

A key to genera of Eriococcidae (Hemiptera: Coccoidea) from the Neotropical region and a revision of *Pseudotectococcus* Hempel (Eriococcidae), a gall inducing scale insect genus from Brazil, with a description of a new species

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Abstract

A key is provided to the adult females of 16 of the 17 genera of Eriococcidae known from tropical South America. The adult female and 1st-instar nymph of the type species of *Pseudotectococcus*, *P. anonae* Hempel, is redescribed and a lectotype and paralectotypes designated; in addition, the adult female, adult male, 1st-instar nymph, 2nd-instar female and 2nd-instar male nymphs, prepupa and pupa of *Pseudotectococcus rollinae* sp. n., discovered inducing leaf-galls on *Rollinia laurifolia* Schldtl. (Annonaceae) in the Zoo-Botanic Foundation, Belo Horizonte, Minas Gerais State, Brazil, are described. The differences between *Pseudotectococcus* and other South American genera are discussed.

Key words: Eriococcidae, Neotropics, key, new species, *Pseudotectococcus*, lectotype.

Introduction

Eriococcidae or felt scales are the fourth largest family of scale insects (Hemiptera: Sternorrhyncha: Coccoidea) and are most abundant in the Southern Hemisphere, especially in New Zealand (Hoy, 1962) and Australia. It is likely that they are also abundant in much of South America, but this continent has been little explored and, at present, only 52 species in 17 genera have been recorded from the Neotropical region. Many are known only from the original description and one or two minor references and therefore are poorly understood.

We studied specimens of at least one species in each of the following genera (the number in parentheses is the number of species in the genus and the species names are the species that we have examined): *Aculeococcus* Lepage, 1941 (2, *morrisoni* Lepage), *Apiococcus* Hempel, 1900 (4, *gregarius* Hempel, *asperatus* Hempel, *singularis* Hempel), *Capulinia* Signoret 1875 (4, *crateriformis* Hempel, *jaboticabae* Von Ihering, *sallei* Signoret), *Carpochloroides* Cockerell, 1899 (2, *mexicanus* Ferris, *viridis* Cockerell), *Chilechiton* Hodgson & Miller, 2002 (1, *lynnae* Hodgson & Miller), *Chilecoccus* Miller & González, 1975 (2, *browni* Miller & González, *spinus* Miller & González), *Eriococcus* Targioni Tozzetti, 1868 (345),

Exallococcus Miller & González, 1975 (1, *laureliae* Miller & González), *Icelococcus* Miller & González, 1975 (3, *charlini* Miller & González, *lithreae* Hodgson & Miller, *nothofagi* Miller & González), *Melzeria* Green, 1930 (1, *horni* Green), *Opisthoscelis* Schrader 1863 (only *O. prosopidis* Kieffer & Jorgensen has been recorded from South America and there is no real evidence that it belongs to this genus), *Ovaticoccus* Kloet, 1944 (only *O. lahillei* (Leonardi) has been recorded in *Ovaticoccus* from South America and, based on the shape of the setae as described in the original description, it appears to belong to *Eriococcus*), *Pseudocapulinia* Hempel, 1932 (1, *lanosa* Hempel), *Pseudotectococcus* Hempel, 1934 (2, *anonae* Hempel, *rollinae* Hodgson & Gonçalves (described as new below)), *Stibococcus* Miller & González, 1975 (1, *cerinus* Miller & González), and *Tectococcus* Hempel, 1900 (1, *ovatus* Hempel).

Although we did not examine specimens of *Macracanthopyga* Lizer y Trelles (Lizer y Trelles, 1955) (1, *verganiana* Lizer y Trelles) and *Neotectococcus* Hempel (Hempel, 1937) (1, *lenticularis* Hempel), adequate descriptions were available to make comparisons. The description of *Opisthoscelis prosopidis* (Kieffer & Jorgenson, 1910) is so poor that it is impossible to determine if the species is even an eriococcid let alone its specific characters. No specimens have been located for study.

Because *Pseudotectococcus* Hempel is very poorly known, the type species, *P. anonae* Hempel, is redescribed. *P. anonae* is also only known from Minas Gerais State in Brazil but, unlike the new species, occurs on *Annona* species.

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Key to the Genera of the Eriococcidae of the Neotropical Region

- 1 Legs present, sometimes located near anal opening 5
 Legs absent 2
- 2(1). Conspicuously enlarged setae present on dorsum 4
 Conspicuously enlarged setae absent from dorsum 3
- 3(2) Microtubular ducts present; quinquelocular pores restricted to ventral thorax mostly near spiracles,
 absent from dorsum *Pseudocapulinia* Hempel
 Microtubular ducts absent; quinquelocular pores on both body surfaces *Carpochloroides* Cockerell
- 4(3) Enlarged setae of 2 sizes, acorn shaped (on anterior abdomen, thorax, and head), and elongate
 (on posterior abdominal segments) *Macracanthopyga* Lizer y Trelles
 Enlarged setae of acorn shape only (scattered over dorsum) *Apiococcus* Hempel
- 5(1) Antennae 6-segmented 10
 Antennae with 5 or fewer segments 6
- 6(5) Without ring of tubular ducts surrounding apex of abdomen 7
 With ring of tubular ducts surrounding apex of abdomen *Capulinia* Signoret
- 7(6) Legs large, well developed; without dermal sclerotization at posterior apex of abdomen 8
 Legs small, abortive; with dermal sclerotization at posterior apex of abdomen *Aculeococcus* Lepage
- 8(7) Enlarged setae not grouped in circular area on thorax and head; thorax and head not sclerotized 9
 Enlarged setae grouped in circular area on thorax and head; thorax and head sclerotized *Neotectococcus* Hempel (in part)
- 9(8) Anal lobes protruding, heavily sclerotized *Pseudotectococcus* Hempel
 Anal lobes absent or very small, unsclerotized *Tectococcus* Hempel (in part)
- 10(5) Anal lobes not protruding from posterior apex of abdomen 14
 Anal lobes protruding from posterior apex of abdomen 11
- 11(10) Macrotubular ducts present on dorsum 12
 Macrotubular ducts absent from dorsum *Icelococcus* Miller & González
- 12(11) Macrotubular ducts on dorsum with conspicuous rim surrounding dermal orifice 13
 Macrotubular ducts on dorsum without conspicuous rim surrounding dermal orifice *Eriococcus* Targioni Tozzetti
- 13(12) Venter with large clusters of tubular ducts on abdomen; dorsum without simple pores; without
 cruciform pores *Stibococcus* Miller & González (in part)
 Venter without tubular ducts; dorsum with numerous simple pores; cruciform pores on venter near
 body margin *Exallococcus* Miller & González
- 14(10) Anal-lobe area without conspicuous sclerotization 16
 Anal-lobe area with conspicuous sclerotization 15
- 15(14) Enlarged setae forming conspicuous band around body margin *Chilechiton* Hodgson & Miller
 Enlarged setae not forming conspicuous band around body margin *Chilecoccus* Miller & González
- 16(14) Enlarged setae absent or not grouped in circular area on thorax and head; thoracic area unsclerotized 17
 Enlarged setae grouped in circular area on thorax and head; thorax and
 head sclerotized *Neotectococcus* Hempel (in part)
- 17(16) Venter without large clusters of tubular ducts on abdomen 18
 Venter with large clusters of tubular ducts on abdomen *Stibococcus* Miller & González (in part)
- 18(17) Largest dorsal macrotubular ducts with 1-3 associated setae; apex of abdomen broadly rounded *Melzeria* Green
 Largest dorsal macrotubular ducts without associated setae; apex of abdomen narrowly rounded *Tectococcus* Hempel (in part)

PSEUDOTECTOCOCCUS HEMPEL**Introduction**

A new species of *Pseudotectococcus* Hempel was discovered inducing leaf-galls on *Rollinia laurifolia* Schldtl. (Annonaceae) in the Zoo-Botanic Foundation, Belo Horizonte, Minas Gerais State, Brazil. Because this genus is very poorly known, it was decided to also redescribe the type species, *P. anonae* Hempel, which is also only known from Minas Gerais State in Brazil but of *Annona* species.

***Pseudotectococcus* Hempel**

Pseudotectococcus Hempel, 1934: 139. Type species: *Pseudotectococcus anonae* Hempel, by monotypy and original designation.

Pseudotectococcus Hempel; Hempel, 1935: 56 [description, taxonomy]; Lindinger, 1937: 194 [taxonomy]; Borchsenius, 1949: 44 [taxonomy]; Ferris, 1957: 88 [taxonomy]; Hoy, 1962: 13, 201 [taxonomy]; Hoy, 1963: 191 [catalogue, taxonomy]; Morrison & Morrison, 1966: 168 [taxonomy]; Beardsley, 1984: 86 [taxonomy]; Miller & Gimpel, 2002: 447 [catalogue, systematics].

Generic diagnosis. Appearance of galls: galls of both sexes on upper leaf surface, those of females slightly rounder and blunter than those of males; female galls with a small orifice about 0.5 mm wide on lower leaf surface, often without a distinct lip but a small lip sometimes present; male galls more sharply conical with a larger oval opening on ventral leaf surface, each usually about 1 mm wide, with a strong lip or ridge standing proud below leaf surface, probably more pronounced with galls of *P. rolliniae* (Fig. 1).

Adult female: *unmounted material:* rather globose in appearance, with rounded head, broad across thorax and tapering posteriorly, but abdomen cone-shaped. *Mounted material* (Figs 2 & 4): body outline broadest across thorax, with rounded head and pointed abdomen; small, length 1.6-1.85 mm, width 0.93-1.3 mm. *Dorsum.* Derm membranous, with a nodulate surface, particularly on young specimens; anal lobes mildly to quite strongly sclerotised. Dorsal setae spinose and conical, some rather bluntly pointed, others with a sharper apex; rather variable in size but none minute; in fairly distinct bands across each abdominal segment but bands less clear across each thoracic segment and with a group anteriorly on head. Dorsal microtubular ducts with a lightly sclerotised rim on derm and an undivided main duct. Macrotubular ducts rather large, with a stout outer ductule and a slightly shorter inner ductule with a small glandular apex; each with a conspicuous rim around dermal orifice: mainly present on abdomen but extending anteriorly to mesothorax. Anal lobes strongly protruding, narrow, apically acute, distinctly sclerotised, each lobe with two stout setae along inner dorsolateral margin, a long, flagellate apical seta and a setose posterior suranal seta antero-ventrally; anterior suranal setae strong; lobes without sessile pores or microtubular ducts. With a generally distinct, sclerotised median lobe dorsad to anal ring. Anal ring located beneath dorsal sclerotised median lobe, without an anal tube but with 3 pairs of setae. *Margin* poorly defined but demarcated

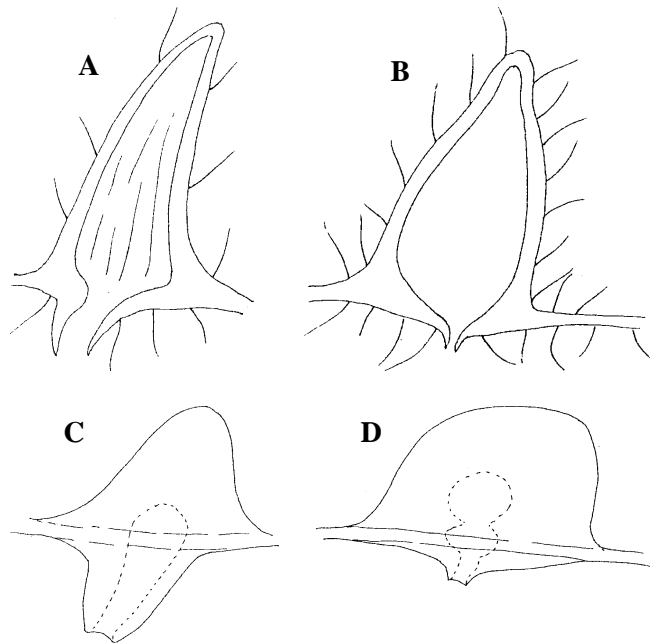


Figure 1 - Cross sections through: (A) male gall and (B) female gall of *P. anonae*; and side views of: (C) the male gall and (D) female gall of *P. rolliniae*. Dotted lines in C and D show approximate shape of inner chambers.

by an uneven band of spinose setae, similar to those on dorsum but generally shorter and thinner. Ventral bands of quinquelocular pores on abdomen extending laterally into pleural areas. *Venter.* Setae mainly rather flagellate, sparsely distributed, most abundant across abdominal segments; with pairs of longer setae present mesad to coxae and in a group between antennae; other setae much shorter; submarginal setae rather spinose, particularly posteriorly. Macrotubular ducts clearly different from those on dorsum, each outer ductule generally shorter but with a slightly longer, narrow inner ductule, most without a glandular end: generally restricted to abdominal segments. Ventral microtubular ducts perhaps slightly shorter and stouter than dorsal microtubular ducts, each with a more distinctly sclerotised dermal pore; distribution possibly variable but with a distinct group anteriorly between antennae and mouthparts. Multilocular disc-pores mainly 5-locular: present in broad bands across abdominal segments II-VI, those on segments II-IV often apparently in small groups on young specimens. Antennae probably 3-5 segmented but segmentation rather obscure; with 2 or 3 setae on scape, none on pedicel (but campaniform pore present), 1 hair-like seta on III (when present), setae on other segments depending on species. Clypeolabral shield normal; labium probably 2-segmented, with 3 or 4 pairs of setae. Eyespot large and oval, near margin dorsad to antennae. Legs moderately well-developed, sometimes distorted; hind coxae swollen, about as long as broad on *P. rolliniae*, with or without translucent pores; setae on metathoracic legs: coxae 4; trochanter with 2 long setae + 1 short seta on dorsal surface; femur with 1 or 2 setae; each tibia with 1 setae on ventral margin; tarsi marginally

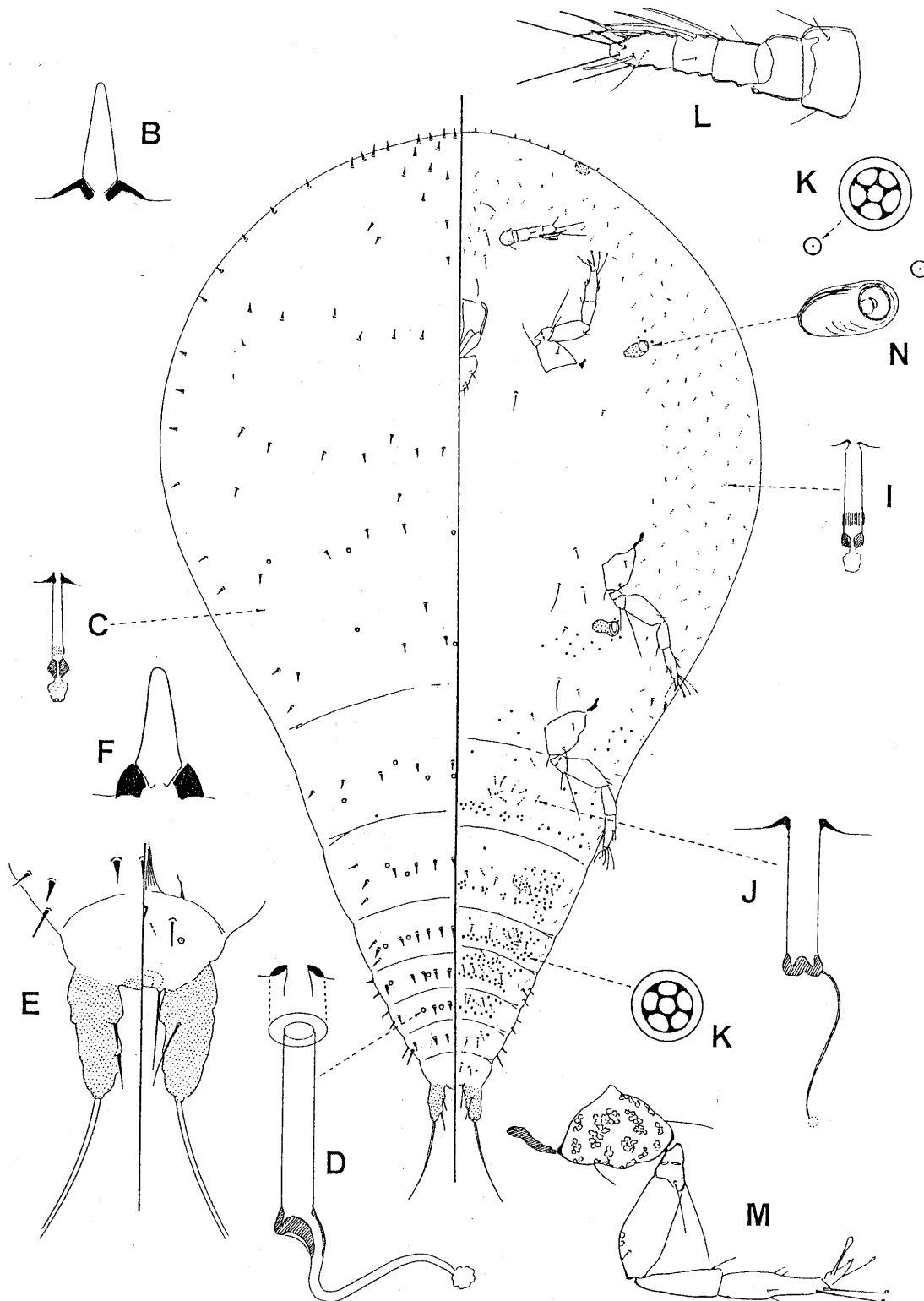


Figure 2 - Adult female *P. anonae* Hempel, dorsum on left and venter on right of central figure. Where B: dorsal setae; C: dorsal microtubular duct; D: dorsal macrotubular duct; E: anal lobes (dorsal view on left, ventral view on right); F: posterior marginal setae; I: ventral microtubular duct; J: ventral macrotubular duct; K: multilocular disc-pore; L: antenna; M: metathoracic leg, and N: spiracle.

longer than tibia and with 3 or 4 setae; tarsal campaniform pore present; tarsal digitules slightly longer than claw digitules; claw long and slender, each with one digitule significantly broader than other and both longer than claw; each claw generally with a small denticle near apex. Vulva placed between segments VII and VIII. With three further small orifices, one on either side of vulva and a third, more heavily sclerotised pore just posterior to vulva.

Comment: *Pseudotectococcus* currently contains two species, the type species *P. anonae* Hempel and a new species, *P. rolliniae* Hodgson & Gonçalves, described below. Based on current records, this genus appears to be restricted to Annonaceae in the Minas Gerais region of Brazil.

For a discussion of the terms anterior and posterior suranal setae, see Hodgson & Miller, 2002, p. 192.

Pseudotectococcus anonae Hempel

Pseudotectococcus anonae Hempel, 1934: 139. Type data: BRAZIL: Minas Gerais, Viçosa, on *Annona* sp. Type depository: São Paulo: Museu de Zoologia, Universidade de São Paulo, Brazil.

P. anonae Hempel: Hempel, 1935: 56 [description, distribution, host, taxonomy]; Costa Lima, 1936: 181 [distribution, host, taxonomy]; Lindinger, 1937: 194 [taxonomy]; Lepage, 1938: 388 [distribution, host, taxonomy]; Borchsenius, 1949: 44 [taxonomy]; Ferris, 1957: 88 [host, taxonomy]; Hoy, 1963: 191 [catalogue, distribution, host, taxonomy]; Silva d'Araujo et al., 1968: 199 [distribution, host]; Morrison & Morrison, 1966: 168 [taxonomy]; Gaedike, 1971: 335 [host]; Beardsley, 1984: 86 [distribution, host, taxonomy]; Miller & Gimpel, 2002: 447 [catalogue, host, distribution, structure, systematics].

Galls (described from dried material) (Fig. 1A, B): female gall about 3 mm tall, cone-shaped with a blunt apex; outer surface hairy; gall almost entirely on upper leaf surface; gall opening on lower leaf surface, usually about 0.5 mm wide, occasionally with a shallow lip. In cross section, apparently with only one chamber. Male gall of about the same height as female gall but narrower and often bent; hairy; gall opening on lower leaf surface about 1 mm wide, usually tubular, the tube extending up to about 1 mm below leaf surface. In cross section, with a single chamber. (*Comment:* the chambers in both the male and female galls were much larger than in the young galls of *P. rolliniae* described below. This difference could be due to the galls either being much more mature (unknown) or to the cells in the walls of the gall shrinking as the galls dried out.)

Adult female (Fig. 2)

Unmounted material. Dried material very shrunken but clearly membranous.

Mounted material. Length 1.6-1.85 mm, width 0.93-1.13 mm.

Dorsum. Dorsal setae frequent, each 8-10µm long on abdomen; number medially on each abdominal segment: I: 6-12; II: 8 or 9; III: 8-12; IV: 9-11; V: 7-10; VI: 5-7; VII: 2-4; VIII: 0, although each segment with a further spinose seta near each margin (plus 2 thinner "marginal" setae). Microtubular ducts about 7-9µm long: present mainly on either side of inter-segmental folds on abdominal segments and sparsely

distributed elsewhere. Macrotubular ducts: outer ductule 13-18µm long and inner ductule 11-13µm long: with a few (perhaps 4-10) on each abdominal segment, 0-4 on meso- and metathorax, otherwise absent. Anal lobes strongly sclerotised, each 50-70µm long; inner margin setae both stout and rather blunt, anterior setae 9-18µm long, posterior setae 20-25µm long; apical setae flagellate, each 125-150µm long; posterior suranal seta 38-48µm long; anterior suranal setae 35-42µm long. Median lobe about 20-25µm wide and rounded posteriorly (rather indistinct on type specimens). Anal ring setae each about 55-72µm long.

Margin. Marginal setae not always easily separable from dorsal setae, but with possibly 7-14 between eyespots, 4-7 between eyespots and point opposite anterior spiracle and 5-7 between points opposite anterior and posterior spiracles, and 2 (occasionally 1 or 3) per side on each abdominal segment; all subequal in size, except one seta on segment VII longest. Eyespots oval, greatest width of each about 18µm, on margin anterior to each scape.

Venter. Setae sparse; long setae associated with coxae about 25-55µm long; rows across abdominal segments: total number per abdominal segment: II: 0 or 1; III: 2; IV-VII: 4 and VIII: 2; with 6-8 (type specimens) or 9 or 10 longer flagellate setae in a group between antennae, longest 25-55µm long. Macrotubular ducts rather sparse: outer ductules about 10µm long, inner ductule 9-12µm long; all ducts similar; apparently restricted to abdominal segments (rarely 1 or 2 between metacoxae). Ventral microtubular ducts: present in a broad submarginal band on head and thorax and laterad on more anterior abdominal segments but perhaps absent from posterior segments; with a distinct group anteriorly between antennae and mouthparts. Multilocular disc-pores: present in broad bands across most abdominal segments, with (totals): metathorax: 2-5 laterad and 0-4 mesad to each coxa; segment II: 25-50; III: 59-80; IV: 60-100; V: 40-70; VI: 10-20; VII: 0-3 and VIII: 0-3.

Antennae probably 5-segmented but segmentation not clear; length 90-110µm; segment III perhaps with 1 or 2 hair-like setae (hs) and sometimes a fleshy seta (fs), segment IV with 2 fs and 1 hs; segment V with 3 fs, 0-2 hs and about 6 thicker stiff setae. Clypeolabral shield 83-92µm long. Legs rarely distorted; length of metathoracic leg: coxa somewhat swollen and significantly larger than coxae of other legs (particularly on non-type specimens): 90-105µm long and (types) 62-65µm wide; trochanter + femur 100-110µm; tibia 48-58 µm, tarsus 53-62µm, claw 14-19µm; hind coxae with numerous small translucent pores in groups over most of its surface; femur with a few pores dorsally at distal end; each tibia often with a pale pore-like area. Spiracles: width of peritremes: 15-19µm.

Discussion. The adult female of *P. anonae* shares the following attributes with *P. rolliniae*: (i) microtubular ducts with a sclerotised orifice; (ii) macrotubular ducts with a conspicuous dermal rim, present on both dorsum and venter; (iii) anal tube short or absent; (iv) anal lobes large and moderately sclerotised; (v) unequal claw digitules; (vi) labium probably 2-segmented; (vii) dorsal spinose setae small; (viii) legs large; (ix) hind coxae distinctly enlarged; (x) antennae short (3-5 segmented); (xi) median anal lobe present; (xii) quinquelocular disc-pores in broad groups across most abdominal segments on venter, and (xiii) a group of ventral microtubular ducts present

between antennae. It differs from *P. rollinae* in having (character-state on *P. rollinae* in brackets): (i) antennae 4- or 5-segmented (3-segmented antennae); (ii) presence of abundant translucent pores on coxae (absent or extremely few and possibly large); (iii) dorsal macrotubular ducts few, particularly on thorax (very abundant, extending to at least mesothorax); (iv) ventral microtubular ducts abundant in a broad submarginal band on thorax and head (extremely few or absent submarginally), and (v) many more spinose setae dorsally on thorax and abdomen (few and sparsely distributed). The adult female was described from 5 good and 2 fair specimens plus 6 others in poor condition.

First-instar nymph (Fig. 3)

Unmounted material. Very small, about 1/4 mm; elongate oval.

Mounted material. Body oval; oldest 1st-instar nymphs with dorsum strongly convex. Length about 230-280 μ m, width 120-125 μ m

Dorsum. Membranous, appearing to become sclerotised when dorsum swells in older specimens. Spinose setae (excluding marginal setae) basally conical but with apical half parallel sided, sometimes slightly curved, of fairly uniform size, distinctly smaller than marginal setae, each 2.5-4 μ m long, distributed in four lines as follows: mid-dorsal lines: with 2 pairs on head, 1 pair on each thoracic segment and 1 pair (or sometimes only a single spinose seta) on abdominal segments I, IV, V and VII; also in two mediolateral lines, with 1 pair on head, 1 pair on pro-, meso- and metathorax, plus pairs on abdominal segments I-III. Microtubular ducts rather large, with an oval, strongly sclerotised, apparently bilocular, cone-like dermal pore; each duct about 8 μ m long; distributed in four lines as follows: marginally: with a pair just anterolaterally to anal lobes; pairs approximately associated with abdominal segments V, IV and I; 1 pair on each thoracic segment, and with a pair anteriorly on head; also submedially: approximately between abdominal segments III and II, between abdominal segment I and metathorax, between meta- and mesothorax, meso- and prothorax, and posteriorly on head. Without other kinds of pores or ducts. Anal lobes elongate, each with a blunt apex; lobes clearly sclerotised; without microtubular ducts but each with 2 blunt spinose inner margin setae dorso-laterally, anterior setae about 6-7 μ m long, posterior setae about 21-24 μ m long; apical setae flagellate, each about 130-165 μ m long; posterior suranal setae each about 10-12 μ m long; anterior suranal setae each on a small protuberance and about 7-8 μ m long. With a narrowly rectangular, sclerotised median lobe dorsad to anal ring, about 15 μ m wide and 3 μ m long.

Margin. Marginal setae spinose, similar in size and shape to those on dorsum but larger, most 5-7 μ m long; with 7 or 8 between eyes, 4 on each side between eyes and point opposite anterior spiracles, 4 on each side laterally between anterior spiracles and abdomen and with 1 on each side of each abdominal segment. Anal ring located between anal lobes, with 6 setae, each about 23-25 μ m long; anal tube short or absent. Eyespots oval, greatest width 10 μ m, situated on margin near base of antennae.

Venter. Derm membranous. Spiracular disc-pores restricted to single pores near each spiracular peritreme, those near anterior

spiracles quite large (about 5 μ m wide) with 5 loculi, somewhat invaginated and touching peritreme; those associated with posterior spiracles smaller (about 3 μ m wide), probably with 3 loculi and positioned just anterior to each peritreme. With 1-3 pairs of microtubular ducts present near margin on thorax, when 3 present, 1 probably associated with each thoracic segment; ductule very short, much shorter than on dorsal microtubular ducts, but with an oval, strongly sclerotised, apparently bilocular, cone-like dermal pore. Also with a pair of round pores anteriorly on head. With 3 pairs of long setae between antennae, another pair mesad to mesocoxae (these long setae 25-27 μ m long), a shorter pair mesad to metacoxae, plus a pair of shorter and more spinose setae medially on abdominal segment VII, each about 8 μ m long. Submarginal setae rather spinose, in a line along either side of abdomen, and on meta- and mesothorax, but apparently absent from prothorax; very small, each setae 2-5 μ m long (longest posteriorly).

Antennae 3-segmented, 35-40 μ m long; setal distribution: scape 2; pedicel 0; segment III perhaps with 4 or 5 fleshy setae plus 4-6 other setae; apical seta 26-28 μ m long. Clypeolabral shield about 45-50 μ m long; labium perhaps 2-segmented; about 26 μ m wide, with possibly 2 pairs of minute setae. Spiracles small; anterior spiracle very closely associated with spiracular disc-pore; posterior spiracles appearing smaller and not as close to disc-pore. Legs well developed; lengths (metathoracic leg (μ m)): coxa 20-23; trochanter + femur 33-35; tibia + tarsus 40-48; claw 8-9 μ m; tibia generally subequal to or slightly shorter than tarsus; setae: coxae 2, trochanter 2 or 3, femur 2, tibia 1, tarsus 3; long trochanter seta 20-23 μ m long; tarsal campaniform sensillum present; claw perhaps without a denticle; both tarsal digitules on all three pairs of legs capitate and equal in size; claw digitules dissimilar, 1 with a conspicuously larger apex, other apex about same size as on tarsal digitules.

Discussion. The 1st-instar nymphs of *P. anonae* and *P. rollinae* (described as new below) are very similar. For differences, see under the 1st instar of the latter species.

The 1st-instar nymph was described from 6 specimens in good condition plus 32 others of varying quality.

Material studied: LECTOTYPE: BRAZIL, Viçosa, Estado de Minas Gerais, on *Annona* sp., 30.ix.1933, E.J. Hambleton (MZSP): 1/1 adF. PARALECTOTYPES as for lectotype specimen: 8/12 adF + 12/76 1st instars (depositories: MZSP, USNM, BMNH, NMW); as above but mounted by E.E. Green from type material (BMNH): 1/adF.

Other material: BRAZIL: site unknown, host unknown, 20.x.1935, coll. BRL (USDA): 1/4adF (good); Viçosa, Minas Gerais, no host, 16.x.1935, H. Sauer (USDA): 1/3adF (poor).

Comment. As pointed out by Miller & Gimpel (2000), Hempel (1934) spelt the host plant genus *Annona* as *Anona* and therefore named the species *anonae*. As this misspelling is consistent throughout Hempel's paper, it is clear that the correct spelling for this species is *anonae*.

Mass & Westra (1992) refer to a gall on *Rollinia sylvatica* as being induced by the "pseudococcid" *Pseudotectococcus anonae*. Based on the host plant, these galls are more likely to have been caused by the next species, *P. rollinae*, described as new.

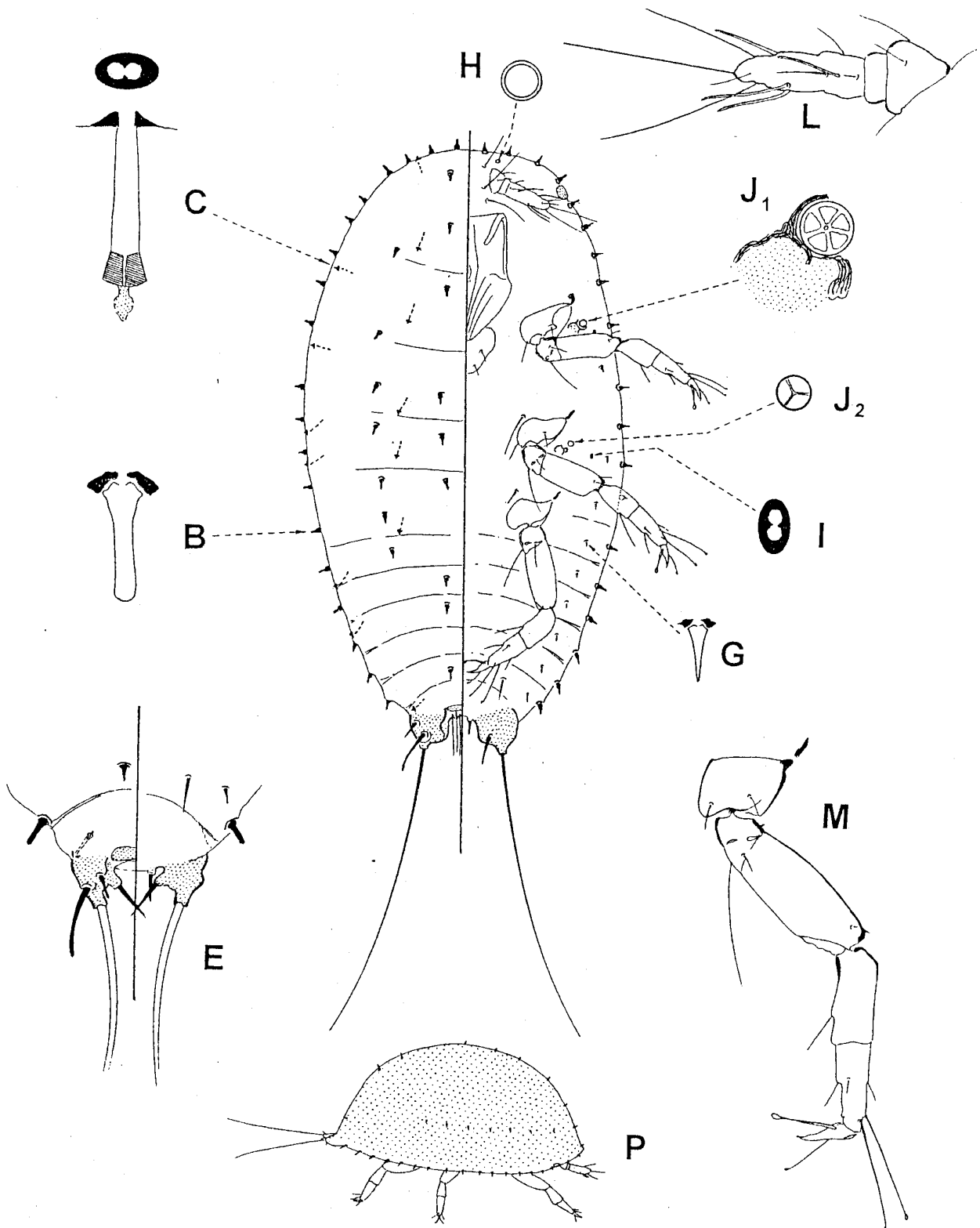


Figure 3 - First-instar nymph of *P. anonae* Hempel (sex not determined). Where B: dorsal setae; C: dorsal microtubular duct; E: anal lobes (dorsal view on left, ventral view on right); G: ventral submarginal seta; H: simple pore; I: ventral microtubular duct; J₁: anterior spiracular disc-pore; J₂: posterior spiracular disc-pore; L: antenna; M: metathoracic leg, and P: side view of mature 1st-instar nymph, showing convex dorsum.

***Pseudotectococcus rolliniae* Hodgson & Gonçalves, sp. n.**

Galls (Fig 1C, D): female gall convex and evenly rounded; outer surface with few or no hairs; gall mainly developed on upper leaf surface; gall opening on lower leaf surface, usually about 0.5 mm wide, with a shallow lip. In cross section, young female galls with two chambers, one above other (but connected vertically), with adult female in larger upper chamber. Male gall of about same height as female gall, also roundly convex but narrower; lower leaf surface with a broad, elongate tubular opening, longer than depth of gall on upper surface; opening on lower leaf surface about 1 mm wide. In cross section, with a single elongate chamber.

Adult female (Fig. 4)

Unmounted material. As for generic diagnosis. Galls probably slightly longer and narrower than those of *P. anonae*.

Mounted material. Length 0.8-1.5 mm, width 0.75-1.3 mm.

Dorsum. Dorsal setae rather few, mainly on abdomen and on head near eyespot, each 5-7µm long; number on each abdominal segment: I: 2; II: 4-6; III: 4-6; IV: 5-6; V: 4-5; VI: 2-4; VII: 2; VIII: 0. Microtubular ducts about 8µm long; with a few on most abdominal segments; apparently scarce on thorax and possibly absent on head. Macrotubular ducts rather large, outer ductule 15-20µm long, inner ductule 11-18µm long; common on segments I-IV, extending anteriorly onto thorax to at least anterior margin of mesothorax (possibly in 4-5 longitudinal groups). Anal lobes lightly sclerotised, each about 36-42µm long; anterior inner margin setae 5-6µm long, posterior inner margin seta 9-12µm long; long apical seta 73-105µm long; posterior suranal setae 16-33µm long; anterior suranal setae 30-39µm long. Median lobe approximately oval and about 18-20µm wide. Anal ring setae each 40-60µm long.

Margin. Marginal setae as follows: with perhaps 7-10 between eyes, 4 or 5 between eyes and point opposite anterior spiracle, 2-5 between points opposite anterior and posterior spiracles, and 2 (rarely 1) on each side of abdominal segments, with postero-dorsal seta of each pair often noticeably larger than more antero-ventral seta. Eyespots oval, each about 20 x 25µm wide, on margin anterior to each scape.

Venter. Setae: setose, sparse; long setae mesad to mesocoxae and between antennae each about 25µm; most setae short; with a submarginal band of minute spinose setae on abdomen and more setose setae on thorax, plus rows across each abdominal segment; total per segment: II: 0; III: 5; IV: 4; V: 4-6; VI: 4 or 5; VII: 4, and VIII: 2; with 5-12 flagellate setae in a group between antennae and eyespot, mostly setose, occasionally slightly spinose, longest 25µm long. Macrotubular ducts: outer ductule 11-14µm long, slightly broader than on dorsum; inner ductule generally 20-26µm long, much longer and narrower than outer ductule; some ducts on segment VI with inner ductules similar to dorsal macrotubular ducts: restricted to abdominal segments III-VI. Microtubular ducts not detected apart from a distinct group anteriorly between antennae and mouthparts. Multilocular disc-pores present in a broad submarginal band on thorax (extending sometimes onto head between front legs and mouthparts) but also in broad bands across abdominal segments II-VI; totals per segment:

metathorax: 2 between coxae; II: 9-45; III: 40-93; IV: 48-87; V: 42-60; VI: 11-30; VII: 0 or 1 and VIII: 0.

Antennae probably 3-segmented; length 63-67µm. Clypeolabral shield 75-82µm long. Eyespot large and oval, 20-28µm long and 16-20µm wide. Legs: coxa very swollen, tarsus often malformed and femur somewhat distorted; length of metathoracic leg: coxa 70-87µm long and greatest width 56-80µm; trochanter + femur 68-87µm; tibia 33-43µm, tarsus 36-51µm, claw 14-17µm; hind coxae and femur sometimes with 1 or 2 small translucent pores. Spiracles: width of peritremes: 13-17µm

Comment. The adult female of *P. rolliniae* is very similar to those of *P. anonae* - see under the latter species for comparison. The adult female was described from 6 specimens in fair to good condition.

2nd-instar female (Fig. 5)

Unmounted material. Rather plump, with a rounded head and pointed anal region.

Mounted material. Body broadest across mesothorax, with a rounded head and more pointed posterior end. Anal lobes small. Body length 435-550µm; width 250-380µm

Dorsum. Derm membranous. Dorsal setae strongly spinose, distributed in 4 lines as follows: in a double mid-dorsal line, with 3 pairs on head, 1 pair on pro-, meso- and metathorax and on abdominal segments I, IV and VII; most posterior setae on abdomen largest (9-10µm long), those on head narrower; setae also present in a pair of submedian rows, with 2 on each side of head, 1 on each thoracic segment and 1 on each side of abdominal segments I-III. Dorsal pores: microtubular ducts probably present throughout, extremely small (5-6µm long) but with a shallow, lightly sclerotised outer pore; dorsal macrotubular ducts absent. Anal lobes about 17µm long, each lobe about 2x as long as wide, each lightly sclerotised; each lobe without pores or microtubular ducts; with two spinose inner margin setae dorsally on inner margin, anterior seta 3-5µm long, posterior seta 9-12µm long; long apical setae flagellate, each 120-125µm long; posterior suranal seta setose, each about 20-25µm long; anterior suranal setae on small protuberances and about 18-25µm long. Anal ring without an anal tube, with six setae, each about 28-30µm long. With a sclerotised, posteriorly rounded, medial lobe overlying anal ring, 13-20µm wide and 8-10µm long.

Margin. Margin fairly clearly defined, demarcated by an uneven band of distinctly spinose conical setae, each with well-developed, narrow basal sockets; those on posterior segments of abdomen broadest, becoming smaller anteriorly to thorax and then longer and narrower on head; with perhaps 8-10 anteriorly between eyespots, 8-10 on each side between eyespots and point opposite each posterior spiracle, and 7 on each side of abdomen; length of longest 7-9µm on head and posteriorly on abdomen, and about 3-5µm laterally on prothorax. Eyespots 10-12µm wide, on margin near base of antennae.

Venter. Membranous. Multilocular disc-pores, each mainly with 5 loculi, restricted to near spiracular peritremes, with 2 or 3 anterior to each anterior peritreme and 1 anterior to each posterior peritreme; about half of specimens also have an additional disc-pore just posterior to each posterior peritreme.

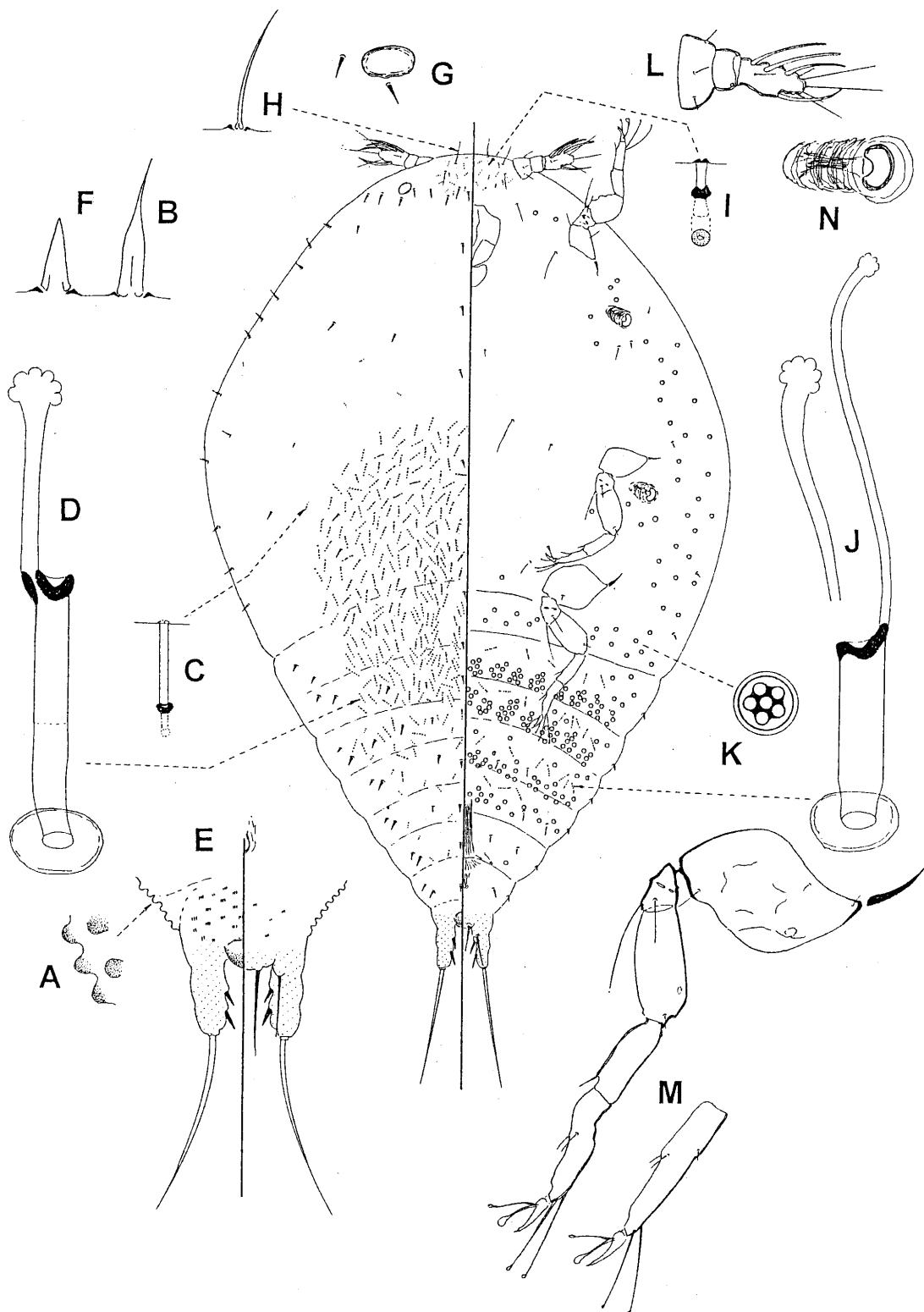


Figure 4 - Adult female *P. rollinae* Hodgson & Gonçalves. Where A: dorsal derm; B: dorsal setae; C: dorsal microtubular duct; D: dorsal macrotubular duct; E: anal lobes (dorsal view on left, ventral view on right); F: anterior marginal seta; G: eyespot; H: inter-antennal seta; I: ventral microtubular duct; J: ventral macrotubular duct with two variants of inner ductule; K: multilocular disc-pore; L: antenna; M: metathoracic leg with distorted and undistorted tarsus, and N: spiracle.

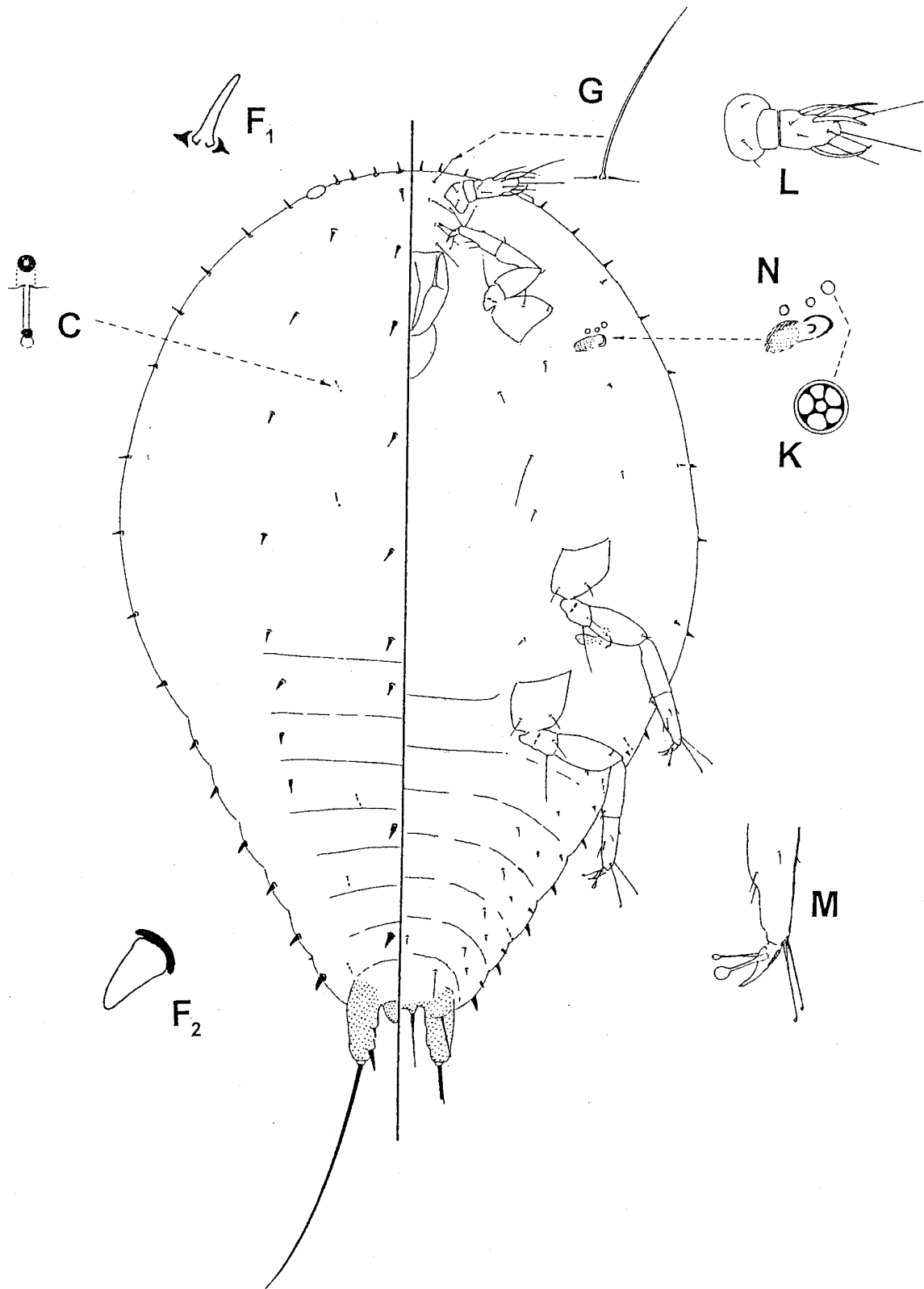


Figure 5 - Second-instar female of *P. rollinae* Hodgson & Gonçalves. Where C: dorsal microtubular duct; F₁: anterior marginal seta; F₂: posterior marginal seta; G: inter-antennal seta; K: multilocular disc-pore; L: antenna; M: part of metatarsus and claw and N: spiracle.

Ventral microtubular ducts not detected; ventral macrotubular ducts absent. Ventral setae: medial setae all rather setose: with four pairs of rather long and fine setae (longest about 20-24 μ m long) between antennae and another pair medially between pro- and mesocoxae; shorter setae: with 2 posterior to each procoxa, plus 1 anterior to each meso- and metacoxa; setae medially on abdomen short and slightly stouter, with 1 pair on segments III-V, 2 pairs on segment VI and 1 (slightly longer) pair on segment VII; each abdominal segment also with a pair of minute spinose setae (each about 1-2 μ m long) submedially on segments II-VII; also with a submarginal band of slightly larger spinose setae (each perhaps 2-4 μ m long), more or less associated with more posterior 8 marginal spines, plus two on each side of thorax and another pair laterally on head.

Antennae short and 3-segmented; length 34-43 μ m; setal distribution: scape with 2 or 3 hair-like setae, pedicel probably none, apical segment with 4 fleshy setae, and 3-5 stiff setae + 1 hair-like seta; length of apical seta 24-28 μ m. Length of clypeolabral shield 48-50 μ m long; labium probably 2 segmented, number of labial setae uncertain. Width of each spiracular peritreme 6-7 μ m. Legs well developed: posterior coxae not swollen and without pores; length of metathoracic legs (μ m): coxa 38-40, trochanter + femur 50-54; tibia 27-30; tarsus 28-30; claw 9-12; setal distribution: coxa 3 or 4, trochanter 3 (longest 28-30 μ m), femur 2, tibia 1, tarsus 4; tarsal campaniform pores present; tarsal digitules slightly longer than claw digitules; one claw digitule with a broad apex, other digitule with small apex; claw quite narrow, with a minute denticle.

Comment. The 2nd-instar female is very similar to the 2nd-instar male but lacks macrotubular ducts and quinquelocular pores on the abdominal venter.

The 2nd-instar female was described from 5 specimens in fair to good condition, plus 3 poorer specimens.

2nd-instar male (Fig. 6)

Unmounted material. Rather plump, with a rounded head and pointed anal region.

Mounted material. Body broadest across mesothorax, with a rounded head and more pointed posterior end. Anal lobes small. Length 419-622 μ m; width 355-375 μ m

Dorsum. Derm membranous. Dorsal setae strongly spinose, distributed as follows: in a double mid-dorsal line, with 3 pairs on head, 1 pair on pro-, meso- and metathorax and on abdominal segments I, IV and VII - possibly occasionally on others as well (1 present on segment VI on one specimen); posterior setae on abdomen largest (8-10 μ m long), those on head narrowest; pairs of setae also present in submedian rows, with 2 pairs on each side of head, 1 on each thoracic segment and 1 on each side of abdominal segments I-III. Dorsal pores: microtubular ducts present, probably throughout, extremely small (5 μ m long), each with a small, shallow, sclerotised outer pore; dorsal macrotubular ducts present, each with inner and outer ductules subequal in length, former with a small terminal gland; total length 23 μ m: distributed throughout but more or less in segmental rows. Anal lobes about 38-45 μ m long, each about 2x as long as wide and lightly sclerotised; each lobe without pores or microtubular ducts; with 2 spinose inner margin setae: anterior setae 4-6 μ m long, posterior setae 8-13 μ m

long; long apical setae each 125-150 μ m long; posterior suranal setae, each about 18-20 μ m long; anterior suranal setae on small protuberances and about 20-24 μ m long. Anal ring without an anal tube, with 6 setae, each about 30-35 μ m long. With a sclerotised, posteriorly rounded, medial lobe overlying anal ring, 18-20 μ m wide.

Margin. Margin fairly clearly defined, demarcated by an uneven band of distinctly spinose setae, each seta distinctly spinose, with a well-developed, narrow basal socket; those on abdomen broadest, becoming narrower towards head; with 8 anteriorly between eyespots; 8 or 9 on each side between eyespots and point opposite each posterior spiracle, and 7 on each side posterior to posterior spiracle; length of longest 8-10 μ m on head and posteriorly on abdomen but about 5 μ m laterally on prothorax. Eyespots 11-13 μ m wide, on margin near base of antennae.

Venter. Membranous. Quinquelocular disc-pores present in two submedial lines on abdomen but presence on any given segment rather variable; also sometimes with 1 present between labium and procoxa; also with 1-3 anterior to each anterior peritreme and 1 anterior to each posterior peritreme and frequently with another posterior to posterior peritreme. Ventral microtubular ducts hard to detect but either similar in structure to those on dorsum and restricted to near margin or absent; ventral macrotubular ducts also similar to those on dorsum but much less frequent and probably absent medially on thorax. Ventral setae: medial setae all rather setose: with four pairs of rather long and fine (longest about 28-30 μ m long) between antennae and another pair medially between pro- and mesocoxae; shorter setae: with 1 or 2 posterior to each procoxa, and 1 anterior to each meso- and metacoxa; setae medially on abdomen short and slightly stouter, with 1 pair on segments II-IV, 2 pairs on segments V and VI and 1 (slightly longer) pair on segment VII; each abdominal segment also with a pair of minute spinose setae (each about 1-2 μ m long) submedially on segments II-VI; also with a submarginal band of slightly larger spinose setae (each perhaps 2-3 μ m long), more or less associated with more posterior 8 marginal spines, plus one on each side of thorax and another pair on head.

Antennae short, 3-segmented; length 41-50 μ m; setal distribution uncertain, but scape with at least 2 setae, pedicel probably with none and apical segment with at least 3-4 fleshy setae, and 3-5 bristle-like setae; length of apical seta 26-30 μ m. Length of clypeolabral shield 50-60 μ m long; labium probably 2 segmented, number of labial setae uncertain. Width of each spiracular peritreme 6-9 μ m. Legs well developed; posterior coxae not swollen and without pores; length of metathoracic legs (μ m): coxa 40-44, trochanter + femur 50-61; tibia 27-33, tarsus 31-33, claw 10-14; setal distribution: coxa 3 or 4, trochanter 2 (longest 30-35 μ m), femur 2, tibia 1, tarsus 4; tarsal campaniform pore present; tarsal digitules subequal in length to claw digitules; one claw digitule with a broad apex, other digitule with small apex; claw quite narrow, with a denticle.

Comment. For differences from 2nd-instar female, see under that species.

The 2nd instar male was described from 2 specimens in fair to good condition but anal lobes twisted on one, plus 6 poorer specimens.

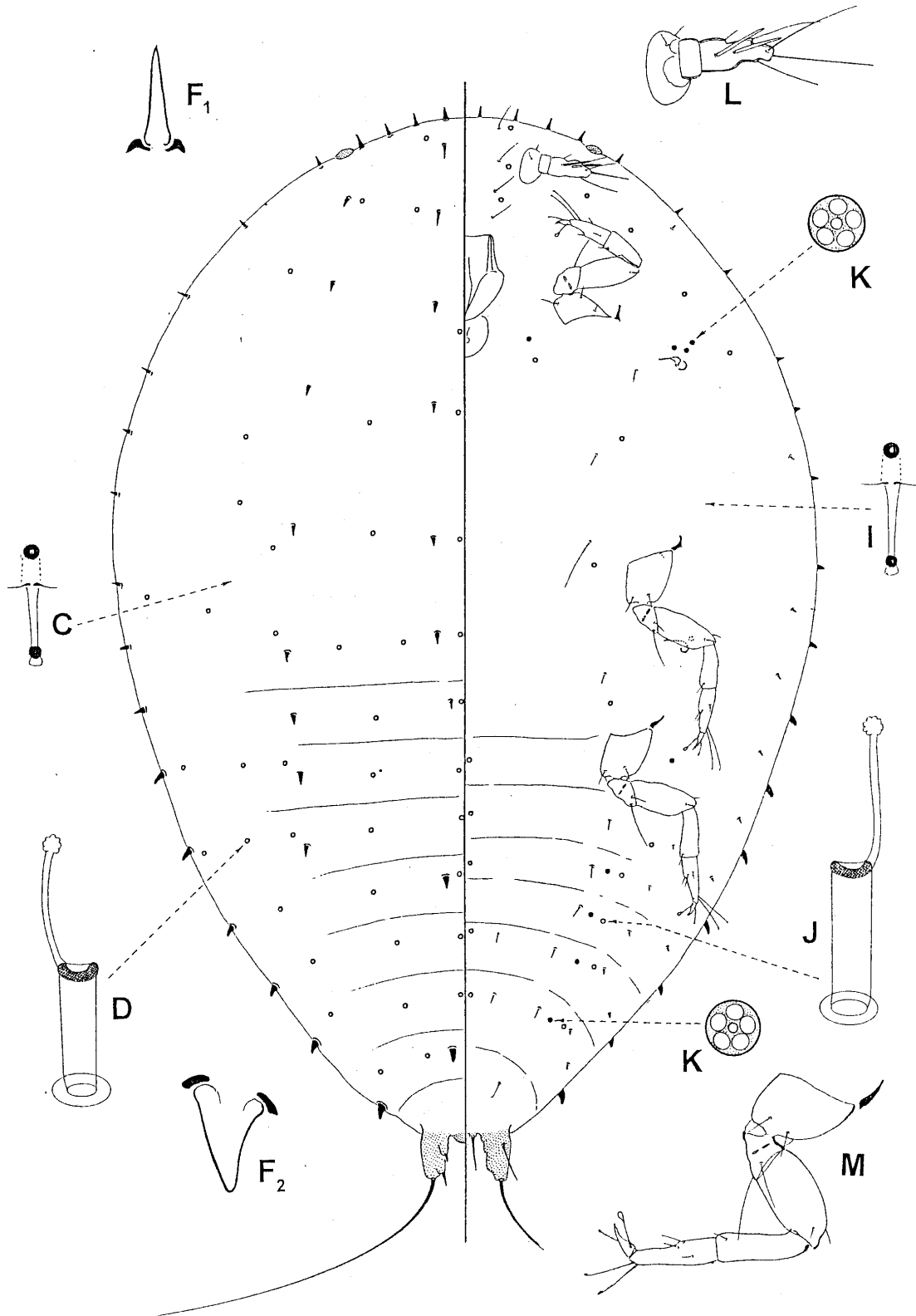


Figure 6 - Second-instar male of *P. rollinae* Hodgson & Gonçalves. Where C: dorsal microtubular duct; D: dorsal macrotubular duct; F₁: anterior marginal seta; F₂: posterior marginal seta; I: ventral microtubular duct; J: ventral macrotubular duct; K: multilocular disc-pore; L: antenna, and M: metathoracic leg.

First-instar nymph (Fig. 7)

Unmounted material. Very small, about 1/4 mm; elongate oval.

Mounted material. Body oval. Length about 240µm, width 124µm

Dorsum. Spinose setae (excluding marginal setae) conical, sometimes slightly curved, of 1 rather variable size, arranged in a double mid-dorsal line, as follows: with 2 pairs on head, 1 pair on pro-, meso- and metathorax and 1 pair on abdominal segments I, IV and VII; also in two mediolateral lines, with 1 pair on head, 1 pair on pro-, meso- and metathorax plus pairs on abdominal segments I-III; all about 5µm long and 3µm wide at base. Microtubular ducts rather large, with a distinct, sclerotised, apparently bilocular cone-like pore; each microtubular duct about 8µm long; with a pair just anterior to anal lobes and pairs submedially on abdominal segments I and II, metathorax and on head; also with pairs marginally as follows: between eyes, laterad to pro-, meso- and metacoxae and marginally on about abdominal segments V & IV. Without other kinds of pores or ducts. With 2 elongate anal lobes, each with rounded apices; lobes clearly sclerotised; without microtubular ducts but each with 2 spinose inner margin setae dorso-laterally, anterior setae each about 2µm long, posterior setae about 6-8µm long; apical setae flagellate, each about 75µm long; posterior suranal setae about 20µm long; anterior suranal setae each on a small protuberance and about 6-7µm long. With a sclerotised median lobe, rounded posteriorly, present dorsad to anal ring, 12µm wide and 8µm long.

Margin. Marginal setae spinose, similar in shape to those on dorsum but slightly larger; with 8 between eyes, 4 on each side between eyes and point opposite anterior spiracles, 4 on each side laterally between anterior spiracles and abdomen with 1 on each side of each abdominal segment. Anal ring located between anal lobes, with 6 setae. Eyespots each 10µm wide, situated on margin near base of antennae.

Venter. Derm membranous. Disc-pores restricted to single pores near each spiracular peritreme, those near anterior spiracles quite large (about 4µm wide) with 5 loculi and touching peritreme; those associated with posterior spiracles smaller (about 2µm wide), probably with 3 loculi and positioned just anterior to each peritreme. With 1 pair of microtubular ducts present near margin on thorax, just posterior to anterior spiracles. Head with a pair of small round pores anteriorly. With 3 pairs of long setae between antennae and another pair mesad to mesocoxae (length about µm), and with a shorter seta mesad to each metacoxa; also with a pair of shorter and more spinose setae medially on abdominal segment VII; submarginal setae very small, in a line of 9 from abdominal segment VII to just posterior to anterior spiracle.

Antennae 3-segmented, about 30µm long; setal distribution uncertain; apical seta 23µm long. Clypeolabral shield about 43µm long; labium perhaps 2-segmented; about 26µm wide, with possibly 2 pairs of minute setae. Spiracles small; anterior spiracle very closely associated with spiracular disc-pore; posterior spiracles appearing smaller and not as close to disc-pore. Legs well developed; length of metathoracic leg (µm): coxa 18-20; trochanter + femur 30-32; tibia + tarsus 33; claw 8-

9µm; tibia slightly shorter than tarsus; setae: coxa 2, trochanter 2, femur 2, tibia 1, tarsus 3; setal distribution on prothoracic legs similar; long trochanter setae 16-20µm; tarsus with a campaniform sensillum; claw perhaps without a denticle; tarsal digitules on all three pairs of legs capitate, about equal in size; claw digitules dissimilar, 1 with a conspicuously larger apex, other apex similar to those on tarsal digitules.

Discussion. The 1st-instar nymphs of *P. anonae* and *P. rolliniae* n. sp. are very similar, but differ as follows (character-states on *P. rolliniae* in brackets): (i) posterior inner margin seta on anal lobes with a blunt apex and quite long, >20µm (apex sharp, seta short, <10µm); (ii) median anal plate narrow lengthwise, about 3µm long (longer, about 8µm, and oval), and (iii) spinose setae all with rather parallel margins (spinose setae cone shaped).

The 1st-instar nymph was described from 1 specimen in good condition plus 11 much poorer specimens.

Prepupa (Fig. 8)

Unmounted: cylindrical in shape, rounded anteriorly, slightly pointed posteriorly.

Mounted specimens elongate oval; length 735-760µm, head width 200-210µm Division into head, thorax and abdomen unclear, although segmentation reasonably distinct on abdomen. Derm membranous, with small dermal spinules. All ducts absent; multiloculate disc-pores, mostly with 6 or 7 loculi in outer ring, present on head, thorax and abdomen; setae few.

Head: lacking mouthparts but with a mouth opening possibly present medially just anterior to front legs. Simple eyes or ocelli perhaps indicated by a pair of sclerotised oval areas dorsolaterally, each 7-9µm wide. Antennae short; segmentation obscure but apparently with 8 segments; length 120-130µm; all segments lightly sclerotised; scape each with 1 minute setal socket. Setae: dorsally with two lines of 6 or 7 setae medially and 1 or 2 laterally plus 0 or 1 minute pores; loculate disc-pores absent dorsally; ventrally with 4 or 5 pairs of setae plus 3 or 4 pairs of loculate disc-pores medially more or less in two lines between scapes.

Thorax: unsclerotised, segmentation unclear. With three pairs of short legs, segmentation mostly indistinct; length of metathoracic legs about 100-110µm; all segments showing light sclerotisation; prothoracic legs directed anteriorly; metathoracic legs extending posteriorly only to about IInd abdominal segment; coxae each with 0 or 1 minute setae; tarsal campaniform pores absent. With a pair of short wing-buds on either side, barely extending to mesocoxae posteriorly; mildly sclerotised; ratio of length to width 1:0.6-1:0.65 (length 135-140µm; width 80-90µm). With 2 pairs of small spiracles, width of anterior peritremes about 10-12µm; with 2 or 3 disc-pores just anterior to each mesothoracic peritreme, and with 1 or 2 disc-pores just posterior to each metathoracic peritreme. Setae and other disc-pores: dorsally with a group of 9-15 disc-pores on prothorax, plus 2 pairs of setae + 2-4 disc-pores across both meso- and metathorax; ventrally with a group of about 8 disc-pores medially between procoxae + 0-2 disc-pores laterad to leg; and with 0 or 1 disc-pore mesad to each mesocoxa and 0 or 1 setae just mesad to each coxa.

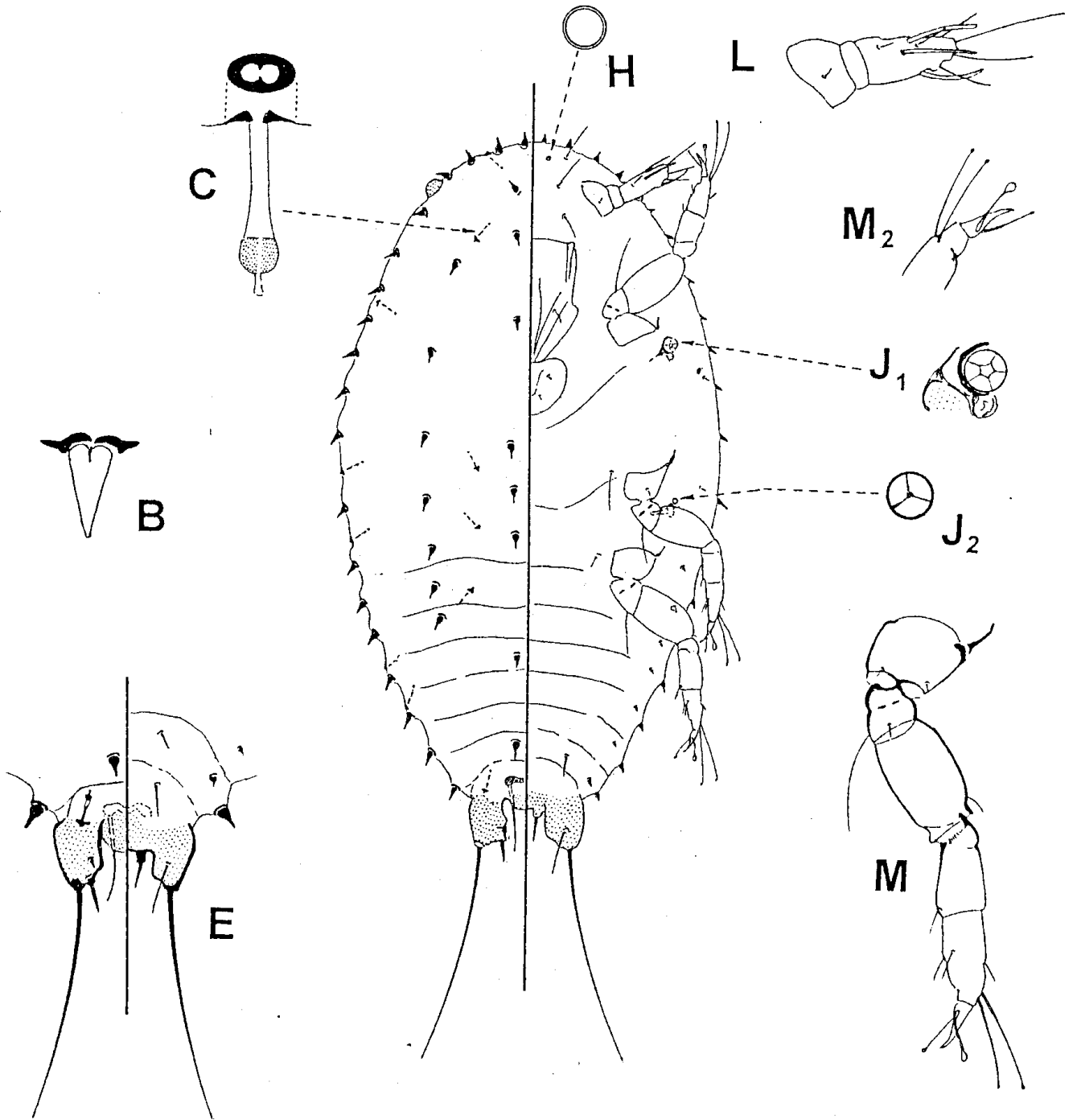


Figure 7 - First-instar of *P. rollinae* Hodgson & Gonçalves (sex not determined). Where B: dorsal setae; C: dorsal microtubular duct; E: anal lobes (dorsal view on left, ventral view on right); H: simple pore; J₁: anterior spiracular disc-pore; J₂: posterior spiracular disc-pore; L: antenna; M: complete metathoracic leg, and M₂: claw and part of tarsus of prothoracic leg.

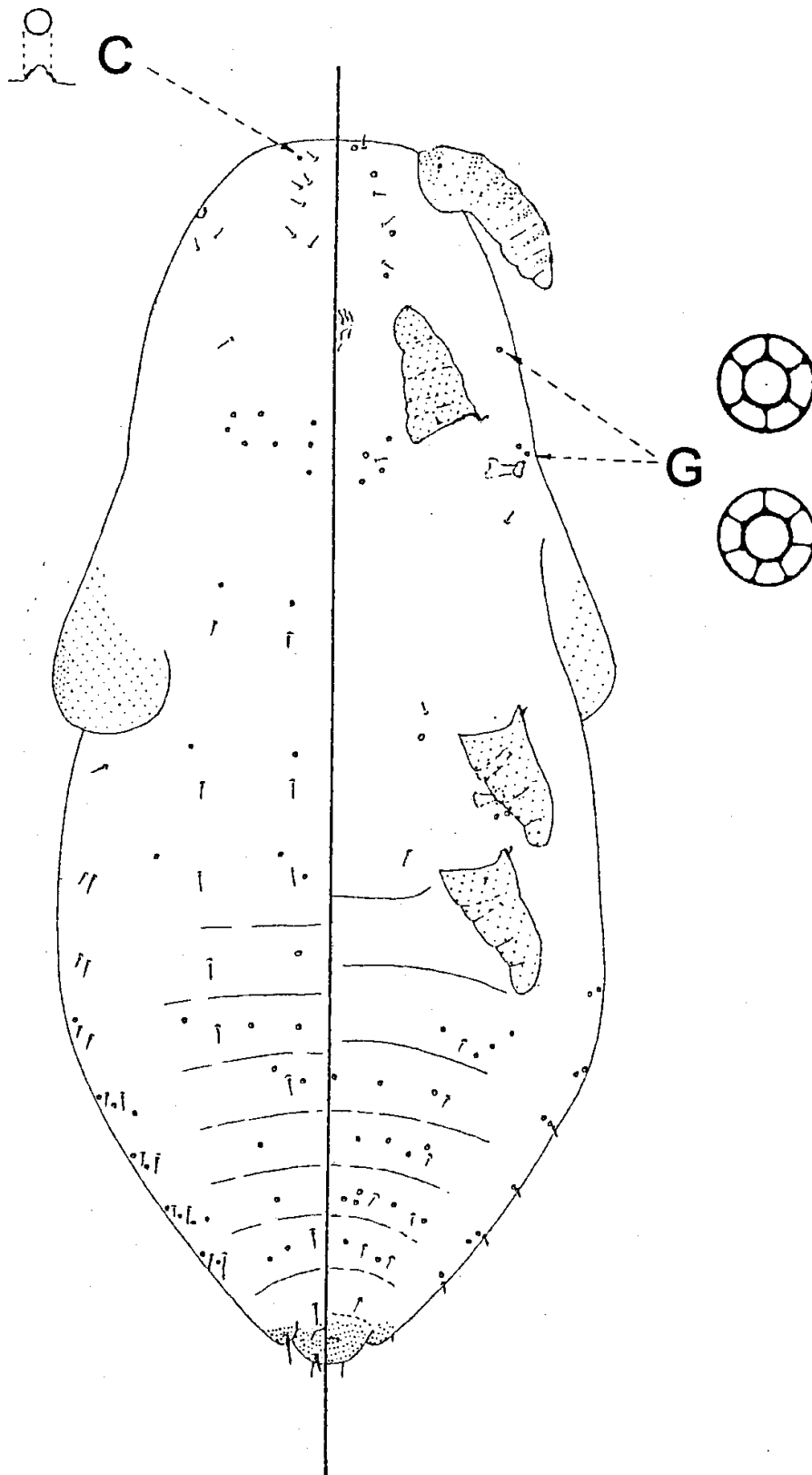


Figure 8 - Prepupa of *P. rollinae* Hodgson & Gonçalves. Where C: convex pore, and G: multilocular disc-pore.

Abdomen: segmentation fairly distinct; as there are only seven visible segments ventrally anterior to penial sheath, anteriormost segment on venter considered to represent segment II; eight segments present dorsally. Setae (s) and disc-pores (lp) as follows: dorsally: (totals) I: 4 s (dorsal abdominal setae (ads)) + 3-5 lp; II: 2-4 s + 1-4 lp; III: 2 s + 2-4 lp; IV: 2 s + 4 lp; V & VI: 0 s + 2-4 lp; VII: 2 s + 3-5 lp; VIII: 2 ante-anal setae (aas); ventrally: II: 0 ventral abdominal setae (avs) + 0 lp; II-VI: 2 or 3 s + 3-8 lp; VII: 4 s + 4-6 lp; VIII: 2 s only. Dorsopleural setae (dps): I-VII: 2 s (one generally slightly longer than other), VIII: 1 longer seta (each 16-19µm long); and segments I and II with 0 or 1 lp; III-VII: 2-4 lp, VIII: 0 lp; ventropleural setae (vps) and pores: I-III: 0 setae + 0 or 1 lp; IV-VII: 1 seta + 1-3 lp; VIII: 1 seta (each 5-6µm long); setae at posterior end rather stronger than those more anteriorly. Segment VII apparently without membranous lobes but segment VIII with a pair of distinct, slightly sclerotised lobes (ce_{viii}). Penial sheath short and broad (length 20-25µm; width at base 50-55µm; ratio of length to basal width 1:2.25) but distinctly longer than lobes of segment VIII; sclerotised; with a distinct anal opening dorsally and genital opening ventrally; without setae or pores.

Comment. The only other description of an eriococcid prepupa known to the authors is that of *Eriochiton armatus* Brittin (Hodgson & Henderson, 1996), to which it appears reasonably similar. Both share the following character-states: (i) multilocular disc-pores on dorsum, venter and pleural areas; (ii) no lateral lobes on abdominal segment VII; (iii) lobes on abdominal segment VIII quite large, and (iv) penial sheath rather short, much shorter than wide. This is significantly different from the prepupae of Coccidae, which have (i) very few or no multilocular disc-pores, (ii) large lobes on abdominal segment VII, (iii) lobes on abdominal segment VIII usually small or absent, and (iv) penial sheath often longer than broad.

The prepupa of *E. armatus* differs (character-states on *P. rolliniae* in brackets) in having: (i) multilocular disc-pores with 10 loculi (rarely more than 7); (ii) multilocular disc-pores present most frequently laterally (least common laterally).

The prepupa was described from 3 specimens, 1 in excellent condition, 1 fair and 1 poor.

Pupa (Fig. 9)

Unmounted material: cylindrical, rounded anteriorly, slightly pointed posteriorly.

Mounted specimens elongate oval; length 860µm, head width 120-195µm. Division into head, thorax and abdomen reasonably clear, although segmentation obscure apart from on abdomen. Derm membranous, with small dermal spinules. All setae hair-like (hs). All ducts absent; multilocular disc-pores present on thorax and abdomen; setae few.

Head: lacking mouthparts but with a mouth opening possibly present between pro-coxae. Simple eyes or ocelli perhaps indicated by a pair of sclerotised oval areas dorsolaterally, width 9-12µm. Antennae rather short, just reaching pre-coxae posteriorly; segmentation obscure but apparently with 8 segments; length 245-260µm; basal segments slightly to moderately sclerotised, scape and pedicel each with 1 or 2 minute setal sockets. Setae: with 3-5 pairs of small hs medially on dorsal surface, 4 pairs medially just posterior to each scape

plus 0 or 1 laterally. With a pair of lightly sclerotised plate-like structures posterolaterally on ventral surface (ventral eyes?).

Thorax: unsclerotised, segmentation not clear. With three pairs of moderately well-developed legs, segmentation clear; length of metathoracic legs about 285-305µm; coxa and trochanter generally showing some sclerotisation; prothoracic legs directed anteriorly; metathoracic legs extending posteriorly to about VIIth abdominal segment; coxae with 1 or 2 minute setae; meso- and metatibiae with small ventral setae; tarsal campaniform pores absent. With a pair of long wing-buds on either side, extending to about abdominal segment II, mildly sclerotised; length 285-305µm, width 87-100µm; ratio of length to width about 1:0.32. With 2 pairs of small spiracles, width of anterior peritremes about 13-15µm; mesothoracic pair just posterior and laterad to procoxae and metathoracic pair just posterior and laterad to mesocoxae; mesothoracic pair without spiracular disc-pores; each posterior spiracle with 3 disc-pores (mainly 5 locular) just posterior to each muscle plate. Setae: dorsal: 3 or 4 hs across both meso- and metathorax; ventral: with a pair of hs submedially between pro- and mesocoxae and another just anterior to metacoxae.

Abdomen: segmentation fairly distinct; as seven segments present ventrally anterior to penial sheath, anteriormost segment on venter considered to represent segment II. Setae: with pairs of dorsal abdominal setae (ads) medially on segments I, VII and VIII (preanal setae); with 1 or 2 pairs of small ventral abdominal setae (avs) on segments III-VIII, those on segment VIII distinctly larger (ante-anal setae (aas)), each 15-17µm long; dorsopleural setae (dps): with 1 or 2 hs on either side of metathorax plus 1 or 2 hs on each side of segments I-VIII, those on segment VIII rather larger; and with single minute ventropleural seta (vps) present on each side of segments V-VII. Quinquelocular disc pores as follows: dorsal: VI 2-4, VII 9-12; pleural: IV 2-6, V 3-5, VI 3-8, VII 6-8, VIII 0; ventral IV 0-2, V 2-4, VI 4-8, VII 8. Segment VII without membranous lobes; segment VIII with rounded lobes (ce_{viii}); sternite VIII lightly sclerotised. Penial sheath (ps) sclerotised, generally with some constriction about 2/3rds along length; longer than broad (length 75-80µm; width 65-73µm; ratio of length to basal width 1:0.89). Anal (a) opening obvious near anterior margin dorsally, width 17µm; genital opening (go) present on dorsal surface as an oval opening between constriction, width 14µm; with 2 pairs of long setae just posterior to genital opening, each 8-15µm long; without penial sheath pores.

Comment. The only other eriococcid pupae which has been described are those of *Sibococcus cerinus* Miller & González (Miller & González, 1975) and some *Eriochiton* species (Hodgson & Henderson, 1985). Like the prepupae, these share (i) multilocular disc-pores ventrally and in pleural areas (and dorsally on *Eriochiton* species and *P. rolliniae*); (ii) absence of membranous lobes on abdominal segment VII; (iii) lobes on abdominal segment VIII quite distinct but rounded; (iv) penial sheath quite long, length probably at least equal to width, and (v) mouth opening present just posterior to head. This is significantly different from the prepupae of Coccidae, which have (i) very few or no multilocular disc-pores, (ii) large lobes

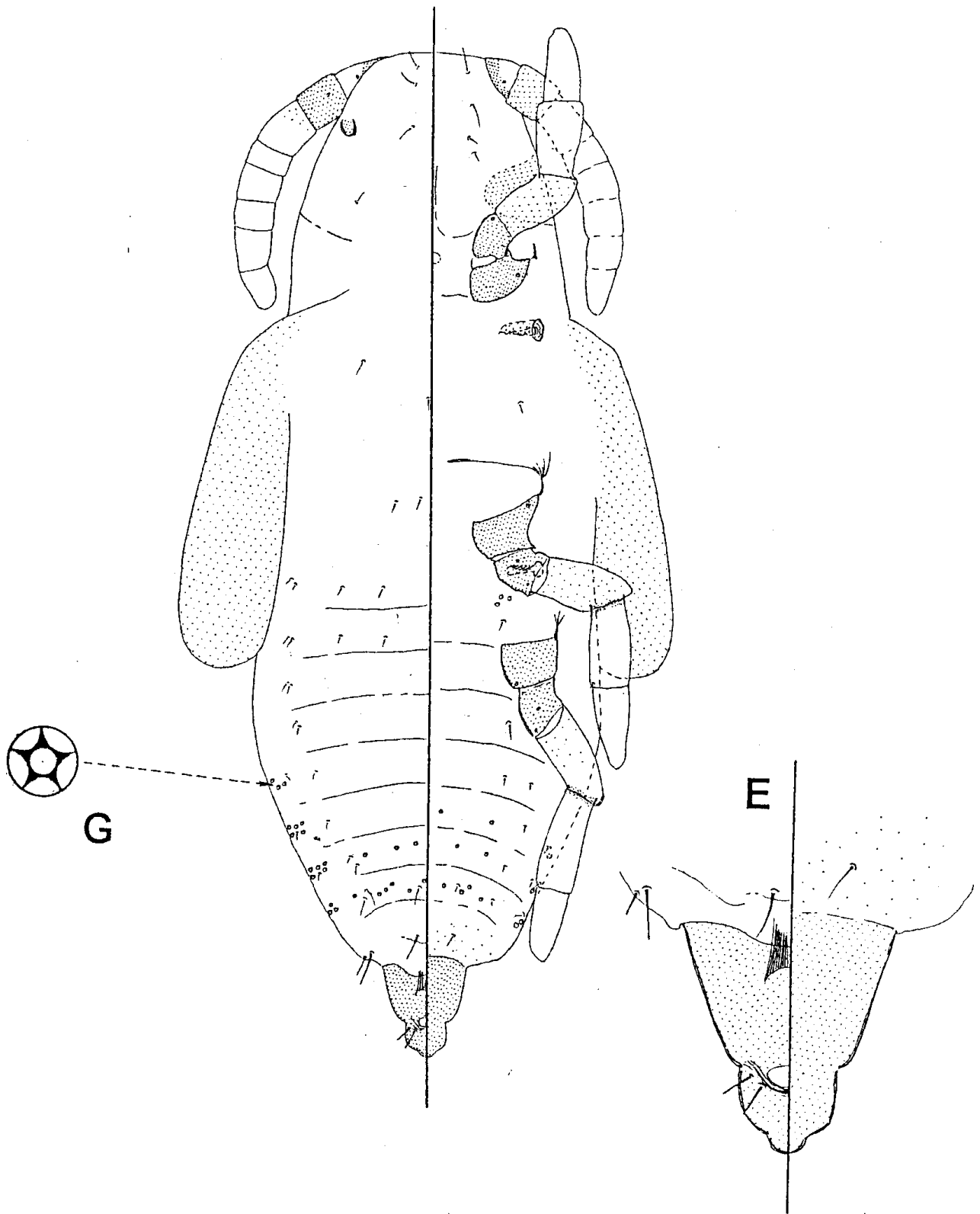


Figure 9 - Pupa of *P. rollinae* Hodgson & Gonçalves. Where E: penial sheath, dorsal view left and ventral view right, and G: multilocular disc-pore.

on abdominal segment VII, (iii) lobes on abdominal segment VIII usually small or absent and (iv) mouth opening rarely, if ever, visible. The penial sheaths of the two families are fairly similar.

The pupa of *P. rolliniae* differs from that of *S. cerinus* as follows (character-states for *S. cerinus* in brackets): (i) loculate disc-pores absent medially on pro- and mesothorax (present); (ii) quinquelocular disc-pores absent from near anterior spiracle but present near posterior spiracle (present near anterior spiracle, possibly absent from near posterior spiracle); (iii) quinquelocular disc-pores present dorsally on abdominal segments VI and VII (absent dorsally); (iv) antennae eight-segmented (9 or 10 segmented); (v) pleural sclerotisations absent (present on segments (IV) V-VIII); (vi) genital opening on dorsal surface of penial sheath (on ventral surface, indicated by a small projection), and (vii) with two pairs of subapical setae on penial sheath (one pair of apical setae).

The pupa of *Eriochiton* species differ from those of *P. rolliniae* (character-state on *P. rolliniae* in brackets): (i) 10-segmented antennae (8-segmented); (ii) a line of multilocular disc-pores present along posterior margin of head dorsally (multilocular disc-pores absent from this position); (iii) disc-pores with mainly 10-loculi (rarely more than 7 loculi), and (iv) abdominal segment VIII with lobulate lateral lobes (lobes on segment VIII very rounded).

The position of the genital opening on the dorsal surface of the penial sheath on *P. rolliniae* seems rather unlikely but it was quite clear on both specimens.

The pupa was described from 2 specimens, both in excellent condition but one with a damaged wing.

Adult male (Fig. 10)

Live material: pink.

Mounted material: small, total body length 0.7-0.92 mm; antennae short, 8-segmented, only about one-third total body length; body with few setae, fleshy setae (fs) clearly differentiated from hair-like setae (hs) and present throughout; length of fs on antennae shorter than width of antennal segments. Wings about 0.8 total body length and about 0.4 as wide as long. Hamulohalteres absent.

Head: approximately six-sided in dorsal view; length 120-125µm; width across genae about 150-155µm. Median crest (mc) poorly demarcated and not reticulated; preoccipital ridge (por) distinct, with strong posterior ridges and weaker anterior ridges; with (on each side) about 8-10 hs + 1-7 fs dorsal head setae (dhs); pores absent. Mid-cranial ridge: dorsal ridge (dmcr) well developed but short; ventral ridge (vmcr) rather longer, extending from lateral arms (lmcr) posteriorly almost to ocular sclerite; without any reticulation laterally but with 2-4 hs ventral mid-cranial ridge setae (vmcrs) on either side of ridge. Genae (g) not reticulated but with 3-6 hs + 9-12 fs genal setae (gs) on each side. Simple eyes (se): two pairs, each round and subequal in size, 25-30µm wide; ventral eyes clearly posterior to dorsal eyes. Ocelli (o) quite large, very convex and placed laterally, 11-14µm wide, situated where preocular ridge (procr) and postocular ridge (pocr) fuse. Ocular sclerite (ocs) sclerotised between ocelli and dorsal simple eyes and around ventral simple eyes but not reticulated. Preocular ridge (procr)

short dorsally but extending posteriorly and fusing with postocular ridge (pocr) ventral to each ocellus. Postocular ridge (pocr) strongly developed, extending dorsally past posterior margin of each dorsal eye and almost reaching preoccipital ridge (por) medially. Dorsal ocular setae absent. Ventral head setae (vhs): with 2 or 3 hs + 2 fs between vse and 10-14 hs + 14-17 fs above and laterad to each ventral simple eyes. Tentorial bridge and preocular ridge absent. Cranial apophysis parallel-sided and extending to vse, probably rounded apically; length about 33µm. With a pair of convex pores on either side of mouth area.

Antennae: 8-segmented and filiform; 230-256µm long (ratio of total body length to antennal length 1:0.30). Scape (scp): 25-28µm long and 30-32µm wide, with 2 hs ventrally and 2 dorsally. Pedicel (pdc): length 33-40µm, width 24-27µm; with distinct reticulations distally; with 0-2 fs, 9-16 hs + (probably) 1 campaniform pore. Segments III-VII becoming gradually broader towards apex, about 13µm at base and 23µm at widest point; fs about 6-9µm long; lengths of segments (µm): III: 53-60; IV: 30-42; V: 20-33; VI: 16-30, and VII: 16-22; approximate number of setae per segment: III: 5-8 fs, 1-3 hs + 1 basiconic placodeum; IV: 3-4 fs + 4-6 hs; V: 3 or 4 fs + 1 hs; VI: 0-2 fs, 4-6 hs + 0 or 1 bristle (ab), and VII: 0 fs, 2-4 hs, 1 or 2 ab + 1 capitate seta (caps) (some hs on segments IV-VI are long but do not appear to be capitate). Segment VIII constricted towards apex; length 25-37µm; with 6-8 caps, 0 fs + 3 large ab and 2 small ab; 1 sensilla basiconica present on apex.

Thorax. Prothorax: pronotal ridge (prnr) well-developed and perhaps fused dorsally; with a small, slightly striated, triangular, lateral pronotal sclerite (prn), without lateral pronotal (lps) setae. Medial pronotal and post-tergital setae apparently absent. Post-tergites possibly present. Sternum (stn₁) not sclerotised but with slight radial striations; with a strong transverse ridge; median ridge short and fairly weak; with a total of 9-13 hs + 0 or 1 fs prosternal setae (stn₁s). Anteprosternal setae and antemesospiracular setae absent.

Mesothorax: prescutum (prsc) transversely oval, 66-78µm long and 85-100µm wide; sclerotised but not reticulated; with 1-3 pairs hs prescutal setae anteriorly plus 0-3 fs + 0-3 hs laterally; prescutal ridges (pscr) and prescutal suture (pscs) well developed. Scutum (sct): median area sclerotised but not reticulated, about 15-21µm long, with 0 or 1 fs + 0 or 1 hs setae; lateral scutal setae (scts): 0-2 hs + 0-2 fs on each side laterad to median area; lateral margins sclerotised but not reticulated; prealare ridge (pra) weak. Scutellum (scl) 78-100µm wide and 34-43µm long; with an inverted U-shaped scutellar ridge (sclr); probably not tubular and lacking a foramen; scutellar setae (scls): 1 pair hs; posterior notal wing process (pnp) quite long and sclerotised. Basisternum (stn₂) 130-150µm wide and 70-91µm long; median ridge (mdr) absent, but bounded anteriorly by a moderately strong marginal ridge (mr) and posteriorly by strong precoxal ridges (pcr₂); with a total of about 13-21 hs basisternal setae (stn₂s); lateropleurite (lpl) narrow, without an extension from marginal ridge; furca (f) well developed, narrow-waisted, arms very divergent and extending almost to anterior marginal ridge. Mesopostnotum (pn₂) well developed; postnotal apophysis (pna) well developed

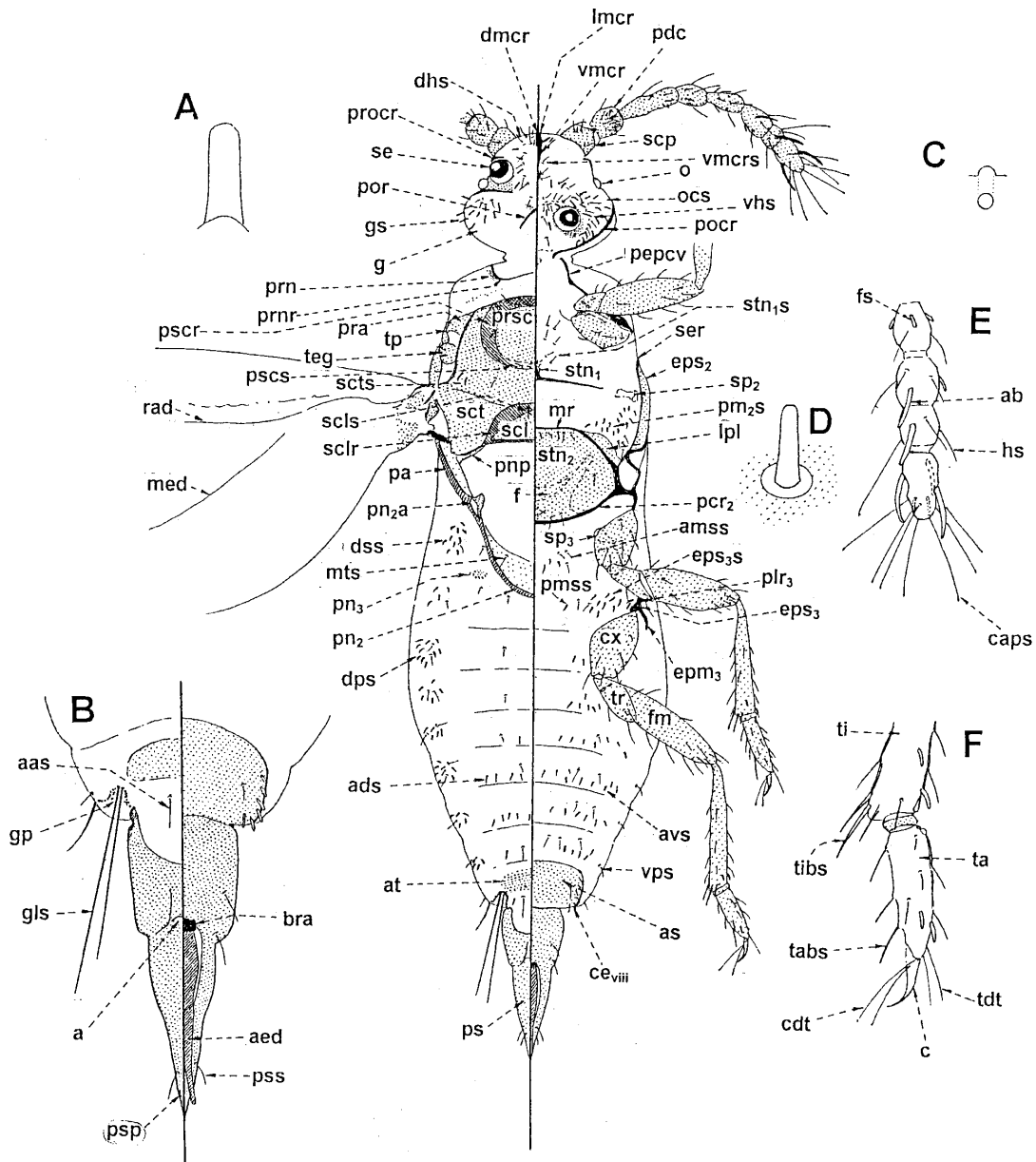


Figure 10 -Adult male of *P. rollinae* Hodgson & Gonçalves, dorsum on left and venter on right of central figure. Where A: cranial apophysis; B: penial sheath, dorsal view left and ventral view right; C: convex pore laterad to area of mouth; D: fleshy seta on antennae; E: apical four segments of antenna, and F: apical part of metathoracic leg. And where: a: anal opening; aas: ante-anal setae; ab: antennal bristle; ads: dorsal abdominal setae; aed: aedeagus; amss: anterior metasternal setae; at: abdominal tergites; as: abdominal sternites; avs: ventral abdominal setae; bra: basal rod; caps: capitate setae; c: claw; cdt: claw digitule; ce VIII: caudal extension on abdominal segment VIII; cx: coxa; dhs: dorsal head setae; dmc: dorsal part of midcranial ridge; dps: dorsopleural setae; dss: dorsospiracular setae; epm₂: metepimeron; eps₂: mesepisternum; eps₃: metepisternum; eps_{3s}: postmetaspiracular setae; f: furca; fm: femur; fs: fleshy seta; g: gena; gls: glandular pouch; gp: glandular pouch; gs: genal setae; hs: hair-like seta; lmcr: lateral branch of midcranial ridge; lpl: lateropleurite; med: media; mr: marginal ridge; mts: metatergal setae; o: ocelli; ocs: ocular sclerite; pa: postalar; pcr₂: precoxal ridge of mesothorax; pdc: pedicel; pepcv: proepisternum + cervical sclerite; plr₃: metapleural ridge; pmss: posterior metasternal setae; pm_{2s}: postmesospiracular setae; pn₂: mesopostnotum; pn₃: metapostnotum; pn_{2a}: mesopostnotal apophysis; pnp: posterior notal wing process; por: postocular ridge; pra: prealar; prn: lateral pronotal sclerite; prnr: pronotal ridge; procr: preocular ridge; prsc: prescutum with prescutal setae; ps: penial sheath; pscr: prescutal ridge; pscs: prescutal suture; psp: penial sheath pores; pss: penial sheath setae; rad: radius; sb: sensilla basiconica; scl: scutellum; sclr: scutellar ridge; scl: scutellar setae; scp: scape; sct: scutum; scts: scutal setae; se: simple eyes; ser: subepisternal setae; sp₂: mesothoracic spiracle; sp₃: metathoracic spiracle; stn₁: prosternum; stn_{1s}: basisternum; stn₂: basisternum; tabs: tarsal spur; ta: tarsus; tdt: tarsal digitule; teg: tegula with tegular setae; ti: tibia; tibs: tibial spur; tr: trochanter; vhs: ventral head setae; vmcr: ventral midcranial ridge; vmcrs: ventral midcranial ridge setae; vps: ventral pleural setae.

and opening quite elongate. Area bounded anteriorly by scutellum and laterally and posteriorly by mesopostnotum not sclerotised. Mesepisternum (eps_2) not reticulated; subepisternal ridge (ser) well developed. Postalare (pa) well developed; without postalare setae (pas). Mesothoracic spiracle (sp_2) small: width of peritreme 16-18 μ m. Postmesospiracular setae (pm_{2s}) present in a group of 1-5 hs + 8-16 fs posterior to each spiracle and with 0-2 hs medially. Tegula (teg) present, each with 2 or 3 hs + 1 or 2 fs tegular setae on each side.

Metathorax: with 1-3 pairs hs + 0 or 1 fs metatergal setae (mts). Metapostnotum (pn_3) present as a pair of small sclerites. Dorsal part of metapleural ridge (plr_3) absent, ventral part well developed; episternum (eps_3) unsclerotised, with 9 or 10 fs + 0-2 hs postmetaspiracular setae (eps_{3s}) on each side; precoxal ridge (pcr_3) short, just anterior to metacoxae. Metepimeron (epm_3) short, without setae. Antemetaspiracular setae absent. Metathoracic spiracle (sp_3): width of peritreme 16-18 μ m. Dorsospiracular setae (dss): 10 or 11 fs + 0-2 hs on each side. Metasternum membranous, with 1-3 pairs hs + 1-4 pairs fs anterior metasternal setae ($amss$) and 1-4 pairs hs + 4 or 5 pairs of fs posterior metasternal setae ($pmss$).

Wings: hyaline, about 698-730 μ m long and 273-385 μ m wide (ratio of length to width 1:0.46; ratio of total body length to wing length 1:0.88); alar lobe and alar setae absent. Hamulohalteres absent.

Legs: metathoracic leg marginally longest. Coxae (cx): I: 60-72; II: 58-68; III: 58-75 μ m long; setae of coxa III: about 2-5 fs + 7-10 hs; long apical setae not differentiated, length 18-22 μ m. Trochanter (tr) + femur (fm): I: 124-145; II: 115-137; III: 135-152 μ m long; trochanter III with 4 hs; long trochanter seta not differentiated but about 18-27 μ m long; femur III with about 13-18 hs + 0 or 1 fs. Tibia (ti): I: 94-107; II: 100-117; III: 108-124 μ m; tibia III with a total of about 18-22 setae, mainly hs, a few becoming spur-like on distal third of leg, plus 1 or 2 fs on dorsal surface distally; with 2 or 3 apical spurs ($tibs$), length 16-20 μ m. Tarsi (ta) 2 segmented, proximal segment very short: both segments combined I: 55-60; II: 53-65; III: 55-62 μ m long (ratio of length of tibia III to length of tarsus III 1:0.51); tarsus III with 10-17 setae, mainly spur-like, plus 1 or 2 fs on proximal end dorsally; tarsal spurs ($tabs$) barely differentiated, each 20 μ m long; tarsal campaniform pore present; tarsal digitules (tdt) distinctly shorter than claws, possibly without apical knobs. Claws (c) quite long and strongly curved, distinctly longer than width of tarsi, without a denticle (or with just a hint of a denticle); length: III: 16-25 μ m; claw digitules (cdt) longer than claw, probably with minute apical knobs.

Abdomen: segments I-VII: tergites (at) and sternites (as) unsclerotised; without obvious oval membranous areas in intersegmental membranes. Caudal extension of segment VII absent. Dorsal setae (ads) (totals): segment I: 4 hs; II: 0-2 hs + 0-2 fs; III: 2 hs + 11 fs; IV: 2 hs + 10-12 fs; V: 0-2 hs + 12-14 fs; VI: 0-2 hs + 8 or 9 fs; VII: 2 + 5-8 fs. Pleural setae: dorsopleural setae (dps): segments I-III: 2 or 3 hs + 4-8 fs; IV & V: 2 hs + 5-12 fs; VI & VII: 2 hs + 2-10 fs; ventropleural setae (vps) (on each side): I-III: absent; IV: 0 or 1 hs + 0 fs; V-VII: 0 or 1 hs + 0-4 fs. Ventral setae (avs) (totals): II: 0 hs + 0 or 1 fs; III-V: 2

hs + 13-19 fs; VI: 2-4 hs + 13 or 14 fs; VII: 4 hs + 10-19 fs. Segment VIII: with a small tergite (at) and a large sternite (as); with about 2 (rarely 4) hs (each 20-25 μ m long) + 0-(rarely)4 fs ante-anal setae (aas) dorsally; sternite with about 1 or 2 hs + 5-8 fs ventral abdominal setae (avs) on each side; caudal extension (ce) rounded, with 1 long hs pleural setae (length 28-37 μ m) + 1 short seta (13-20 μ m long). Glandular pouches (gp) present, fairly shallow; each with a few loculate pores outside around margin of pouch; glandular pouch setae (gls) each about 80-102 μ m long.

Genital segment: penial sheath (ps) divided into two parts: anterior section (segment IX?) sclerotised, broad (50-60 μ m wide, 40-60 μ m long); anal opening (a) present medially on dorsal surface; with two longish setae latero-ventrally on posterior margin, each 16-20 μ m long. Posterior part (penial sheath proper?) 33-35 μ m wide at base, gradually tapering to a sharp point; sclerotised; length from anterior margin of anterior section 85-92 μ m (ratio of total body length to length of penial sheath + segment IX 1:0.19); with 2 pairs of long setae (pss) near apex, each 18-20 μ m long. Aedeagus (aed) narrowing slightly towards apex, 12-14 μ m wide at base; length about 85-97 μ m. Basal rod (bra) short, perhaps 8-10 μ m long. Penial sheath with a few small sensilla (psp) near apex.

Comment. Rather few fully-winged males of Eriococcidae have been described (*Eriococcus araucariae* Maskell, *E. orariensis* Hoy, *E. buxi* (Fonscolombe), *Ovaticoccus agavium* (Douglas), *Gossyparia spuria* (Modeer) and *G. salicicola* Borchsenius (Afifi, 1968); *Apiomorpha* (?) *pharetrata* (Schrader) and *Opisthoscelis* species (Theron, 1968); *Stibococcus cerinus* Miller & González (Miller & González, 1975); *Acanthococcus droserae* Miller, Liu & Howell (Miller et al., 1992); *Eriochiton hoheriae* Hodgson (Hodgson & Henderson, 1996). The senior author has also illustrated and described (unpublished) the following eriococcid males: *Eriochiton armatus* Brittin, *Calycicoccus merwei* Brain, *Lachnodioides eucalyptus* (Maskell), *Callococcus leptospermi* Maskell, *Apiomorpha spinifer* Froggatt and *Opisthoscelis verrucula* Froggatt. Of these, the male of *P. rollinae* is very similar to that of *C. merwei* in possessing fleshy setae on the body (unknown on the other male eriococcids) and in having only 8 antennal segments (rare). *C. merwei* also has fleshy setae on the tibia and tarsus. *C. merwei* is the only known indigenous eriococcid from South Africa and also induces galls.

Afifi (1968) also described the apterous males of *Pseudokermes fraxini* (Kaltenbach), whose antennae is also 8-segmented and structurally very similar to that of *P. rollinae*. It is otherwise difficult to compare, being apterous and female-like.

The adult male was described from 4 specimens, 2 in excellent condition, 1 quite good but head distorted and 1 poor.

General biology of *P. rollinae*: preliminary observation suggest that the galls start developing shortly after bud-burst in September-October in Minas Gerais State, once the rains have arrived. The galls grow at a very fast rate and have reached their full size in about 12 days. The galls are light green and sexually dimorphic, with those induced by the female spherical and usually prominent on the adaxial leaf surface, while the

galls containing the males are more conical, with an equally well-developed ventral extension which is almost as large as the gall on the upper leaf surface; it has a large opening ventrally. Galls induced by the female are larger than those of the male and each of the former has one chamber when young but two when the insects are adult, whilst those induced by the male always have just one nymphal chamber. Eggs are laid within the lower of the two chambers within the female gall around mid-November. The first-instar nymphs or crawlers hatch inside the galls and disperse by exiting from the gall through the hole on the abaxial leaf surface, and disperse to the bases of leaf petioles where they appear to go into diapause until the first rains of the following season. The crawlers then emerge from diapause, locate the young expanding leaves and commence gall induction. No moults have been found within female galls but, once they have secreted a woolly wax test and moulted to become a prepupa, one cast skin is always present under the males' body. The males emerge from the larger hole in the base of the male gall about 12 days after gall induction and then copulate with the females inside the female galls, and so development of both the males and females would appear to be very fast, even though egg-laying is much later.

Material studied: HOLOTYPE female: BRAZIL, Minas Gerais, Belo Horizonte, Zoo-botanic Foundation near the gorilla's place, on leaves and stems (nymphs in diapause) of *Rollinia laurifolia* Schldtl. (Annonaceae), ix-xii. 2001, Samuel José de Melo Reis Gonçalves (MZSP): 1/1 adF. PARATYPE material: BRAZIL, Minas Gerais, Belo Horizonte, Zoo-botanic Foundation near the gorilla's place, on leaves and stems (nymphs in diapause) of *Rollinia laurifolia* Schldtl. (Annonaceae), ix-xii. 2001 and ix-x. 2002, Samuel José de Melo Reis Gonçalves: 4/5 adF, 7/8 2ndF, 9/10 2ndM, 7/12 1st instar, 2/3 prepupae, 2/2 pupae, 4/4 adM (Depositories: MZSP; USNM; BMNH, NMW).

Etymology: the species name *rollinae* is taken from the host plant genus *Rollinia*.

Discussion

Of the 17 genera of eriococcids that occur in Central and South America, none are obviously similar to species of *Pseudotectococcus*. The presence of protruding and heavily sclerotized anal lobes and antennae with less than 6 segments is unlike any other Neotropical genus. However, there are several shared similarities with 2 other genera, namely *Exallococcus* and *Tectococcus*.

Adult females of *Exallococcus* and *Pseudotectococcus* have: (i) large sclerotized anal lobes each with 2 enlarged setae medially; (ii) slightly invaginated anal opening; (iii) macro tubular ducts with a conspicuous rim around dermal orifice; (iv) posterior suranal setae on a small tubercle; (v) legs large and conspicuous; (vi) enlarged setae present on dorsum, and (vii) sclerotized dorsal area anterior to anal ring. *Exallococcus* differs from *Pseudotectococcus* (character-state on *Pseudotectococcus* in brackets) in having: (i) 6-segmented antennae (3- or 4-segmented); (ii) body margin with row of large macro tubular ducts and enlarged setae (without marginal row of macro tubular ducts and enlarged setae); (iii) conspicuous

discoidal pores (discoidal pores absent), and (iv) anal lobes divided longitudinally (anal lobes undivided).

Adult females of *Tectococcus* and *Pseudotectococcus* share the following attributes: (i) both induce leaf galls (males induce smaller galls than females); (ii) posterior apex of body narrowly rounded; (iii) legs well developed, and (iv) antennae usually with less than 6 segments. *Tectococcus* differs from *Pseudotectococcus* (character-state on *Pseudotectococcus* in brackets) in having: (i) anal lobes absent or small, unsclerotized (anal lobes large and sclerotized); (ii) macro tubular ducts without a dermal rim (macro tubular ducts with a dermal rim), and (iii) dorsal setae slightly enlarged (dorsal setae conspicuously enlarged).

Abbreviations for depositories: BMNH: The Natural History Museum, London, UK; NMW: National Museum of Wales, Cardiff, Wales; São Paulo: Museu de Zoologia, Universidade de São Paulo, Brazil, and USDA: National Museum of Natural History, Beltsville, MD, USA. Also note that 4/4adF means 4 slides, each with 1 adult female specimen.

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