.1(7.0-9.3) wide, diameter of atrial orifice 3.0(2.3-4.6); 3 quinquelocular pores, (occasionally 1 is 7-locular) in bifid furrow, diameter ca. 3.8.

Pores: Two small biloculars (fig. h) anterior of antenna; 10 biloculars (fig. i) on thorax, each 4.2(3.8-4.8) long, 3.0(2.8-3.8) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 21.1(12.4-32.4) long. Four rows of slender hairlike setae on abdomen, submedial (fig. j) 12.1(7.0-16.2), marginal 7.7(4.6-9.3) long, respectively. A pair of stout setae anterior of anal ring, 20.4(18.6-25.5) long.

Anal lobes: With medial seta 10.4(9.3-11.6) long.

Anal ring (fig. f): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular 19.6(13.9-25.5) long, 17.9(13.9-20.9) wide; 6 anal ring setae, each 33.9(27.8-41.8) long; complete outer row of translucent pores with incomplete row.

Microspines (fig. k): In transverse rows from submargin to submargin on abdomen.

Affinities: This species morphologically resembles C. ficoides, never the less, their known geographical distribution is widely separated, C. kalmiae being found in U.S. and C. ficoides being taken from Formosa and India. C. kalmiae has 10 bilocular pores on the ventrum of the thorax and C. ficoides has 12 such pores.

Cerococcus koebelei (Cockerell)

Plate 19

Solenophora koebelei Cockerell, 1898b:429 Cerococcus koebelei, Ferris, 1955:31.

MATERIAL STUDIED: On Mahonia aquifolium (Berberidaceae), 7(10), (VPI&SU No. ABH-08a-g), Stillwater, OK, coll. Bieberdorf, V-10-1956, (OSU).

DESCRIPTION: Body (fig. a) elliptical, widest at mesothorax; tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 548(498-589) long, 248(196-317) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Eighty of 1 size, arranged in 4 longitudinal rows on abdomen, 6-8 rows on thorax, 8.6(7.0-9.3) long, ca. 4.6 wide.

Simple pores (fig. c): About 24 in submarginal and submedial longitudinal rows, diameter 1.6(1.2-2.3).

Marginal setae (fig. d): From 32 to 34, hairlike, 8.8(7.0-11.6) long.

Spiracular setae (fig. e): Acorn-shaped, anterior 8.9(8.2-9.4) long; posterior 8.5(7.0-9.4) long.

Body setae: On cephalothorax and abdomen in 2-4 submedial longitudinal rows, each 5.7(2.3-9.3) long.

Anal lobes: Well developed, membranous, sclerotized slightly on inner margin; 2 stout spines on inner margin of each anal lobe, anterior 7.7(7.0-9.3), posterior 8.8(7.0-11.6) long. Apical setae 203(177-224) long. Lateral seta 9.6(7.0-11.6) long.

Anal plate (fig. f): Trapezoid-shaped 13.1(11.6-16.2) long, 20.5(18.6-

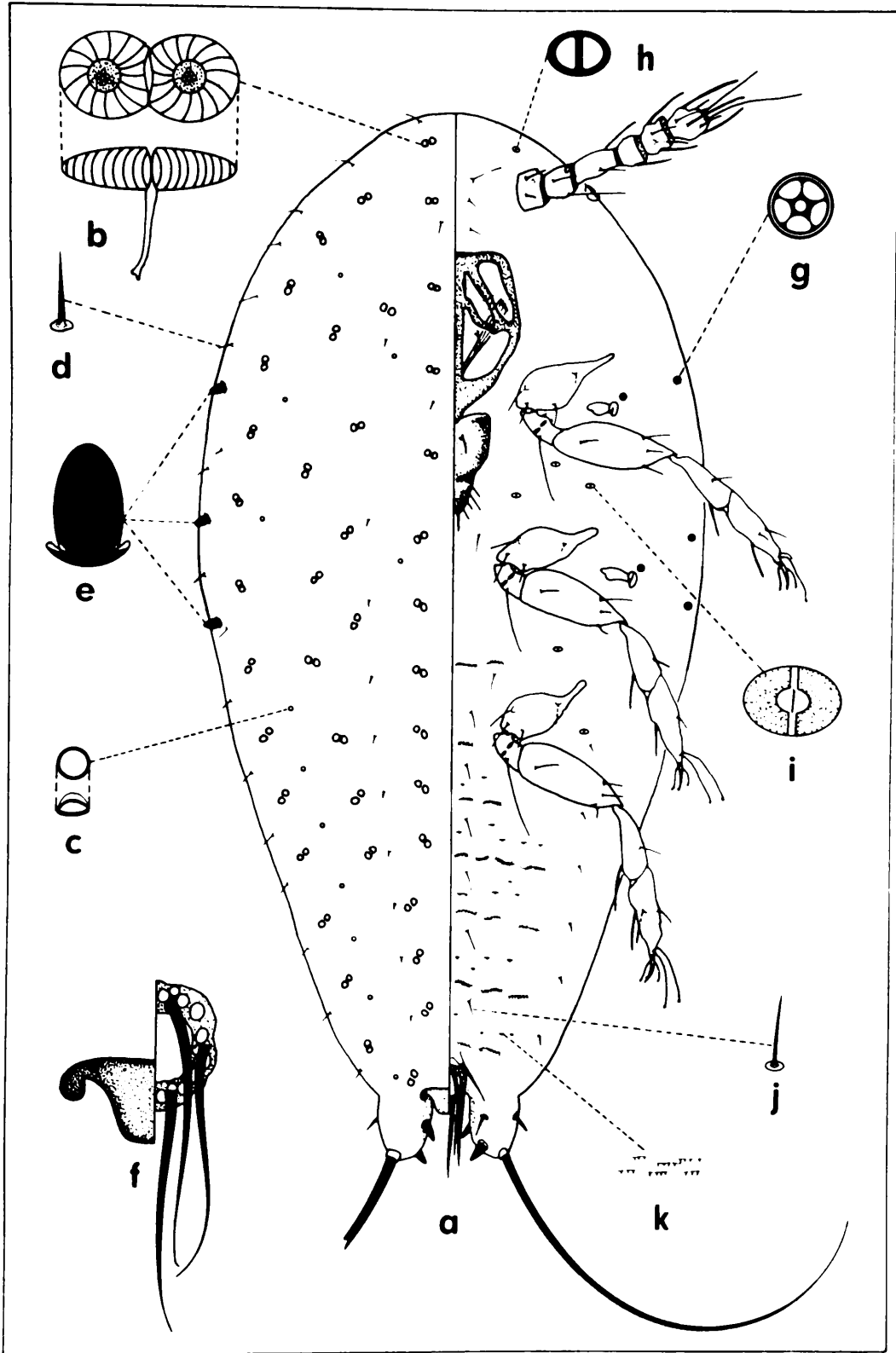


Plate 19.- *Cerococcus koebelei* (Cockerell)

23.2) wide.

VENTRAL SURFACE

Antennae: Total length 131(128-147), scape 20.9(18.6-25.5) long, 23.0(18.6-27.8) wide. Segments II to VI: 18.6(16.2-20.9), 31.1(27.8-34.8), 17.5(16.2-18.6), 19.6(16.2-20.9), 22.4(20.9-25.5) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Oblong, 94.2(83.5-107) long, 78.0(71.9-81.2) wide.

Labium: Triangular, 64.5(39.4-71.9) long, 49.9(41.8-58.0) wide; with 12 slender setae, each 18.6(9.3-25.5) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex on each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	24.1(18.6-27.8)	25.5(20.9-30.2)	28.1(20.9-30.2)
Trochanter	29.7(27.8-30.2)	28.1(25.5-30.2)	28.3(27.8-30.2)
Femur	67.3(58.0-71.9)	66.1(62.6-69.6)	69.1(65.0-71.9)
Tibia	43.5(39.4-48.7)	45.0(41.8-48.7)	45.0(41.8-48.7)
Tarsua	39.1(34.8-44.1)	41.8(39.4-46.4)	44.3(41.8-51.0)
Tarsal dig.	33.7(30.2-39.4)	33.7(30.2-39.4)	33.7(30.2-39.4)
Claw	19.8(18.6-20.9)	21.7(18.6-23.2)	22.1(18.6-23.2)
Claw dig.	25.2(20.9-27.8)	25.2(20.9-27.8)	25.2(20.9-27.8)
Entire leg	221(202-230)	229(221-237)	234(218-248)

Spiracles: Anterior 13.2(9.3-16.2) long, peritreme 8.8(7.0-9.3) wide, diameter of atrial orifice 3.2(2.3-4.6); with 2 quinquelocular pores (fig. g), diameter 3.2(2.3-4.6). Posterior 14.2(11.6-16.2) long, peritreme 9.0(7.0-9.3) wide, diameter of atrial orifice 4.6(2.3-7.3); 3 quinquelocular pores (fig. g) in bifid furrow.

Pores: Two small biloculars (fig. h) anterior of antennae; 10 biloculars

(fig. i) on thorax, each 4.6(3.5-4.7) long, 3.4(2.3-3.5) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 3 each, 31.2(18.6-37.1) long. Four rows of slender hairlike setae on abdomen, submedial (fig. j) 9.3(7.0-11.6), marginal 7.0(4.6-11.6) long, respectively. A pair of stout setae anterior of anal ring, 27.0(21.1-31.6) long.

Anal lobes: With medial seta 7.0(4.6-9.3) long.

Anal ring (fig. f): Placed almost vertical of the longitudinal axes of the anal lobes, subcircular 19.7(18.6-25.5) long, 20.6(18.6-20.9) wide; 6 anal ring setae, each 38.3(34.8-44.1) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. k): On abdomen in transverse rows from submargin to submargin.

Affinities: This species is morphologically very similar to C.

tuberculus, but is different because C. tuberculus has spiracular setae over 8 long, and prothoracic legs under 231 long. C. koebelei is known from the U.S. and Mexico, while C. tuberculus is only known from Brazil. The geographical of C. koebelei distribution is similar to that of C. parrotti, but the body of C. parrotti is much longer.

Cerococcus ornatus Green

Plate 20

Cerococcus ornatus Green, 1909:306.

MATERIAL STUDIED: On Coffea arabica (Rubiaceae), 3(14), (VPI&SU No. ABH-36-a-c), Pundaluoya, Ceylon, (BM).

DESCRIPTION: Illustration and measurements are made from fragments, as this was the only material available. Averages and ranges will probably change as more material become available for study. Body (fig. a) appears elliptical and tapers posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 286(265-318) long, 128(106-148) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-four of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores 12.0(11.6-13.9) long, 9.0(7.0-9.3) wide; small pores 9.3(7.0-11.6) long, 6.0(4.6-7.0) wide.

Simple pores (fig. c): About 28 near submargin, diameter ca. 1.0.

Marginal setae (fig. d): From 32 to 34, hairlike, 7.6(4.6-13.9) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each ca. 4.6 long.

Anal lobes: Well developed, membranous, sclerotized on inner margin; 2 spines on inner margin of each anal lobe, anterior 10.5(9.3-11.7), posterior 10.1(9.3-10.5) long. Apical setae ca. 189 long. Lateral seta ca. 7.0 long.

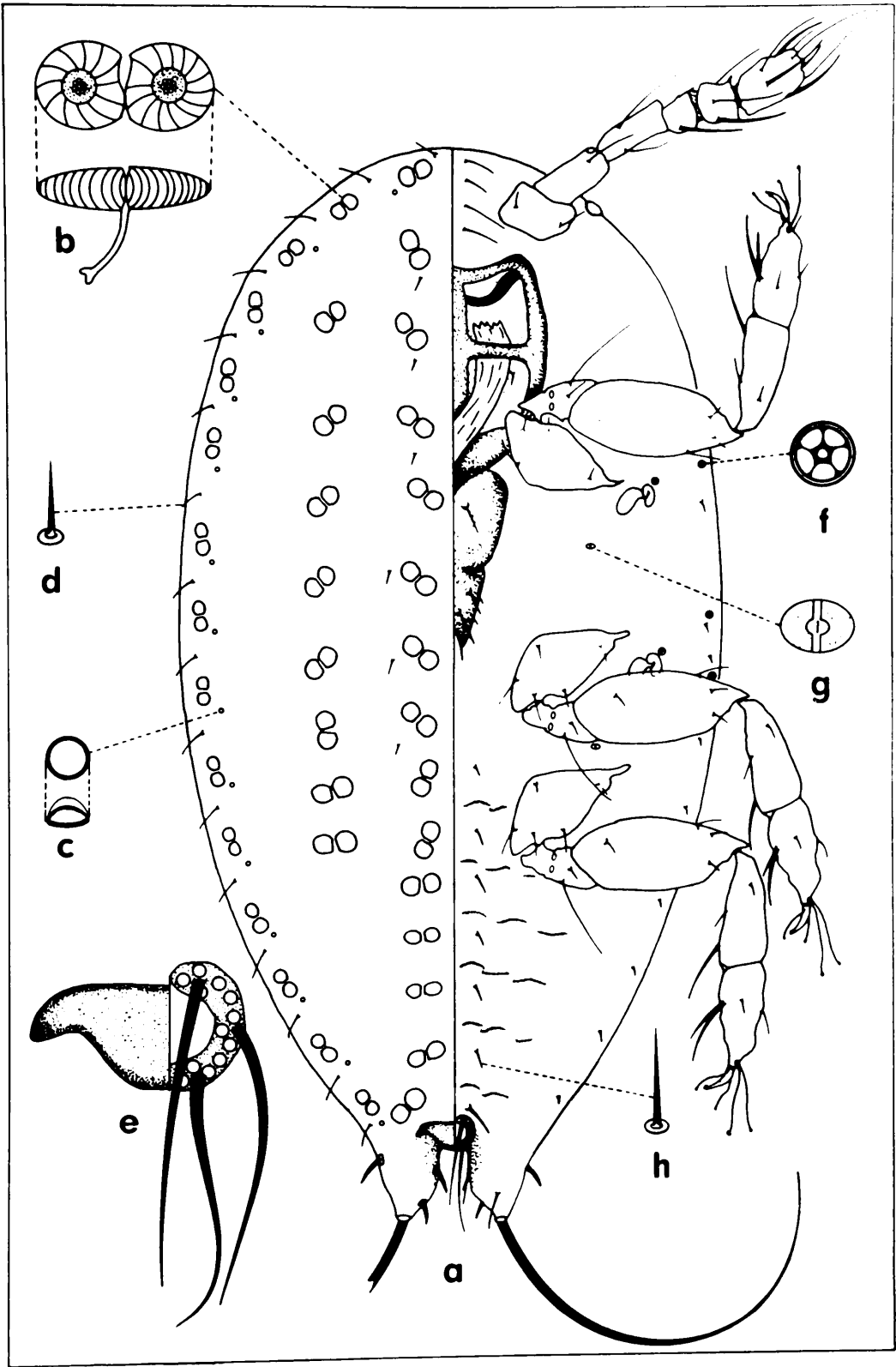


Plate 20.- *Cerococcus ornatus* Green

Anal plate (fig. e): Trapezoid-shaped 11.6(9.4-13.9) long, 17.8(13.9-20.9) wide.

VENTRAL SURFACE

Antennae: Total length 99.4(97.0-107), scape 15.0(11.6-16.2) long, 17.6(13.9-20.9) wide. Segments II to VI: 17.1(13.9-18.6), 22.3(20.9-23.2), 11.0(9.3-16.2), 13.3(9.3-16.2), 20.0(18.6-20.9) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 69.0(62.6-74.2) long, 52.1(44.1-55.7) wide.

Labium: Triangular, 43.5(37.1-48.7) long, 31.2(27.8-34.8) wide; with 12 slender setae, each 15.0(11.6-18.6) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	17.7(13.9-20.9)	18.6(16.2-20.9)	17.6(16.2-20.9)
Trochanter	19.4(16.2-20.9)	19.2(13.9-20.9)	20.0(18.6-20.9)
Femur	50.6(46.4-55.7)	51.4(48.7-55.7)	51.5(48.7-55.7)
Tibia	34.0(30.2-39.4)	34.0(20.9-39.4)	35.6(32.5-37.1)
Tarsus	31.0(27.8-32.5)	33.0(30.2-37.1)	31.0(27.8-32.5)
Tarsal dig.	26.3(20.9-30.2)	26.3(20.9-30.2)	26.3(20.9-30.2)
Claw	15.1(13.9-16.2)	14.4(13.9-16.2)	14.7(11.6-16.2)
Claw dig.	14.3(11.6-16.2)	14.3(11.6-16.2)	14.3(11.6-16.2)
Entire leg	162(162)	171(148-183)	174(174)

Spiracles: Anterior 12.4(11.6-13.9) long, peritreme 7.6(7.0-9.3) wide, diameter of atrial orifice 1.3(1.0-2.3); with 2 quinquelocular pores (fig. f), diameter ca. 4.6. Posterior 12.0(11.6-13.9) long, peritreme 8.5(7.0-9.3) wide, diameter of atrial orifice 1.2(1.0-2.3); 3 quinquelocular pores (fig. f) in bifid furrow, diameter ca. 4.6.

Pores: Four biloculars (fig. g) on thorax, ca. 4.6 long, ca. 3.5 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 24.0(16.2-32.5) long. Four rows of slender hairlike setae on abdomen, submedial (fig. h) 8.5(7.0-9.3), marginal 3.8(2.3-4.6) long, respectively. A pair of stout setae anterior of anal ring, 20.9(18.6-23.2) long.

Anal lobes: With marginal setae ca. 13.9 long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular 22.1(20.9-23.2) long, 18.9(17.6-20.9) wide; 6 anal ring setae, each 32.4(27.8-37.1) long; complete outer row of translucent pores with incomplete inner row.

Microspines: Not discernible on material studied.

Affinities: This species is similar in geographical distribution with C. indicus. Their morphology is differentiated by the number of dorsal 8-shaped pores in the submarginal rows, C. ornatus has 8 present, while C. indicus has 7 present. The latter also has longer mesothoracic legs.

Cerococcus paradoxus (Maskell)

Plate 21

Eriococcus paradoxus Maskell, 1889:104; Cerococcus paradoxus, Green 1910:5; Morrison and Morrison, 1927:20.

MATERIAL STUDIED: On Pittosporum sp. (Pittosporaceae)1(7), Bathurst, N.S.W., Australia, coll. W. W. Froggatt, VII-12-1907, (Froggatt No. 46), (USNM).

ADDITIONAL MATERIAL STUDIED: Unknown host, 3(17) (VPI&SU No. PL200b, e,h) Gunnedah, N.S.W., Australia, Coll. W. W. Froggatt, IX-13-1902, (VPI&SU).

DESCRIPTION: Body (fig. a) elliptical, widest at mesothorax, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous, with 8-shaped pores on dorsum; 393 (362-438) long, 196(166-227) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-two of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores 22.5(20.9-23.2) long, 11.3(9.3-11.6) wide; small pores 12.3(11.6-13.9) long, ca. 7.0 wide.

Simple pores (fig. c): About 30 submarginal and submedial longitudinal rows, diameter ca. 1.9.

Marginal setae (fig. d): From 38 to 40, hairlike, 7.6(7.0-9.3) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each 8.8(7.0-9.3) long.

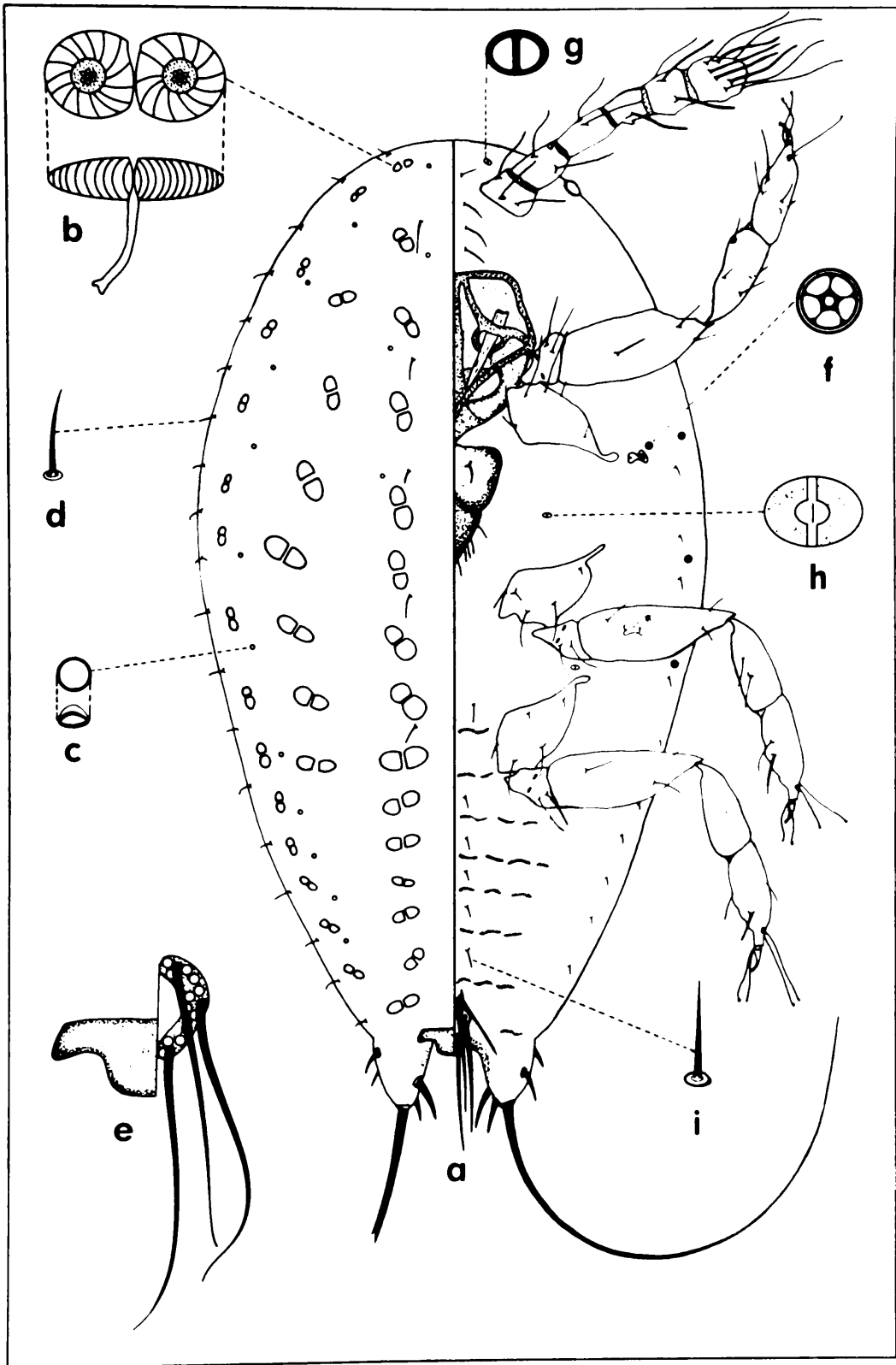


Plate 21.- *Cerococcus paradoxus* (Maskell)

Anal lobes: Well developed, membranous, sclerotized on inner margin; 2 spines on inner margin of each anal lobe, anterior 11.2(7.0-13.9), posterior 9.0(7.0-11.6) long. Apical setae 184(153-254) long. Lateral seta 10.1(7.0-13.9) long.

Anal plate (fig. e): Trapezoid-shaped, ca. 13.9 long, ca. 16.2 wide.

VENTRAL SURFACE

Antennae: Total length 109(95.0-116), scape 16.2(13.9-18.6) long, 23.9(20.9-27.8) wide. Segments II to VI: 19.2(16.2-23.2), 20.5(16.2-25.5), 12.9(11.6-13.9), 17.6(13.9-20.9), 22.2(18.6-25.5) long, respectively. Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 75.9(65.0-88.2) long, 72.2(62.6-83.5) wide.

Labium: Triangular, 53.4(51.0-55.7) long, 44.7(37.1-53.4) wide; with 12 slender setae, each 12.8(9.3-13.9) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	23.2(18.6-34.8)	21.2(16.2-25.5)	21.6(18.6-23.2)
Trochanter	22.2(20.9-25.5)	21.7(16.2-25.5)	22.8(18.6-25.5)
Femur	60.3(53.4-65.0)	59.6(55.7-65.0)	57.3(51.0-65.0)
Tibia	39.1(30.2-44.1)	37.1(30.2-41.8)	36.8(32.5-41.8)
Tarsus	35.8(25.5-41.8)	35.2(32.5-37.1)	36.4(32.5-39.4)
Tarsal dig.	29.5(27.8-32.5)	29.5(27.8-32.5)	29.5(27.8-32.5)
Claw	16.9(16.2-18.6)	17.4(13.9-20.9)	18.6(11.6-20.9)
Claw dig.	21.4(20.9-23.2)	21.4(20.9-23.2)	21.4(20.9-23.2)
Entire leg	198(179-223)	192(174-204)	194(177-207)

Spiracles: Anterior 12.0(10.5-15.9) long, peritreme 7.9(7.0-9.3) wide, diameter of atrial orifice 2.9(2.3-4.6); with 2 quinquelocular pores (fig. f), diameter 4.3(2.3-4.6). Posterior 11.6(9.3-13.9) long,

peritreme 8.2(7.0-9.4) wide, diameter of atrial orifice 3.3(2.3-4.6); 3 quinquelocular pores (fig. f) in bifid furrow, diameter 4.3(2.3-4.6).

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each ca. 4.8 long, ca. 3.8 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 27.9(20.9-34.8) long. Four rows of slender hairlike setae on abdomen, submedial (fig. i) 9.0(4.6-11.6), marginal 7.0(4.6-11.6) long, respectively. A pair of stout setae anterior of anal ring, 29.0(25.5-34.8) long.

Anal lobes: With midlateral seta ca. 13.9 long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular 23.5(18.6-27.8) long, 19.8(18.6-20.9) wide; 6 anal ring setae, each 35.1(30.2-37.1) long; complete outer row of translucent pores with incomplete inner row.

Microspines: Absent.

Affinities: This species is very closely related to C. punctiferus by morphology, hosts, and geographical distribution, but is different because C. paradoxus has a longer medial seta on the venter of each anal lobe, and by the shorter anal ring setae.

Note: Morrison and Morrison (1927) described this species as follows: "Very similar to this stage of other species; length as mounted about 420, width about 200; antennae 6-segmented, the third longest; legs not unusual; beak short conical, fairly distinctly 2-segmented; marginal setae small, slender; no spiracular spines; 8-shaped pores large, in the usual two complete and one incomplete rows on each half of the dorsal

surface; apical setae of the slightly protruding anal lobes about 215 long, cauda fairly strongly protruding, with rounded posterior margin; anal ring with a single row of pores and six setae, each about 32 long".

Cerococcus parahybensis Hempel

Plate 22

Cerococcus parahybensis Hempel, 1927:390.

MATERIAL STUDIED: On coffee tree, 1(3), (VPI&SU No. ABH-32a), Brazil, coll. C. Moreira, (BM).

DESCRIPTION: Body (fig. a) elliptical, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 448(408-498) long, 202(183-212) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-two of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores ca. 18.6 long, ca. 11.6 wide; small pores 12.3(11.6-13.9) long, ca. 7.0 wide.

Simple pores (fig. c): About 30 in submarginal and submedial longitudinal rows, diameter ca. 1.0.

Marginal setae (fig. d): From 32 to 34 hairlike, 7.8(7.0-9.3) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each 8.5(7.0-9.3) long.

Anal lobes: Well developed, membraneous, sclerotized slightly on inner margin; 2 spines on inner margin of each anal lobe, anterior 12.4(9.3-16.2), posterior 8.5(7.0-9.3) long. Apical setae ca. 183 long. Lateral seta 5.4(4.6-7.0) long.

Anal plate (fig. e): Trapezoid-shaped ca. 11.6 long, 17.8(16.2-18.6) wide.

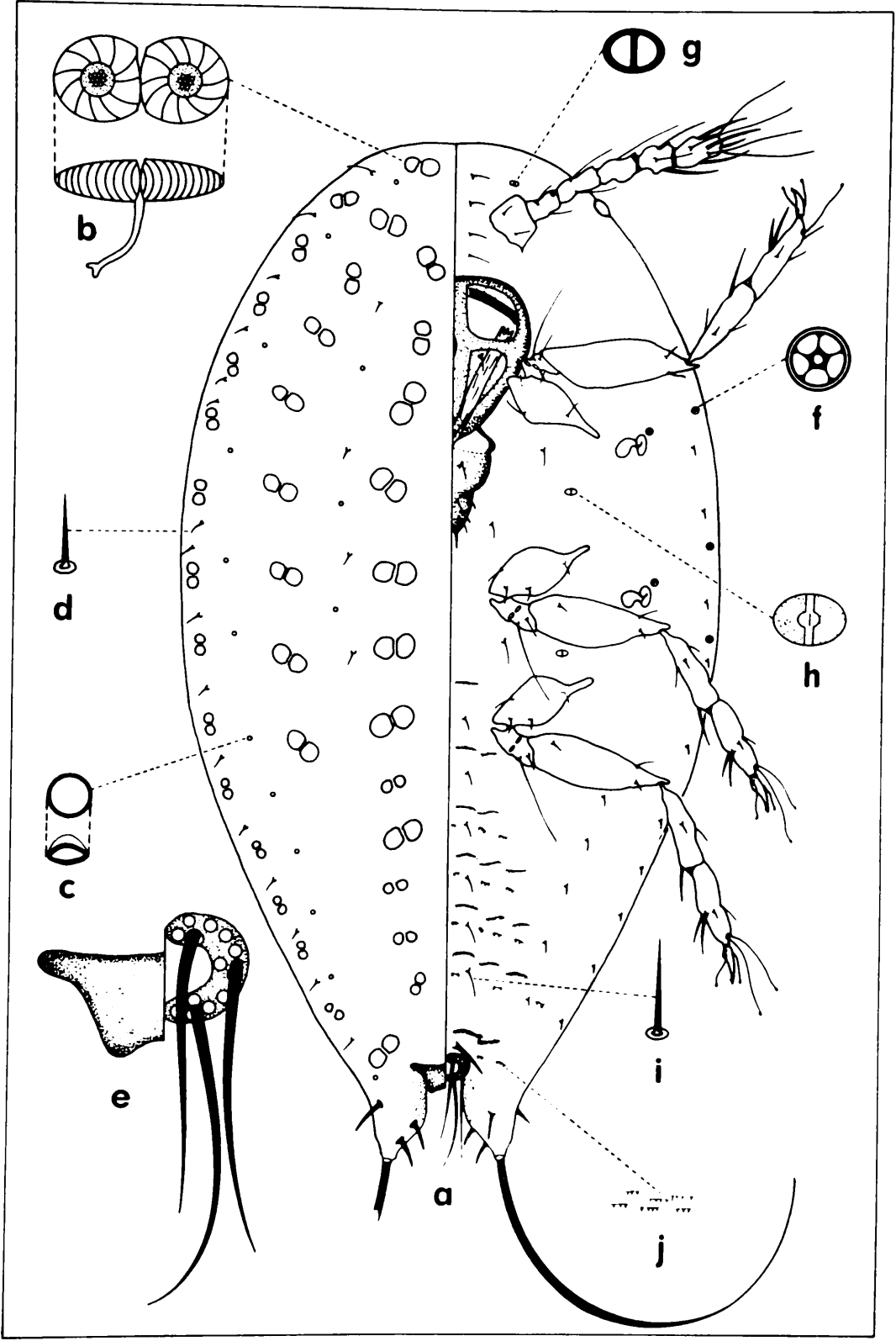


Plate 22.- *Cerococcus parahybensis* Hempel

VENTRAL SURFACE

Antennae: Total length 109(107-111), scape 14.7(13.9-16.2) long, ca. 18.6 wide. Segments II to VI: ca. 18.6, ca. 23.2, ca. 16.2, 15.5(13.9-18.6), ca. 20.9 long, respectively. Segment II with sensory pore at outer margin.

Clypeolabral shield: Ovoid, ca. 69.6 long, 56.5(53.4-60.3) wide.

Labium: Triangular, 37.9(34.8-39.4) long, 37.1(34.8-39.4) wide; with 12 slender setae, each 12.4(9.3-13.9) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	18.6(18.6)	20.1(18.6-23.2)	20.9(20.9)
Trochanter	23.2(23.2)	20.9(18.6-23.2)	21.7(20.9-23.2)
Femur	58.8(58.0-60.3)	57.2(55.7-58.0)	60.3(60.3)
Tibia	36.3(34.8-37.1)	37.1(37.1)	38.2(37.1-39.4)
Tarsus	34.0(32.5-34.8)	34.8(32.5-37.1)	37.1(37.1)
Tarsal dig.	24.0(23.2-25.5)	24.0(23.2-25.5)	24.0(23.2-25.5)
Claw	15.1(13.9-16.2)	14.7(13.9-16.2)	15.1(13.9-16.2)
Claw dig.	14.7(13.9-16.2)	14.7(13.9-16.2)	14.7(13.9-16.2)
Entire leg	188(188)	185(183-195)	194(192-195)

Spiracles: Anterior 12.8(11.6-13.9) long, peritreme ca. 7.0 wide, diameter of atrial orifice 1.4(1.0-2.3); with 2 quinquelocular pores (fig. f), diameter ca. 3.5. Posterior ca. 11.6 long, peritreme 8.5(7.0-9.3) wide, diameter of atrial orifice ca. 2.3; 3 quinquelocular pores (fig. f) in bifid furrow, diameter ca. 3.5.

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each ca. 4.7 long, ca. 3.5 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 23.2(20.9-25.5) long. Six rows of slender hairlike setae on abdomen,

submedial (fig. i) 12.4(11.6-13.9), submarginal 5.8(4.6-7.0), marginal ca. 4.6 long, respectively. A pair of stout setae anterior of anal ring, 23.2(20.9-25.5) long.

Anal lobes: With medial seta 10.1(9.3-11.6) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular ca. 20.9 long, ca. 18.6 wide; 6 anal ring setae, each 32.5(30.2-34.8) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. j): In transverse rows on abdomen.

Affinities: This species is near C. theydoni in morphology, but their known geographical distribution is widely separated. Presently C. paragybensis is known only from South America and C. theydoni is known only from Africa.

Cerococcus parrotti (Hunter)

Plate 23

Lecaniodiaspis parrotti Hunter, 1899:76; Cerococcus parrotti, Lawson, 1917:170. Howell et al. 1971:9.

MATERIAL STUDIED: On unknown host, 2(5), Woodward, OK, coll. E.C. Chilcott, II-8-1927, (USNM). On Ulmus americana (Ulmaceae), 1(4) Columbus, Ohio, coll. J.G. Sanders, IX-7-1906, (USNM). On Liquidambar styraciflua (Hamamelidaceae), 1(6), North Bergen, NJ, coll. G. Rau, X-1941, (USNM).

DESCRIPTION: Body (fig. a) oblong, widest at mesothorax, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous, with 8-shaped pores on dorsum; 647 (619-680) long, 312(196-354) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-four of 1 size, arranged in 4 longitudinal rows on abdomen, 6-8 rows on thorax, 10.4(7.0-13.9) long, 6.0(4.6-9.3) wide.

Simple pores (fig. c): About 36 in submarginal and submedial longitudinal rows, diameter 1.2(1.0-1.4).

Marginal setae (fig. d): From 40 to 42, hairlike, 7.9(7.0-11.7) long.

Spiracular setae (fig. e): Acorn-shaped; anterior 13.0(11.6-13.9) long; posterior 11.4(9.3-13.9) long.

Body setae: On cephalothorax and abdomen in 2 submedial longitudinal rows, each 6.0(2.3-9.3) long.

Anal lobes: Well developed, membraneous, sclerotized on inner margin; 2

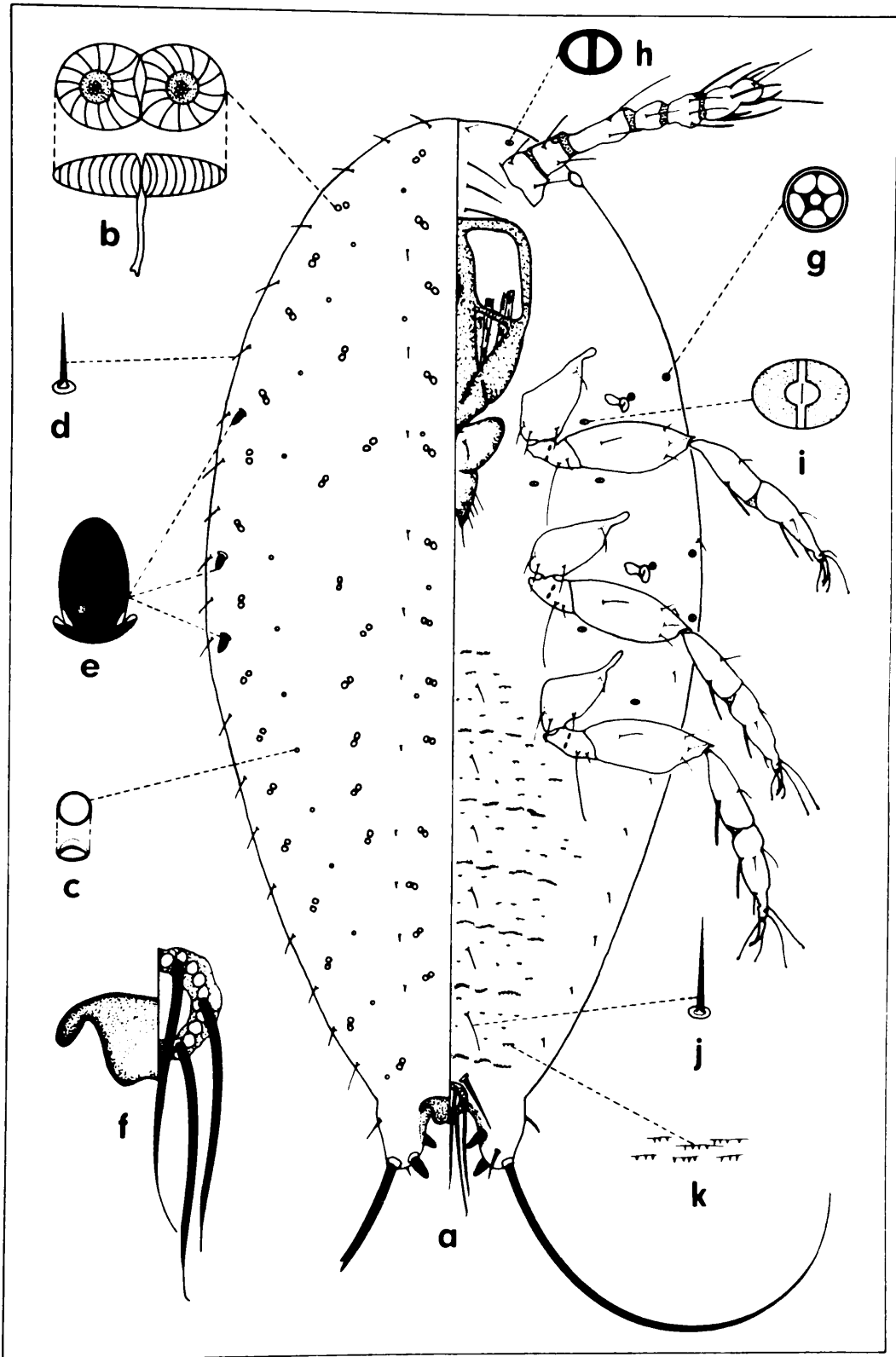


Plate 23.- *Cerococcus parrotti* (Hunter)

(9.3-13.9), posterior 11.1(9.3-11.7) long, Apical setae 250(197-277) long. Lateral seta 10.8(9.3-11.6) long.

Anal plate (fig. f): Trapezoid-shaped 13.9(11.6-16.2) long, 26.2(18.6-30.2) wide.

VENTRAL SURFACE

Antennae: Total length 158(148-169), scape 22.4(19.4-25.5), 31.4(27.8-34.8) wide. Segments II to VI: 19.2(16.2-23.2), 43.1(41.8-51.0), 19.9(17.5-20.9), 22.6(20.9-25.5), 26.7(23.2-30.2) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 118(91.3-130) long, 103(81.6-116) wide.

Labium: Triangular, 73.4(60.3-85.5) long, 70.2(60.3-78.9) wide; with 12 slender setae, each 22.8(18.6-27.8) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	27.0(20.9-30.2)	29.4(25.5-32.5)	30.1(25.5-34.8)
Trochanter	34.9(31.1-39.4)	33.5(32.5-37.1)	33.0(27.8-37.1)
Femur	83.0(71.6-90.5)	81.2(74.2-85.8)	81.9(71.9-88.2)
Tibia	48.8(44.7-51.0)	48.7(44.1-53.4)	50.0(46.4-53.4)
Tarsus	49.7(46.4-53.4)	52.6(46.4-58.0)	47.7(46.7-58.0)
Tarsal dig.	39.6(29.1-44.1)	39.6(29.1-44.1)	39.6(29.1-44.1)
Claw	22.8(18.6-25.5)	24.5(23.2-25.5)	21.6(20.9-27.8)
Claw dig.	27.8(23.3-32.5)	27.8(23.3-32.5)	27.8(23.3-32.5)
Entire leg	266(247-281)	270(248-283)	273(244-292)

Spiracles: Anterior 16.1(12.4-19.0) long, peritreme 9.8(9.5-10.5) wide, diameter of atrial orifice 3.5(1.9-4.8); with 2 quinquelocular pores (fig. g), diameter 3.4(2.8-4.8). Posterior 17.9(15.2-20.9) long,

peritreme 10.2(8.6-13.3) wide, diameter of atrial orifice 4.0(2.8-7.0); 3 quinquelocular pores (fig. g) in bifid furrow.

Pores: Two small biloculars (fig. h) anterior of antennae; 10 biloculars (fig. i) on thorax, each ca. 4.8 long, 3.7(2.8-3.8) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 3 each, 33.0(18.6-44.1) long. Four rows of slender hairlike setae on abdomen, submedial (fig. j) 10.3(9.3-13.9), marginal 8.6(4.6-9.7) long, respectively. A pair of stout setae anterior of anal ring, 26.1(23.2-30.2) long.

Anal lobes: With medial seta 11.6(9.3-16.2) long.

Anal ring (fig. f): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular 21.6(18.6-25.5) long, 22.9(20.9-23.3) wide; 6 anal ring setae, each 47.7(44.1-52.4) long; complete outer row of pores with incomplete inner row.

Microspines (fig. k): In transverse rows from submargin to submargin on abdomen.

Affinities: This species is near to C. koebelei by morphology, host, and geographical distribution. It is different from C. koebelei by having a longer body and longer spiracular setae.

Cerococcus passerinae Brain

Plate 24

Cerococcus passerinae Brain, 1920:121.

MATERIAL STUDIED: On Passerina ericoides (Thymelaeaceae), 2(3), Montagu, So. Africa, coll. C.P. van de Merwe, X-1914 (Brain No. 24), (PPRI).

DESCRIPTION: Body (fig. a) elliptical, tapering posteriorly to anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 327(317-332) long, 151(151) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-two of 1 size, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; ca. 11.6 long, ca. 7.0 wide.

Simple pores (fig. c): About 34 in submarginal and submedial longitudinal rows, diameter ca. 1.9.

Marginal setae (fig. d): From 34 to 36, hairlike, ca. 4.6 long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each 5.8(4.6-7.0) long.

Anal lobes: Well developed, membraneous, sclerotized on inner margin; 2 stout spines on inner margin of each anal lobe, anterior ca. 11.6, posterior ca. 9.3 long. Apical setae 121(118-124) long. Lateral seta ca. 7.0 long.

Anal plate (fig. e): Trapezoid-shaped, ca. 11.6 long, ca. 16.2 wide.

VENTRAL SURFACE

Antennae: Total length 91.3(88.2-95.1), scape 13.9(11.6-16.2) long, 18.6(18.6) wide. Segments II to VI: 14.7(13.9-16.2), 20.1(18.6-20.9),

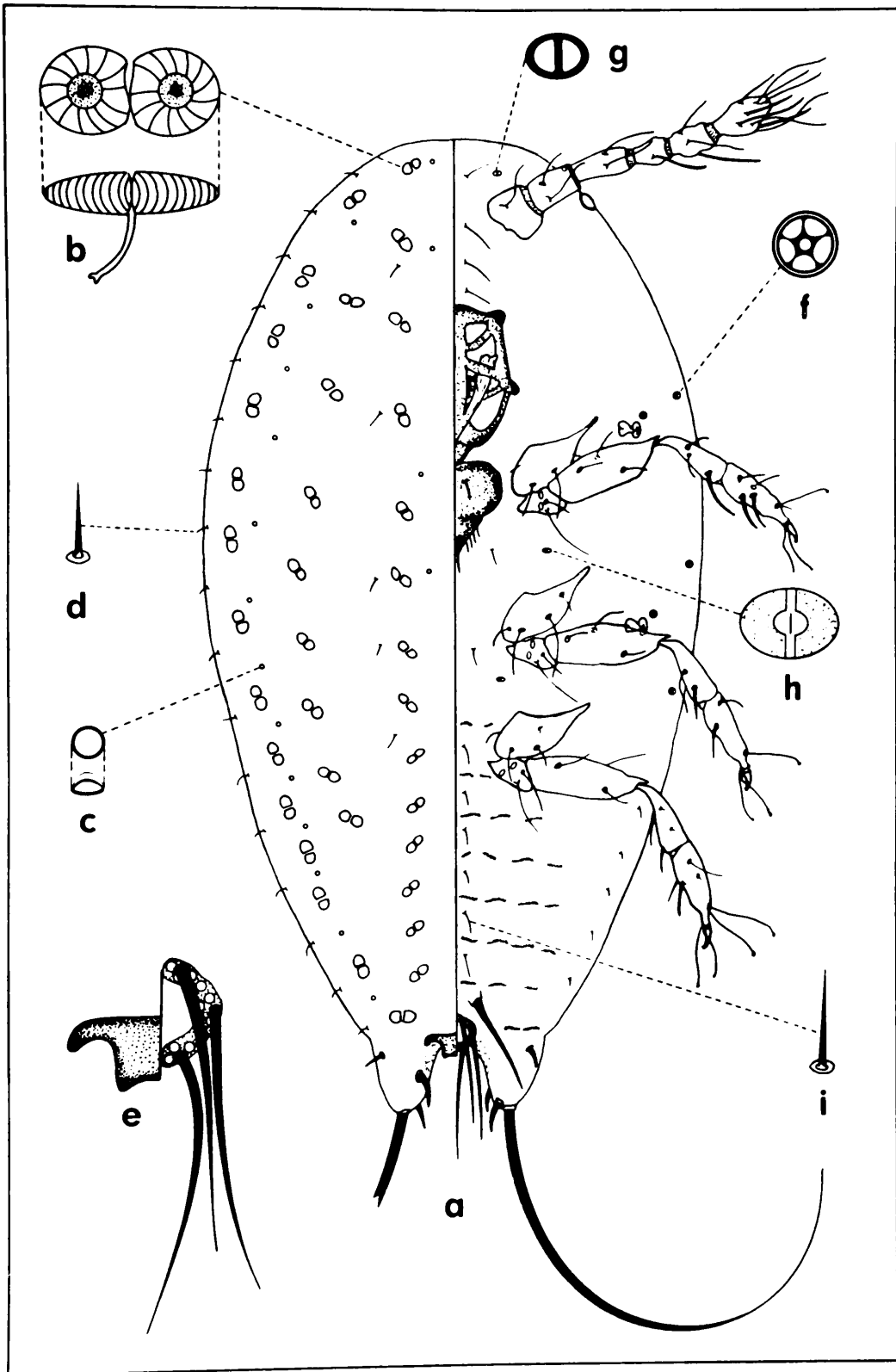


Plate 24.- *Cerococcus passerinae* Brain

10.1(9.3-11.6), ca. 13.9, ca. 18.6 long, respectively. Segment II with sensory pore at outer margin.

Clypeolabral shield: Oblong, 60.3(55.7-62.6) long, 42.5(39.4-44.1) wide.

Labium: Triangular, 50.3(46.4-53.4) long, 33.3(32.5-34.8) wide; with 12 slender setae, each 9.3(7.0-11.6) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	16.2(16.2)	15.4(13.9-16.2)	18.6(16.2-20.9)
Trochanter	23.2(23.2)	20.9(20.9)	22.4(20.9-23.2)
Femur	54.2(53.4-55.7)	52.6(48.7-55.7)	54.9(51.0-58.0)
Tibia	34.8(34.8)	35.6(32.5-39.4)	36.3(34.8-39.4)
Tarsus	32.5(27.8-34.8)	34.0(32.5-34.8)	34.0(30.2-39.4)
Tarsal dig.	24.7(23.2-27.8)	24.7(23.2-27.8)	24.7(23.2-27.8)
Claw	10.4(9.3-11.6)	13.9(11.6-16.2)	17.0(13.9-20.9)
Claw dig.	16.0(13.3-18.6)	16.0(13.3-18.6)	16.0(13.3-18.6)
Entire leg	174(174)	172(167-181)	183(172-195)

Spiracles: Anterior 11.1(9.5-12.4) long, peritreme ca. 6.6 wide, diameter of atrial orifice 2.2(1.9-2.8); with 2 quinquelocular pores (fig. f), diameter ca. 2.8. Posterior 10.8(10.5-11.4) long, peritreme ca. 5.7 wide, diameter of atrial orifice 1.9(1.0-2.8); 3 quinquelocular pores (fig. f) in bifid furrow, diameter ca. 2.8.

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each 4.3(3.8-4.8) long, 2.8(1.9-3.8) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 25.5(23.2-27.8) long. Four rows of slender hairlike setae on abdomen, submedial (fig. i) ca. 7.0, marginal ca. 4.6 long respectively. A pair of stout setae anterior of anal ring- 34.8(30.2-39.4) long.

Anal lobes: Medial seta not measurable on material studied.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes; subcircular ca. 18.6 long, 17.4(16.2-18.6) wide; 6 anal ring setae, each 28.8(22.8-34.8) long; complete outer row of translucent pores with incomplete inner row.

Microspines: Absent.

Affinities: This species is known only from South Africa on a single host, Passerina ericoides, and morphologically it appears to be near C. corokiae. However, C. passerinae can be distinguished because it has three quinquelocualr pores associated with each posterior spiracle while C. corokiae has only one. The latter is known only from New Zealand.

Cerococcus punctiferus (Green)

Plate 25

Antecerococcus punctiferus Green, 1901:560; Cerococcus punctiferus, Green, 1908a:41.

MATERIAL STUDIED: On Pittosporum sp. (Pittosporaceae), 1(3), VPI&SU No. PL-188g), N.S.W., Australia, coll. W. W. Froggatt, Rec'd. E. E. Green, VIII-7-1905, (DPI): 1(7), type material, N.S.W., Australia, coll. W. W. Froggatt, rec'd. E. E. Green, VIII-7-1905, (USNM).

DESCRIPTION: Body (fig. a) elliptical, tapering posteriorly to well developed anal lobes; body segmentation evident on abdomen only; derm membranous with 8-shaped pores on dorsum; 413(393-423) long, 183(136-196) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-two of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores 23.2(20.9-25.5) long, 11.6(11.6) wide, small pores 12.5(9.3-13.9) long, 7.2(7.0-9.3) wide.

Simple pores (fig. c): About 26 in submarginal and submedial longitudinal rows, diameter ca. 1.7.

Marginal setae (fig. d): From 36 to 38, hairlike, 6.4(4.6-9.3) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each 8.1(7.0-9.3) long.

Anal lobes: Well developed, membraneous, sclerotized on inner margin; 2 spines on inner margin of each anal lobe, anterior 12.5(11.6-13.9),

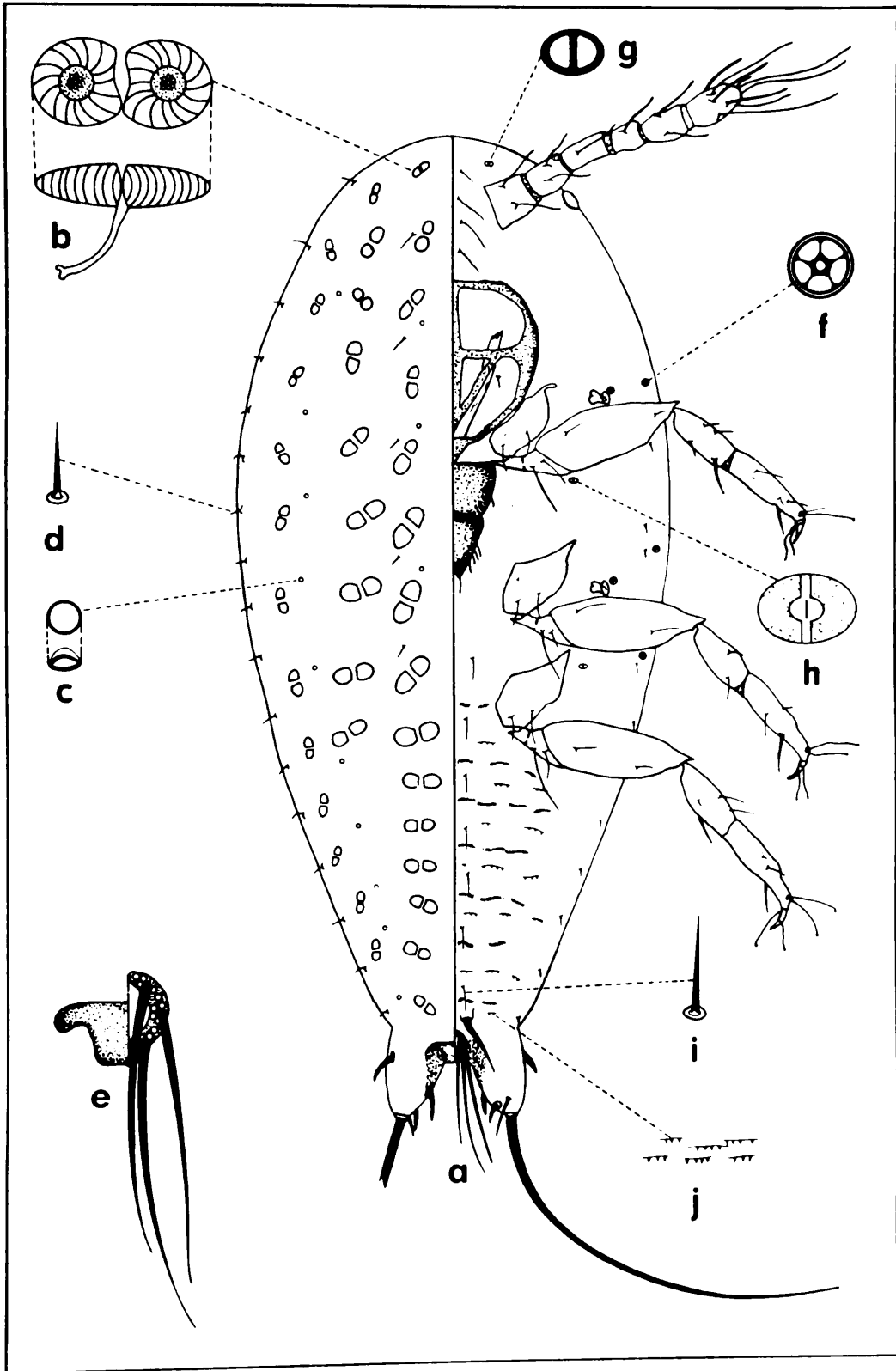


Plate 25.- *Cerococcus punctiferus* (Green)

posterior 9.3(7.0-11.6) long. Apical setae 183(171-201) long. Lateral seta 11.2(9.3-13.9) long.

Anal plate (fig. e): Trapezoid-shaped, situated in positions which make it unmeasurable in available specimens.

VENTRAL SURFACE

Antennae: Total length 116(107-132), scape 19.3(11.6-25.5) long, 21.8 (16.2-25.5) wide. Segments II to VI: 20.2(18.6-20.9), 23.7(18.6-30.2), 12.5(9.3-16.2), 17.6(13.9-20.9), 23.2(20.9-25.5) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Ovoid, 80.7(65.0-92.8) long, 68.3(60.3-76.6) wide.

Labium: Triangular, 56.4(53.4-65.0) long, 48.2(39.4-53.4) wide; with 12 slender setae, each 11.6(7.0-13.9) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	23.2(18.6-27.8)	22.3(18.6-27.8)	23.0(20.9-25.5)
Trochanter	24.4(18.6-27.8)	24.4(20.9-25.5)	25.0(23.2-27.8)
Femur	61.3(53.4-65.0)	61.9(55.7-67.3)	61.5(58.0-65.0)
Tibia	38.0(34.8-46.4)	41.3(37.1-46.4)	40.4(37.1-44.1)
Tarsus	37.8(30.2-44.1)	36.2(32.5-41.8)	36.0(30.2-44.1)
Tarsal dig.	28.4(25.5-32.5)	28.4(25.5-32.5)	28.4(25.5-32.5)
Claw	16.7(11.6-18.6)	18.6(13.9-20.9)	18.1(13.9-20.9)
Claw dig.	20.3(18.6-20.9)	20.3(18.6-20.9)	20.3(18.6-20.9)
Entire leg	204(183-223)	205(186-218)	204(195-218)

Spiracles: Anterior 11.6(8.6-16.2) long, peritreme 13.1(10.5-15.2) wide, diameter of atrial orifice 2.2(1.0-3.8); with 2 quinquelocular pores (fig. f), diameter 3.3(2.3-4.6). Posterior 13.1(10.5-15.2) long, peritreme 8.2(6.6-9.5) wide, diameter of atrial orifice 3.0(1.0-4.6); 3

quinelocular pores (fig. f) in bifid furrow, diameter 3.3(2.3-4.6).

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each ca. 4.8 long, ca. 3.8 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each 24.1(16.2-34.8) long. Four rows of slender hairlike setae on abdomen, submedial (fig. i) 11.3(9.3-16.2), marginal 5.8(4.6-11.6) long, respectively. A pair of stout setae anterior of anal ring, 27.3 (20.9-37.2) long.

Anal lobes: With medial seta 10.8(9.3-11.6) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular 22.1(20.9-23.2) long, 22.9(20.9-23.2) wide; 6 anal ring setae, each 40.7(32.5-46.4) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. j): In transverse rows on abdomen.

Affinities: This species is very closely aligned to C. paradoxus by morphology, host, and geographical distribution. It can be differentiated from C. paradoxus because it has longer anal ring setae, and shorter medial setae on the venter of the anal lobes.

Cerococcus quercus Comstock

Plate 26

Cerococcus quercus Comstock, 1882:213; Riley, 1894:71; Patterson, 1901:390; Steinweden, 1929:218.

MATERIAL STUDIED: On Quercus oblongifolia (Fagaceae), 1(4), (VPI&SU PL-080d), Dept. of Agr. coll., Arizona, III-29-1881, (USNM); 2(7), Dept. of Agr. coll., Arizona, labeled type, III-29-1881, (USNM).

DESCRIPTION: Body (fig. a) elliptical, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous, with 8-shaped pores on dorsum; 524(483-574) long, 243 (226-272) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Ninety-two of 1 size, arranged in 6 longitudinal rows on abdomen, 8 rows on thorax, 14.5(13.9-16.2) long, 9.0(7.0-9.3) wide.

Simple pores (fig. c): About 28 in submarginal and submedial longitudinal rows, diameter ca. 1.0.

Marginal setae (fig. d): From 44 to 46, slender, straight, or slightly curved at tip, 14.1(11.6-20.9) long.

Spiracular setae: Not different form marginal setae.

Body setae: On cephalothorax and abdomen in 2 submedial longitudinal rows, each 4.8(3.8-5.7) long.

Anal lobes: Well developed, membranous, sclerotized on inner margin; 2 strong, slightly curved spines on inner margin of each anal lobe, anterior 12.3(11.6-13.9), posterior 12.1(11.6-13.9) long. Apical setae

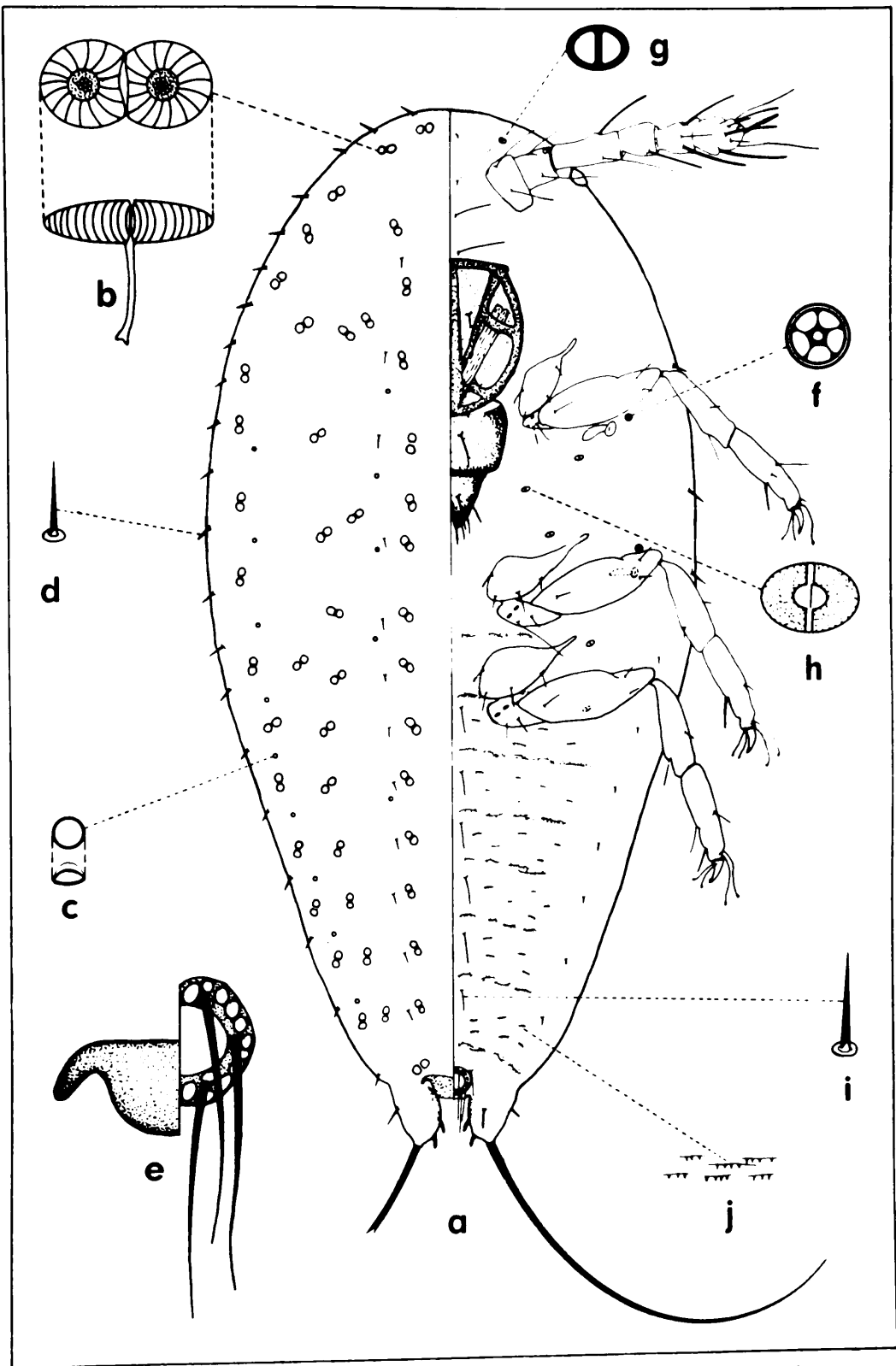


Plate 26.- *Cerococcus quercus* Comstock

211(130-242) long. Lateral seta 13.8(12.4-14.8) long.

Anal plate (fig. e): Trapezoid-shaped, 13.7(11.6-18.6) long, 24.5(23.2-27.8) wide.

VENTRAL SURFACE

Antennae: Total length 129(123-134), scape 16.4(16.2-18.6) long, 26.4(23.2-27.8) wide. Segments II to VI: ca. 16.2, 33.7(20.2-27.1), 18.3(16.2-20.9), 19.1(18.6-23.2), 25.7(23.2-27.8), long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 94.2(88.2-99.8) long, 78.9(69.6-92.8) wide.

Labium: Triangular, 60.6(53.4-67.3) long, 50.8(46.4-58.0) wide; with 12 slender seta, each 25.7(18.6-30.2) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	26.7(25.5-27.8)	26.9(20.9-30.2)	29.9(27.8-32.5)
Trochanter	27.4(18.6-30.2)	28.1(25.5-30.2)	29.2(27.8-32.5)
Femur	72.8(63.3-76.6)	73.3(71.9-76.6)	73.8(69.6-76.6)
Tibia	45.0(44.1-46.4)	46.4(44.1-48.7)	48.5(44.1-53.4)
Tarsus	48.5(44.1-53.4)	50.6(48.7-53.4)	54.3(51.0-58.0)
Tarsal dig.	36.4(27.8-39.4)	36.4(27.8-39.4)	36.4(27.8-39.4)
Claw	23.4(20.9-25.3)	24.4(23.2-25.5)	24.8(23.2-25.5)
Claw dig.	25.5(25.5-27.8)	25.5(20.9-27.8)	25.5(20.9-27.8)
Entire leg	241(230-237)	247(236-251)	257(245-269)

Spiracles: Anterior 14.6(11.6-16.2) long, peritreme ca. 9.3 wide, diameter of atrial orifice ca. 2.3; with 1 quinquelocular pore (fig. f), diameter ca. 3.8. Posterior 14.3(13.9-16.2) long, peritreme 9.5(9.3-11.6) wide, diameter of atrial orifice 2.4(2.3-2.8); 1 quinquelocular pore near spiracle, diameter ca. 3.8.

Pores: Two small biloculars (fig. g) anterior of antennae; 10 biloculars (fig. g) anterior of antennae; 10 biloculars (fig. h) on thorax, each 4.9(4.8-5.7) long, 4.2(3.8-4.8) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each 25.9(18.6-34.8) long. Four rows of slender hairlike setae on abdomen, submedial (fig. i) 22.2(18.7-25.5), marginal 10.2(9.3-13.9) long, respectively. A pair of stout setae anterior of anal ring, 35.6(27.8-39.4) long.

Anal lobes: With medial seta 16.0(13.9-20.9) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes; subcircular 26.4(20.9-30.2) long, 22.7(18.6-25.5) wide; 6 anal ring setae, each 48.5(39.4-53.4) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. j): On abdomen in transverse rows from submargin to submargin.

Affinities: Morphologically this species is different from all others by having complete submarginal longitudinal rows of dorsal 8-shaped pores and thus has 92 dorsal 8-shaped pores. It is also the only North American species without acorn-shaped spiracular setae.

Note: This species is host specific to members of the family Fagaceae. Patterson (1901) described the first instar as follows: "...about .5mm long, elliptical in outline, and distinctly segmented.... Caudal segment... 2 prominent lobes and bears at least 4 pair of comparatively short spines... 8 anal ring setae. Each leg has 4 digitules (knobbed) ... 6-jointed antenna. ...6 longitudinal rows of double pits on dorsum; no single pits occur".

Cerococcus roseus Green

Plate 27

Cerococcus roseus Green, 1909:310.

MATERIAL STUDIED: On unknown host, 4(12), (VPI&SU No. ABH-19a-d), Trincomadli, Ceylon, coll. Major Yerbury and F. Moore, IX-11-1911, (BM).

DESCRIPTION: Body (fig. a) elliptical, widest at mesothorax, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous only; with 8-shaped pores on dorsum; 407(378-453) long, 169(106-181) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-two of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax, large pores 21.3(18.6-23.2) long, 12.9(11.6-13.9) wide; small pores 13.1(11.6-13.9) long, ca. 7.0 wide.

Simple pores (fig. c): About 26 near submargin, diameter ca. 1.0.

Marginal setae (fig. d): From 36 to 38, hairlike 7.3(4.6-9.3) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each 8.3(7.0-9.3) long.

Anal lobes: Well developed, membraneous, sclerotized slightly on inner margin; 2 spines on inner margin of each anal lobe, anterior 11.4(7.0-13.9), posterior 8.0(4.6-9.3) long. Apical setae 129(71.9-207) long. Lateral seta 8.0(7.0-9.3) long.

Anal plate (fig. e): Trapezoid-shaped with a posterolateral projection 11.6(7.0-16.2) long, 21.9(13.9-27.8) wide.

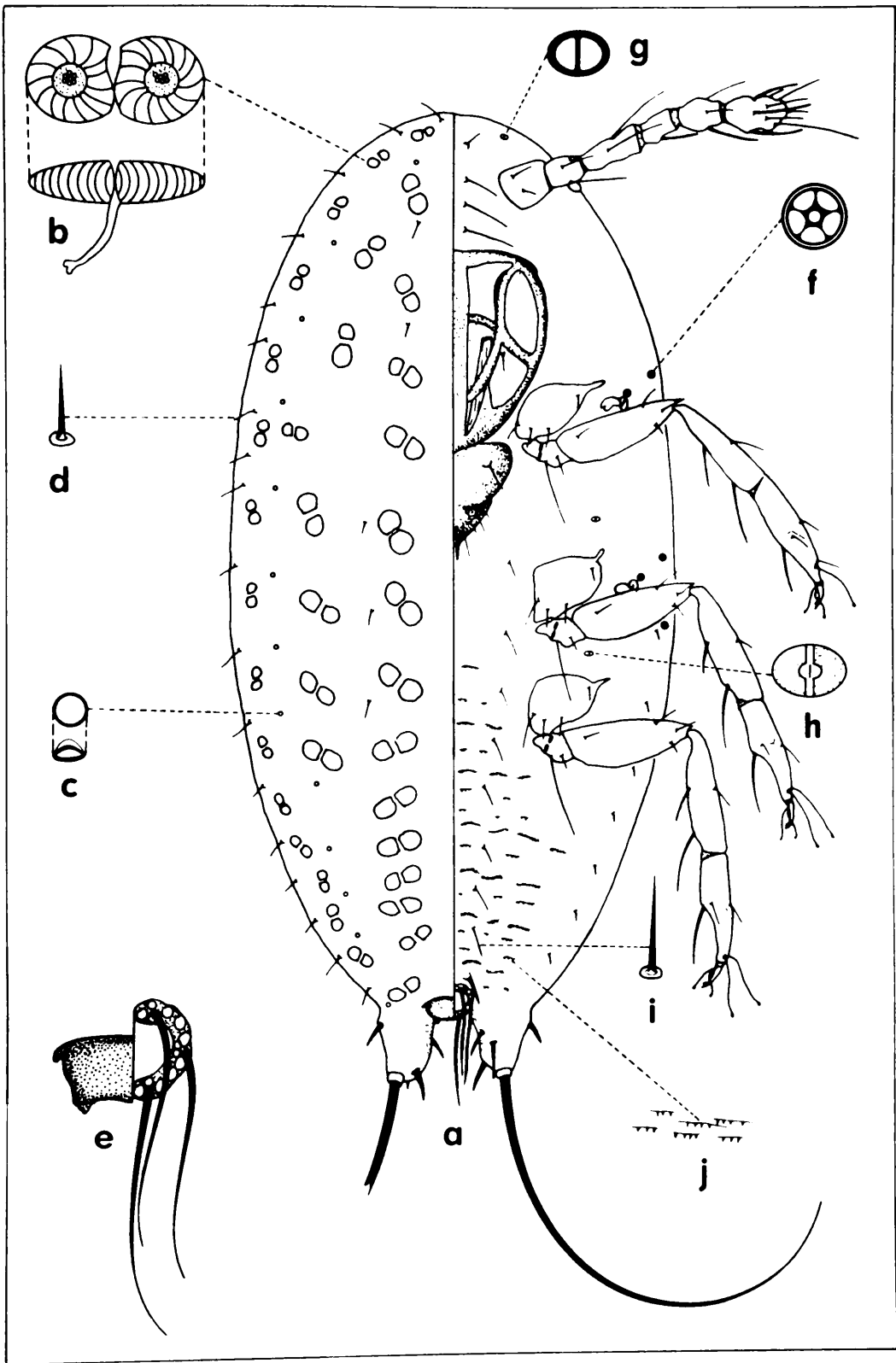


Plate 27.- *Cerococcus roseus* Green

VENTRAL SURFACE

Antennae: Total length 125(111-137), scape 20.7(16.2-23.2) long, 19.9 (18.6-20.9) wide. Segments II to VI: 17.6(16.2-18.6), 25.5(20.9-30.2), 17.9(13.9-23.2), 19.2(13.9-20.9), 23.8(20.9-25.5) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 75.8(62.6-88.2) long, 55.3(46.4-58.0) wide.

Labium: Triangular, 47.6(37.1-58.0) long, 45.4(30.2-46.4) wide; with 12 slender setae, each 12.6(9.3-20.9) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	24.6(16.2-30.2)	21.4(11.6-27.8)	25.9(18.6-41.8)
Trochanter	24.9(20.9-27.8)	23.2(20.9-25.5)	24.4(23.2-25.5)
Femur	65.5(55.7-69.6)	64.3(51.0-69.6)	65.2(58.0-69.6)
Tibia	43.9(39.4-48.7)	44.3(41.8-48.7)	43.8(37.1-48.7)
Tarsus	37.6(33.9-46.4)	39.9(32.5-44.1)	38.6(34.8-46.4)
Tarsal dig.	24.8(16.2-30.2)	24.8(16.2-30.2)	24.8(16.2-30.2)
Claw	15.9(11.6-18.6)	17.2(13.9-18.6)	17.4(13.9-18.6)
Claw dig.	23.7(23.2-25.5)	23.7(23.2-25.5)	23.7(23.2-25.5)
Entire leg	213(183-230)	213(169-230)	217(186-246)

Spiracles: Anterior 8.3(4.6-13.9) long, peritreme 10.8(9.3-13.9) wide, diameter of atrial orifice 3.9(2.3-4.6); with 2 quinquelocular pores (fig. f), diameter 4.3(3.8-4.8). Posterior 9.7(4.6-13.9), peritreme 9.1 (2.3-11.6) wide, diameter of atrial orifice 4.2(2.3-7.0); 3 quinquelocular pores (fig. f) in bifid furrow, diameter 4.3(3.8-4.8).

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each ca. 4.8 long, ca. 3.8 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4

each, 32.0(23.2-41.8) long. Four rows of slender hairlike setae on abdomen, submedial (fig. i) 8.3(7.0-9.3), marginal 5.2(4.6-7.0) long, respectively. A pair of stout setae anterior of anal ring, 13.7(9.3-18.6) long.

Anal lobes: Medial seta 10.2(7.0-13.9) long.

Anal ring: Placed almost vertical to the longitudinal axes of the anal lobes, subcircular ca. 20.0 long, 20.2(19.0-23.8) wide; 6 anal ring setae, each 32.9(25.5-39.4) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. j): In transverse rows on abdomen.

Affinities: This species is similar to the Australian species C. paradoxus and C. punctiferus, but C. roseus can be separated from them by the shorter stout setae anterior and ventral of the anal ring.

Cerococcus ruber Balachowsky

Plate 28

Cerococcus ruber Balachowsky, 1930:303.

MATERIAL STUDIED: On Rhantherium suaveolens (Compositae), 1(9), labeled type, Bordj-bou Hedma, Tunisia, Coll. C. Dumont, III-1929, (USNM).

DESCRIPTION: Body (fig. a) ovoid, tapering to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 432(378-471) long, 251(183-378) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores 17.5(13.6-18.6) long, 8.3(7.0-9.3) wide; small pores 10.7(9.3-13.9) long, 5.5(4.6-7.0) wide.

Simple pores (fig. c): About 30 in submarginal and submedial longitudinal rows, diameter ca. 1.0.

Marginal setae (fig. d): From 32 to 34, hairlike, 5.1(4.6-7.0) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each 8.1(7.0-9.3) long.

Anal lobes: Well developed, membraneous, sclerotized on inner margin; 2 stout spines on inner margin of each anal lobe, anterior 11.6(9.3-13.9), posterior 9.4(7.0-11.6) long. Apical setae 203(177-236) long. Lateral seta 19.6(13.6-25.5) long.

Anal plate (fig. e): Trapezoid-shaped with an acute posterolateral projection, 10.8(9.3-11.6) long, 16.2(13.9-18.6) wide.

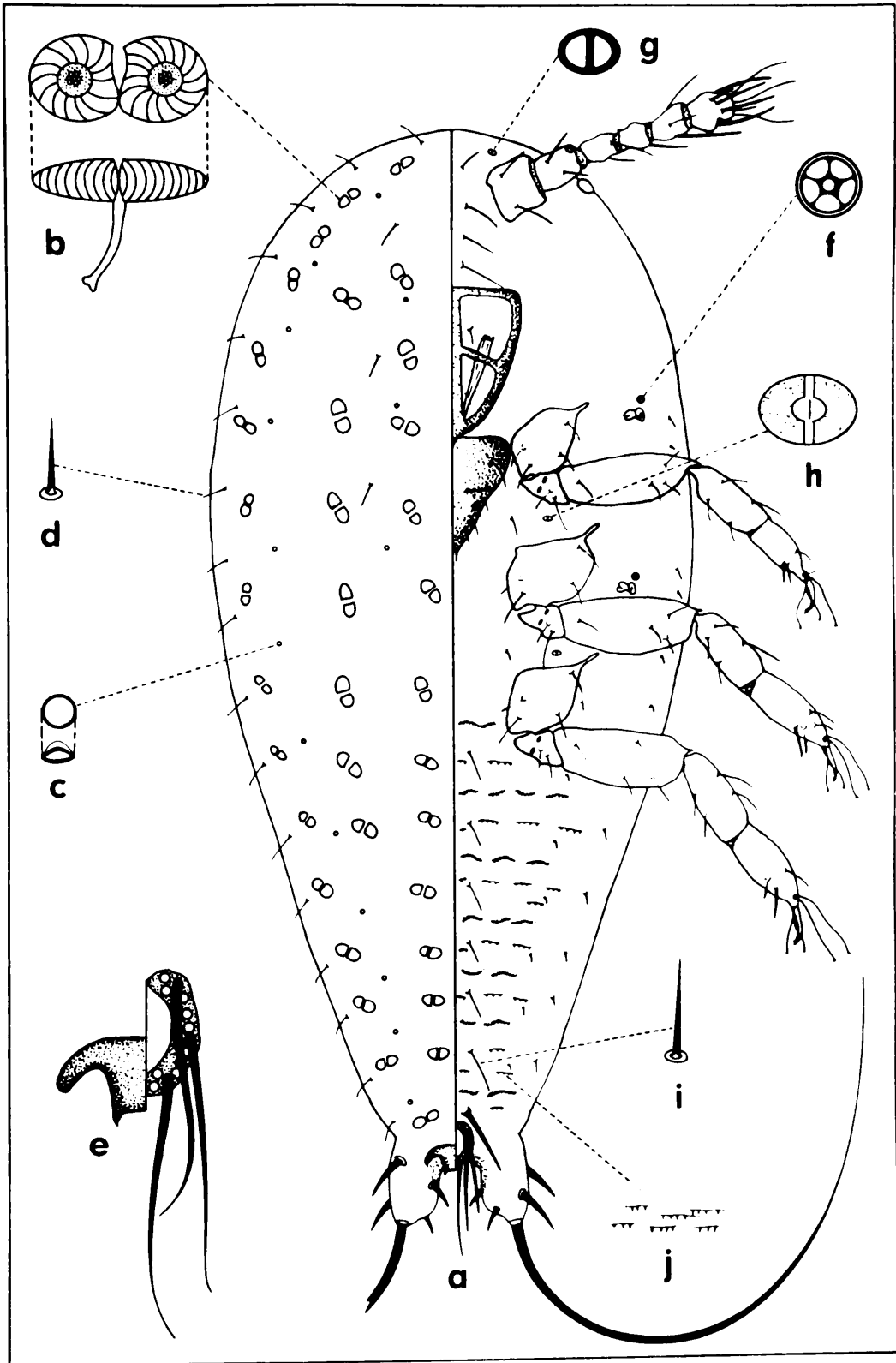


Plate 28.- *Cerococcus ruber* Balachowsky

VENTRAL SURFACE

Antennae: Total length 110(100-123), scape 17.5(13.9-18.6) long, 25.3 (20.9-30.2) wide. Segments II to VI: 17.0(13.9-18.6), 18.0(16.2-20.9), 14.3(11.6-18.6), 19.4(13.9-20.9), 24.2(20.9-27.8) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 81.3(74.0-89.3) long, 60.0(53.4-69.6) wide.

Labium: Triangular, 52.5(41.8-77.7) long, 49.3(41.8-58.3) wide; with 12 slender setae, each 16.9(11.6-23.2) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	20.4(18.6-20.9)	22.3(20.9-23.2)	23.7(20.9-25.5)
Trochanter	22.2(20.9-25.5)	22.0(20.9-23.2)	20.5(18.6-23.2)
Femur	61.5(55.7-65.0)	61.1(53.4-65.0)	65.6(62.6-68.0)
Tibia	37.1(34.8-44.0)	42.0(34.8-46.4)	42.9(34.8-51.0)
Tarsus	32.4(27.2-34.8)	38.3(31.5-39.4)	40.3(36.9-41.8)
Tarsal dig.	32.2(30.2-34.8)	32.2(30.2-34.8)	32.2(30.2-34.8)
Claw	21.1(18.6-23.2)	21.0(18.6-23.2)	22.4(20.9-23.2)
Claw dig.	22.4(20.9-23.2)	22.4(20.9-23.2)	22.4(20.9-23.2)
Entire leg	195(181-204)	207(183-220)	216(200-230)

Spiracles: Anterior ca. 13.6 long, peritreme 8.8(7.3-9.3) wide, diameter of atrial orifice 2.8(2.3-3.9); with 1 quinquelocular pore (fig. f), diameter ca. 3.5. Posterior 13.5(11.7-13.9) long, peritreme 8.0(7.0-9.3) wide, diameter of atrial orifice 2.6(2.3-3.9); 1 quinquelocular pore (fig. f) near spiracle.

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each 4.0(3.8-4.7) long, 3.0(2.8-3.8) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4

each, 18.6(16.2-25.5) long, six rows of slender setae on abdomen, submedial (fig. i) 26.8(17.5-37.0), submarginal 9.7(9.0-13.9), marginal 10.6(8.0-13.9) long, respectively. A pair of stout setae anterior of anal ring, 31.3(27.8-37.1) long.

Anal lobes: With lateral seta ca. 13.6 long.

Anal ring (fig. e): Placed almost vertical of the longitudinal axes of the anal lobes, subcircular 20.6(18.6-23.2) long, 19.7(16.2-25.5) wide; 6 anal ring setae, each 32.6(27.8-34.8) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. j): On abdomen in transverse rows from submargin to submargin.

Affinities: This species morphologically is similar to C. cistarum.

Although they share a mediterranean goeographical range, they have different hosts. C. ruber also has 70 dorsal 8-shaped pores and C. cistarum has 64 dorsal 8-shaped pores.

Cerococcus stellatus (Maskell)

Plate 29

Planchonia bryoides var. stellata Maskell, 1897:315; Cerococcus stellatus, Morrison and Morrison, 1927:22.

MATERIAL STUDIED: On Loranthus linophyllis (Loranthaceae), 2(10), VPI&SU No. ABH-05a-b), Victoria, Australia, coll. C. French, (BM).

DESCRIPTION: Body (fig. a) elliptical, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 409(362-438) long, 198(166-227) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores 21.1(20.9-23.2) long, 11.8(11.6-13.9) wide; small pores ca. 11.6 long, ca. 7.0 wide.

Simple pores (fig. c): About 26 in submarginal and submedial longitudinal rows, diameter ca. 1.9.

Marginal setae (fig. d): About 36, hairlike, 6.0(4.6-9.3) long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each 7.0(4.6-9.3) long.

Anal lobes: Well developed, membraneous, sclerotized slightly on inner margin; 2 stout blunt spines on inner margin of each anal lobe, anterior 9.1(7.0-11.6), posterior 9.5(7.0-13.9) long. Apical setae 147(100-174) long. Lateral seta 8.8(7.0-11.6) long.

Anal plate (fig. e): Trapezoid-shaped with anterolateral projection

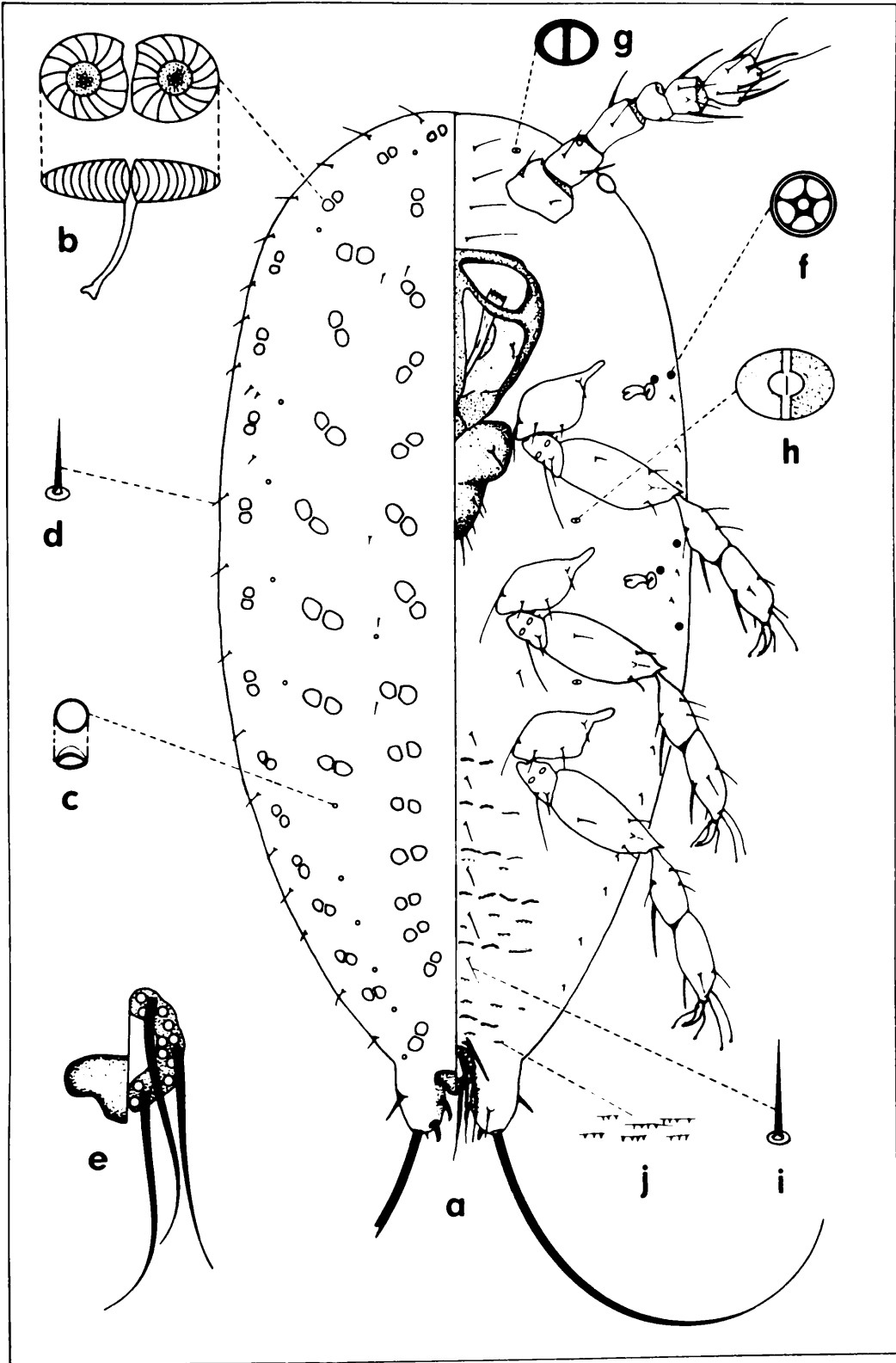


Plate 29- *Cerococcus stellatus* (Maskell)

broadly oval, 13.5(11.6-16.2) long, 20.5(16.2-23.2) wide.

VENTRAL SURFACE

Antennae: Total length 118(109-125), scape 20.0(16.2-23.2) long, 23.1 (18.6-25.5) wide. Segments II to VI: 18.8(16.2-20.9), 25.5(20.9-27.8), 14.4(11.6-18.6), 16.9(13.9-18.6), 23.0(20.9-23.2) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 77.1(69.6-85.8) long, 62.4(48.7-74.2) wide.

Labium: Triangular, 67.3(51.0-97.4) long, 50.8(46.4-65.) wide; with 12 slender setae, each 13.4(11.6-16.2) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	22.7(18.6-30.2)	21.7(13.9-23.2)	22.2(18.6-25.5)
Trochanter	25.5(23.2-27.8)	24.2(23.2-25.5)	23.2(20.9-25.5)
Femur	59.8(53.4-62.6)	60.8(55.7-62.6)	60.0(51.0-65.0)
Tibia	37.1(32.5-41.8)	37.9(34.8-41.8)	37.6(32.5-39.4)
Tarsus	33.8(30.2-37.1)	35.1(32.5-39.4)	34.5(30.2-37.1)
Tarsal dig.	25.2(20.9-27.8)	25.2(20.9-27.8)	25.2(20.9-27.8)
Claw	18.1(16.2-18.6)	18.9(18.6-20.9)	18.6(16.2-20.9)
Claw dig.	20.1(16.2-23.2)	20.1(16.2-23.2)	20.1(16.2-23.2)
Entire leg	197(186-204)	199(188-204)	196(176-202)

Spiracles: Anterior 13.1(11.6-13.9) long, peritreme 7.8(7.0-9.3) wide, diameter of atrial orifice 3.3(2.3-4.6); with 2 quinquelocular pores (fig. f), diameter 3.6(2.3-4.6). Posterior 13.5(10.5-17.6) long, peritreme 7.3(4.6-9.4) wide, diameter of atrial orifice 4.3(2.3-7.0); 3 quinquelocular pores (fig. f) in bifid furrow, diameter 3.6(2.3-4.6).

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, each c. 4.8 long, ca. 3.8 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 24.5(16.2-30.2) long. Four rows of slender hairlike setae on abdomen, submedial (fig. i) 8.1(7.0-11.6), marginal 5.6(4.6-7.0) long, respectively. A pair of stout setae anterior of anal ring, 22.8(19.0-29.4) long.

Anal lobes: Medial seta 8.8(7.0-9.3) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular 22.7(19.0-25.6) long, 19.8(18.1-21.0) wide; 6 anal ring setae, each 29.7(20.9-37.1) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. j): In transverse rows on abdomen.

Affinities: This species morphologically is related to C. roseus, but the setae on the inner margin of the anal lobes are sharp pointed in C. roseus and are slunt in C. stellatus.

Cerococcus theydoni Hall

Plate 30

Cerococcus theydoni Hall, 1935:218; Cerococcus coffeae, Vayssiere, 1946:379; Lambdin and Kosztarab In Press

MATERIAL STUDIED: On Acalypha sp. (Euphorbiaceae), 2(4), (VPI&SU No. ABH-28-b-c), Que Que, Rhodesia, coll. C.J. Hodgson, IX-17-1967, (WC).

DESCRIPTION: Body (fig. a) ovoid, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 347(336-362) long, 157(153-159) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores ca. 18.6 long, ca. 11.6 wide; small pores ca. 11.6 long, ca. 7.0 wide. Fifth in submedial row from posterior is large size and 6th. is small size.

Simple pores (fig. c): About 42 in submarginal and submedial longitudinal rows, diameter ca. 2.3.

Marginal setae (fig. d): From 30 to 32 hairlike, ca. 7.0 long.

Spiracular setae: Not different from marginal setae.

Body setae: On cephalothorax in 2 submedial longitudinal rows, each ca. 7.0 long.

Anal lobes: Well developed, membranous, sclerotized on inner margin; 2 spines on inner margin of each anal lobe, anterior 10.1(9.3-11.6), posterior 7.8(7.0-9.3) long. Apical setae 125(74.2-162) long. Lateral seta 6.2(4.6-7.0) long.

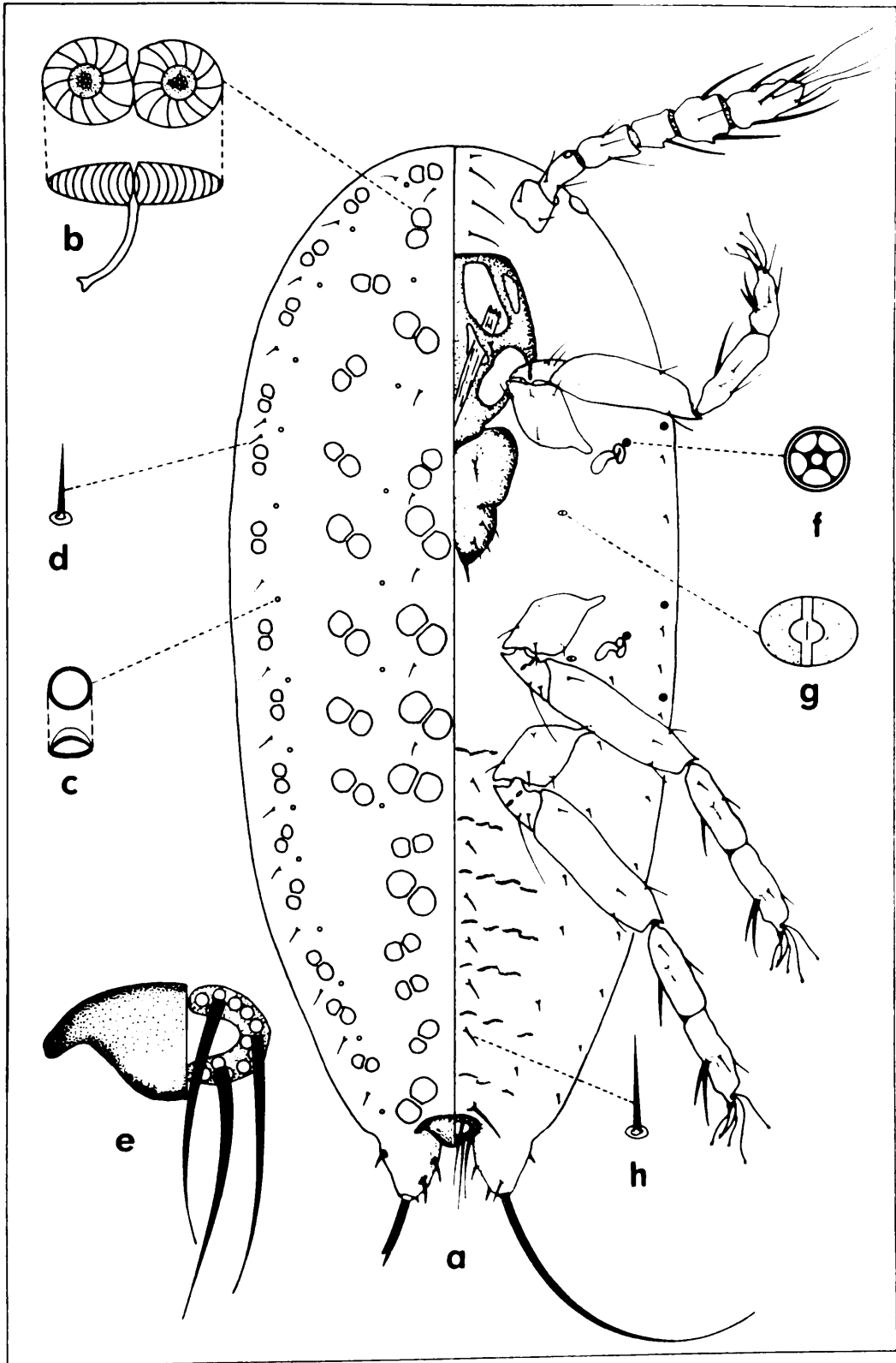


Plate 30.- *Cerococcus theydoni* Hall

Anal plate (fig. e): Evidently trapezoid, length not determined, ca. 18.6 wide.

VENTRAL SURFACE

Antennae: Total length 105(100-107), scape 15.4(13.9-16.2) long, 20.3 (18.6-20.9) wide. Segments II to VI: ca. 16.2, 19.7(16.2-20.9), 13.3 (9.3-16.2), 16.8(16.2-18.6), 23.8(20.9-25.5) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Subcircular, 63.2(60.3-67.3) long, 53.4(48.7-55.7) wide.

Labium: Triangular, 36.0(34.8-27.1) long, 36.5(34.8-37.1) wide; with 12 slender setae, each 10.1(9.3-11.6) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw dititules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	18.6(16.2-20.9)	18.6(16.2-20.9)	19.4(18.6-20.9)
Trochanter	16.8(11.6-23.2)	15.4(13.9-16.2)	16.2(11.6-18.6)
Femur	48.7(44.1-51.0)	47.6(39.4-55.7)	48.7(46.4-51.0)
Tibia	27.8(25.5-32.5)	32.0(25.5-34.8)	28.4(23.2-32.5)
Tarsus	29.0(27.8-30.2)	29.6(25.5-34.8)	29.6(27.8-30.2)
Tarsal dig.	25.5(20.9-27.8)	25.5(20.9-27.8)	25.5(20.9-27.8)
Claw	13.9(9.3-16.2)	13.9(7.0-16.2)	13.9(11.6-16.2)
Claw dig.	15.5(11.6-18.6)	15.5(11.6-18.6)	15.5(11.6-18.6)
Entire leg	157(153-160)	165(158-174)	161(158-162)

Spiracles: Anterior 12.8(11.6-13.9) long, peritreme ca. 7.0 wide, diameter of atrial orifice ca. 1.0; with 2 quinquelocular pores (fig. f), diameter ca. 4.6. Posterior ca. 11.6 long, peritreme ca. 7.0 wide, diameter of atrial orifice ca. 1.0; 3 quinquelocular pores (fig. f) in bifid furrow, diameter ca. 4.6.

Pores: Four biloculars (fig. g) on thorax, each ca. 4.8 long, ca. 3.8 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 23,8(18.6-30.2) long. Six rows of slender hairlike setae on abdomen, submedial (fig. h) ca. 9.3, submarginal ca. 4.6, marginal ca. 7.0 long, respectively. A pair of stout setae anterior of anal ring, 21.7(20.9-23.2) long.

Anal lobes: With medial seta 7.8(7.0-9.3) long.

Anal ring ((fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular ca. 23.2 long, 19.4(18.6-20.9) wide; 6 anal ring setae, each 30.8(27.8-32.5) long; complete outer row of translucent pores with incomplete inner row.

Microspines: Absent.

Affinities: This species is similar to C. parahybensis in morphology, but is different because it has 70 dorsal 8-shaped pores (C. parahybensis has 72) and is known only from Africa, while C. parahybensis is known from South America.

Note: The bilocular pore which is anterior of each antenna in most Cerococcus species was not observed in this species.

Cerococcus tuberculus (Hempel)

Plate 31

Solenococcus tuberculus Hempel, 1900:390; Cerococcus tuberculus Green, 1917:80.

MATERIAL STUDIED: On Baccharis sp. (Compositae), 3(10), labeled type, Sano Paulo, Brazil, coll. A. Hempel, 1900, (USNM).

DESCRIPTION: Body (fig. a) elliptical, widest at mesothorax, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 530 (513-533) long, 248(232-272) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Eighty of 1 size, arranged in 4-6 longitudinal rows on abdomen, 6-8 rows on thorax, 8.6(7.0-9.3) long, ca. 4.6 wide.

Simple pores (fig. c): About 30 in submarginal and submedial longitudinal rows, diameter ca. 1.9.

Marginal setae (fig. d): From 34 to 36, each 6.3(4.6-7.0) long.

Spiracular setae (fig. e): Acorn-shaped, anterior and posterior ca. 7.0 long.

Body setae: On cephalothorax and abdomen in 2 submedial longitudinal rows, each 4.9(2.3-9.3) long.

Anal lobes: Well developed, membranous, sclerotized on inner margin; 2 stout spines on inner margin of each anal lobe, anterior ca. 9.3, posterior 8.8(7.0-9.3) long. Apical setae 286(230-330) long. Lateral seta 10.2(7.0-11.6) long.

Anal plate (fig. f): Trapezoid-shaped 11.6(7.0-16.2) long, 25.8(23.2-

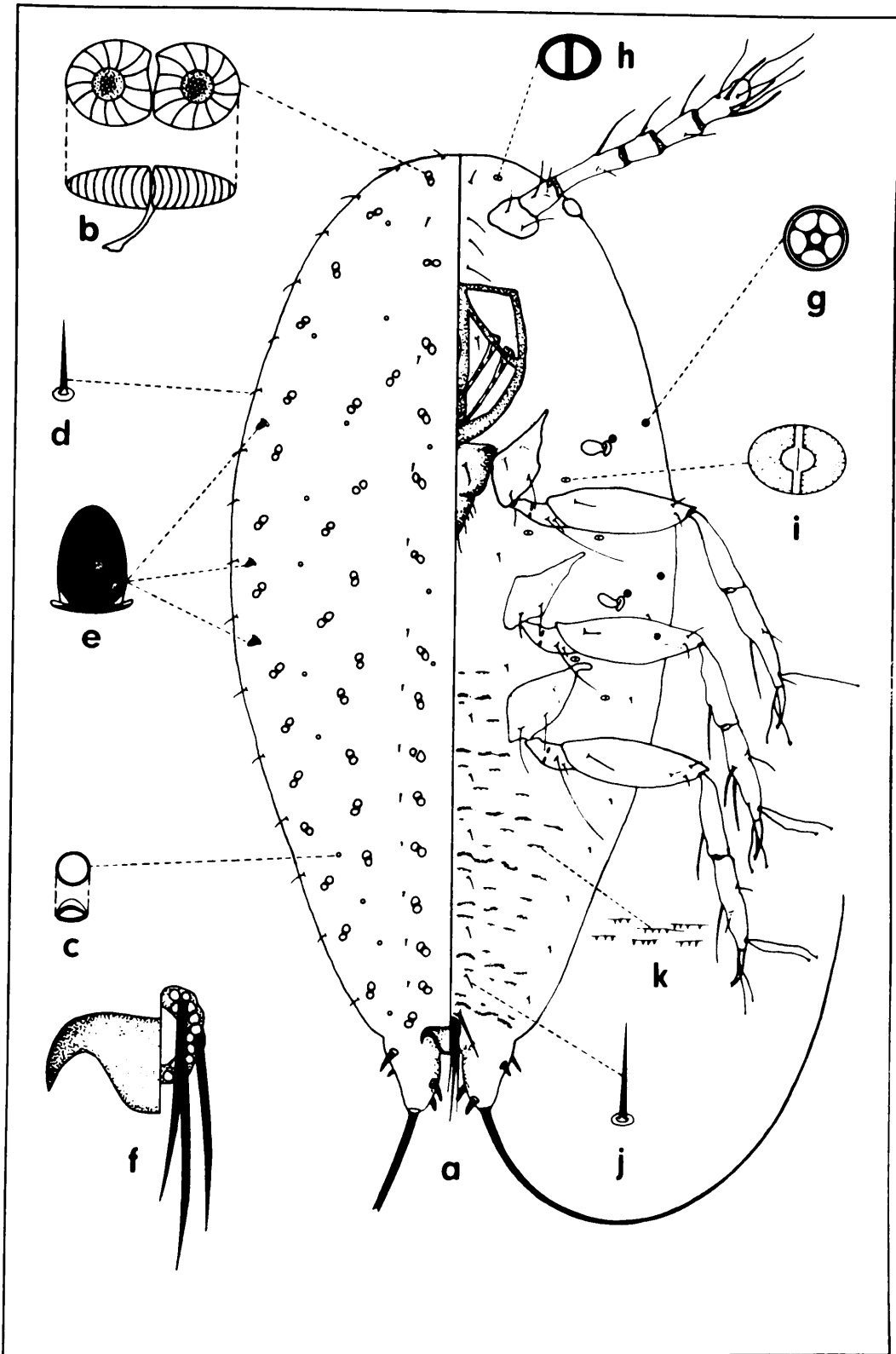


Plate 31- *Cerococcus tuberculus* (Hempel)

27.8) wide.

VENTRAL SURFACE

Antennae: Total length 152(135-160), scape 23.4(18.6-25.5) long, 26.9 (25.5-30.2) wide. Segments II to VI: 18.1(16.2-18.6), 38.1(27.8-44.1), 18.1(16.2-20.9), 23.2(18.6-32.5), 31.3(27.8-32.5) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Oblong, 90.7(83.5-95.1) long, 76.1(65.0-90.5) wide.

Labium: Triangular, 63.6(51.0-74.2) long, 49.7(34.8-58.0) wide; with 12 slender setae, each 17.0(11.6-25.5) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	26.0(18.6-30.2)	26.0(23.2-27.8)	26.9(23.2-30.2)
Trochanter	30.2(27.8-32.5)	29.0(27.8-30.2)	27.8(25.5-30.2)
Femur	81.2(74.2-85.0)	81.2(74.2-83.5)	82.6(74.2-85.8)
Tibia	48.5(44.1-51.0)	48.9(44.1-51.0)	48.9(44.1-53.4)
Tarsus	51.0(46.4-55.7)	49.2(46.4-55.7)	52.2(46.4-58.0)
Tarsal dig.	34.6(30.2-37.1)	34.6(30.2-37.1)	34.6(30.2-37.1)
Claw	20.1(18.6-23.2)	22.1(20.9-23.2)	21.6(20.9-23.2)
Claw dig.	26.9(25.5-27.8)	26.9(25.5-27.8)	26.9(25.5-27.8)
Entire leg	257(239-271)	254(216-269)	260(244-278)

Spiracles: Anterior 13.4(9.3-13.9) long, peritreme ca. 9.3 wide, diameter of atrial orifice 3.9(2.3-7.0); with 2 quinquelocular pores (fig. g), diameter 2.4(2.3-3.5). Posterior 13.7(11.6-13.9) long, peritreme 9.1(7.0-9.3) wide, diameter of atrial orifice 3.2(2.3-4.6); 3 quinquelocular pores (fig. g) in bifid furrow.

Pores: Two small biloculars (fig. h) anterior of antennae; 10 biloculars (fig. i) on thorax, each 4.2(3.5-4.7) long, 3.0(2.3-3.5) wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 32.6(25.5-37.1) long. Four rows of slender hairlike setae on abdomen, submedial (fig. j) 10.4(7.0-13.9), marginal 6.0(5.0-7.0) long, respectively. A pair of stout setae anterior of anal ring, 22.5(18.6-25.5) long.

Anal lobes: With lateral seta 9.5(7.0-11.6) long.

Anal ring (fig. f): Placed almost vertical of the longitudinal axes of the anal lobes, subcircular 22.4(20.9-25.5) long, 22.5(20.9-23.2) wide; 6 anal ring setae, each 42.5(37.1-48.7) long; complete outer row of translucent pores with incomplete inner row.

Microspines (fig. k): On abdomen in transverse rows from submargin to submargin.

Affinities: This species is similar to C. koebele and can be separated by differences in length of the spiracular setae, antennal segment VI, and prothoracic legs. C. tuberculus is known only from Brazil and the closest geographical distribution of C. koebele is Mexico. It also related to C. andinus, but C. tuberculus has 80 dorsal 8-shaped pores on the venter, while C. andinus, has 86 dorsal 8-shaped pores and 14 bilocular pores on the venter.

Note: Hempel (1900) described the first instar of this species as follows: "...elliptical form; 6 antennal segments; anal ring with 6 setae; 6 longitudinal rows of 8-shaped glands on dorsum; 4 digitules on each leg; about 0.52mm long."

Cerococcus zapotlanus (Cockerell)

Plate 32

Solenophora zapotlana Cockerell, 1903:164; Cerococcus zapotlana, Green, 1919:264.

MATERIAL STUDIED: On sage-like plant, 5(10) (VPI&SU No. ABH-23b-f), Zapotlan-Jalisco, Mexico, T. & B. Cyo. coll. No. 55, rec'd VII-1903, (USNM).

DESCRIPTION: Body (fig. a) ovoid, tapering posteriorly to well developed anal lobes; body segmentation discernible on abdomen only; derm membranous with 8-shaped pores on dorsum; 345(317-408) long, 158(135-181) wide.

DORSAL SURFACE

8-shaped pores (fig. b): Seventy-four of 2 sizes, arranged in 4 longitudinal rows on abdomen, 6 rows on thorax; large pores 17.2(13.0-18.6) long, 10.2(9.3-11.6) wide; small pores 11.8(11.6-13.9) long, 6.3(4.6-7.0) wide.

Simple pores (fig. c): About 28 in submarginal row, diameter ca. 1.9.

Marginal setae (fig. d): From 34 to 36, hairlike, 7.9(7.0-9.3) long at posterior end of margin; those anterior of spiracular setae 14.4(11.6-16.2) long.

Spiracular setae: Not different from marginal setae, placed between marginal 8-shaped pores 6th and 7th from anterior.

Body setae: On cephalothorax in 2 submedial longitudinal rows, 6.0(4.6-7.0) long.

Anal lobes: Well developed, membranous, sclerotized on inner margin;

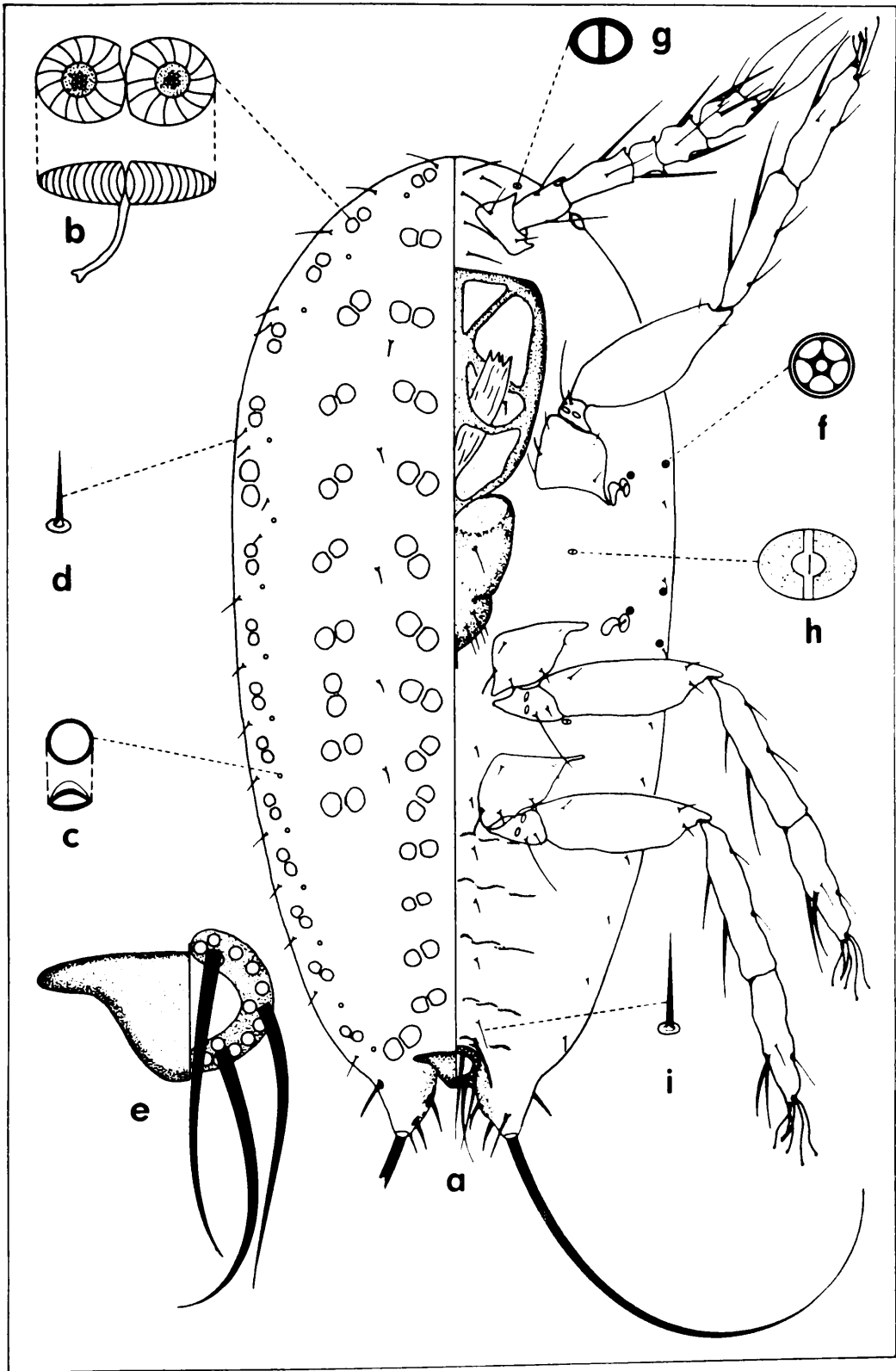


Plate 32.- *Cerococcus zapotlanus* (Cockerell)

2 spines on inner margin of each anal lobe, anterior 13.0(9.3-16.2), posterior 13.2(9.3-16.2) long. Apical setae 194(148-218) long.

Lateral seta 15.0(13.9-16.2) long.

Anal plate (fig. e): Trapezoid-shaped, 15.1(13.9-16.2) long, 18.6(13.9-20.9) wide.

VENTRAL SURFACE

Antennae: Total length 105(102-111), scape 16.4(16.2-18.6) long, 19.5(16.2-23.2) wide. Segments II to VI: 17.2(16.2-18.6), 23.7(20.9-25.5), 10.4(9.3-11.6), 16.0(11.6-18.6), 21.6(20.9-23.2) long, respectively.

Segment II with sensory pore at outer margin.

Clypeolabral shield: Ovoid, 82.8(76.6-85.8) long, 59.2(48.7-69.6) wide.

Labium: Broadly triangular, 50.0(46.4-55.7) long, 44.0(39.4-51.0) wide; with 12 slender setae, each 13.0(9.4-16.2) long.

Legs: Four sensory pores on each trochanter and a small denticle near apex of each claw. Tarsal and claw digitules slender, enlarged at tip.

Part of leg	Length prothoracic	Length mesothoracic	Length metathoracic
Coxa	20.1(18.6-23.2)	20.6(18.6-23.2)	20.6(16.2-23.2)
Trochanter	23.0(20.9-25.5)	22.3(20.9-23.2)	23.0(20.9-25.5)
Femur	62.2(58.0-67.3)	59.6(51.0-67.3)	61.1(55.7-67.3)
Tibia	47.0(41.8-51.0)	50.0(41.8-53.4)	49.7(41.8-53.4)
Tarsus	39.0(32.5-44.1)	37.3(34.8-39.4)	36.3(30.2-39.4)
Tarsal dig.	28.1(25.5-30.2)	28.1(25.5-30.2)	28.1(25.5-30.2)
Claw	18.1(13.9-20.9)	18.8(16.2-20.9)	18.0(13.9-20.9)
Claw dig.	19.1(16.2-20.9)	19.1(16.2-20.9)	19.1(16.2-20.9)
Entire leg	212(204-221)	207(197-220)	208(195-223)

Spiracles: Anterior 13.6(11.7-16.2) long, peritreme 9.0(7.0-11.6) wide, diameter of atrial orifice ca. 2.4; with 2 quinquelocular pores (fig. f), diameter ca. 4.6. Posterior 13.0(10.5-16.2) long, peritreme 9.6(9.3-11.6) wide, diameter of atrial orifice 2.2(1.2-2.3); 3 quinquelocular

pores (fig. f) in bifid furrow, diameter ca. 4.6.

Pores: Two small biloculars (fig. g) anterior of antennae; 4 biloculars (fig. h) on thorax, ca. 4.6 long, ca. 3.5 wide.

Setae: Anterior of clypeolabral shield in 2 longitudinal rows of 4 each, 25.6(18.6-32.5) long. Four rows of slender hairlike setae on abdomen, submedial (fig. i) 14.5(9.3-18.6), marginal 9.2(7.0-11.7) long, respectively. A pair of setae anterior of anal ring, 28.0(23.4-32.5) long.

Anal lobes: With medial seta 14.6(11.6-18.6) long.

Anal ring (fig. e): Placed almost vertical to the longitudinal axes of the anal lobes, subcircular 19.7(16.2-23.2) long, 20.6(18.6-23.2) wide; 6 anal ring setae, each 32.2(25.5-39.4) long; complete outer row of translucent pores with incomplete inner row.

Microspines: Not observed in specimens studied.

Affinities: This species morphologically is similar to C. ornatus, but their known geographical distribution is separated widely. They can be separated because C. ornatus has shorter mesothoracic legs and shorter ventral abdominal setae.

TABLE 1: Summation of body measurements and morphological characters
(averages in microns)

Some distinguishing morphological characters with notes on host and distribution

Name of Cerococcus Species	Number of specimens available	Measurements		
		Body length	Body width	
albospicatus	10	537	244	clypeolabral shield over 90 long; Ceylon & Java
arinus	2	491	235	14 bilocular pores on ventrum of thorax; Argentina
artemislae	11	482	239	body usually under 500 long; dorsal lateral seta of anal lobe over 14 long; known only from USA
baccharidis	10	379	174	76 dorsal 8-shaped pores; Compositae; Cactaceae; So. America
badius	10	432	191	74 dorsal 8-shaped pores; Compositae & others; So. America
bryoides	10	393	181	dorsal 8-shaped pores on abdomen of similar sizes; 4 rows of ventral abdominal setae; Asia, Fiji
cistarum	4	389	196	24 dorsal 8-shaped pores; Cistaceae; Algeria, Cyprus, France
corokiae	7	400	221	2, 5-locular pores at each anterior spiracle, 1, 5-locular at posterior spiracle; New Zealand
cycliger	10	447	204	clypeolabral shield under 90 long; Labiatae, Cistaceae; France, Czechoslovakia, Germany
deklei	12	411	192	1, 3-locular pore anterior of each antenna; Malvaceae; U.S.A., Caribbean Is., Brazil
dumonti	8	527	265	1, 5-locular pore at anterior spiracles; Helianthemum sp.; Tunisia
eremotius	10	488	224	setae anterior of anal ring over 40 long; Helianthemum sp.; Algeria, Tunisia
ficoides	10	433	212	12 bilocular pores on ventrum of thorax; numerous hosts; India, Formosa
froggatti	3	383	201	anal lobes short, about as long as wide; Compositae; Australia
indicus	12	378	177	anal lobes normally developed, about twice as long as wide; numerous hosts; India, Pakistan
intermedius	5	414	177	3 dorsal 8-shaped pores absent from submarginal rows; Labiatae; Tunisia
kairiae	14	425	206	acorn-shaped anterior spiracular setae always double; Ericaceae; USA
koebelae	10	548	248	acorn-shaped spiracular setae over 8 long; Rosaceae, Berberidaceae; USA, Mexico
ornatus	14	286	128	ventral abdominal setae under 9 long in submedial rows; Rubiaceae; Ceylon, Formosa, Pakistan
paradoxus	7	393	196	average length of anal ring setae 35; Pittosporaceae; Australia
paratybensis	3	448	202	72 dorsal 8-shaped pores; Rubiaceae; Brazil
parrotti	10	647	312	body always over 600 long; numerous hosts; USA
passerinae	3	327	151	72 dorsal 8-shaped pores, 4 rows ventral abdominal setae; Thymelaeaceae; So. Africa
punctiferus	10	413	183	average length of anal ring setae 41; Pittosporaceae; Australia
quercus	11	524	243	92 dorsal 8-shaped pores, complete submarginal rows of 8-shaped pores; Fagaceae; USA
roseus	12	407	169	setae anterior of anal ring under 19 long; hosts unknown; Ceylon
ruber	9	432	251	70 dorsal 8-shaped pores, 4 absent from submarginal rows; Compositae; Tunisia
stellatus	10	409	198	setae on inner margin of anal lobes blunt; Santalaceae, Loranthaceae; Australia
theydoni	4	347	157	70 dorsal 8-shaped pores, 6 rows of ventral abdominal setae; numerous hosts; Rhodesia, Kenya
tuberculus	20	530	248	acorn-shaped spiracular setae 7 long; Baccharis sp.; Brazil
zapotlanus	10	345	158	mesothoracic legs over 190 long; sage-like plant, Mexico

TABLE 2: Summation of some measurements of morphological characters on
the venter (averages in microns)

Name of Cerococcus Species	Antennae							Clypeolabral shield	Labium		Anal ring		Anal ring setae length	
	Width 1st Segment	Length of segments							Total length	length	width	length		width
		I	II	III	IV	V	VI							
albospicatus	25.5	20.7	22.4	30.6	16.1	18.7	27.8	136	68.3	65.8	25.7	18.6	42.9	
ardinus	23.2	20.9	16.2	30.2	15.0	19.8	25.5	128	88.2	72.0	68.4	--	40.6	
artemisiae	23.2	20.1	18.8	31.0	13.9	17.3	24.5	125	89.0	68.7	55.8	20.2	35.0	
baccharidis	20.4	17.4	19.1	26.0	17.6	20.9	29.0	130	69.6	62.2	46.4	18.9	30.2	
badius	22.9	17.6	18.6	26.9	18.4	22.7	31.6	136	75.3	59.6	43.8	24.4	37.0	
bryoides	16.9	16.9	16.9	26.0	13.0	14.2	20.6	109	71.9	63.6	51.0	20.9	38.0	
cistarus	19.4	20.1	17.0	18.6	10.4	12.8	19.8	98.0	71.9	60.9	51.6	20.9	31.9	
corokiae	21.3	16.2	15.4	22.1	14.3	16.2	24.0	108	80.4	65.0	40.6	23.2	33.5	
cycliger	20.9	17.5	20.0	22.7	12.1	17.1	24.5	114	75.6	64.0	46.2	22.2	34.3	
deklei	19.0	16.0	15.4	25.1	13.9	14.5	21.3	106	79.7	63.1	47.8	15.3	29.2	
dumonti	26.7	22.4	21.6	27.4	13.5	21.9	29.0	136	86.1	82.5	79.5	27.3	49.0	
eremobius	27.3	24.2	22.4	29.7	14.4	21.6	29.7	142	85.6	80.5	75.2	30.2	49.9	
ficoides	21.3	18.2	19.9	27.6	17.1	17.9	22.6	123	69.5	61.1	59.6	19.0	35.9	
froggatti	23.2	15.4	16.2	20.1	10.8	16.2	24.7	104	74.3	62.0	41.0	23.2	48.2	
indicus	19.9	15.8	19.3	25.7	15.4	16.8	24.5	118	77.6	53.1	43.6	20.9	37.9	
intermedius	21.8	17.2	17.6	22.3	11.6	15.3	22.7	107	72.0	63.7	47.2	25.5	39.5	
kalmiae	23.0	20.0	17.2	33.4	15.1	16.0	22.7	122	78.1	67.4	46.1	19.6	33.9	
koebeleri	23.0	20.9	18.6	31.1	17.5	19.6	22.4	131	94.2	78.0	64.5	19.7	38.3	
ornatus	17.6	15.0	17.1	23.2	11.0	13.3	20.0	99.4	69.0	52.1	43.5	22.1	32.4	
paradoxus	23.9	16.2	19.2	20.5	12.9	17.6	22.2	109	75.9	72.2	53.4	23.5	35.1	
parahybensis	18.6	14.7	18.6	23.2	16.2	15.5	20.9	109	69.6	56.5	37.9	20.9	35.1	
parrotti	31.4	22.4	19.2	43.1	19.9	22.6	26.7	158	118	103	73.4	21.6	47.7	
passerinae	18.6	13.9	14.7	20.1	10.1	13.9	18.6	91.3	60.3	42.5	50.3	18.6	28.8	
punctiferus	21.8	19.3	20.2	23.7	12.5	17.6	23.2	116	80.7	68.3	56.4	22.1	40.7	
quercus	26.4	16.4	16.2	33.7	18.3	19.1	25.7	129	94.2	78.9	60.6	26.4	48.5	
roseus	19.9	20.7	17.6	25.5	17.9	19.2	23.8	125	75.8	55.3	47.6	20.0	32.9	
ruber	25.3	17.5	17.0	18.0	14.3	19.4	24.2	110	81.3	60.0	52.2	20.6	32.6	
stellatus	23.1	20.0	18.8	25.0	14.4	16.9	23.0	118	77.1	62.4	67.3	22.7	29.7	
theydoni	20.3	15.4	16.2	19.7	13.3	16.8	23.8	105	63.2	53.4	36.0	19.8	30.8	
tuberculus	26.9	23.4	18.1	38.1	18.1	23.2	31.3	152	90.7	76.1	49.7	22.4	42.5	
zaplotanus	19.5	16.4	17.2	23.7	10.4	16.0	21.6	105	82.8	59.2	50.0	19.7	32.2	

TABLE 3: Summation of some measurements of morphological characters on the dorsum
(averages in microns)

Name of Cerococcus Species	Dorsal 8-shaped pores				Anal Plate		Anal lobe setae			
	Large		Small		length	width	ant. length	post. length	lateral length	apical length
	length	width	length	width						
albospicatus	25.7	15.2	15.2	9.1	16.2	26.7	9.6	13.1	11.3	240
andinus	--	--	7.0	4.6	--	22.0	7.0	7.0	12.8	174
artemisiae	--	--	11.8	8.0	15.4	22.3	10.1	11.2	15.8	202
baccharidis	--	--	10.4	7.1	20.4	19.6	10.2	11.0	8.2	184
badius	--	--	12.6	8.8	15.6	20.0	9.3	10.1	6.7	221
bryoides	20.4	12.8	12.5	7.4	8.1	22.9	10.9	9.5	6.1	157
cistarum	16.8	9.3	12.2	5.2	18.6	24.0	7.7	8.7	10.1	171
corokiae	--	--	13.2	10.3	15.6	18.6	8.9	9.7	5.1	169
cycliger	19.5	10.9	14.8	7.5	11.6	16.2	10.2	9.8	9.6	175
deklei	--	--	9.3	6.0	10.6	15.4	8.9	7.5	9.3	150
dumonti	--	--	14.2	7.8	14.2	18.2	21.7	21.6	24.1	234
eremobius	19.5	10.4	12.1	7.2	12.4	28.6	27.8	17.5	19.2	249
ficoides	13.4	8.9	8.7	6.2	11.7	17.7	10.2	8.3	7.8	185
froggatti	20.0	10.8	11.6	7.0	--	20.9	11.6	10.1	--	171
indicus	19.1	11.4	11.6	7.0	18.6	18.6	12.0	9.5	8.7	198
intermedius	17.9	11.6	13.2	7.9	17.4	19.8	13.0	12.1	12.8	210
kalmiae	--	--	11.6	7.3	13.5	18.0	11.8	8.6	--	194
koebeliei	--	--	8.6	4.6	13.1	20.5	7.7	8.8	9.6	158
ornatus	12.0	9.0	9.3	6.0	11.6	17.8	10.5	10.1	7.0	189
paradoxus	22.5	11.3	12.3	7.0	13.9	16.2	11.2	9.0	10.1	184
parahybensis	18.6	11.6	12.4	7.0	11.6	17.8	12.4	8.5	5.4	183
parrotti	--	--	10.4	6.0	13.9	26.2	11.4	11.1	10.8	250
passerinae	--	--	11.6	7.0	11.6	16.2	11.6	9.3	7.0	121
punctiferus	23.2	11.6	12.5	7.2	--	--	12.5	9.3	11.2	183
quercus	--	--	14.7	9.3	13.7	24.5	12.3	12.1	13.8	211
roseus	21.3	12.9	13.1	7.0	11.6	21.9	11.4	8.0	8.0	129
ruber	17.5	8.3	10.7	5.5	10.8	16.2	11.6	9.4	19.6	203
stellatus	21.1	11.8	11.6	7.0	13.5	20.5	9.1	9.5	8.8	147
theydoni	18.6	11.6	11.6	7.0	--	18.6	10.1	7.8	6.2	125
tuberculus	--	--	8.6	4.6	11.6	25.8	9.3	8.8	10.2	286
zapotlanus	17.2	10.2	11.8	6.3	15.1	18.0	13.0	13.2	15.0	194

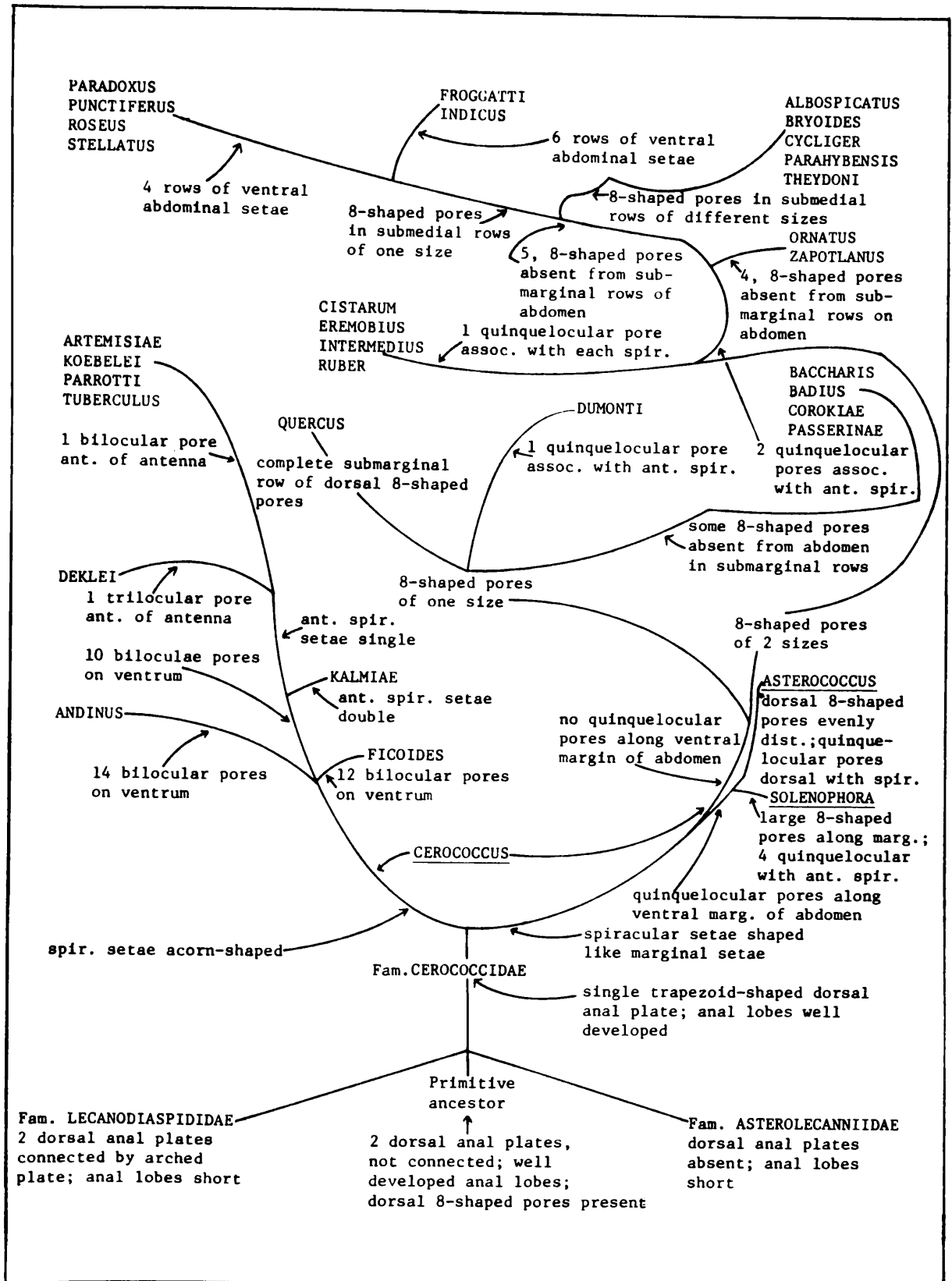
VIII. PHYLOGENY OF CEROCOCCUS, BASED ON FIRST INSTARS

The inference of phylogeny by using observations of the first instars is speculative at best. A more accurate phylogeny will probably be obtained by observing the adult females, first instars, second instars, and adult males, and coordinating these observations as a whole. Advanced and primitive characters are difficult to deduce when the first instars are the source of those characters.

Unfortunately, just over half of the species of Cerococcus are represented in this study. Large gaps occur in their known geographical distribution and the host lists are incomplete. A large amount of information on geographical distribution, hosts and other instars needs to be compiled before an accurate phylogeny can be concluded. However, even with few species studied, incomplete host information and gaps in geographical distribution, it seems appropriate to present a tentative phylogenetic tree for the species studied. Therefore, a tentative phylogenetic tree of Cerococcus, based on first instars, (Plate 33) is presented.

The text given with the phylogenetic tree is self explanatory. It is evident from this that all the Nearctic species have acorn-shaped spiracular setae, except C. quercus. The only species with acorn-shaped spiracular setae which occurs outside the Nearctic and Neotropical regions is C. ficoides which occurs in the Oriental region.

Conclusions could not be made on species distribution on the continents or on the effect of Continental Drift on their geographical distributions, because of the scarcity of distribution records.

Plate 33. - Phylogenetic tree of *Cerococcus*, based on first instars

IX. CONCLUSIONS

The first instars of the genus Cerococcus had received little attention in the past. In this study, the generic names Amelococcus Marchal, Antecerococcus Green, Cercococcus, Scott, Coricoccus Mahdihassan and Phenacobryum Cockerell were considered synonyms of Cerococcus Comstock as was done by Lambdin and Kosztarab (In Press) in their study of the adult females. They were previously considered synonyms because of their similar morphology by Green (1908), Lindinger (1910), Balachowsky (1930), Ferris (1955), and Ali (1970).

The closely related genera Asterococcus Borchsenius and Solenophora Maskell appear distinct based on morphological characters of the first instars. In the genus Asterococcus the dorsal 8-shaped pores are evenly distributed and the larger ones never along the margin only. Two or three quinquelocular (sometimes 7-locular) pores are associated with each anterior spiracle. The genus Solenophora is nonotypic with only the type species S. fagi Maskell included (Lambdin and Kosztarab, 1976). It has about 60 large dorsal 8-shaped pores distributed along the body margin only, and submarginal and submedial longitudinal rows of smaller dorsal 8-shaped pores. Four quinquelocular pores are associated with each anterior spiracle.

The species of the genus Cerococcus do not have close morphological affinities with species in the genera of Asterolecaniidae or Lecanodiaspididae. Therefore, this study supports the findings of Koteja (1974) and Lambdin and Kosztarab (In Press) in their recognition of the family Cerococcidae.

The first instars of 31 Cerococcus species were studied and were found to possess similar morphological characters. The most conspicuous of these characters were: an elliptical to ovoid body that tapered posteriorly to well developed anal lobes; anal lobes terminated by long apical setae; inner margin of anal lobes armed with stout spines, anal ring with six anal ring setae; large dorsal 8-shaped pores of one or two sizes in longitudinal rows; antennae with 6-segments; well developed legs; bilocular pores on ventrum of thorax; one pair of setae on the clypeolabral shield; six pairs of setae on the triangular-shaped labium; submarginally placed spiracles with associated quinquelocualr pores; acorn-shaped or regular setae-shaped spiracular setae; and four or six longitudinal rows of ventral abdominal setae.

With the exception of C. quercus and C. zapotlanus all of the North American species of Cerococcus were found to have acorn-shaped spiracular setae. Other species possessing acorn-shaped spiracular setae were C. andinus from Argentina and C. ficoides from Formosa and India.

Generally the classification of Cerococcus species by using morphological characters of the first instars agreed well with the adult female classification. Only closely related species were difficult to separate, e.g. C. paradoxus and C. punctiferus, both Australian species from the same host.

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MORPHOLOGY AND TAXONOMY OF THE FIRST
INSTARS OF THE GENUS CEROCOCCUS COMSTOCK
(HOMOPTERA: COCCOIDEA: CEROCOCCIDAE)

by

Avas B. Hamon

(ABSTRACT)

The taxonomy of species in the genus Cerococcus has been unstable and adequate keys and descriptions have not been available for identification. This detailed study of the first instars is one step in the revision of the genus and reevaluation of the taxa which have been referred to the genus.

The first instars of 31 species of Cerococcus are included in this study. Each species studied is fully described, including measurements of morphological characters, and illustrated.

Cerococcus first instars were found to have well developed legs; well developed mouthparts with a 3-segmented labium; 6-segmented antennae; 2 pairs of spiracles with associated quinquelocular pores; acorn-shaped spiracular setae or regular setae-shaped spiracular setae; well developed anal lobes which are armed with spines on the inner margin and terminated by long apical setae; large conspicuous dorsal 8-shaped pores in longitudinal rows; dorsal trapezoid-shaped anal plate; and 6 setae on the anal ring.

The classification of Cerococcus first instars generally agreed

with the classification of the adult females, and keys are provided for separation of the first instars studied.

Species of the genus Cerococcus were found to be morphologically distinct from the species in the genera Asterococcus and Solenophora. It appears that the genus Cerococcus is only distantly related to the genera in the families Asterolecaniidae, Eriococcidae, and Lecanodiaspididae.