

DESCRIPTION OF NEW GENERA AND SPECIES
IN THE TRIBE RHIZOECINI (HOMOPTERA,
COCCOIDEA, PSEUDOCOCCIDAE)

KOZÁR, F. and FOLDI, I.

*Plant Protection Institute, Hungarian Academy of Sciences
H-1525 Budapest P. O. Box 102, Hungary. E-mail: h2405koz@ella.hu*
*Département Systématique et Evolution, Entomologie CP 50, Muséum National d'Histoire
Naturelle, 45 rue Buffon, 75005 Paris, France. E-mail: foldi@cimrs1.mnhn.fr*

Two new genera and nine new species are described. *Benedictyoccina* gen. n. includes four species; three of them are new. *Hambletonia* gen. n. with one new species. The genus *Coccidella* HAMBLETON, 1946 is re-established, including eight species, among them five are new. A new morphological character, the structure of female genital organ is described. A review for the tribe and a key for the genera, and species are given.

Key words: Homoptera, Coccoidea, Pseudococcidae, Rhizoecini, new genera and species, review, keys

INTRODUCTION

The Rhizoecinae is a distinct subfamily of the Pseudococcidae. The members of the subfamily were intensively studied by HAMBLETON (1946a, 1976). The subfamily was also studied in detail by MATILE FERRERO (1976), TANG (1992), WILLIAMS and GRANARA DA WILLINK (1992), WILLIAMS (1998, 2004), and BEN-DOV (1994), KOZÁR and KONCZNÉ BENEDICTY (2002, 2003) and others. In the Scalenet computer database (the Pseudococcidae family last updated on 26 May 2001) (MILLER *et al.* 2001) contains the most important information (taxonomy, distribution, biology, etc). The world fauna of the subfamily was not well explored, thus the distribution of the known species is poorly known.

In the past, the internal female genitalia were not used as character to separate species. The authors studied them in some species. A tentative, to establish the different types of female reproductive system in Coccoidea, by referring to 28 species, including one *Rhizoecus* species. In 11 families, eight basic types, and their evolutionary trends were discussed by DE MARZO *et al.* (1990). A recent description on the general organization of the reproductive system of a soft scale (Coccidae) based on the scanning electron microscope observations was reported by FOLDI (1997), is serving the basis to recognize the cuticular structures of the KOH treated genitalia, visible on microscopic slides.

The aim of the present work is the study of the subfamily Rhizoecinae on a world-wide scale, in more detail, the Rhizoecini tribe, and to prepare a revision, to learn more about the distribution patterns of each species. During this project several new genera and species were found, which need further study. We are describing here two new genera, also, one genus is re-established, and nine new species of this tribe are described.

MATERIALS AND METHODS

This study presents the results of the analyses of about 5000 samples from many parts of the World. The descriptions follow the terminology of morphological characters as given in the works of HAMBLETON (1946a, 1976), and WILLIAMS (1998).

The insects were collected by visual survey from soil, from Berlese funnel and sifting samples (KOZÁR & MILLER 2000). The sample collectors are mentioned in the species descriptions. Most of the studied insects are from the scale insect collection of the Plant Protection Institute, Hungarian Academy of Sciences (PPI), Budapest, and from the Arachnoidea collection of the Hungarian Natural History Museum, Budapest, Hungary (HNHM). Some other samples from the Natural History Museum (London), Smithsonian Institutions, and the Natural History Museum (Paris), have been also studied.

New morphological characters, the female internal genitalia, were also studied in some species. Usually, with the traditional mounting process the internal genitalia of females were not preserved, and often even their cuticular parts were destroyed. However, in most of the Rhizoecini species, the ectodermic parts of internal genitalia are heavily sclerotized and could be observed on microscopic slides. The shape and size of vagina and locations of vaginal glands are variable, thus they can be useful complementary characters to separate *Rhizoecus* species.

Most of the studied females, including some immature stages, were preserved on microscopic slides at the PPI.

RESULTS

In the studied samples 530 Rhizoecinae females and 139 immature stages were found. The analysis of our samples and other materials resulted the discovery several new species and two new genera described below, while one genus is being re-established in this paper. A key for the genera and species of the tribe Rhizoecini for the treated genera are also given.

***Benedictycoccina* KOZÁR et FOLDI gen. n.**

Type species: *Ripersiella ornata* HAMBLETON, 1946a

Description: Body elongate, oval. Antennae 6 segmented, typical for the tribe. The sensory seta on the fifth segment of antennae short and blunt. Legs well developed. Dorsum and venter with

tritubular pores (cerores) surrounded by trilocular pores, which in some species appear as tritubular pore structures. Tubular ducts and multilocular pores absent or present. Anal ring with 6 setae, anal ring cells in small number, with spiculae on outer row. Ostioles present, with two circuli in the known species. Genitalia simple, as long as the of width one segment.

Distribution: The species of this genus are distributed in the Neotropical and Ethiopian regions (Fig. 1).

Etymology: The new genus is named after ZSUZSANNA KONCZNÉ BENEDICTY in acknowledging her help with the study of these species.

Comments: This genus is distinct from other genera, especially by the unique groups of trilocular pores surrounding the tritubular pores (cerores). Four species are included in the genus, three of them are new to science.

***Benedictycoccina baloghi* KOZÁR et FOLDI sp. n.**

(Fig. 2)

Type material: The holotype female, (coll. J. BALOGH), D-Am. Chile, No. 201. Deposited in the Hungarian Natural History Museum (Budapest, Hungary).

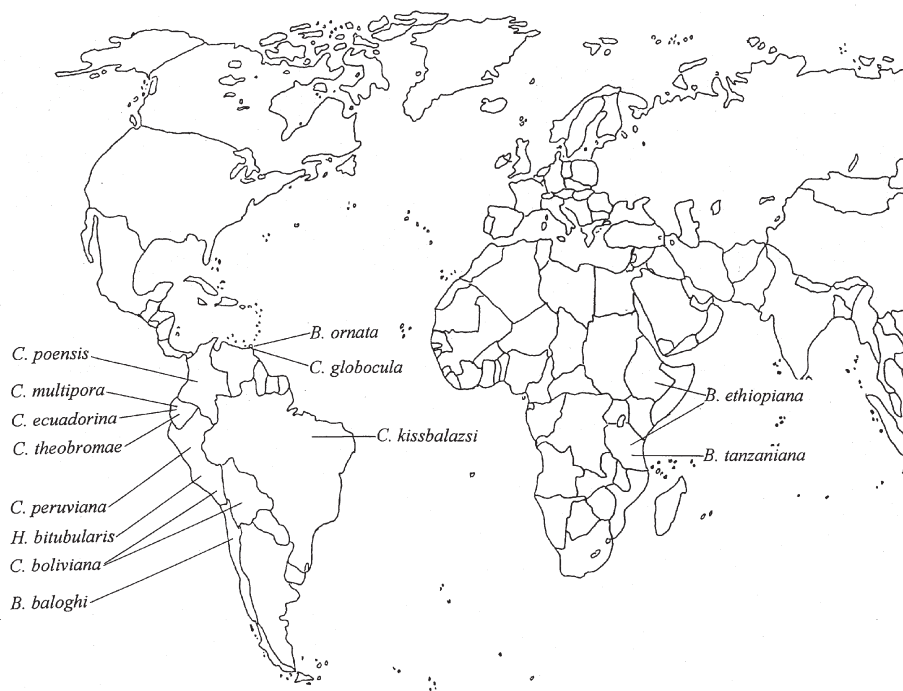


Fig. 1. Distribution of the studied genera and species

Description: Body elongate oval. Slide-mounted specimen (Fig. 2) 1.08 mm long and 0.51 mm wide. Antenna 6 segmented, the length of the segments: 1st – 28 μm , 2nd – 15 μm , 3rd – 23 μm , fourth – 10 μm , fifth – 9 μm , sixth 34 μm long. There is one sensory pore on the 2nd segment of the antenna. The 3rd segment is almost parallel sided. The apical segment has four falcate sensory setae. On the fifth segment one, 12 μm long, blunt seta. Most segments of the antenna have a few hair-like setae; the longest one is 23 μm . Eyes well visible. Anal lobe is slightly developed with three long, hair-like setae.

Venter. Labium appears two-segmented, 64 μm long. Stylet loop twice longer than labium. Cephalic plate not visible. Legs robust: coxa of anterior legs 30 μm , trochanter 24 μm , femur 60 μm , tibia 48 μm , tarsus 36 μm , and claw 19 μm . Coxa of middle legs 30 μm , trochanter 25 μm , femur 52 μm , tibia 45 μm , tarsus 31 μm , and claw 20 μm long. Coxa of posterior legs 32 μm , trochanter 28 μm , femur 55 μm , tibia 52 μm and tarsus 45 μm , and claw 17 μm , tarsal digitules absent, claw digitules short, 4 μm long. Trochanter with two pores on each side. Claw without denticle. Legs with few hair-like setae, tibia and tarsus with 13 μm long setae. On the ventral segments few tritubular duct present on margin surrounded by trilocular pores. Multilocular pores with 5–8 pores present in small number on all segments, 5–6 μm in diameter. The diameter of anterior spiracles 7 μm . Venter with a small number of scattered hair-like setae. Circulus two, 25–28 μm in diameter. Tubular ducts absent. Internal genitalia longer than width of one segment; middle part of vulva enlarged bearing ductules of the vaginal glands.

Dorsum. Ostioles present, not sclerotized. Multilocular pores present. Anal ring oval, 67 μm wide. Anal ring with six, 62 μm long hair-like setae. Anal ring pores (cells) typical, in small number, with strong blunt spicules on pores of outer row. Tritubular pores of two sizes, the smaller are on thorax and head, the tubes 2–5 μm wide. Situated on the margin and in middle line Tubular ducts absent. Hair-like setae 11 μm long, trilocular pores 3 μm wide, scattered on the dorsum, among them some unusual for the group, bilocular pores present also.

Distribution: Chile (Fig. 1).

Etymology. The species is named after late Prof. JÁNOS BALOGH, the collector of the species.

Affinities: This species similar to *B. ethiopiana*, but differs by the absence of tubular ducts.

***Benedictyoccina ethiopiana* FOLDI et KOZÁR sp. n.** (Fig. 3)

Type material: The holotype female, in middle of the slide (marked), two *Benedictyoccina* females on the same slide. Ethiopia, Addis Abeba, 28.09.1980 (leg. A. DEMETER), No. 329. One paratype female, the slide contains two *Benedictyoccina* immatures, also, from the same collection as the holotype, No. 325. One paratype from Tanzania, Uluguru, 12.07.1972, No. 118 (leg. T. PÓCS). Types are deposited in the Hungarian Natural History Museum (Budapest, Hungary).

Description: Body elongate oval. Slide-mounted specimen (Fig. 3) 0.96 mm long and 0.39 mm wide. Antenna 6 segmented, the length of the segments: 1st – 33 μm , 2nd – 15 μm , 3rd – 28 μm , fourth – 20 μm , fifth – 22 μm , sixth 50 μm long. There is one sensory pore on the 2nd segment of the antenna. The 3rd segment is almost parallel sided. The apical segment has four falcate sensory setae. On the fifth segment one 13 μm long, strong, blunt seta present. Most segments of the antenna have a

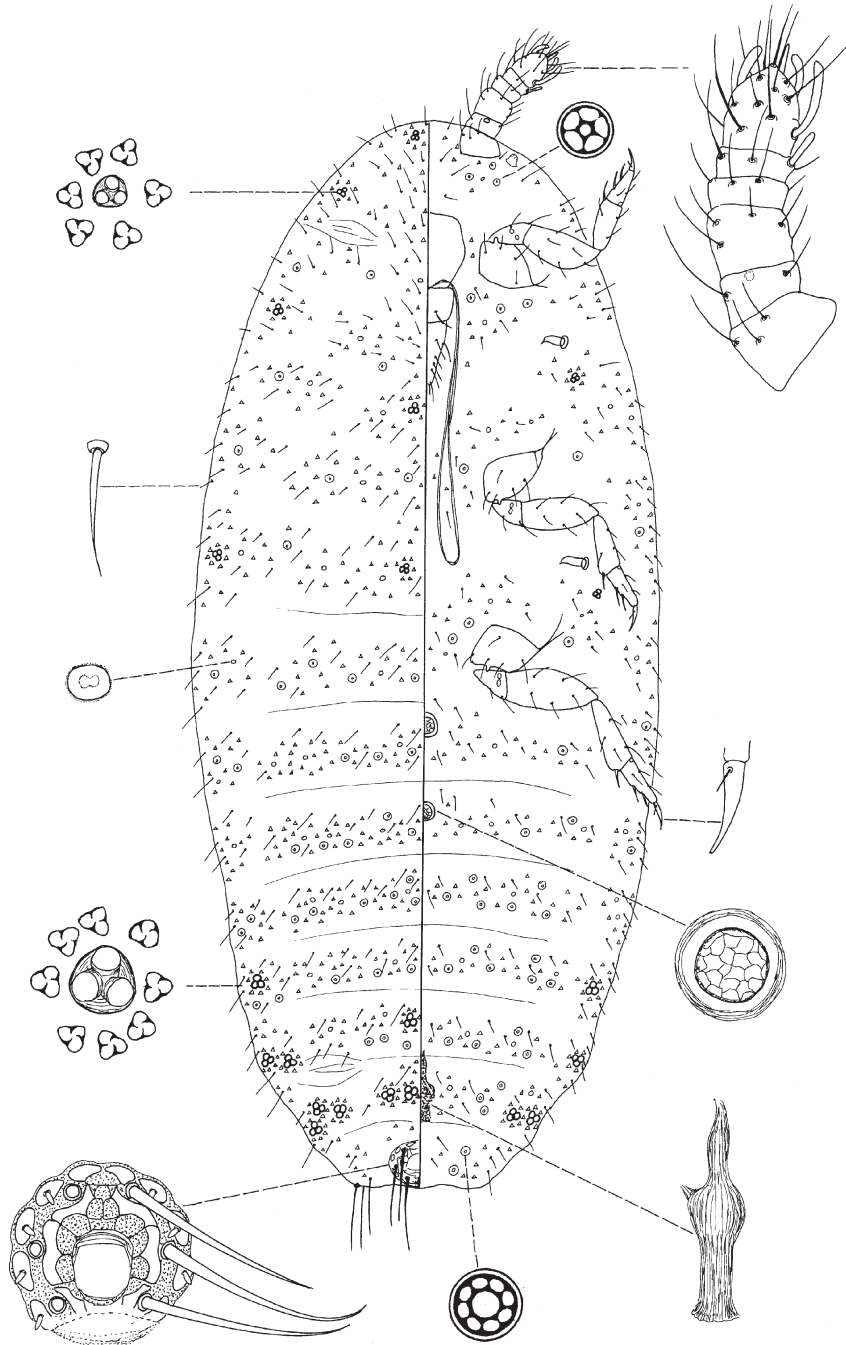


Fig. 2. *Benedictycoccina baloghi* KOZÁR et FOLDI sp. n.

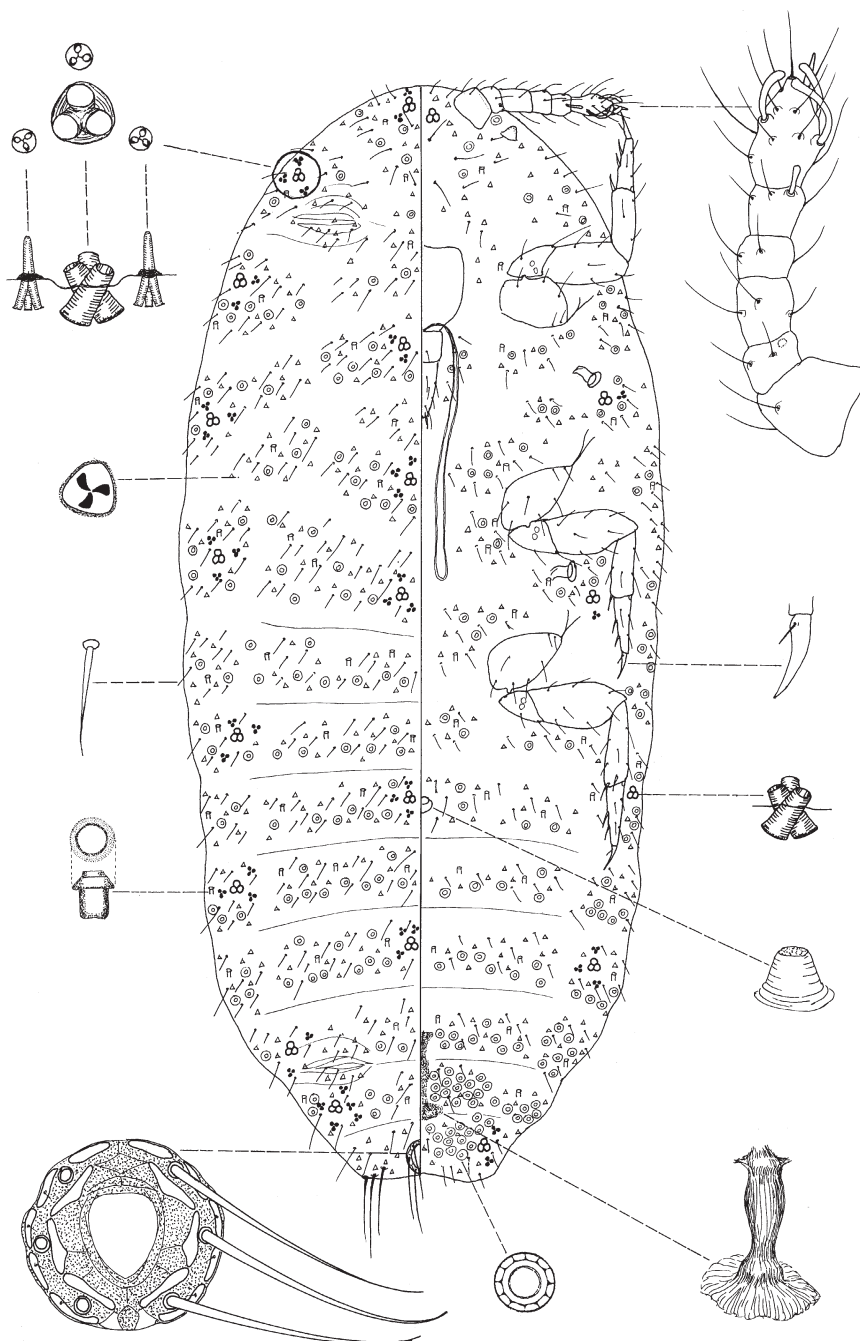


Fig. 3. *Benedictyococcina ethiopiana* FOLDI et KOZÁR sp. n.

few hair-like setae; the longest one is 25 μm . Eye well visible. Anal lobe is slightly developed with three long, hair-like setae.

Venter. Labium appears two-segmented, 67 μm long. Stylet loop twice longer than labium. Cephalic plate not visible. Legs robust: coxa of anterior legs 43 μm , trochanter 30 μm , femur 95 μm , tibia 67 μm , tarsus 52 μm , and claw 22 μm . Coxa of middle legs 53 μm , trochanter 34 μm , femur 88 μm , tibia 67 μm , tarsus 48 μm , and claw 22 μm long. Coxa of posterior legs 55 μm , trochanter 37 μm , femur 104 μm , tibia 95 μm , tarsus 54 μm , and claw 26 μm , tarsal digitules absent, claw digitules short, 5 μm long. Trochanter with two pores on each side. Claw without denticle. Legs with few hair-like setae, tibia and tarsus with 16 μm long setae. On the ventral segments few tritubular pores surrounded by trilobular pores, which appear as tritubular pores, present on margin. Multilobular pores present on all segments. The diameter of anterior spiracles 13 μm . Venter with a small number of scattered hair-like setae. One circulus present, 19 μm in diameter. Tubular ducts present. Trilobular pores scattered on the venter, 3 μm in diameter. Internal genitalia longer than width of one segment; vaginal glands located at higher part of vagina.

Dorsum. Ostioles present, sclerotized. Multilobular pores present on all segments. Anal ring oval, 41 μm wide and 38 μm long. Anal ring with six, 56 μm long hair-like setae. Anal ring pores (cells) typical, in small number, with spicules on pores of outer row. Tritubular pores of one size, 3–5 on each segment, tubes 4 μm in diameter, 10 μm long, all surrounded by trilobular pores, which appears as tritubular pores, 8 μm long. Tubular ducts present, 3 μm long. Hair-like setae 11 μm long. Trilobular pores 3 μm wide, scattered on the dorsum.

Distribution: Ethiopia and Tanzania (Fig. 1).

Etymology: The species is named after the country of origin.

Affinities: This species differs from all other species by having tubular ducts.

Benedictyoccina ornata (HAMBLETON, 1946a)

(Fig. 4)

Comment: This species differs from other members of the genus by the absence of multilobular pores, and by the presence of wide bands and groups of trilobular pores on the abdomen.

Distribution: Trinidad (Fig. 1).

***Benedictyoccina tanzaniana* KOZÁR et FOLDI sp. n.**

(Fig. 5)

Type material: The holotype female, in middle of the slide, Tanzania, 1987 (coll. S. MAHUNKA), No. 3402 (103). Six paratype females, on five slides, from the same collection as the holotype, No. 3402 (103) (two slides), and No. 560 (three slides). Types are deposited in the Hungarian Natural History Museum (Budapest, Hungary).

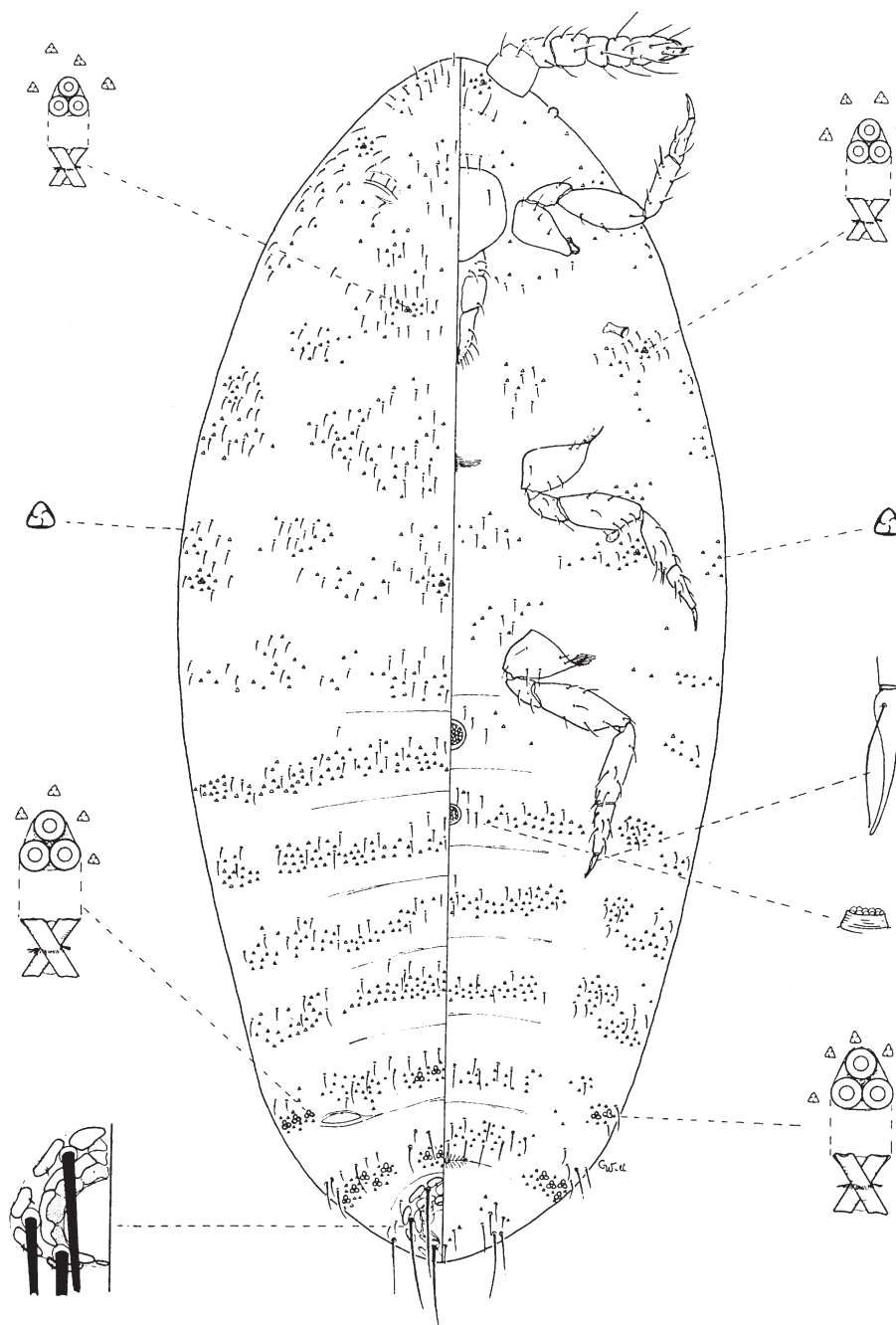


Fig. 4. *Benedictycoccina ornata* (HAMBLETON, 1946) (after WILLIAMS & GRANARA DE WILLINK 1992)

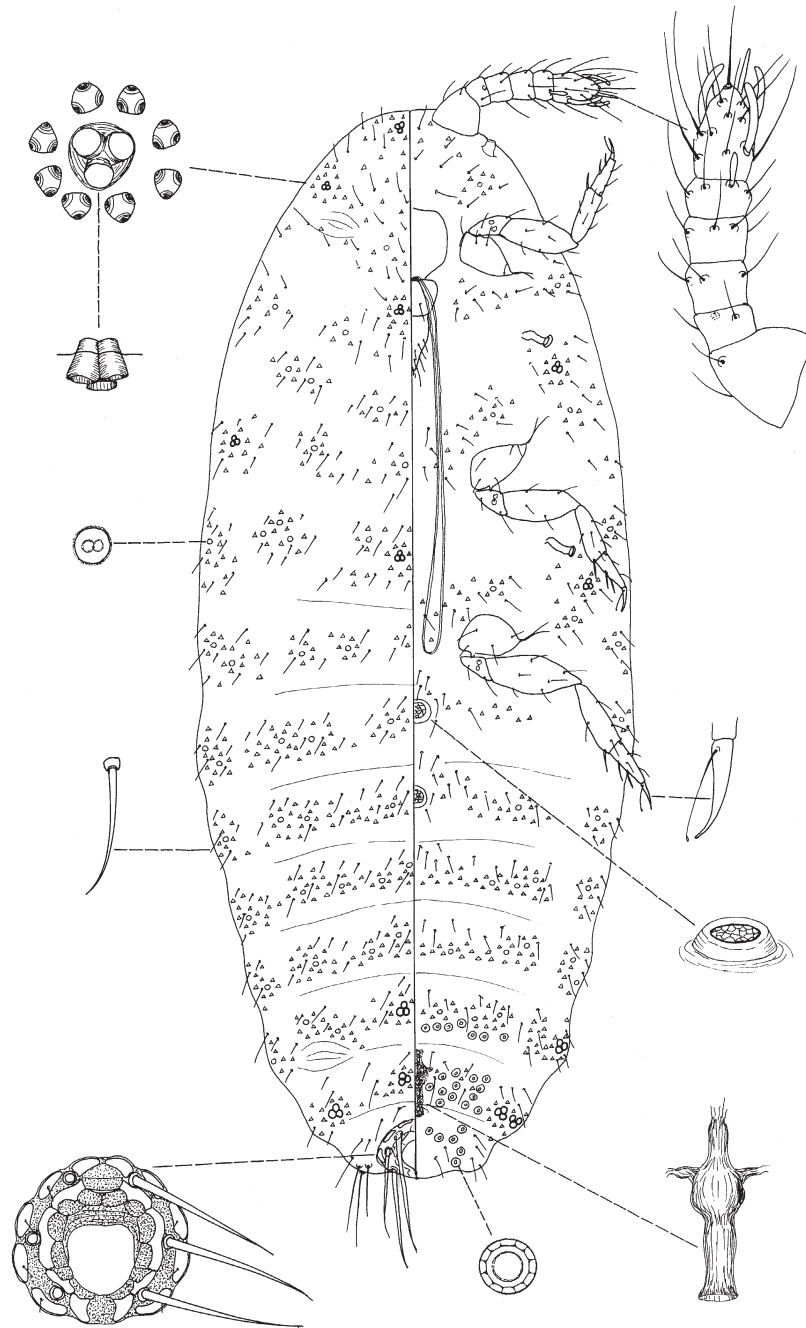


Fig. 5. *Benedictycoccina tanzaniana* KOZÁR et FOLDI sp. n.

Description: Body elongate oval. Slide-mounted specimen (Fig. 5) 0.71 mm long and 0.26 mm wide. Antenna 6 segmented, the length of the segments: 1st – 29 μm , 2nd – 12 μm , 3rd – 15 μm , fourth – 14 μm , fifth – 12 μm , sixth 29 μm long. There is one sensory pore on the 2nd segment. The 3rd segment is almost parallel-sided. The apical segment has four falcate sensory setae. On the fifth segment one, strong 13 μm long, blunt seta. Most segments of the antenna have a few hair-like setae; the longest one is 19 μm . Eyes well visible. Anal lobe is slightly developed with three long, hair-like setae.

Venter. Labium appears two-segmented, 51 μm long. Stylet loop four times longer than labium. Cephalic plate not visible. Legs robust: coxa of anterior legs 25 μm , trochanter 24 μm , femur 55 μm , tibia 33 μm , tarsus 31 μm , and claw 18 μm . Coxa of middle legs 27 μm , trochanter 22 μm , femur 45 μm , tibia 35 μm , tarsus 26 μm , and claw 17 μm long. Coxa of posterior legs 29 μm , trochanter 23 μm , femur 50 μm , tibia 45 μm , tarsus 38 μm , and claw 20 μm , tarsal digitules absent, claw digitules short, as long as claw, blunt. Trochanter with two pores on each side. Claw without denticle. Legs with few hair-like setae, tibia and tarsus with 11 μm long setae. On the ventral segments few tritubular ducts present on margin surrounded by trilocular pores. Some multilocular pores present around of vulva, 6 μm in diameter. The diameter of anterior spiracles 9 μm . Venter with a small number of scattered hair-like setae. Two circuli present, 24 μm in diameter. Tubular ducts absent. Internal genitalia as long as width of one segment; close to distal part, vagina is enlarged bearing vaginal glands.

Dorsum. Ostioles present, not sclerotized. Multilocular pores absent. Anal ring oval, 55 μm wide and 48 μm long. Anal ring with six, 51 μm long hair-like setae. Anal ring pores (cells) typical, few, with spicules on pores of outer row. Tritubular ducts of one size, in small number on last segments, and scattered on thorax, the tube 4 μm long and 3 μm wide. Tubular ducts absent. Hair-like setae 11 μm long, trilocular pores scattered on the dorsum. Bilocular pores present on all segments.

Distribution: Tanzania (Fig. 1).

Etymology. The species is named after the country of origin.

Affinities: This species differs from all others in the genus, by having multilocular pores only on the last ventral abdominal segments.

Key for species of *Benedictycoccina*

- | | | |
|---|--|-------------------------------------|
| 1 | Multilocular pores absent | <i>B. ornata</i> (HAMBLETON, 1946a) |
| – | Multilocular pores present | 2 |
| 2 | Tubular ducts present | <i>B. ethiopiana</i> sp. n. |
| – | Tubular ducts absent | 3 |
| 3 | Multilocular pores only on the last abdominal segments of venter | <i>B. tanzaniana</i> sp. n. |
| – | Multilocular pores both on venter and dorsum | <i>B. baloghi</i> sp. n. |

Coccidella HAMBLETON, 1946b

Type species: *Morrisonella poensis* HAMBLETON, 1946b

Description: Body elongate oval. Antennae 5 or 6 segmented, typical for the tribe, but the sensory seta on fifth segment is narrow and long, when the species has five segmented antennae it is situated near to the base of the fifth segment. Legs well developed. Dorsum and venter with tritubular pores (cerores). Tubular ducts absent or present. Anal ring normal, with 6 setae, cells in small number, outer row cells with spicula. Ostioles present, circulus absent. Internal genital organ heavily sclerotized, usually as long as width of one segment.

Distribution: The genus contains eight species, all are from the Neotropical Region (Fig. 1).

Comments: This genus was synonymized by FERRIS (1953), and latter HAMBLETON (1946b) accepted this act. However, FERRIS (1953) was not entirely sure about his decision and noted "It may seem desirable to resurrect the genus *Coccidella* and to name even more." The present re-establishment is based on several newly described species and the study of type material, which gave possibility to find some new characters, and describe more definitely the genus, which follows HAMBLETON's (1946a) description, but adds several new and important characters, which were not considered by him.

Coccidella HAMBLETON, 1946b, is a replacement name of *Morrisonella* HAMBLETON, 1946a. This genus is distinct from other genera by having groups of trilocular pores with special structures on some of the ventral segments of the abdomen.

***Coccidella boliviana* KONCZNÉ BENEDICTY et KOZÁR sp. n.**
(Fig. 6)

Type material: The holotype female, in the middle of the slide, Bolivia, 1966, (coll. J. BALOGH), D-Am No. 276. Two paratype females, from the same collection as the holotype, No. 275. Three female on one slide similar to this species, but was not included into the paratype series, Peru, Iquitos, 01. 12. 1971 (coll. J. BALOGH) IQ No. B 9. Deposited in the Collection of Plant Protection Institute, Hungarian Academy of Sciences (Budapest, Hungary).

Description: Body elongate oval. Slide-mounted specimen (Fig. 6) 1.08 mm long and 0.50 mm wide. Antenna 5 segmented, the length of the segments: 1st – 40 μ m, 2nd – 20 μ m, 3rd – 31 μ m, fourth – 24 μ m, fifth – 65 μ m long. There is one sensory pore on the 2nd segment of the antenna. The 3rd segment is almost parallel sided. The apical segment has four falcate sensory setae, one of them narrow, 31 μ m long, blunt seta. Most segments of the antenna have a few hair-like setae; the longest one is 22 μ m. Eyes well visible. Anal lobe is slightly developed with three long, hair-like setae.

Venter. Labium appears two-segmented, 76 μ m long. Stylet loop three times longer than labium. Cephalic plate not visible. Legs robust: coxa of anterior legs 51 μ m, trochanter 48 μ m, femur

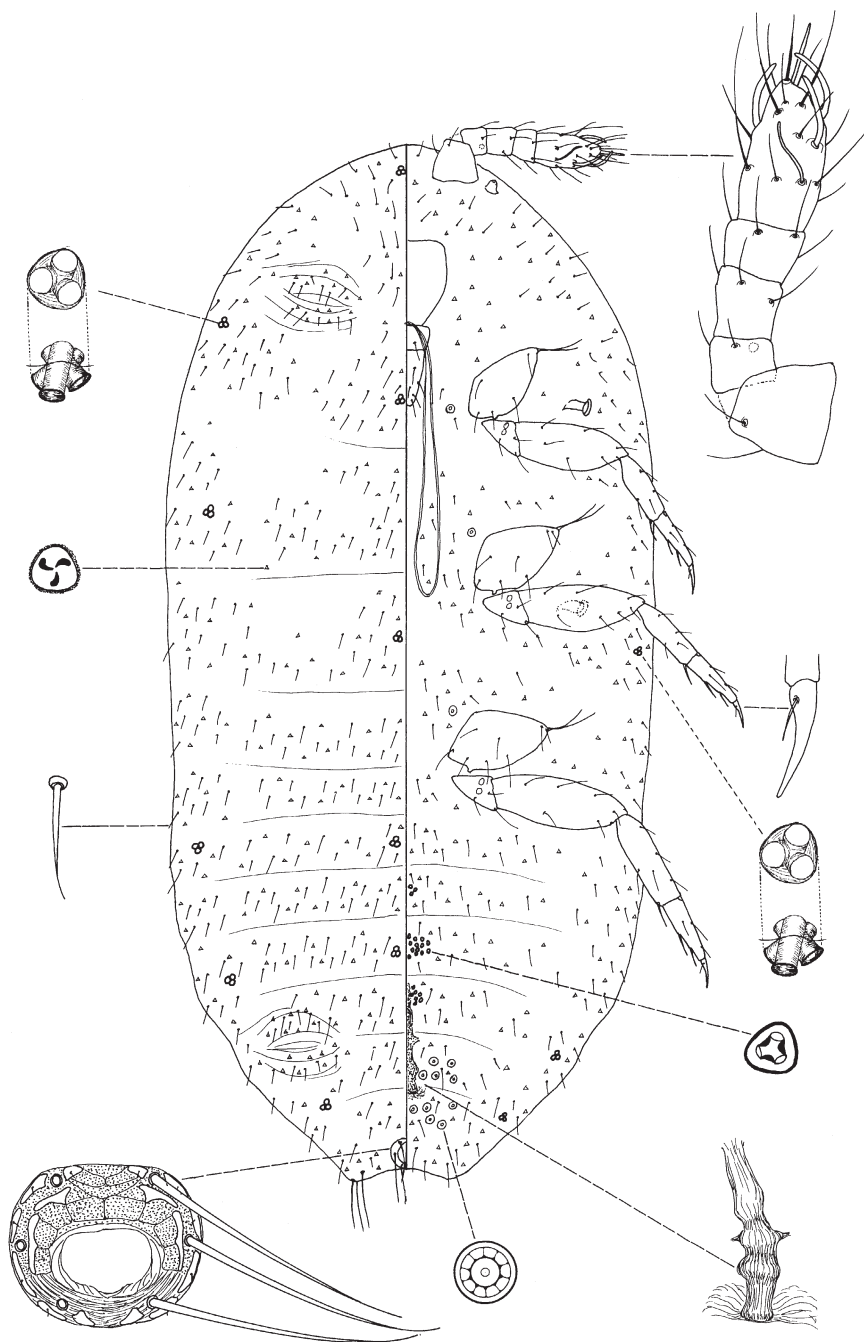


Fig. 6. *Coccidella boliviana* KONCZNÉ BENEDICTY et KOZÁR sp. n.

118 μm , tibia 77 μm , tarsus 67 μm , and claw 24 μm . Coxa of middle legs 65 μm , trochanter 50 μm , femur 103 μm , tibia 70 μm , tarsus 58 μm , and claw 26 μm long. Coxa of posterior legs 72 μm , trochanter 50 μm , femur 122 μm , tibia 98 μm , tarsus 70 μm , and claw 29 μm , tarsal digitules absent, claw digitules short, 8 μm long. Trochanter with two pores on each side. Claw without denticle. Legs with few hair-like setae, tibia and tarsus with 13 μm long setae. On the ventral segments few tritubular pores, 7 μm in diameter present on margin, diameter of tubes 4 μm . Few multilocular pores with ten pores present around vulva, and some scattered in the midline of the thorax, 8 μm in diameter. The diameter of anterior spiracles 17 μm . Venter with a small number of scattered hair-like setae. Circulus absent. Tubular ducts absent. Trilocular pores widely distributed on venter. On the segments IV and V, and on the head a group of special trilocular pores present, 4 μm in diameter, the structure appears as tritubular. Internal genitalia, forming a characteristic, particularly elongate structure, as long as two segments; near the basal part the vagina enlarged; vaginal glands not seen.

Dorsum. Ostioles present, sclerotized. Multilocular pores absent. Anal ring oval, 41 μm wide and 37 μm long. Anal ring with six, 54 μm long hair-like setae. Anal ring pores (cells) typical, in small number, with small spicules on pores of outer row. Tritubular pores of one size, 1–3 on each segment, 10 μm in diameter, ducts short, diameter of tubes 4 μm . Tubular ducts absent. Hair-like setae 11 μm long, trilocular pores 3 μm wide, scattered on the dorsum.

Distribution: Bolivia and Peru (Fig. 1).

Etymology. The species is named after the country of origin.

Affinities: The species is similar to *C. theobromae*, but differs from it by having short and wide tritubular pores, and five segmented antennae.

***Coccidella ecuadorina* KONCZNÉ BENEDICTY et FOLDI sp. n.**
(Fig. 7)

Type material: The holotype female, in the middle of the slide, Ecuador, Guayaguil-Riobamba trans., 1973 (coll. J. BALOGH), No. EC 37. Two paratype females, from the same collection as the holotype, No. EC 34. Deposited in the Collection of Plant Protection Institute, Hungarian Academy of Sciences (Budapest, Hungary).

Description: Body elongate oval. Slide-mounted specimen (Fig. 7) 1.55 mm long and 0.75 mm wide. Antenna 6 segmented, the length of the segments: 1st – 52 μm , 2nd – 22 μm , 3rd – 30 μm , fourth – 26 μm , fifth – 76 μm long. There is one sensory pore on the 2nd segment of the antenna. The 3rd segment is almost parallel sided. The apical segment has four falcate sensory setae. On fifth segment one narrow, 35 μm long, blunt seta. Most segments of the antenna have a few hair-like setae; the longest one is 27 μm . Eyes well visible. Anal lobe is slightly developed with three long, hair-like setae.

Venter. Labium appears two-segmented, 105 μm long. Stylet loop twice longer than labium. Cephalic plate visible. Legs robust: coxa of anterior legs 70 μm , trochanter 43 μm , femur 120 μm , tibia 86 μm , tarsus 77 μm , and claw 26 μm . Coxa of middle legs 74 μm , trochanter 50 μm , femur 125 μm , tibia 84 μm , tarsus 72 μm , and claw 26 μm long. Coxa of posterior legs 86 μm , trochanter 65 μm , femur 146 μm , tibia 118 μm and tarsus 84 μm , and claw 29 μm , tarsal digitules absent, claw digitules short, 9 μm long. Trochanter with two pores on each side. Claw without denticle. Legs with few hair-like setae, tibia and tarsus with 13 μm long setae. On the ventral segments few tritubular pores

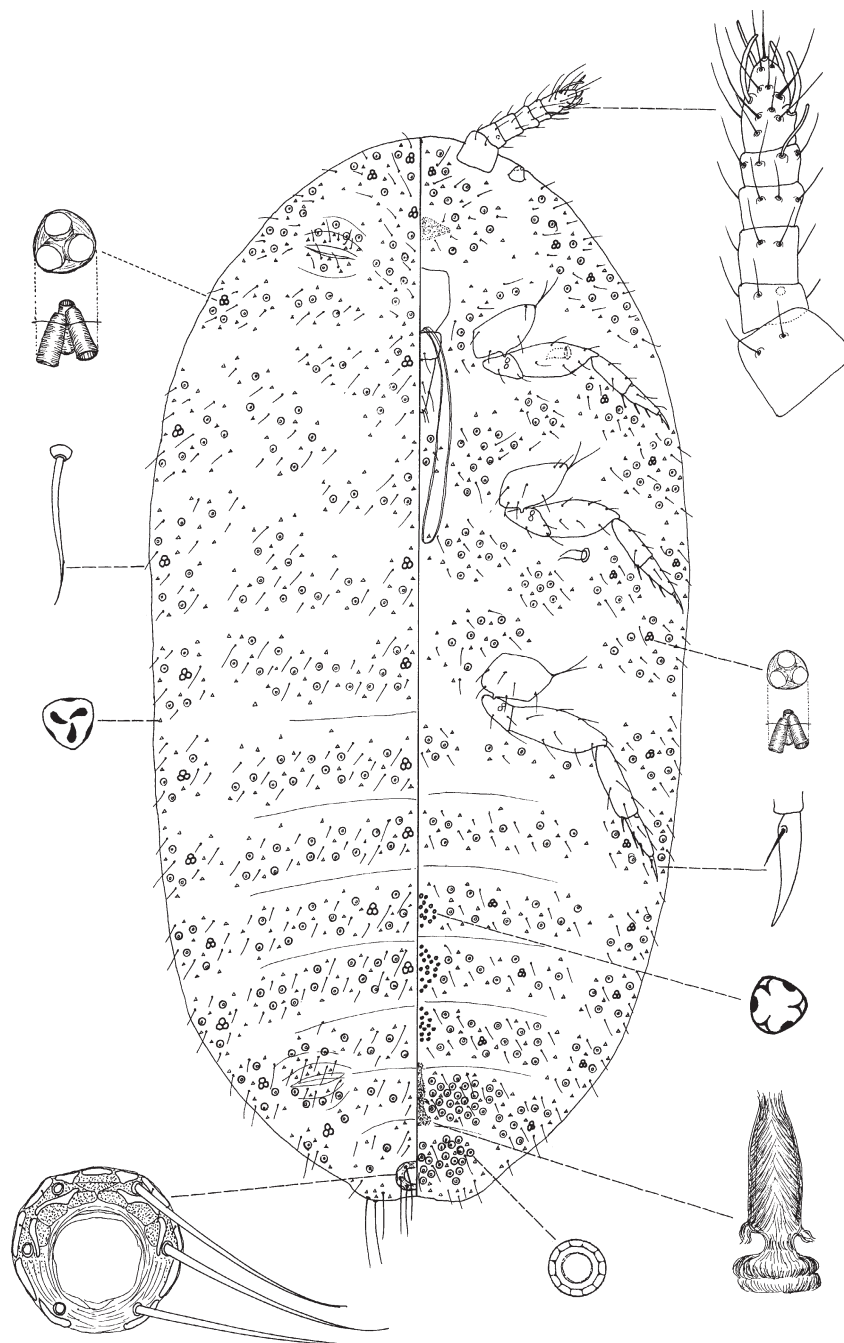


Fig. 7. *Coccidella ecuadorina* KONCZNÉ BENEDICTY et FOLDI sp. n.

present, 2–3 μm in diameter. Multilocular pores present on all segments. The diameter of anterior spiracles 18 μm . Venter with a few of scattered hair-like setae. Circulus and tubular ducts absent. Trilocular pores widely present on the venter, 3 μm in diameter. On the segments III, IV and V, a group of trilocular pores, with special structure present, 4 μm in diameter. Internal genitalia, a little longer than width of one segment; basal part of vagina constricted just below of the vaginal glands.

Dorsum. Ostioles present, sclerotized. Multilocular pores present all over the dorsum. Anal ring oval, 50 μm wide and 46 μm long. Anal ring with six, 78 μm long hair-like setae. Anal ring pores (cells) typical, in small number, with spicules on pores of outer row. Tritubular ducts of one size, 2–4 on each segment, tubes short, 4 μm in diameter. Tubular ducts absent. Hair-like setae 15 μm long, trilocular pores 3 μm wide, scattered on the dorsum.

Distribution: Ecuador (Fig. 1).

Etymology. The species is named after the country of origin.

Affinities: This species is similar to *C. poensis*, but differs from it by the short, 4 μm wide tritubular pores.

Coccidella globocula (HAMBLETON, 1946b)

(Fig. 8)

Distribution: Trinidad (Fig. 1).

Comment: This species has only two small groups of trilocular pores, with special structure, on venter. Few multilocular pores with six–seven pores only on venter around vulva. Tritubular pores with narrow, long tubes (WILLIAMS & GRANARA DE WILLINK 1992).

***Coccidella kissbalazsi* KONCZNÉ BENEDICTY et KOZÁR sp. n.**

(Fig. 9)

Type material: The holotype female, in middle of the slide, 1995 (coll. J. BALOGH), No. Br. B 81. One paratype female, from the same collection as the holotype, No Br. B82. Deposited in the Hungarian Natural History Museum (Budapest, Hungary).

Description: Body elongate oval. Slide-mounted specimen (Fig. 9) 1.22 mm long and 0.75 mm wide. Antenna 5 segmented, the length of the segments: 1st – 31 μm , 2nd – 12 μm , 3rd – 20 μm , fourth – 17 μm , fifth – 58 μm long. There is one sensory pore on the 2nd segment of the antenna. The 3rd segment rounded. apical segment with four falcate sensory setae. On this segment one narrow, 22 μm long, blunt seta near base of segment. Most segments of the antenna have a few hair-like setae, the longest one is 14 μm . Eyes not visible. Anal lobe not developed with three long, hair-like setae.

Venter. Labium appears two-segmented, 57 μm long. Stylet loop twice longer than labium. Cephalic plate not visible. Legs robust: coxa of anterior legs 38 μm , trochanter 28 μm , femur 81 μm ,

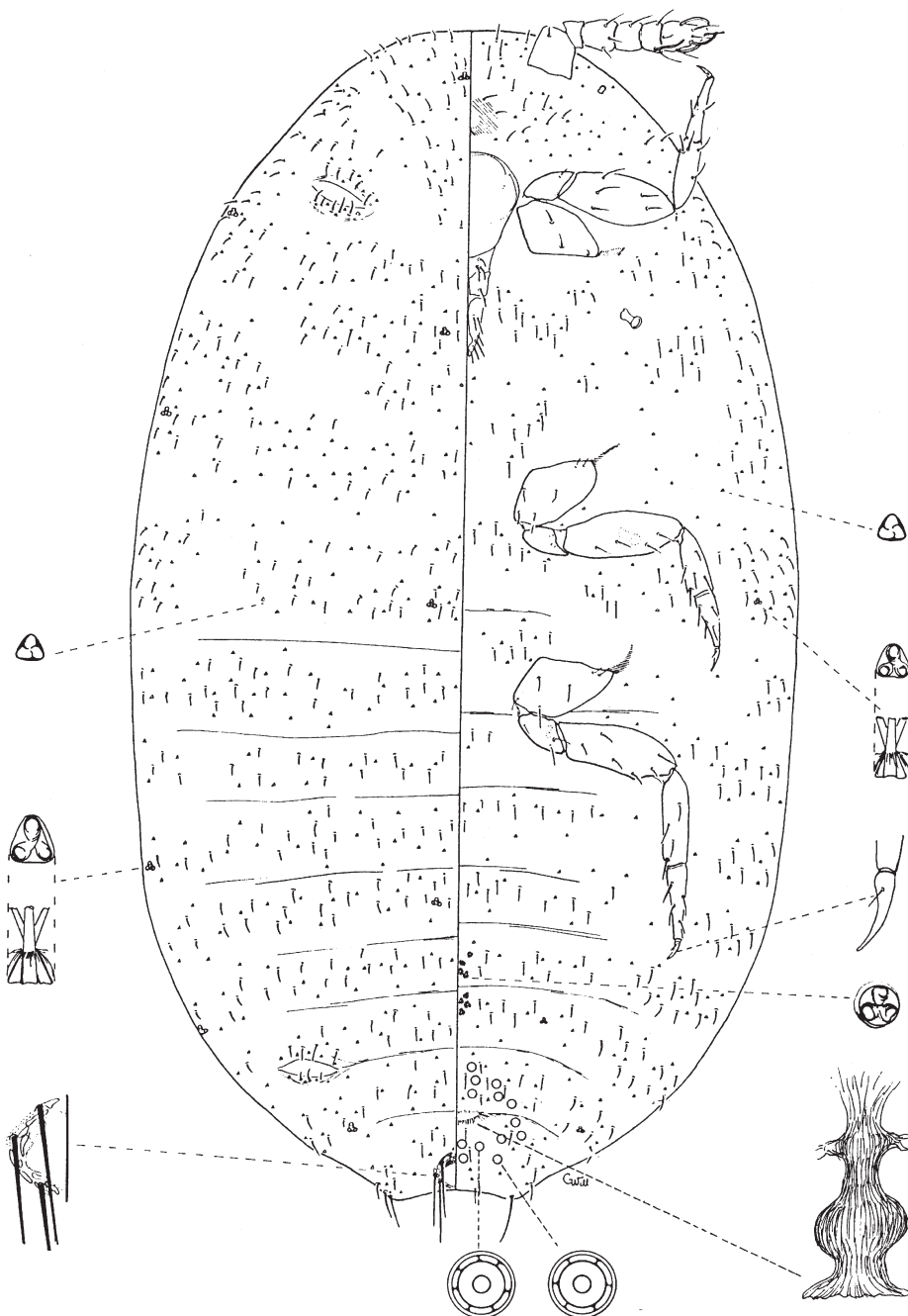


Fig. 8. *Coccidella globocula* (HAMBLETON, 1946) (modified after WILLIAMS & GRANARA DE WILLINK 1992)

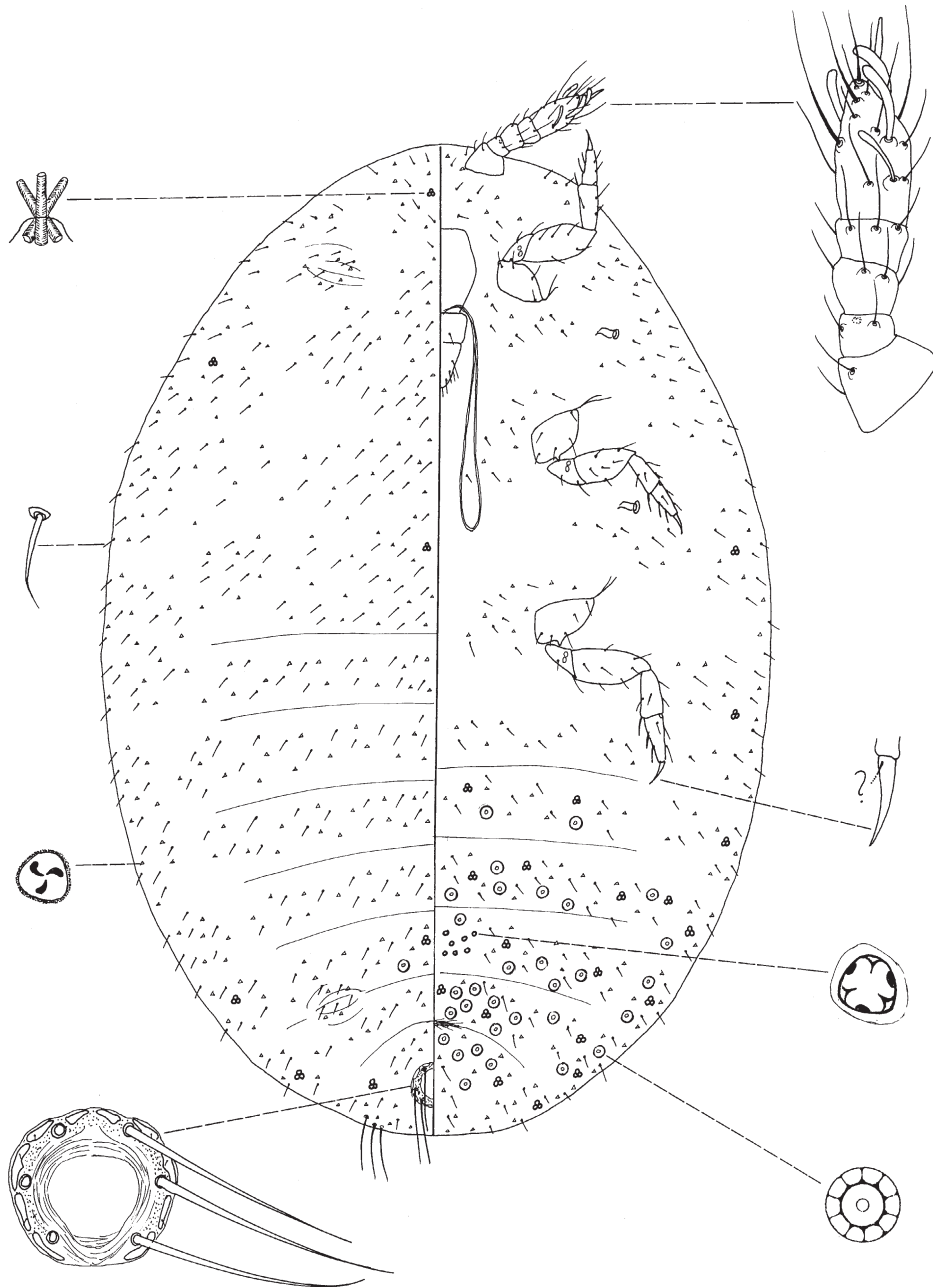


Fig. 9. *Coccidella kissbalazsi* KONCZNÉ BENEDICTY et KOZÁR sp. n.

tibia 50 µm, tarsus 46 µm, and claw 23 µm. Coxa of middle legs 36 µm, trochanter 26 µm, femur 74 µm, tibia 48 µm, tarsus 45 µm, and claw 22 µm long. Coxa of posterior legs 47 µm, trochanter 29 µm, femur 90 µm, tibia 65 µm and tarsus 54 µm, and claw 26 µm, tarsal digitules absent, claw digitules not seen. Trochanter with two pores on each side. Claw without denticle. Legs with few hair-like setae, tibia and tarsus with 18 µm long setae. On the ventral segments few tritubular pores present. Multilocular pores present on last segments of abdomen, with 8–10 pores. The diameter of anterior spiracles 11 µm. Venter with few scattered hair-like setae. Circulus and tubular ducts absent. Trilocular pores widely present on the venter, 3 µm in diameter. On segment V, a group of special trilocular pores present, 3 µm in diameter. Internal genital organ not seen.

Dorsum. Ostioles present, not sclerotized. Only one multilocular pore found on the dorsum. Anal ring oval, 41 µm wide and 38 µm long. Anal ring with six, 54 µm long hair-like setae. Anal ring pores (cells) typical, in small number, with spicules on pores of outer row. Tritubular ducts of one size, with long narrow tubes, 8 µm long and 1 µm wide, a few are situated on the last abdominal segments and some on the thorax. Tubular ducts absent. Hair-like setae 9 µm long, trilocular pores 3 µm wide, scattered on the dorsum.

Distribution: Brazil (Fig. 1).

The species is named after Dr. BALÁZS KISS in acknowledging his help in our coccidological studies.

Affinities: The species is similar to *C. globocula*, but has only five-segmented antennae, more multilocular pores and tritubular ducts on venter than in *C. globocula*.

***Coccidella multipora* KOZÁR et FOLDI sp. n.** (Fig. 10)

Type material: The holotype female, on the right side of the slide (marked), one paratype female on the left side of the same slide, Ecuador, Quito (coll. J. BALOGH), No. QB B57. Deposited in the Hungarian Natural History Museum (Budapest, Hungary).

Description: Body elongate oval. Slide-mounted specimen (Fig. 10) 1.09 mm long and 0.64 mm wide. Antenna 5 segmented, the length of the segments: 1st – 53 µm, 2nd – 24 µm, 3rd – 46 µm, fourth – 24 µm, fifth – 82 µm long. There is one sensory pore on the 2nd segment of the antenna. The 3rd segment is almost parallel sided. The apical segment has four falcate sensory setae. One narrower, 38 µm long, blunt sensory seta situated near base of the segment. Most segments of the antenna have a few hair-like setae; the longest one is 29 µm. Eye well visible. Anal lobe is slightly developed with three long, hair-like setae.

Venter. Labium appears two-segmented, 96 µm long. Stylet loop three times longer than labium. Cephalic plate visible. Legs robust: coxa of anterior legs 72 µm, trochanter 48 µm femur 132 µm, tibia 84 µm, tarsus 79 µm, and claw 38 µm. Coxa of middle legs 82 µm, trochanter 54 µm, femur 122 µm, tibia 86 µm, tarsus 74 µm, and claw 31 µm long. Coxa of posterior legs 82 µm, trochanter 62 µm, femur 151 µm, tibia 108 µm and tarsus 86 µm, and claw 41 µm, tarsal digitules absent, claw digitules short, 8 µm long. Trochanter with two pores on each side. Claw without denticle. Legs with few hair-like setae, tibia and tarsus with 29 µm long setae. On the ventral segments few tritubular

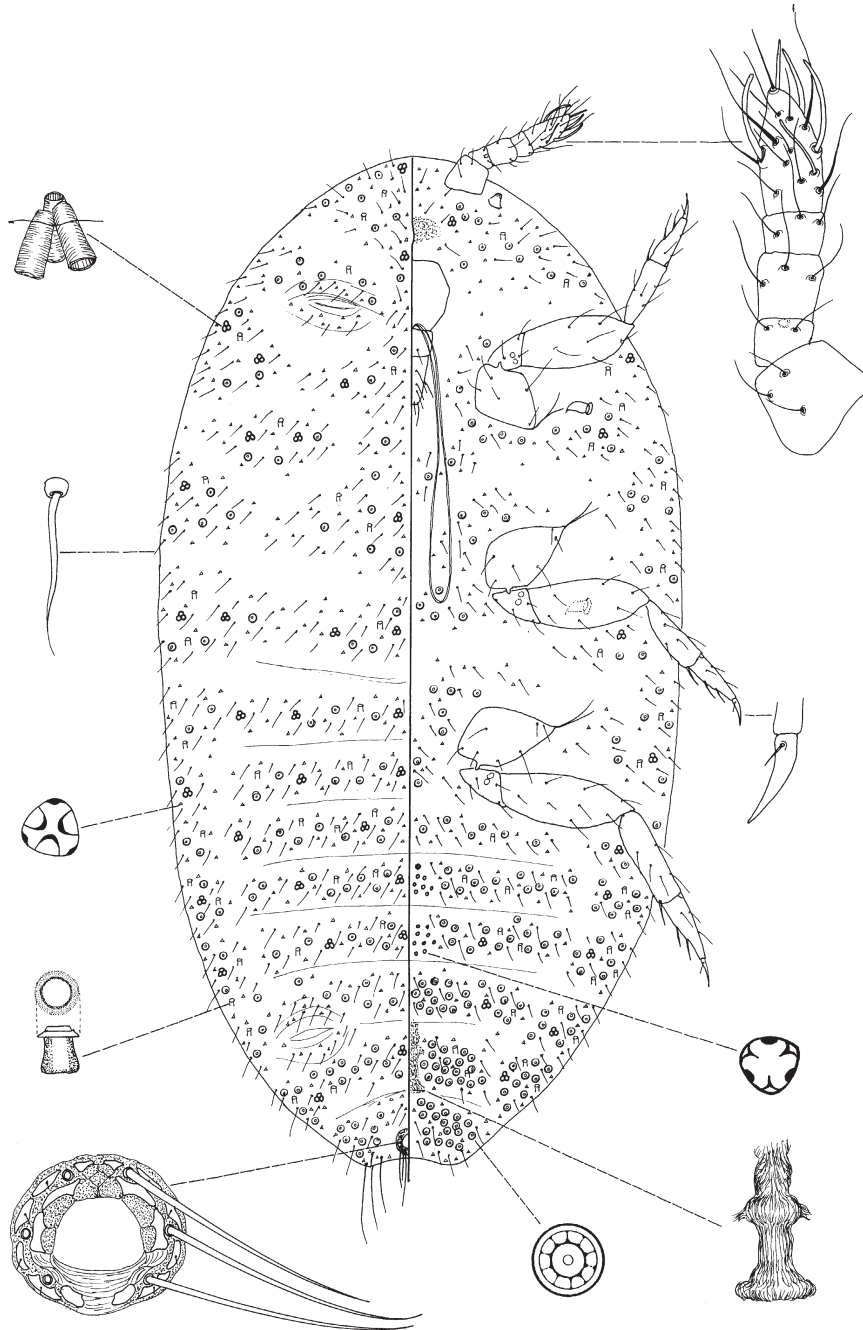


Fig. 10. *Coccidella multipora* KOZÁR et FOLDI sp. n.

pores. Multilocular pores with 8–12 pores, on all segments. The diameter of anterior spiracles 18 μm . Venter with a small number of scattered hair-like setae. Circulus absent. Tubular ducts absent. Trilocular pores scattered on venter, 3 μm in diameter. On the segments IV and V, a group of special trilocular pores, 3 μm in diameter. Internal genitalia, resembling an elongated cross-shaped structure, as long as the width of one segment; middle part of vagina enlarged bearing ductules of vaginal glands.

Dorsum. Ostioles present, sclerotized. Multilocular pores present on all segments. Anal ring oval, 58 μm wide and 53 μm long. Anal ring with six, 80 μm long hair-like setae. Anal ring pores (cells) typical, few, with spicules on pores of outer row. Tritubular pores of one size, 3–6 on each segment, tubes 9 μm long and 4 μm wide. Tubular ducts present, 4 μm long and 3 μm wide. Hair-like setae 31 μm long, trilocular pores 3 μm wide, scattered on the dorsum.

Distribution: Ecuador (Fig. 1).

Etymology. The species is named after the high number of multilocular pores on both sides of the body.

Affinities: This species differs from all others having high number of thick and short tubular ducts on both surfaces.

***Coccidella peruviana* KOZÁR et KONCZNÉ BENEDICTY sp. n.**

(Fig. 11)

Type material: The holotype female, in middle of the slide, Peru, Iquitos, 01. 12. 1971 (coll. J. BALOGH), No. IQ B16. Four paratype females, on three slides, from the same collection as the holotype, No. IQ B2, B18, B28. Two paratype females, Peru, Iquitos, Locuna Quistocodia, No. IQ B8. Three paratype females, Peru, Iquitos, Sungarococha, No. IQ B10, B35. Types are deposited in the Hungarian Natural History Museum (Budapest, Hungary).

Description: Body elongate oval. Slide-mounted specimen (Fig. 11) 1.24 mm long and 0.98 mm wide. Antenna 5 segmented, the fifth segment with slight division line, the length of the segments: 1st – 55 μm , 2nd – 17 μm , 3rd – 41 μm , fourth – 34 μm , fifth – 72 μm long. There is one sensory pore on the 2nd segment of the antenna. The 3rd segment is almost parallel sided. The apical segment has four falcate sensory setae, and one narrow, 43 μm long, blunt seta. Most segments of the antenna have a few hair-like setae; the longest one is 24 μm . Eyes well visible. Anal lobe is slightly developed with three long, hair-like setae.

Venter. Labium appears two-segmented, 86 μm long. Stylet loop three times longer than labium. Cephalic plate visible. Legs robust: coxa of anterior legs 60 μm , trochanter 48 μm , femur 144 μm , tibia 101 μm , tarsus 79 μm , and claw 30 μm . Coxa of middle legs 84 μm , trochanter 58 μm , femur 146 μm , tibia 101 μm , tarsus 77 μm , and claw 31 μm long. Coxa of posterior legs 77 μm , trochanter 53 μm , femur 156 μm , tibia 137 μm and tarsus 84 μm , and claw 29 μm , tarsal digitules absent, claw digitules short, 7 μm long. Trochanter with two pores on each side. Claw without denticle. Legs with few hair-like setae, tibia and tarsus with 14 μm long setae. On the ventral segments few tritubular ducts on margin, the tubes 3 μm in diameter. Multilocular pores absent. The diameter of anterior spiracles 21 μm . Venter with few scattered hair-like setae. Circulus absent. Tubular ducts absent. Trilocular pores distributed on all segments. On the abdominal segments, four groups of special trilocular pores present, 4 μm in diameter. Internal genitalia, forming an elongated cross-shaped

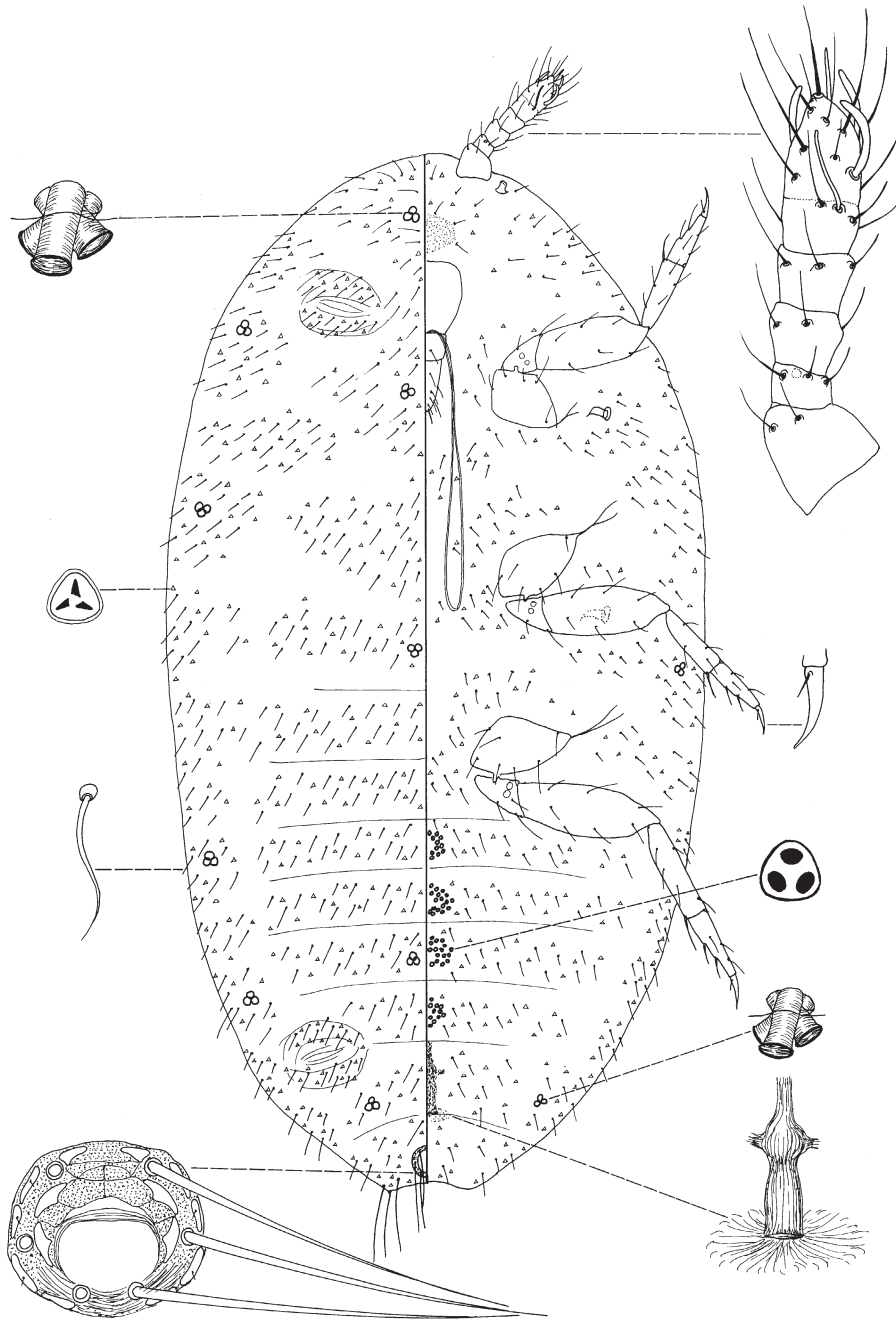


Fig. 11. *Coccidella peruviana* KOZÁR et KONCZNÉ BENEDICTY sp. n.

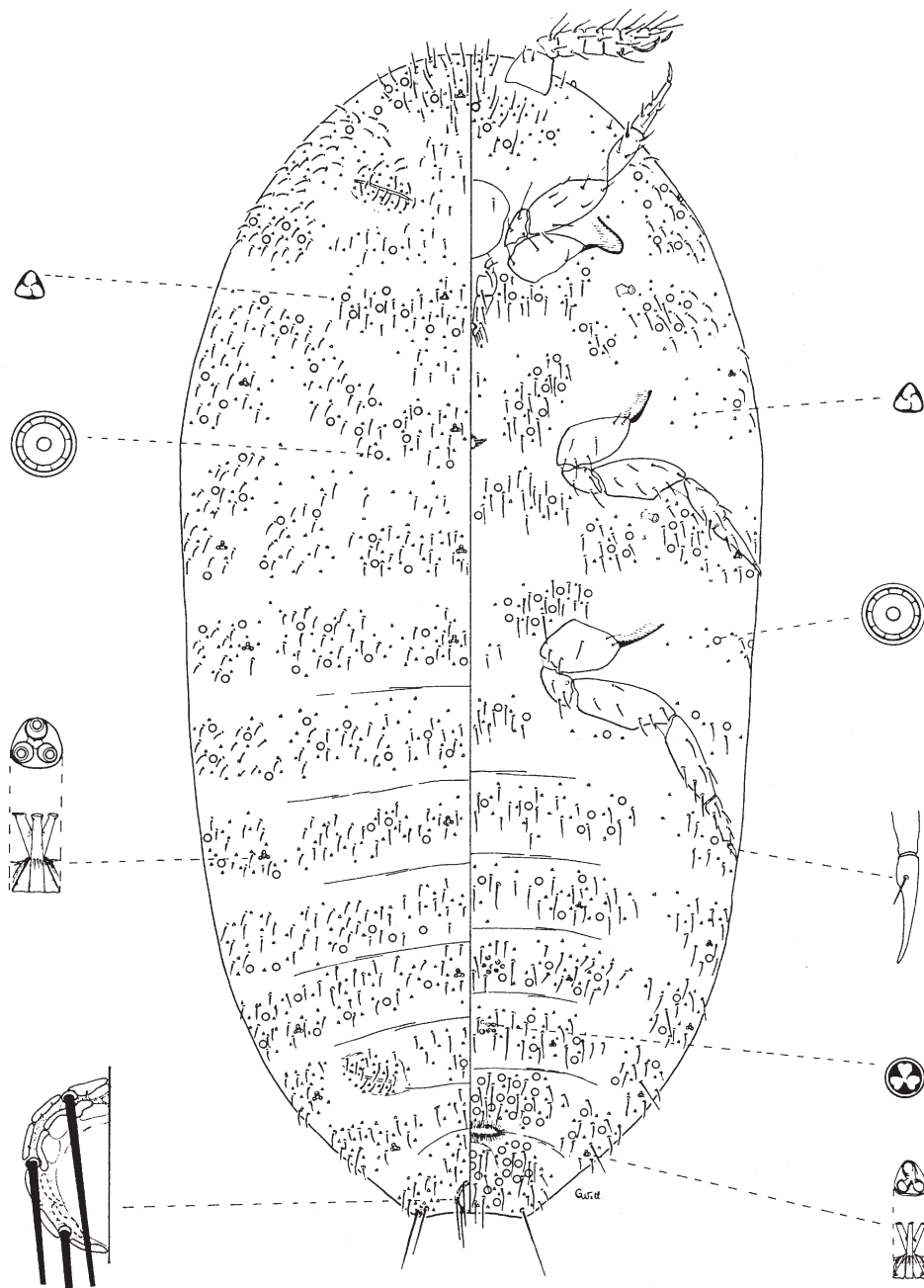


Fig. 12. *Coccidella poensis* (HAMBLETON, 1946) (after WILLIAMS & GRANARA DE WILLINK 1992)

structure, as long as width of one segment; vagina at its middle part is weakly constricted just below of the vaginal glands.

Dorsum. Ostioles present, sclerotized. Multilocular pores absent. Anal ring oval, 42 μm wide and 38 μm long. Anal ring with six, 71 μm long hair-like setae. Anal ring pores (cells) typical, few, with spicules on pores of outer row. Tritubular ducts of one size, 2–3 on each segment, tubes 4 μm in diameter, 10 μm long. Tubular ducts absent. Hair-like setae 17 μm long, trilocular pores 3 μm wide, scattered on the dorsum.

Distribution: Peru (Fig. 1).

Etymology. The species is named after the country of origin.

Affinities: This species differs from all species by the absence of multilocular pores.

Coccidella poensis (HAMBLETON, 1946b)

(Fig. 12)

Comment: This species has only two small groups of trilocular pores, with special structure on venter. Numerous multilocular pores on venter and dorsum. Tritubular pores with narrow, long tubes on dorsum, on venter in smaller size (WILLIAMS & GRANARA DE WILLINK 1992).

Distribution: Columbia (Fig. 1).

Coccidella theobromae (HAMBLETON, 1946b)

(Fig. 13)

Comment: This species has on venter only two small groups of trilocular pores, with special structure. Few multilocular pores on venter, on dorsum even fewer. Tritubular pores with narrow, long tubes on dorsum, on venter of smaller size. Few tubular ducts on venter (WILLIAMS & GRANARA DE WILLINK 1992)

Distribution: Ecuador (Fig. 1).

Key for species of *Coccidella*

- | | | |
|---|----------------------------|----------------------------|
| 1 | Multilocular pores absent | C. peruviana sp. n. |
| – | Multilocular pores present | 2 |

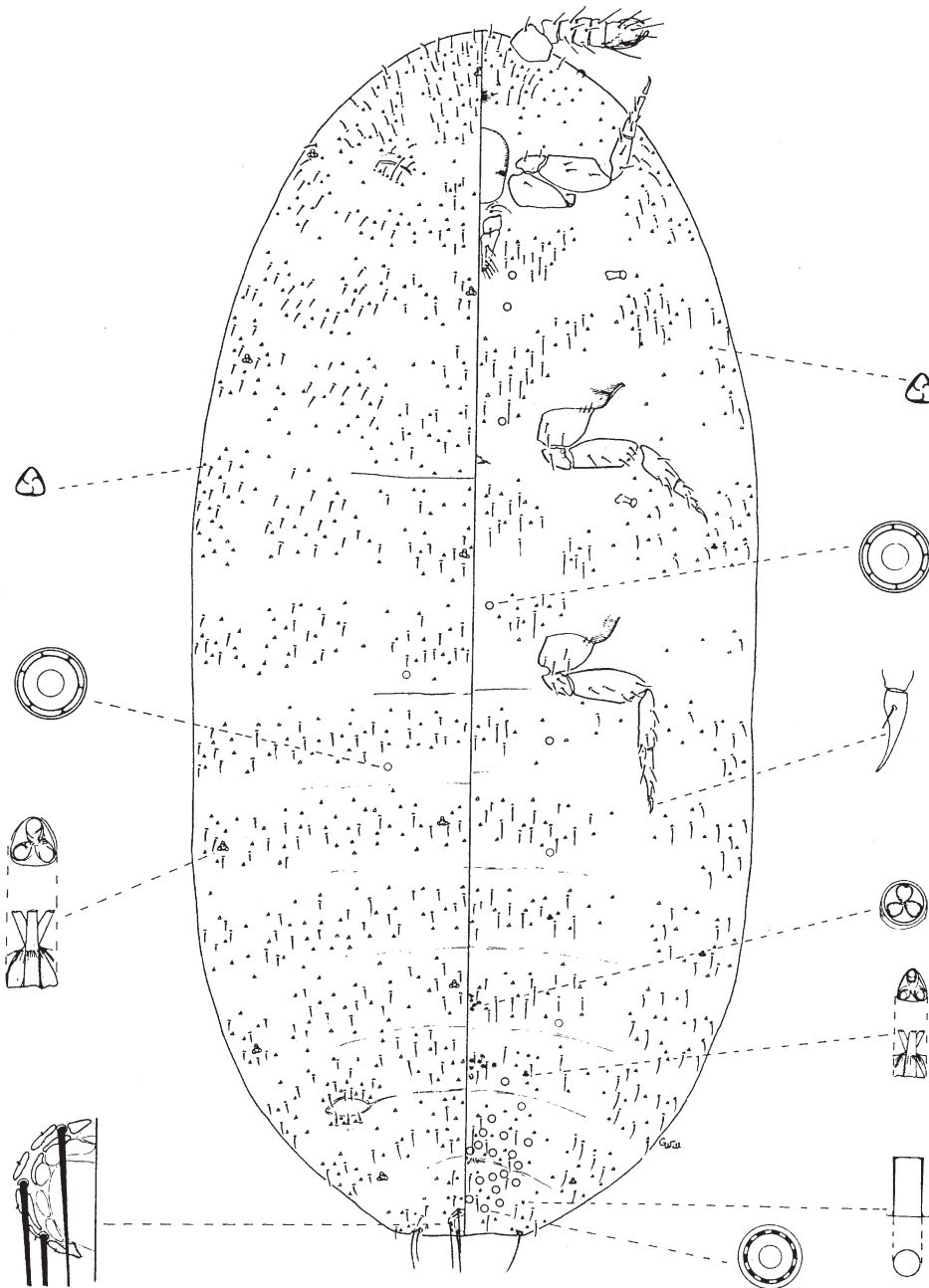


Fig. 13. *Coccidella theobromae* (HAMBLETON, 1946) (after WILLIAMS & GRANARA DE WILLINK 1992)

- | | | |
|---|--|---|
| 2 | Tubular ducts in high number on both surfaces | C. multipora sp. n. |
| – | Tubular ducts absent (<i>C. theobromae</i> has a few on venter) | 3 |
| 3 | Multilocular pores on dorsum absent or very few | 4 |
| – | Multilocular pores on dorsum numerous on all segments | 7 |
| 4 | Multilocular pores only on the last ventral abdominal segments | 5 |
| – | Multilocular pores present also on venter of thorax | 6 |
| 5 | Antennae five segmented | C. kissbalazsi sp. n. |
| – | Antennae six segmented | <i>C. globocula</i> (HAMBLETON, 1946b) |
| 6 | Tritubular ducts short, wide, antennae five segmented | C. boliviana sp. n. |
| – | Tritubular ducts long, narrow, antennae six segmented | <i>C. theobromae</i> (HAMBLETON, 1946b) |
| 7 | Tritubular ducts short and wide, 4 µm in diameter | C. ecuadorina sp. n. |
| – | Tritubular ducts narrow and long | <i>C. poensis</i> (HAMBLETON, 1946b) |

Hambletonia KOZÁR et FOLDI gen. n.

Type species: *Hambletonia bitubularis* sp. n.

Description: Body elongate oval. Antennae 5 segmented, typical for the tribe. The sensory seta on the fifth segment of antennae long and blunt. Legs well developed. Dorsum and venter with bitubular pores (cerores). Tubular ducts absent. Instead of multilocular pores some five locular pores present on the venter of last abdominal segment. Unique trilocular pores form large groups in median area of two ventral abdominal segments, one group on the head. Trilocular pores on entire body also are unusual. Anal ring with 6 setae, anal ring, few, with spiculae on outer row. Ostioles present, no circulus. Internal genital organ sclerotized, has a special structure, as long as width of one segment.

Distribution: Peru (Fig. 1).

Etymology. The new genus is named in honour of the deceased expert of this subfamily E. J. HAMBLETON.

Comments: This genus is distinct from the other genera, especially by the groups of unique trilocular pores on abdominal venter and head. One new species is included in the genus.

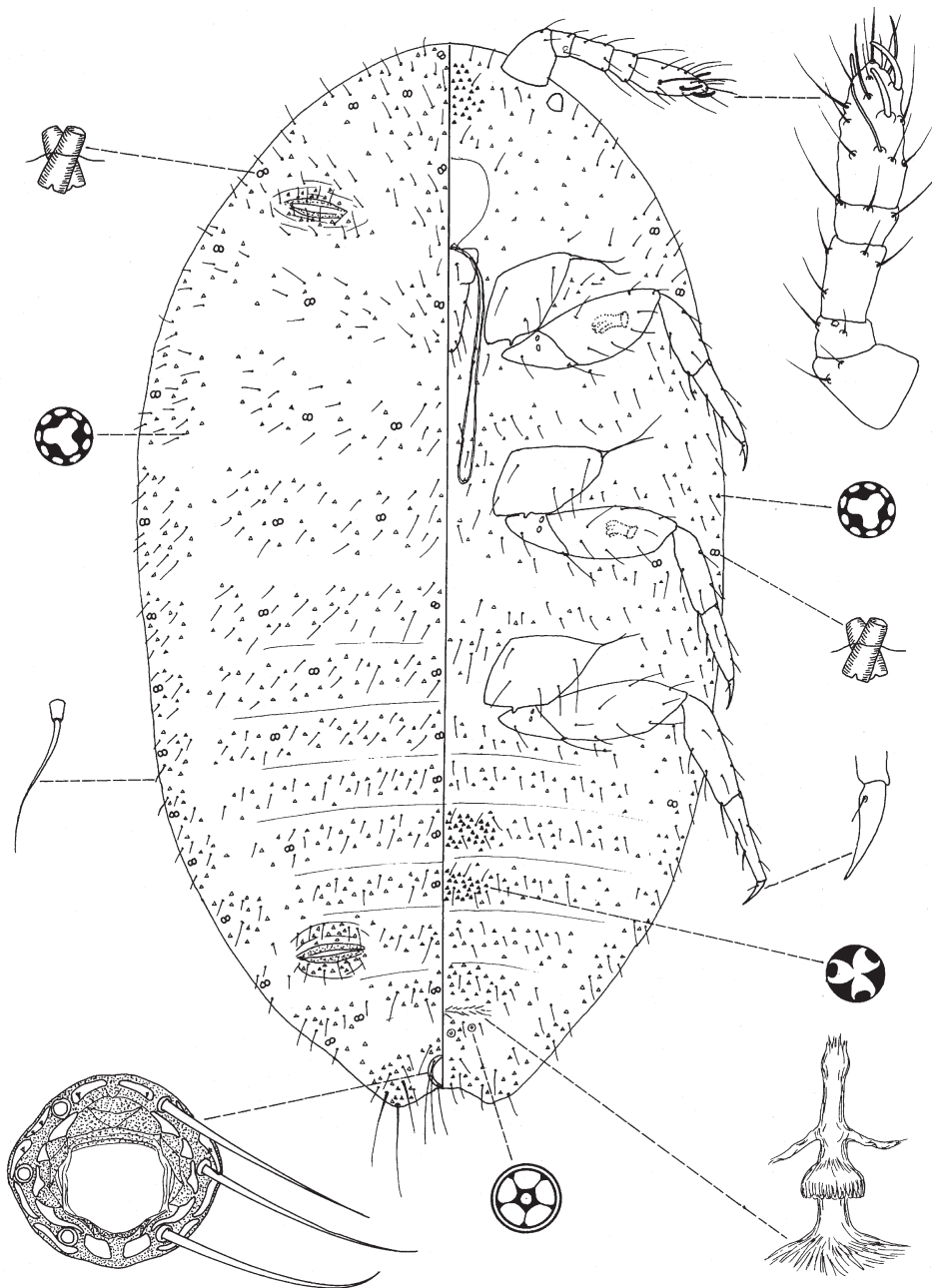


Fig. 14. *Hambletonia bitubularis* KOZÁR et FOLDI sp. n

Hambletonia bitubularis KOZÁR et FOLDI sp. n.

(Fig. 14)

Type material: The holotype female, in center of the slide (marked), one paratype female and an immature on the same slide, Peru, Oxypampa, 01.11.2000 (coll. G. SZÖVÉNYI), No. 6189, from moss. Three paratype females, on one slide, from the same collection as the holotype. One paratype female, Peru (coll. G. SZÖVÉNYI, YC 2400) No. 6190. One paratype female, Peru (coll. G. SZÖVÉNYI, YC 2500) No. 6194. Holotype deposited in the Hungarian Natural History Museum (Budapest, Hungary), paratypes deposited in Collection of Plant Protection Institute, Hungarian Academy of Sciences (Budapest, Hungary).

Description: Body elongate oval. Slide-mounted specimen (Fig. 14) 1.13 mm long and 0.67 mm wide. Antenna 5 segmented, the length of the segments: 1st – 53 μm , 2nd – 22 μm , 3rd – 38 μm , fourth – 24 μm , fifth – 76 μm long. One sensory pore on 2nd segment of the antenna. The 3rd segment is almost parallel sided. The apical segment has four falcate sensory setae, and one narrow, 38 μm long, blunt seta. Most segments of the antenna have a few hair-like setae, the longest one is 43 μm . Eyes well visible. Anal lobe slightly developed with three long, hair-like setae.

Venter. Labium appears two-segmented, 101 μm long. Stylet loop twice longer than labium. Cephalic plate visible. Legs robust: coxa of anterior legs 74 μm , trochanter 48 μm , femur 122 μm , tibia 84 μm , tarsus 84 μm , and claw 36 μm . Coxa of middle legs 70 μm , trochanter 55 μm , femur 127 μm , tibia 84 μm , tarsus 82 μm , and claw 34 μm long. Coxa of posterior legs 84 μm , trochanter 62 μm , femur 139 μm , tibia 101 μm and tarsus 89 μm , and claw 36 μm , tarsal digitules absent, claw digitules short, 9 μm long. Trochanter with two pores on each side. Claw without denticle. Legs with few hair-like setae, tibia and tarsus with 25 μm long setae. On segments few bitubular ducts present on margin, the tubes 5 μm in diameter, and 10 μm long. Instead of multilocular pores some five locular pores present on the last segment. The diameter of anterior spiracles 17 μm . With a small number of scattered hair-like setae. Circulus absent. Tubular ducts absent. Trilocular pores distributed on all segments. On median area of abdominal segments, two groups of unique trilocular pores, 4 μm in diameter.

Also one more unique trilocular pore group on the head. Internal genitalia have an unusual structure and as long as width of one segment. Internal genitalia with two lateral extensions appearing to be the well developed ductules of vaginal glands, situated at its middle part of vagina; between these glands and vulva, vagina is strongly enlarged.

Dorsum. Ostioles sclerotized. Multilocular pores absent. Anal ring oval, 50 μm wide and 43 μm long. Anal ring with six, 74 μm long hair-like setae. Anal ring pores (cells) typical, few, with spicules on pores of outer row. Bitubular ducts of one size, 4–6 on each segment, tubes 5 μm in diameter, 10 μm long. Tubular ducts absent. Hair-like setae 22 μm long, trilocular pores 3 μm wide, scattered on the dorsum, with a special structure, three central pores surrounded by nine small pores.

Distribution: Peru (Fig. 1).

Etymology. The species is named after the presence of bitubular pores.

CHECKLIST OF GENERA OF THE TRIBE RHIZOECINI

Rhizoecus KUNCKEL D'HERCULAIS, 1878

Type species: *Rhizoecus falcifer* KUNCKEL D'HERCULAIS, 1878, by monotypy.

Ripersiella TINSLEY, 1899

Type species: *Ripersia rumicis* MASKELL, 1892

Capitisetella HAMBLETON, 1977

Type species: *Pseudorhizoecus migrans* GREEN, 1933, by monotypy and original designation.

Pseudorhizoecus GREEN, 1933

Type species: *Pseudorhizoecus proximus* GREEN, 1933, by original designation.

Pygmaeococcus MCKENZIE, 1960

Type species: *Pygmaeococcus morrisoni* MCKENZIE, 1960, by monotypy and original designation.

Geococcus GREEN, 1902

Type species: *Geococcus radicum* GREEN, 1902, by original designation.

Leptorhizoecus WILLIAMS, 1998

Type species: *Leptorhizoecus deharvengi* WILLIAMS, 1998

Brevicoccus HAMBLETON, 1946a

Type species: *Brevicoccus clavisetosus* HAMBLETON, 1946a, by monotypy and original designation.

Prorhizoecus MILLER et MCKENZIE, 1971

Type species: *Prorhizoecus atopoporus* MILLER et MCKENZIE, 1971, by monotypy and original designation.

Marottarhizoecus KOZÁR et KONCZNÉ BENEDICTY, 2002

Type species: *Marottarhizoecus issisi* KOZÁR et KONCZNÉ BENEDICTY, 2002, by monotypy and original designation.

The genus *Coccidella* HAMBLETON, 1946b was re-established, and two new genera added. By the new descriptions the number of genera in the Rhizoecini tribe increases to 13.

KEY TO THE GENERA OF THE TRIBE RHIZOECINI
(after WILLIAMS (1998), TANG (1992), KOZÁR and KONCZNÉ
BENEDICTY (2002) with changes and additions)

- | | | |
|---|---------------------------------|------------------------|
| 1 | Anal ring with protuberances | <i>Pseudorhizoecus</i> |
| – | Anal ring without protuberances | 2 |
| 2 | Anal ring ventral in position | <i>Leptorhizoecus</i> |
| – | Anal ring dorsal in position | 3 |

3	Bulbous tubular ducts present		4
–	Bulbous tubular ducts absent		5
4	Cerarii present	<i>Prorhizoecus</i>	
–	Cerarii absent	<i>Pygmaeococcus</i>	
5	All body setae knobbed		6
–	All body setae flagellate		7
6	Antennae 3 segmented	<i>Capitisetella</i>	
–	Antennae 4 segmented	<i>Brevicoccus</i>	
7	Antennae of 5 or 6 segments		8
8	Anal lobes well developed, with a stout spine-like seta	<i>Geococcus</i>	
–	Anal lobes not well-developed, without spine-like seta		9
9	Derm with tritubular pores		10
–	Derm with bitubular pores		14
10	Body without groups of trilocular pores on venter, or around tritubular pores		13
–	Body with groups of trilocular pores		11
11	With groups of trilocular pores on venter	<i>Coccidella</i>	
–	Without groups of trilocular pores on venter		12
12	Tritubular pores surrounded by multilocular pores	<i>Marottarhizoecus</i>	
–	Tritubular pores surrounded by trilocular pores	Benedictyoccina gen. n.	
13	Body with tritubular cerores, without groups of trilocular pores	<i>Rhizoecus</i>	
14	Groups of trilocular pores on venter absent	<i>Ripersiella</i>	
–	Groups of trilocular pores on venter present	Hambletonia gen. n.	

*

Acknowledgements – The authors would like to thank the OTKA (Hungarian National Science Fund) (Grant No. T 034236), and Musèum National d’Histoire Naturelle, Paris, France, for financial support of this project. To Dr. S. MAHUNKA and late Prof. Dr. J. BALOGH who made available for us to study the Arachnoidea collection of the Hungarian Natural History Museum (Budapest, Hungary), and to Dr. T. JERMY for the grammatical corrections.

REFERENCES

- BEN-DOV, Y. (1994) *A systematic catalogue of the mealybugs of the World (Insecta: Homoptera: Coccoidea: Pseudococcidae and Putoidea)*. Intercept Ltd., Andover, 686 pp.
- DE MARZO, L., ROMANO, V. & TRANFAGLIA, A. (1990) Types of the female reproductive system in some scale insects (Homoptera: Coccoidea). *Proceedings of ISSIS-VI, Krakow*, pp. 41–46.
- FERRIS, G. F. (1953) *Atlas of the scale insects of North America. The Pseudococcidae (Part II)*. Stanford Univ. Press, California, pp. 279–506.
- FOLDI, I. (1997) Internal anatomy of the adult female. Pp. 73–90. In: BEN-DOV, Y. & HODGSON, C. J. (eds): *Soft Scale Insects: Their Biology, Natural Enemies and Control*. Elsevier, Amsterdam & New York, 452 pp.
- HAMBLETON, E. J. (1946a) Studies of Hypogeic Mealybugs. *Rev. de Entomologia* **17**: 1–77.
- HAMBLETON, E. J. (1946b) A new name for a mealybug. *Proc. Biol. Soc. Washington* **59**: 177.
- HAMBLETON, E. J. (1976) A revision of the New World mealybugs of the genus *Rhizoecus* (Homoptera: Pseudococcidae). *USDA Techn. Bull.* **1522**: 1–88.
- KOZÁR, F. & KONCZNE BENEDICTY, Z. (2002) Description of the *Marottarhizoecus issisi* gen. et sp. nova (Homoptera, Coccoidea, Pseudococcidae, Rhizoecinae) from Africa with a review and key of the subfamily. *Boll. Zool. Agr. Bachic.* **34**: 213–218.
- KOZÁR, F. & KONCZNE BENEDICTY, Z. (2003) Description of four new species from Australian, Austro-Oriental, New Zealand and South Pacific regions (Homoptera, Coccoidea, Pseudococcidae, Rhizoecinae), with a review, and a key to the species *Ripersiella*. *Boll. Zool. agr. Bachic.* **35**: 225–239.
- KOZÁR, F. & MILLER, D. (2000) World revision of the genus *Ortheziola* Sulc, 1895 (Homoptera: Coccoidea) with descriptions of eleven new species. *Systematic Entomology* **25**: 15–45.
- MATILE FERRERO, D. (1976) La faune terrestre de l'île de Sainte-Helene. 7. Coccoidea. *Annales. Mus. e Royal de l'Afrique Centrale. Tervuren. Serie in 8. Sciences Zoologiques* **215**: 292–318.
- MILLER, D. R., BEN-DOV, Y. & GIBSON, G. A. P. (2001) [1999]: Scalenet: a searchable information system on scale insects. *Entomologica* **33**: 37–46.
- TANG, F. T. (1992) *The Pseudococcidae of China*. Chinese Agricultural Science Technology Press, Beijing, 767 pp.
- WILLIAMS, D. J. (1998) Mealybugs of the genera *Eumyrmococcus* Silvestri associated with the ant genus *Acropyga* Roger and a review of the subfamily Rhizoecinae (Homoptera, Coccoidea, Pseudococcidae). *Bull. nat. Hist. Mus. Lond. (Ent.)* **67**: 1–64.
- WILLIAMS, D. J. (2004) *Mealybugs of the Far East*. Southdene Sdn. Bhd., Kuala Lumpur, Malaysia 904 pp. [in print]
- WILLIAMS, D. J. & GRANARA DE WILLINK, M. C. (1992) *Mealybugs of Central and South America*. C. A. B. International Institute of Entomology, London, 635 pp.

Revised version received November 10, 2004, accepted November 12, 2004, published November 24, 2004