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Abstract

The adults male and female, 2nd-instars male and female and pupa of a new species of Rhodococcus, R. luberonensis n. sp. (Coccidae : Coccoidea) off *Rhamnus saxatilis* from the South of France (Petit Lubéron mountain, Vaucluse) are described and illustrated. This new species of *Rhodococcus brings* the number of the species in this genus to 7. The similarity of *R. luberonensis* to species of Eulecanium is discussed.

Résumé

Rhodococcus luberonensis nouvelle espèce de Cochenille de France (Hemiptera, Coccidae). Les adultes mâle et femelle, les 2e stades mâle et femelle et la pupe d'une nouvelle espèce du genre Rhodococcus, collectée au Lubéron (Vaucluse) sur rameaux de R*hamnus saxatilis*, sont décrits et illustrés. L'adulte femelle de *Rhodococcus* est proche d' *Eulecanium*, mais il en diffère par l'absence de pores et de soies sur l'anneau anal. L'adulte femelle de la nouvelle espèce se distingue par la présence des quelques rares tubercules marginaux. Le genre *Rhodococcus* renferme maintenant sept espèces exclusivement paléarctiques.

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Rhodococcus luberonensis, a new species of soft scale from France (Hemiptera, Coccidae)

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Summary. – The adults male and female, 2nd-instars male and female and pupa of a new species of *Rhodococcus*, *R. luberonensis* n. sp. (Coccidae : Coccoidea) off *Rhamnus saxatilis* from the South of France (Petit Lubéron mountain, Vaucluse) are described and illustrated. This new species of *Rhodococcus* brings the number of the species in this genus to 7. The similarity of *R. luberonensis* to species of *Eulecanium* is discussed.

Résumé. – ***Rhodococcus luberonensis* nouvelle espèce de Cochenille de France (Hemiptera, Coccidae).** Les adultes mâle et femelle, les 2e stades mâle et femelle et la pupe d'une nouvelle espèce du genre *Rhodococcus*, collectée au Lubéron (Vaucluse) sur rameaux de *Rhamnus saxatilis*, sont décrits et illustrés. L'adulte femelle de *Rhodococcus* est proche d'*Eulecanium*, mais il en diffère par l'absence de pores et de soies sur l'anneau anal. L'adulte femelle de la nouvelle espèce se distingue par la présence des quelques rares tubercules marginaux. Le genre *Rhodococcus* renferme maintenant sept espèces exclusivement paléarctiques.

Keys words. – Hemiptera, Coccoidea, Coccidae, *Rhodococcus luberonensis* n. sp., *Eulecanium*, France.

According to BORCHSENIUS (1957), BEN-DOV (1993) and HODGSON (1994), six species are currently known in the genus *Rhodococcus* Borchsenius, 1953, all distributed in the Palaearctic Region. *Rhodococcus rosaeluteae* Borchsenius, the type species, *R. spiraeae* (Borchsenius) and *R. perornatus* (Cockerell & Parrot) have been recently illustrated by HODGSON (1994), TEREZNIKOVA (1981) and KOSZTARAB & KOZÁR (1988), respectively, but the remaining species, *R. marchali* (Cockerell), *R. sariuoni* Borchsenius and *R. turanicus* (Archangelskaya), are in need of further study. *Rhodococcus marchali* was originally described by COCKERELL (1903) (as *Eulecanium genevense marchali*) from France, off a species of *Rosa*, but searches in the MNHN (Paris), the BMNH (London), and in the USDA (United State Department of Agriculture, Beltsville) (D. Miller and J. Martin, pers. comm.) have failed to find specimens of this species, even though BEN-DOV (1993) gave the USNM as the depository for the syntypes. The status of this species cannot, therefore, be clarified at the moment and its relationship with the new species cannot be determined.

Depositories and their abbreviations cited in this paper are: MNHN: Muséum National d'Histoire Naturelle, Paris; BNHM: The Natural History Museum, London; PPI: Plant Protection Institute, Hungarian Academy of Science, Budapest; NMW: National Museum of Wales, Cardiff.

Rhodococcus luberonensis Foldi & Kozár, n. sp.

HOLOTYPE: adult ♀, France, Vaucluse, Petit Lubéron, on *Rhamnus saxatilis*, 10.V.1998, *Imre Foldi*, n° : 14100/-1, deposited in the collection of MNHN (Paris). PARATYPES : adult ♀, data as for holotype, 15 slides in MNHN; n° : 14100/-2-14; 2 slides in PPI (Budapest); 2 slides in NMW (Wales); adult ♂, data as for holotype. 5 (MNHN), 1 (NMW), 1 (PPI).

In addition, there are the following slides of other stages : 2nd-instar ♀ : 6 slides with 6 specimens ; 2nd-instar ♂ : 1 slide with 1 specimen ; pupa : 2 slides with 2 specimens (MNHN).

Adult female (fig. 1)

Unmounted material. Strongly convex, sometimes almost globular or pear shaped, and, therefore, dorsum much wider than venter; anal lobes more or less strongly expressed; upper part of body strongly sclerotised on older females. Length increasing with age, from 1.6 mm to 3.5 mm.

Mounted material. Young adults oval to almost round, length 1.91 mm, width 1.63 mm, becoming highly swollen at maturity; with shallow stigmatic clefts; anal cleft shallow, about 1/7th body length.

Dorsum. Derm not greatly thickened when young, sclerotised only in a crescent anterior to anal plates, this crescent narrowest medially and broadest laterally, and composed of elongate cell-like areas similar to those on *Eulecanium* (see HODGSON, 1994); derm becoming rather uniformly sclerotised at maturity. Dorsal setae setose, each with a moderate-sized basal-socket; each seta about 8-17 µm long: sparsely distributed throughout. Dorsal pores of one type, each round and simple, with a flat, granular surface, 4 -5 µm in diameter: frequent throughout. Preopercular pores absent. Dorsal tubular ducts each with a fairly short outer ductule and a short inner ductule without a glandular apex: frequent throughout. Anal plates elongate, each 169-177 µm long and 80-87 µm wide; each with 5 setose setae, 3 more or less on the dorsal surface and 2 apically, longest about 74-78 µm. Ano-genital fold with 3 pairs of long setae on anterior margin and 2 pairs laterally. Anal ring only slightly sclerotised, without setae or pores.

Margin. Marginal setae of 2 types: (I) hairlike and extremely long, each 66-133 µm in length, with a wide basal socket: rather common around margin, with 8-13 on each side between stigmatic areas; and (II) strongly spinose setae, each 17-35 µm long: present among marginal hairlike setae; with about 1-4 between stigmatic clefts only. With 2 stigmatic spines in each stigmatic cleft, each spine rather parallel sided, curved, bluntly pointed and 17-25 µm long. Marginal dorsal tubercles sharply conical: on margin among hairlike setae and strong spines; with about 2-6 in total around margin, situated between or near stigmatic areas. Eyespots marginal.

Venter. Derm entirely membranous. Pregenital disc-pores each with 9-10 outer loculi and with an elongate inner loculus, 8µm in diameter : abundant across all abdominal and thoracic segments (with 23-28 between metacoxae, 21-26 between mesocoxae and 4-6 near each procoxa) ; with 4-5 laterad to each metacoxa, and with 2-3 (with fewer loculi) near base of each scape. Spiracular disc-pores each with 4-6 loculi, 5µm in diameter : present in a loose row of 12-16 between each spiracle and margin and with 1-2 mesad of each peritreme. Ventral microducts quite large, with a large inner gland : present in a band just mesad of submarginal band of tubular ducts. Ventral tubular ducts of one type, each with a fairly long outer ductule and a thinner inner ductule with a large terminal gland : present in a narrow submarginal band but absent on either side of anal cleft ; also with a few medially on head between antennae and laterad to mouthparts. Ventral setae : pairs of moderate-sized setae present on 1 pregenital segments, length 66-83 µm ; also with 3 pairs of rather small setae between antennae ; other setae rather small, 8-14 µm long, sparse throughout. Spiracles quite large ; width of each peritreme, anterior 53-65 µm, posterior 75-77 µm. Legs normal, without a tibio-tarsal articulatory sclerosis ; each claw curved, with a denticle near apex ; claw digitules both narrow but one slightly broader than other, each with a distinctly dilated apex and longer than claw ; tarsal digitules, 30 µm long, subequal in length, each with small apical dilatation ; leg dimensions (µm) : 1st leg : coxa 60 trochanter+femur 108, tibia 72, tarsus 66, claw 20. 2nd leg : coxa 66, trochanter+femur 110, tibia 74, tarsus 67, claw 22 µm long. 3rd leg : coxa 86-91, trochanter + femur 119-130, tibia 78-95 and claw 21-25 µm long ; leg setae (3rd legs) : coxa : 4-5 setae, longest 33-40 µm ; trochanter : 2 pairs of long setae on ventral surface, longest 33-37 µm ; femur : 3 ; tibia : 2 ; tarsus : 4. Antennae 6-segmented with 0-1 pseudoarticulations towards distal end of segment III ; total length about 223-25 µm ; IIIrd segment much longest, almost equal to total length of last 3 segments ; setal distribution : scape : 3 hairlike setae (hs) ; pedicel, 2 hs ; III, 0 setae ; IV & V : 1 fleshy seta (fs) + 1 hs ; VI : 2 fs, 5 rather spinose setae and 1 hs ; longest apical setae on the terminal antennal segment 23-27 µm long. Clypeolabral shield about 83-86 µm long ; labium about 90µm long, with 4 pairs of setae.

Comment. – The adult females of *R. luberonensis* resemble those of *R. rosaeluteae* Borchsenius, 1953 (the type species of the genus) in lacking both setae and pores on the anal ring. It differs from the latter species in having some tubular ducts on the dorsum and in having marginal dorsal tubercles.

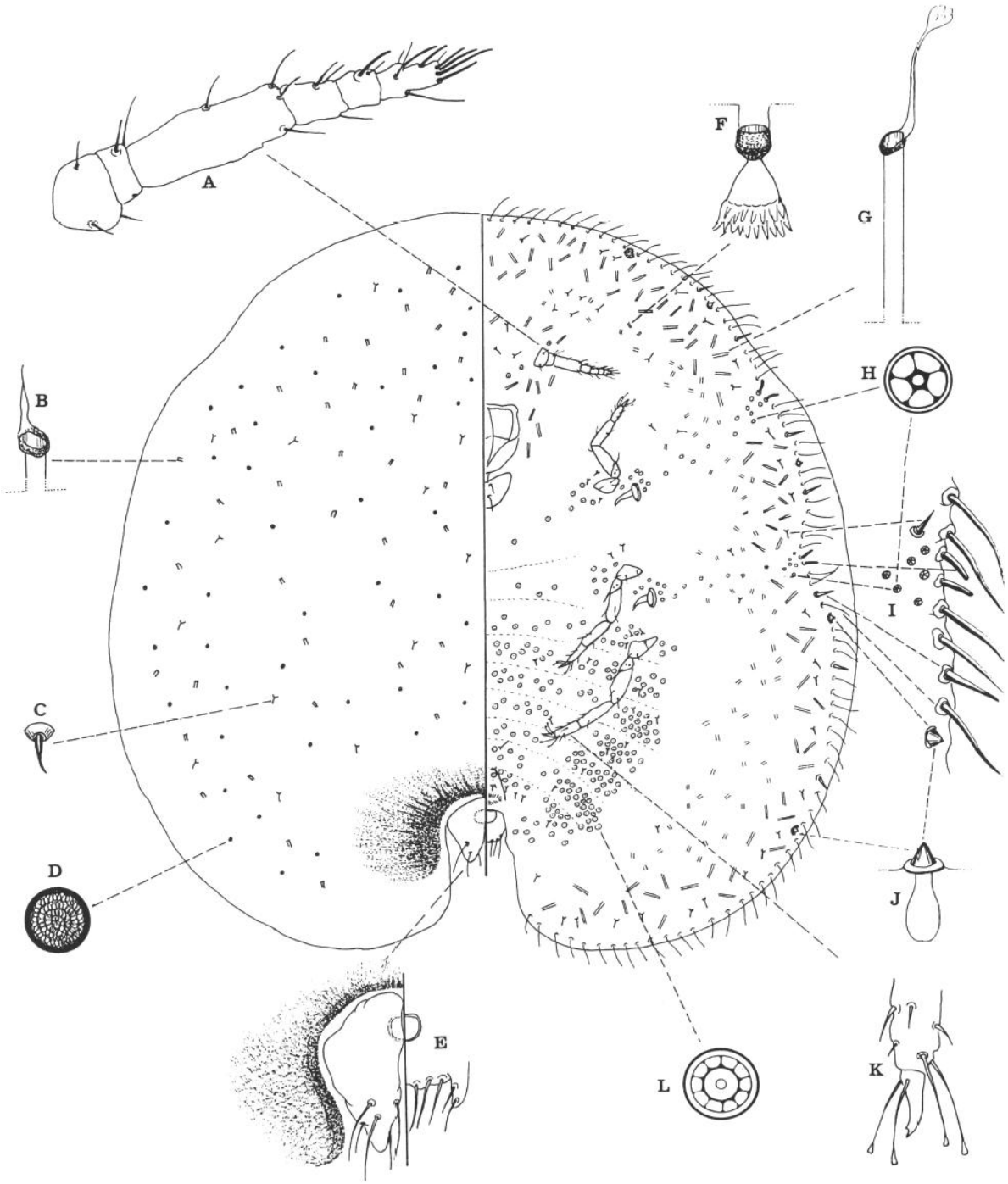

Fig. 1. – *Rhodococcus luberonensis* Foldi & Kozár, ♀ holotype. Left side = dorsum, right side = venter.

Where : A = antenna ; B = dorsal tubular duct ; C = dorsal seta ; D = simple pore with granular surface ; E = anal plates and ano-genital fold ; F = ventral microduct ; G = ventral tubular duct ; H = spiracular disc-pore ; I = marginal setae ; J = marginal dorsal tubercle ; K = claw and tarsal digitules ; L = multilocular disc-pore ; M = dorsal microductules (M1 = small, M2 =large) ; N = preantennal pore ; P = stigmatic spines.

2nd-instar female (fig. 2)

Mounted material. Body oval and evenly rounded at both ends; anal cleft shallow, about 1/12th body length; stigmatic areas with shallow clefts. Length 1.5-2.1 mm; width 0.90-1.35 mm.

Dorsum. Derm membranous. Dorsal setae absent. Dorsal pores all microductules, of two sizes: (I) a larger microductule: restricted to a submarginal band, and (II) a small microductule: apparently randomly distributed throughout dorsum. Dorsal tubular ducts and submarginal tubercles absent. Anal plates together quadrate, inner margins of each plate diverging slightly towards apex; each plate 79-92 µm long, width of single plate 43-50 µm; plates without minute pores on dorsal surface; each plate with 4 setae near apex, 2 on inner margin, one on posterior margin and one on apex; all setae less than 9 µm long. With 2 setae along anterior margin of ano-genital fold (longest 23-33 µm long), and 2 on lateral margin; lateral supporting bar to anal plates distinct. Length of anal tube uncertain; anal ring with six setae, each about 90-110 µm long.

Margin. Marginal setae setose, with well-developed, fairly broad, basal sockets; with 6-8 laterally between stigmatic clefts; length 17-29 µm; at least one seta on anal lobes larger than elsewhere. Stigmatic clefts shallow and margin slightly indented; each stigmatic area with 3 stigmatic spines: lateral spines short and conical, with narrow basal sockets, each 6-12 µm long; median spine very long, narrowing to a blunt apex; each 58-67 µm long. Eyespot 13 µm wide, on margin.

Venter. Derm membranous. Pregenital disc-pores absent. Spiracular disc-pores each with 4-5 loculi, in bands about 2 pores wide between spiracles and margin; with 12-18 in each anterior band and 13-23 in each posterior band; often with 1-2 pores mesad to peritreme. Ventral microducts all small: most abundant in a broad submarginal band but also present very sparsely elsewhere. With 1 preantennal pore just anterior to each scape. Other ventral pores and ventral tubular ducts absent. Ventral setae: posterior lobe setae short, each up to only about 10 µm long; with pairs of long setae in three pregenital segments, most posterior pair about 66-70 µm long; all segments with 1 pair small setae mediolaterally; with 3-5 submarginal setae laterally between each stigmatic area; with two short setae associated with each coxa, except procoxae, where one is quite long, length 30-33 µm; with 3-5 pairs of inter-antennal setae, longest about 70 µm long; other small setae sparsely distributed submarginally. Width of each spiracular peritreme 18-22 µm. Legs well developed; lengths (III): coxa 88-96 µm, trochanter + femur 129-135 µm; tibia 85-92 µm, tarsus 71-75 µm, claw 21-23 µm; each coxa (III) with 5 setae, innermost seta 33-45 µm long; each trochanter with only one long seta, length 53-63 µm; femur with 3 setae; tibia with 2 setae, 1 longer seta along ventral margin; tarsus with 3 setae but without a campaniform pore; tarsal digitules similar and slightly longer than claw digitules; claw digitules dissimilar, one much broader than other; claw without a distinct denticle. Antennae well developed and seven-segmented; length 207-236 µm; number of setae: scape: 2-3 hair-like setae (hs); pedicel: 2 hs + a campaniform pore; III: 0; IV: 3 hs; V: 1 fleshy setae (fs); VI: 1 fs + 1 hs; VII: 6 fs + 1 hs; length of apical seta: 61-68 µm; length of outer long seta 58-75 µm. Length of clypeolabral shield 124-145 µm long; labium with 4 pairs of setae.

Comment. – Two character-states of the 2nd-instar female of this species which are quite different from those of the adult female and 2nd-instar male are the completely different stigmatic spines and the different marginal setae. The other two stages both have only two stigmatic spines per stigmatic area, both a little longer than the marginal setae (the 2nd-instar female has three per stigmatic area, all very different from the marginal setae and with the lateral pair very different from the median spine). In addition, the adult female has two types of marginal setae, one distinctly spinose (as on the 2nd-instar male) and the other setose (as on the 2nd-instar female). Other significant differences are (adult female character-states in brackets) that the 2nd-instar female has 7-segmented antennae (only 6 segmented), the claw digitules are dissimilar (more or less similar and both fine), the trochanter has only a single long seta (two long setae, as on the 2nd-instar male) and the claw lacks a denticle (present). Few immature stages of soft scales have been described to date, but none appear to be as different as this from the other stages, particularly the adult female.

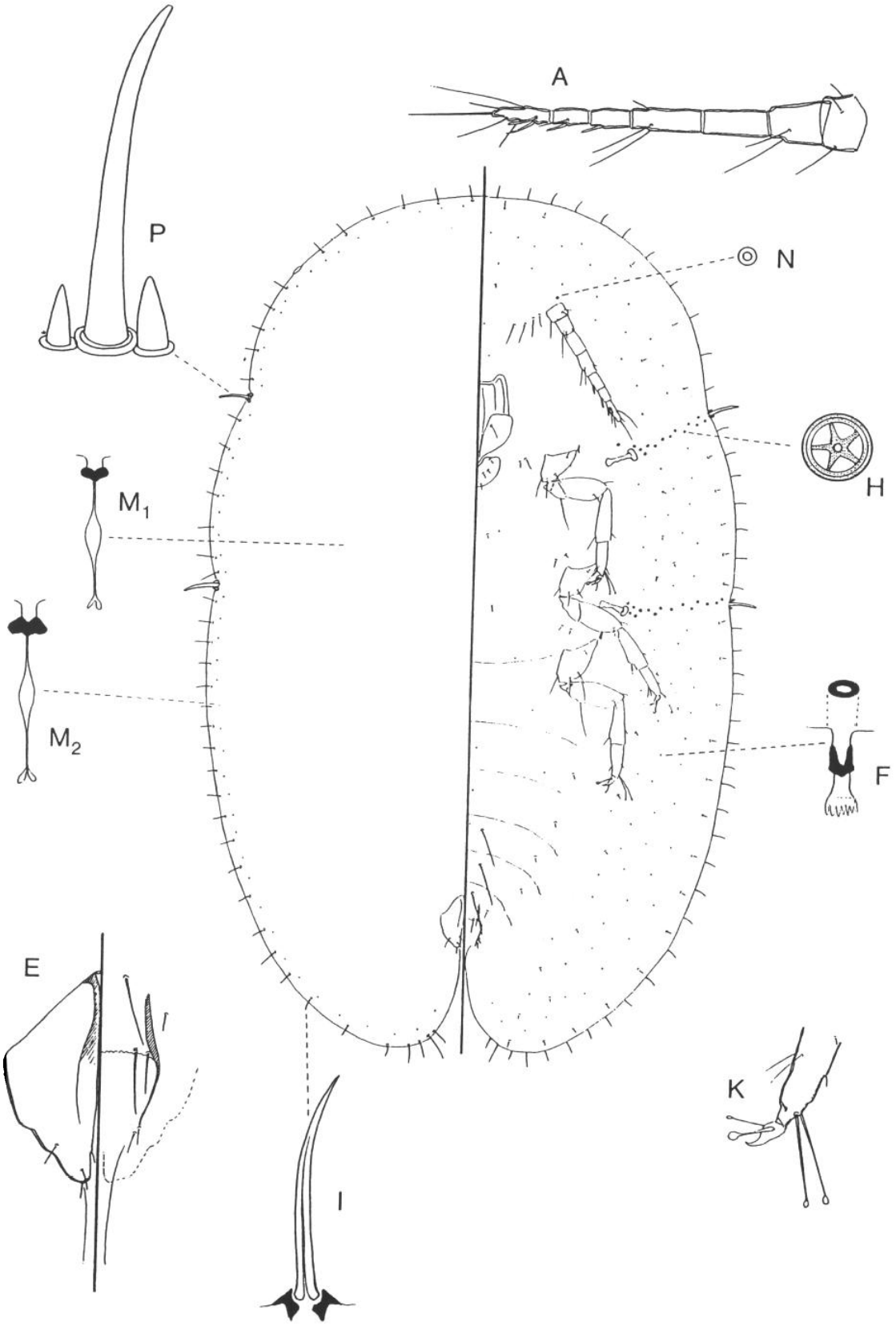

Fig. 2. – *Rhodococcus luberonensis* Foldi & Kozár, 2nd-instar ♀. For lettering, see Fig. 1.

2nd-instar male (fig. 3)

(Described from one specimen in which the prepupa is developing and so some small structures, i.e. setae, not visible).

Mounted material. Body elongate oval, broadest across anterior abdominal segments; with a shallow anal cleft about 1/10th body length; stigmatic areas with shallow indentations. Length 1.8 mm; width 0.8 mm.

Dorsum. Derm membranous. Dorsal setae absent. Dorsal pores all microductules, possibly of only one size, restricted to a submarginal band. Dorsal tubular ducts each with a long outer ductule, well-developed invagination, narrow inner ductule and large glandular end; present in two latero-medial groups on about segment IV of abdomen, with 4-5 ducts in each group; and in an incomplete submarginal band, with (on each side) 7-8 posterior to the posterior stigmatic areas, 5-6 between stigmatic areas and with 36 anteriorly between anterior stigmatic areas, these possibly in a double band between eyespots. Anal plates together quadrate, inner margins of each plate diverging slightly towards apex; each plate 71 µm long, width of single plate 37 µm; plates without minute pores on dorsal surface; each plate with 3 setae near apex and on one on inner margin; length of setae all less than 10 µm. With 2 setae along anterior margin of ano-genital fold, and 1 laterally; lateral supporting bar to anal plates poorly developed. Length of anal tube uncertain; anal ring with six setae, each about 60 µm long.

Margin. Marginal setae fairly stoutly spinose, with well-developed, fairly narrow, basal sockets; with 8-10 laterally between stigmatic clefts; length 10-17 µm; those on anal lobes not differentiated. Stigmatic areas without a stigmatic cleft, but margin slightly indented; each stigmatic area with 2 stigmatic spines, each slightly longer and narrower than marginal spinose setae, blunt and slightly curved; each 15-18 µm long. Eyespot 13 µm wide on margin.

Venter. Derm membranous. Pregenital disc-pores absent. Spiracular disc-pores each with 4-5 loculi, in bands about 2 pores wide between spiracles and margin; with 8-10 in each band, with none extending medially past each anterior peritreme. Ventral microducts: rather large: distribution unclear, perhaps restricted to submargin on posterior end of abdomen. Apparently without preantennal pores. Other ventral pores and ventral tubular ducts absent. Ventral setae: posterior lobe setae short, each up to only about 10 µm long; with pairs of long setae in three pregenital segments, most posterior pair about 25 µm long; distribution of other setae on abdomen uncertain; with only a single submarginal seta laterally between each stigmatic area; usually with a single seta associated with each coxa; length of each procoxal seta uncertain, possibly short; with 1 pair of inter-antennal setae, each 46-51 µm long. Width of each spiracular peritreme 18-20 µm. Legs well developed; lengths (III): coxa 788 µm, trochanter + femur 111-113 µm; tibia 83-88 µm, tarsus 70 µm, claw 23 µm; each coxa (III) with 5 setae, innermost seta 35 µm long; each trochanter with two long seta, longest 46-50 µm long; femur with 3 setae; tibia with 3 setae, 2 longer setae along ventral margin; tarsus with 4 setae but without a campaniform pore; tarsal digitules similar and subequal in length to claw digitules; claw digitules both narrow with well-developed apical knobs; claw probably with a distinct small denticle. Antennae well developed and seven-segmented; length 18 µm; number of setae: scape: 2-3 hair-like setae (hs); pedicel 2 hs + a campaniform pore; III: 0; IV: 3 hs; V: 1 fleshy setae (fs); VI: 1 fs (+ 1hs?); VII uncertain; length of apical seta and outer long seta unknown. Length of clypeolabral shield 124 µm long; labium with 4 pairs of setae.

Comment. This appears to be a fairly typical 2nd-instar male, with a band of submarginal tubular ducts which are absent from the posterior half of the abdomen, and with a small group medially on the abdominal dorsum. HENDERSON (in prep.) has suggested that these latter ducts secrete wax which provides a hinge for a posterior plate on the waxy test, so that the latter plate can be raised once the adult male has matured, allowing him to emerge backwards from under the test.

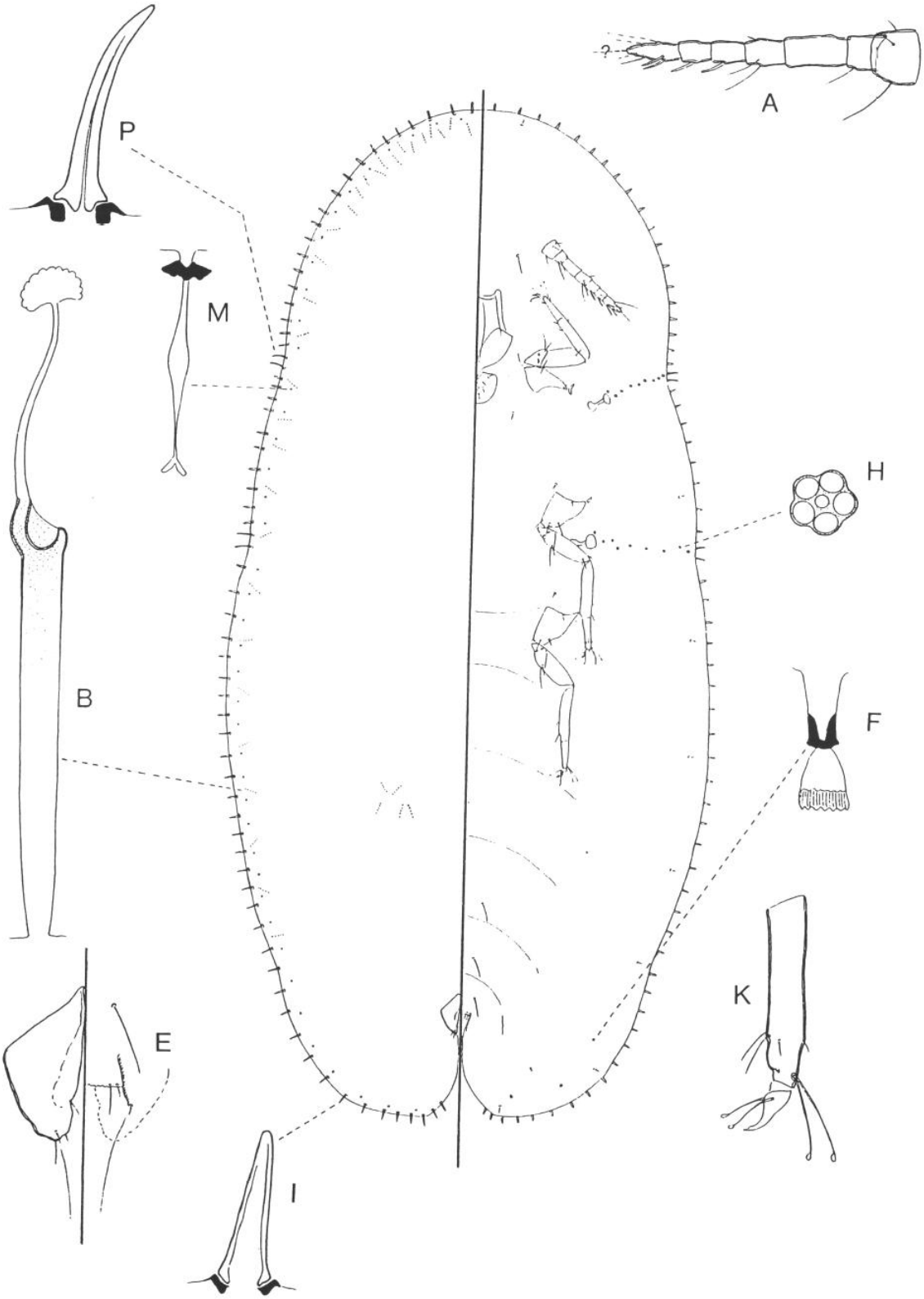

Fig. 3. – *Rhodococcus luberonensis* Foldi & Kozár, 2nd-instar ♂. For lettering, see Fig. 1.

Pupa (fig. 4)

(Described from 2 specimens in quite good condition, but both with the adult male developing inside so that the abdominal and other setae were not visible).

Mounted material. Elongate oval, rather pointed anteriorly. Division into head, thorax and abdomen reasonably clear, segmentation obscure apart from on abdomen. Derm membranous, with small dermal spinules. All ducts and pores, except spiracular disc-pores, absent and setae few. Quite large, 1.8-1.83 mm long, 375-450 µm wide across posterior part of head.

Head. Lacking mouthparts and simple eyes. With a pair of moderately long antennae pointing posteriorly, just reaching mesocoxae, length 723-740 µm (ratio of antennal length to total body length 0.4 : 1); segmentation obscure but with 10 segments; with 1 to 3 short fleshy fingers on apex, probably incipient capitate setae; basal segments moderately sclerotised. With a yolk-like structure present dorsally. Setae: unclear but with 1 to 3 pairs of minute setae medially just posterior to each scape.

Thorax. Unsclerotised. With three pairs of moderately well-developed legs, segmentation clear; coxa and trochanter generally showing some sclerotisation; prothoracic legs C-shaped, directed anteriorly and curving round in front of anterior margin of head; metathoracic legs extending posteriorly to about VIIIth abdominal segment; procoxae with 1-2 minute setae; tarsal campaniform pores absent; each leg with a small triangular finger on apex, probably an incipient claw; length of metathoracic legs 610 µm. With a pair of long wing-buds, extending to about abdominal segment II; mildly sclerotised; length 565-660 µm, width 203-210 µm (ratio of length to width about 1 : 0.35). With 2 pairs of spiracles, mesothoracic pair just posterior and laterad to procoxae and metathoracic pair just posterior and laterad to mesocoxae; width of peritremes 35-38 µm ; mesothoracic pair with 11-16 spiracular disc-pores; number of loculi in each disc-pore rather variable, from 2 to 6; disc-pores absent from posterior spiracles. Setae extremely hard to see: ventral: with a single seta mesad and just posterior to each procoxa, and mesad and anterior to each mesocoxa (and metacoxa?); dorsal: uncertain.

Abdomen. Segmentation usually distinct, anteriormost segment considered to represent segment II, so that seven segments visible (segments II to VIII) anterior to penial sheath. Setae: numbers of dorsal and ventral abdominal setae uncertain; pleural setae present more or less in a line on each side from lobe on segment VII to about segment III, total pleural setae per side 21-24; probably mainly dorsopleural setae. Segment VII with a pair of short, broad, lateral membranous lobes. Segment VIII with a pair of small lobes dorsally, located on either side of base of penial sheath, membranous, apparently without setae. One specimen with a small seta medially of tergite VIII, possibly homologous with ante-anal setae of adult males. Penial sheath sclerotised, much longer than lobes of segment VII and slightly longer than broad: length 149-178 µm, width at base 124-130 µm (ratio of length to breadth 1 : 0.8; apparently without setae or pores on dorsal surface.

Comment. – Few pupae of Coccidae have ever been described. However, from a study of the pupae of New Zealand soft scales (HODGSON & HENDERSON, in prep.), it would appear that the following characters are likely to be significant: (I) their overall size; (II) the number and distribution of the spiracular disc-pores associated with the anterior spiracles; (III) the shape and size of the lobes on abdominal segment VII; (IV) the frequency of dorsal and ventral abdominal setae; (V) the size and distribution of the dorsopleural setae, particularly on segment VII; (VI) the presence or absence and the size of lobes and setae on abdominal segment VIII; (VII) the presence or absence of ante-anal setae on segment VIII; (VIII) the size and shape of the penial sheath, particularly in relation to the length of the lobes on segment VII, and (IX) the presence of pairs of setae and their size on the dorsal surface of the penial sheath. On the basis of the New Zealand study, the grouping of the spiracular disc-pores more or less anterior to the peritreme (rather than in an arc with the group extending both medially and laterally), the small size of the lobes on abdominal segment VII and the arrangement of the pleural setae in a marginal row are all likely to be significant. In addition, the presence of the yolk-like sclerotisation dorsally on the head appears to be unique; this might be part of the pharate male, but the latter was barely sclerotised while the yolk-like sclerotisation was heavily sclerotised on both specimens.

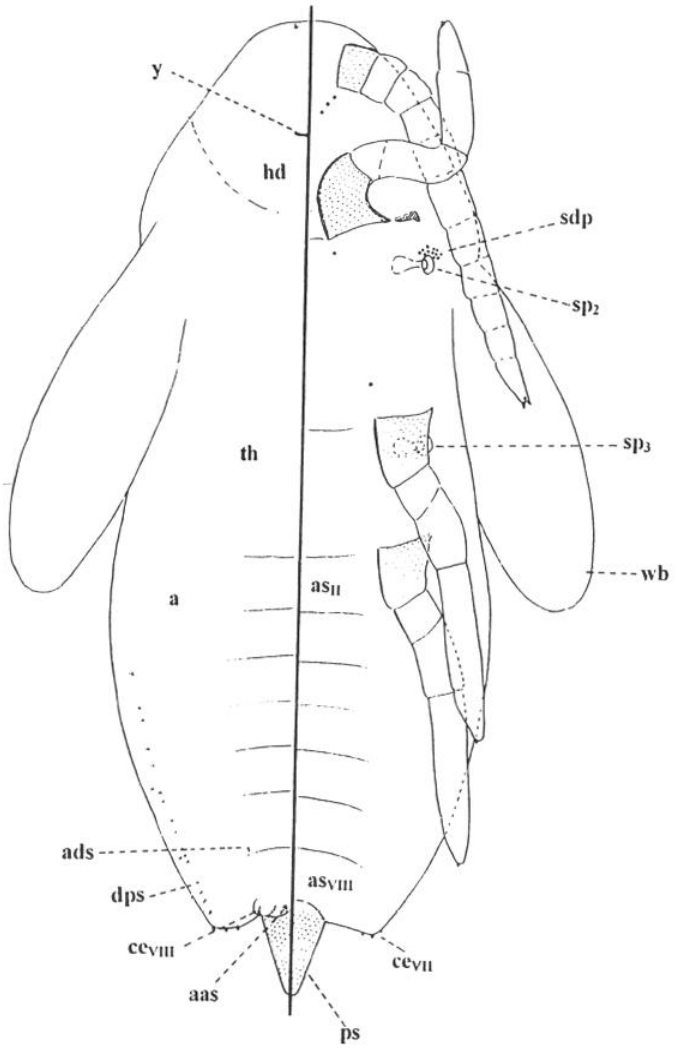

Fig. 4.
Rhodococcus luberonensis Foldi & Kozár, pupa.

Legends for fig. 4 and 5 :

a = abdomen ; aas = ante-anal setae ; ab = antennal bristle ; ads = dorsal abdominal setae ; aed = aedeagus ; al = alar lobe ; amss = anterior metasternal setae ; asII-VIII = abdominal sternites II to VIII ; at = abdominal tergites ; avs = abdominal ventral setae ; bma = basal membranous area ; bra = basal rod ; cap = capitate seta ; cd = claw denticle ; cdt = claw digitule ; ceVII = caudal extension of abdominal segment VII ; ceVIII = caudal extension of abdominal segment VIII ; cx = coxa ; dhs = dorsal head setae ; dps = dorsal pleural setae ; dse = dorsal simple eye ; epm3 = metepimeron ; eps2 = mesepisternum ; eps3 = metepisternum ; f = furca ; fm = femur ; fs = fleshy seta ; g = gena ; gls = glandular pouch setae ; gp = glandular pouch ; gtp = sensillae on penial sheath ; gts = setae on penial sheath ; h = haltere ; hd = head ; hs = hair-like setae ; lse = lateral simple eye ; lmcr = lateral arm of midcranial ridge ; lpl = lateropleurite ; mc = median crest ; mdr = median ridge ; med = media ; mr = marginal ridge ; o = ocellus ; ocs = ocular sclerite ; pa = postalare ; pcr2 = precoxal ridge of mesothorax ; pdc = pedicel ; pepcv = proepisternum + cervical sclerite ; plr2 = mesopleural ridge ; plr3 = metapleural ridge ; pn2 = mesopostnotum ; pna = postnotal apophysis ; pnp = posterior notal wing process ; pocr = postocular ridge ; pra = prealare ; prar = prealare ridge ; prn = lateral pronotal sclerite ; prnr = pronotal ridge ; procr = preocular ridge ; prsc = prescutum ; ps = penial sheath ; pt = post-tergite ; rad = radius ; scl = scutellum ; scp = scape ; sct = scutum ; ser = subepisternal ridge ; sp2 = mesothoracic spiracle ; sp3 = metathoracic spiracle ; stn1 = prosternum ; stn2 = mesosternum ; stn3 = metasternum ; ta = tarsus ; tars = tarsal spur ; tdt = tarsal digitule ; teg = tegular ; tegs = tegular setae ; th = thorax ; ti = tibia ; tibs = tibial spur ; tp = triangular plate ; tr = trochanter ; vmcr = ventral midcranial ridge ; vps = ventral pleural setae ; vse = ventral simple eye ; wb = wing-bud ; y = yolk-like sclerotisation.

Adult male (fig. 5)

Mounted material. Of moderate size, total body length 1.8-2.1 mm; antennae relatively short, about 2/3rds total length of body; body with very few setae, fleshy setae (fs) absent from body but generally easy to differentiate from hair-like setae (hs) on antennae; length of fs more than twice width of antennal segments. Wings of average length, about 4/5th total body length; breadth rather less than half wing length.

Head. Subconical in dorsal view; width across genae 277-323 µm. Median crest (mc) reticulated on anterior 1/3rd-2/3rds; with 2-4 hs dorsal head setae (dhs) on each side. Mid-cranial ridge (mcr) absent dorsally: ventrally (vmcr) long and well defined, extending posteriorly to ocular sclerite (ocs); with few or no reticulations laterally but with a few striations posteriorly; lateral arms (lmcr) well developed; without ventral mid-cranial ridge setae (vmcrs). Genae (g) large, with polygonal reticulations but these faint or absent near postocular ridge, each reticulation without additional inner ridges; genal setae (gs) absent. Eyes: with four pairs of round simple eyes; large dorsal eyes (dse) 40-44 µm, large ventral eyes (vse) 30-33 µm wide; each with a closely associated, slightly smaller, round, lateral simple eye (lse), these 23-30 µm wide, ventral pair perhaps slightly larger than dorsal pair. Ocelli (o) distinct, lying between two arms of postocular ridge (pocr); possibly slightly oval, about 25 µm wide. Ocular sclerite (ocs) polygonally reticulated, reticulations smaller than those on gena and without additional inner ridges. Preocular ridge (procr) with ventral arm almost reaching ventral arm of mid-cranial ridge; dorsally almost reaching larger dorsal simple eyes. Postocular ridge (pocr) well developed, each extending to ventral margin of ocelli, where it divides, each posterior arm almost reaching median ridge dorsally and anterior arm either rejoining posterior arm medially or nearly doing so. Dorsal ocular setae (docs) absent. Ventral head setae (vhs) present dorsad to large ventral simple eyes, with 0-2 hs on each side; with none between or posterior to ventral eyes. Preoral ridge (pror) well developed. Cranial apophysis (ca) not definitely visible on any specimen but perhaps short and bifid.

Antennae. 10-segmented and filiform; 1050-1200 µm long (ratio of total body length to antennal length 1 : 0.57). Scape (scp): 54-58 µm long and 59-63 µm wide; with 1 hs on ventral surface and 2 hs on dorsal surface. Pedicel (pdc): length 44-47 µm, width 44-53 µm; strongly reticulated throughout, with 0 fs + 2-3 hs (placodeum basiconicum not detected). Segment III club-shaped, 41-45 µm wide; segments IV-IX all rather narrow, each about 33 µm wide; fs about 54-63 µm long: lengths (µm): III: 100; IV: 166-191; V: 175-183; VI: 157-160; VII: 116-137; VIII: 107-112 and IX: 87-92; approximate number of setae per segment: III: 11-12 fs + 1-3 hs (no sensilla basiconica detected); IV: 20-22 fs + 0-2 hs; V: 21-30 fs + 0-2 hs; VI: 19-22 fs + 1-2 hs; VII: 19-21 fs + 0-1 hs; VIII: 14-16 fs + 0 hs + 1 bristle (barely differentiated from fs) and IX: 12-14 fs + 0 hs + 1 bristle (barely differentiated from fs). Segment X: length 79-91 µm; without a constriction apically; with three capitate setae (cap); 3 large, 2 small antennal bristles (ab), and 8-10 fs; no 2 sensilla basiconica (sb) detected.

Prothorax. Pronotal ridge (prnr) strong, dorsal ends touching but not fused; with a broad reticulated or striated lateral pronotal sclerite (prn); without lateral pronotal setae (lpns). Medial pronotal setae (mpns) and post-tergital setae (pts) absent. Post-tergite (pt) probably present and lightly sclerotised. Sternum (stn1) with a strong transverse ridge; median ridge absent but with broad, triangular area with faint striations; prosternal setae (stn1s): usually absent, rarely with 1 hs on one side. Anteprosternal setae (astn1s) and antemesospiracular setae (am2s) absent.

Mesothorax. Prescutum (prsc) distinctly wider than long (219-231 µm wide and 140-145 µm long); sclerotised, with distinct polygonal reticulations. Scutum (sct): median membranous area much wider than long (173-199 µm wide; about 41-58 µm long); scutal setae (scts) usually absent, rarely with 1 hs; lateral margins of scutum sclerotised and reticulated both anteriorly and posteriorly; without setae; prealare ridge (prar) well developed. Prealare (pra) and triangular plate (tp) well developed. Scutellum (scl) 199-200 µm wide and 66-83 µm long; not tubular; posterior notal wing process (pnp) strong. Mesepisternum (eps2) polygonally reticulated throughout. Mesopostnotum (pn2) well developed; postnotal apophysis (pna) well developed; median posterior part lightly polygonally reticulated. Basisternum (stn2) about 318-335 µm wide and 194-200 µm long; with a complete, strong, median ridge (mdr), bounded by strong marginal (mr) and precoxal ridges (pcr2); without basisternal setae (stn2s); lateropleurite (lpl) broad, with a sclerotised extension from marginal ridge anteriorly; furca (f) well developed and extending at anteriorly well past joint where marginal and coxal ridges meet. Postalare (pa) probably not reticulated anterior end; without postalare setae (pas). Mesothoracic spiracle (sp2) large: peritreme 36-38 µm wide. Postmesospiracular setae (pm2s) absent. Tegula (teg): present, with 6-8 tegular setae (tegs).

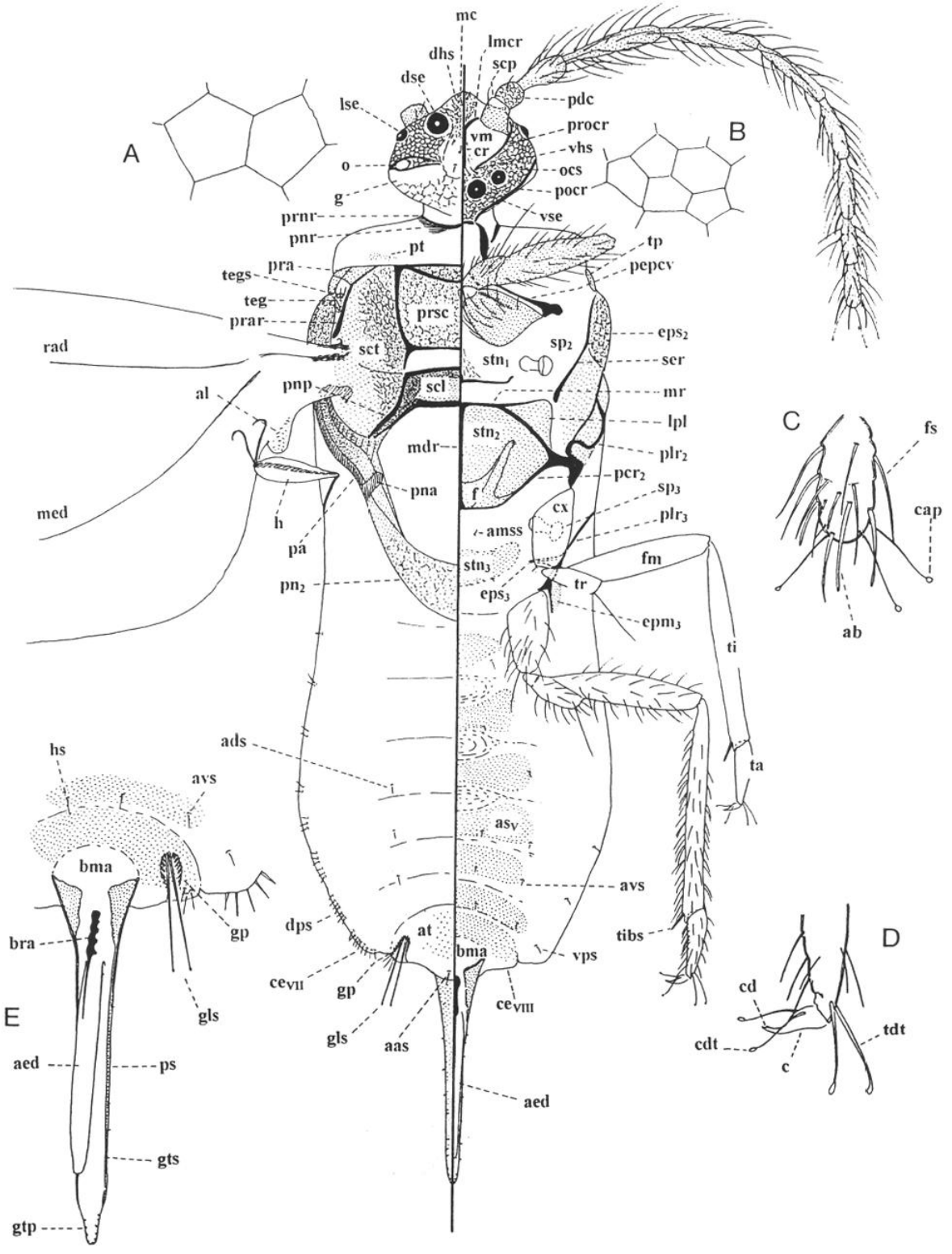

Fig. 5. – *Rhodococcus luberonensis* Foldi & Kozár, adult ♂. For lettering, see Fig. 4.

Where: A = reticulation on gena; B = reticulation on ocular sclerite; C = apical segment of antenna; D = distal end of tarsus + claw, and E = enlarged ventral view of penial sheath.

Metathorax. Metatergal seta (mts) generally absent, occasionally 1 hs present on one side; dorsospiracular setae (dss) and metapostnotum (pn3) absent. Pleural ridge (plr3) well developed but interrupted medially, dorsal section bearing a hamulohaltere (h), ventral section with a broad, sclerotised metepisternal ridge (eps3) extending medially between coxae; postmetaspiracular setae (eps3s) absent or rarely with 1-2 small hs; metepimeron (epm3) well developed, sclerotised, without setae. Antemetaspiracular setae (am3s) absent. Metathoracic spiracle (sp3) large: width of peritreme 33-38 µm. Metasternum (stn3) sclerotised. Anterior metasternal setae (amss) and posterior metasternal setae (pmss): 0-1 hs each.

Wings hyaline, of moderate length (1450-1700 µm) and width (662-775 µm) (ratio of length to width 1 : 0.45; ratio of total body length to wing length 1 : 0.81); without alar setae (als) or pores but with a distinct alar lobe (al). Hamulohalteres (h) present, each 128-153 µm long and 41-58 µm wide and with 1-3 hooked setae.

Legs subequal in length. Fleshy setae hard to separate from hs. Coxae (cx): I: 128-133; II: 145-153; III: 153-170 µm long; coxal III with about 25-30 setae (probably mainly fs); long apical seta on each coxa about 76-93 µm long. Trochanter (tr) + femur (fm): I: 322-335; II: 298-319; III: 313-335 µm long; trochanter III with about 19-23 setae; long trochanter seta about 104-120 µm long; femur III with about 40-46 setae. Tibia (ti): I: 343-377; II: 372-389; III: 380-419 µm; tibia III with about 85-95 setae; with one large apical spur (tibs), 31-35 µm. Tarsi (ta): I: 107-116; II: 111-133; III: 124-137 µm long (ratio of length of tibia III to length of tarsus III 1 : 0.43); tarsus III with about 24-35 setae; campaniform pore absent; distal tarsal spur (tabs) not differentiated from other setae; tarsal digitules (tdt) subequal to claw digitules. Claws (c) slightly longer than width of tarsi, slightly curved, with a small denticle; length: III: 34-37 µm; claw digitules (cdt) a little longer than claw.

Abdomen. Segments I-VII: tergites (at) all apparently unsclerotised; sternites (as) all with a distinct sclerotised plate; intersegmental membranes between sternites II & III, III & IV and IV & V broad. Caudal extension (ce) of segment VII rounded and unsclerotised. Dorsal setae (ads): I-VII: 0-2 hs. Pleural setae: per side: dorsopleural setae (dps): II & III: 1-2 hs; IV: 2-4 hs; V & VI: 5-7 hs; VII: 7-9 hs; ventropleural setae (vps) II-III: 0 hs; IV-VII: 1 hs. Ventral setae (avs): II-IV: 0-2 hs; V: 2-4; VI & VII: 4 hs.

*Segment VIII. T*ergite (at) probably lightly sclerotised, with 2 hs ante-anal setae (aas); sternite (as) sclerotised, without ventral abdominal setae (avs); caudal extension (ce) more or less absent, with 3 hs pleural setae. Glandular pouch (gp) present, deep, with 2 glandular pouch setae (gls), each often with small capitate apices and 129-133 µm long.

Genital segment. Penial sheath (ps) 389-460 µm long and 105-110 µm wide at base (ratio of total body length to penial sheath length 1 : 0.22); gradually narrowing towards apex. Basal rod (bra) not quite reaching basal membranous area (bma) anteriorly and extending thinly down inside aedeagus; length 62-80 µm anterior to base of aedeagus, with extension down aedeagus about 62-110 µm long. Aedeagus (aed) 190-250 µm long (ratio of length of aedeagus to basal rod length 1 : 0.32), quite broad and tapering, apex quite a long way from apex of penial sheath. Penial sheath with 9-10 minute setae along each margin, and with a small cluster of sensillae near apex.

Comment. – GILIOMEE (1967) described the males of over 20 species of Coccidae, including those of *Eulecanium tiliae* (L.) and *Rhodococcus spiraeae* (Borchsenius). The males of *R. luberonensis* are very similar to those of the latter, differing in only a few small particulars, namely (character-state on *R. spiraeae* in brackets): (I) body length is almost 25% larger; (II) genae showing weak reticulations (absent); (III) mesepisternum reticulated (absent); (IV) sternites present on all abdominal segments (only present on II, III and VII); (V) penial sheath about 1/5th total body length (about 1/4th), and (VI) basal rod about 1/3rd length of aedeagus (about 2/3rds). The males of *R. luberonensis* are also rather similar to those of *E. tiliae* but differ in (character-state on *E. tiliae* in brackets): (I) body length about 1/5th smaller; (II) absence of a mid-cranial ridge dorsally (short ridge present); (III) with only 4 pairs of simple eyes (5 pairs); (IV) preocular ridge long (short); (V) episternum reticulated (absent); (VI) absence of coxal bristles on procoxae (present); (VII) tergites absent on all abdominal segments bar VII (present on IV-VII medially); (VIII) penial sheath only 1/5th total body length (about 2/7ths), and (IX) basal rod about 1/3rd length of aedeagus (about 1/2). The value of these character-states for defining genera is not currently fully understood but the presence of only 4 pairs of simple eyes on *R. luberonensis* might support its placement in *Rhodococcus*. On the other hand, *R. luberonensis* is similar to *E.*

tiliae but differs from *R. spiraeae* in (character-states on *R. spiraeae* in brackets): (I) genae weakly reticulated (absent), and (II) glandular pouch setae generally capitate (not capitate).

Discussion. – The adult female of *R. luberonensis* is close to that of *R. spiraeae* but differs in the presence of marginal tubercles, and in the absence of anal ring setae (this was checked under the electron microscope). The genus *Rhodococcus* is close to *Eulecanium* (see HODGSON, 1994) and *R. luberonensis* shows several significant similarities to the latter genus, especially the presence of tubular ducts on the dorsum and the strong spines among the hairlike setae on the margin. However, we believe that the most important difference between these two genera is the presence of a poorly sclerotised anal ring without pores and setae. *R. luberonensis* differs from all other known species in both *Eulecanium* and *Rhodococcus* in having marginal tubercles. *R. luberonensis* brings the number of species in the genus to 7.

Name derivation : after the mountain of Luberon (Petit Lubéron) in the Vaucluse region of France where this material was collected.

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Imre FOLDI & Yair BEN-DOV, 2001. – **A nomenclatural note on "*Steatococcus anonae* Newstead" (Hem., Coccoidea, Margarodidae)**

VAYSSIÈRE (1926) in his comprehensive study on the Margarodidae, published on page 307 the binomen *Steatococcus anonae* Newstead, without reference to any publication by Newstead. *Morrison* (1928, p. 222) listed this binomen together with a note "*can find no data on this insect (see Vayssière, 1926)*". MAMET (1951 p. 219) used again this binomen, while citing a letter that he received from W. J. Hall (London, UK), in which Hall noted "*There are several species of the genus* [Steatococcus] *in Africa*: euphorbiae *(Brain),* caudatus *(Newst.),* gowdeyi *(Newst.),* theobromae *(Newst.) and* anonae *Newst. The only one of these that I am relatively certain of is* theobromae".

We have surveyed all the publications of Newstead and did not find any publication that contained the description of a species named *Steatococcus anonae* Newstead.

Robert Newstead (1859-1947) and Paul Vayssière (1888-1984) studied contemporaneously scale insects. We assume that Newstead provided the binomen *Steatococcus anonae* to Vayssière, who used it, although Newstead did never publish this name.