

The genus *Coccidohystrix* Lindinger, 1943 in the Palaearctic Region with description of two new species from Maghreb (Homoptera: Coccinea: Pseudococcidae)

Род *Coccidohystrix* Lindinger, 1943 в фауне Палеарктики с описанием двух новых видов из стран Магриба (Homoptera: Coccinea: Pseudococcidae)

I.A. GAVRILOV-ZIMIN* & D. MATILE-FERRERO

И.А. ГАВРИЛОВ-ЗИМИН*, Д. МАТИЛЬ-ФЕРРЕРО

Zoological Institute, Russian Academy of Sciences, 1 Universitetskaya Emb., St Petersburg 199034, Russia.
E-mail: coccids@gmail.com *Corresponding author.

Muséum National d'Histoire Naturelle, Département Systématique & Evolution, UMR 7205, MNHN-CNRS, ISYEB, Institut de Systématique, Evolution, Biodiversité, CP 50, F-75231 PARIS Cedex 0. E-mail: dmatile@mnhn.fr

Two new species of mealybugs, *Coccidohystrix maghribiensis* **sp. nov.** from Morocco and *C. monicae* **sp. nov.** from Tunisia are described and illustrated. A key for all Palaearctic species of *Coccidohystrix* (= *Artemicoccus*) as well as descriptions and new detailed figures of *C. echinata* (Balachowsky, 1930), **comb. nov.** and *C. splendens* (Goux, 1946), a new junior synonym and a substitute name for *C. echinata* (Balachowsky, 1936), are provided.

В статье даются описания и иллюстрации двух новых для науки видов мучнистых червецов, *Coccidohystrix maghribiensis* **sp. nov.** из Марокко и *C. monicae* **sp. nov.** из Туниса. Приводится определительный ключ для всех палеарктических видов рода *Coccidohystrix* (= *Artemicoccus*), а также описания и новые детальные рисунки для *C. echinata* (Balachowsky, 1930), **comb. nov.** и *C. splendens* (Гух, 1946); последние название рассматривается в качестве нового младшего синонима и одновременно замещающего названия для *C. echinata* (Balachowsky, 1936).

Key words: scale insects, mealybugs, Morocco, Tunisia

Ключевые слова: мучнистые червецы, кокциды, Марокко, Тунис

INTRODUCTION

Two peculiar genera of mealybugs lacking ostioles and demonstrating so-called “bottle-shaped” tubular ducts, *Coccidohystrix* Lindinger, 1943 and *Artemicoccus* Balachowsky, 1953 are very similar morphologically; moreover, the last name is considered by some authors (Kozár & Pellizzari Scaltriti, 1989) as a subjective junior synonym of *Coccidohystrix*. The type species of these genera, *C. echinata* (Balachowsky, 1936)

and *A. bispinus* (Borchsenius, 1949) differ from each other rather clearly in the presence of dorsal elevated tubercles with large conical setae (mamelons) and 8–9-segmented antennae in the first species and in the absence of mamelons in a combination with the presence of cylindrical dorsal setae and 7-segmented antennae in the second species. These differences are usually used (for example, in the recent paper of Danzig et al., 2012) for supporting of the genera separation. However, the other, non-type

species of the discussed genera, and especially the one described below from Morocco as new for science, demonstrate different intermediate combinations of the generic characters and, in the result, the border between the genera disappears. In view of this situation we follow Kozár & Pellizzari Scaltriti (1989) in considering *Artemicoccus* as a junior synonym of *Coccidohystrix*.

Coccidohystrix differs from all other Palaearctic genera of mealybugs in the combination of the following characters: absence of ostioles and normally developed cerarii, which are replaced by groups of large conical setae without associated trilocular or quinelocular pores, by tubular ducts of characteristic bottle-shaped form and presence of more or less cylindrical setae on dorsum. Moreover, some of *Coccidohystrix* species demonstrate significant decreasing of the number of trilocular pores, till their presence near spiracles only. Thereby, all these characters show lacking or poorly developing of main synapomorphies of Pseudococcidae and denote similarity and probably relationship of *Coccidohystrix* with the family Eriococcidae (felt scales); it seems that *Coccidohystrix* can be considered as an ancestor group for the felt scales. In particular, two North-African species, described below as new for science, *C. maghribiensis* and *C. monicae* differ, in fact, from the species of the largest (and probably most primitive) genus of felt scales, *Acanthococcus* Signoret, 1875, in the presence of small number of trilocular pores only.

The genus *Amonostherium* Morrison et Morrison, 1922 was originally described from North America. Then, four Palaearctic species were also transferred or described in this genus: *A. arabicum* Ezzat, 1960, *A. echinatum* (Balachowsky, 1930), *A. prionodes* Wang, 1976 and *A. rorismarinis* (Boyer de Fonscolombe, 1834). To our mind, all these species are not related with the type species of the genus, *A. lichtensioides* (Cockerell, 1897) and other American species and moreover, are not even related to each other; they must to be transferred in different

Palaearctic genera. In particular, *Amonostherium echinatum* (Balachowsky, 1930) must to be transferred to the genus *Coccidohystrix*. In this case, the species starts to be a major secondary homonym of the type species of *Coccidohystrix*, *C. echinata* (Balachowsky, 1936) and we are providing here for the last species a substitute name – *Coccidohystrix splendens* (Goux, 1946). Below, we are giving a key for all Palaearctic species of *Coccidohystrix* as well as descriptions and figures of two new species and short redescriptions and new figures of *C. echinata* (Balachowsky, 1930) and *Coccidohystrix splendens* (Goux, 1946).

Finally, we include below in the key the following 11 Palaearctic species of *Coccidohystrix*: *C. artemisiae* (Kiritshenko, 1937), *C. bispina* (Borchsenius, 1949), *C. burumandi* Moghaddam, 2009, *C. echinata* (Balachowsky, 1930), **comb. nov.**, *C. insolita* (Green, 1908), *C. lubersaci* (Balachowsky, 1953), *C. maghribiensis* **sp. nov.**, *C. monicae* **sp. nov.**, *C. samui* Kozár et Konczné Benedicty 1997, *C. splendens* (Goux, 1946) and *C. zangheri* Kozár et Pellizzari, 1989.

Type material of the new species and redescribed species is preserved in the collection of Muséum National d'Histoire Naturelle, Paris (MNHN) or in the collection of Zoological Institute, Russian Academy of Sciences, St Petersburg (ZIN RAS) – see concrete notes below.

Key to Palaearctic species of *Coccidohystrix* (= *Artemicoccus*)

- 1(18). Trilocular pores scattered more or less evenly on all surface of body.
- 2(9). Mamelons are not developed at all or poorly developed on some tergites.
- 3(8). Groups of conical setae forming transverse rows on most tergites of body.
- 4(7). Dorsal tubular ducts of one size. On angiosperm herbs.
- 5(6). Conical setae are significantly smaller than large tubular ducts; bases of conical setae are about the same size as diameter of tubular ducts ***C. bispina***
- 6(5). Conical setae are larger or the same size as tubular ducts; bases of conical setae are about

- 2 times wider than diameter of tubular ducts ***C. lubersaci***
- 7(4). Dorsal tubular ducts of two sizes. On *Juni-perus* ***C. zangheri***
- 8(3). Groups of conical setae forming a row along body margin only, similar to cerarii; occasional conical setae present on dorsal side of thorax ***C. echinata* comb. nov.**
- 9(2). Mamelons well developed throughout the dorsum.
- 10(11). Dorsal tubular ducts numerous ***C. artemisiae***
- 11(10). Dorsal tubular ducts absent.
- 12(13). Ventral tubular ducts numerous. Multilocular and quinquelocular pores numerous ***C. insolita***
- 13(12). Ventral tubular ducts very few, present on last abdominal sternites only. Multilocular pores few or absent; quinquelocular pores few.
- 14(17). Hind tibia and tarsus without translucent pores.
- 15(16). Any setae, excluding large conical ones in mamelons, absent on dorsum Anal ring setae same size as diameter of anal ring ***C. splendens***
- 16(15). Minute conical setae present on dorsum between and near mamelons Anal ring setae significantly longer than diameter of anal ring ***C. samui***
- 17(14). Hind tibia and tarsus with few translucent pores ***C. burumandi***
- 18(1). Trilocular pores present near spiracles only.
- 19(20). Mamelons forming transverse rows on tergites. Cylindrical setae very short, about 2 times longer than wide ***C. maghribiensis* sp. nov.**
- 20(19). Mamelons absent; dorsal conical setae few, present along body margin only. Cylindrical setae long, more than 10 times longer than wide ***C. monicae* sp. nov.**

Coccidohystrix echinata

(Balachowsky, 1930), **comb. nov.**

(Fig. 1)

Balachowsky, 1930: 181 (*Ripersia*). Balachowsky, 1932: lxii (*Amonostherium*).

Material. *Lectotype* (designated here): adult female, **France**, *Alpes-Maritimes*, Cap d'Antibes, on *Fumana spachii*, A. Balachowsky, 10.VII.1929, MNHN 5247-2; *paralectotypes*: 6 adult females with the same collecting data,

MNHN 5247-1, 3–7; Cap d'Antibes, on *Fumana spachii*, A. Balachowsky, 8.VIII.1930, MNHN 5248; *Var*, Callian, on *Fumana spachii*, A. Balachowsky 25.VII.1931, MNHN 5676.

Description. Adult female. Body broadly oval, about 2 mm long. Antennae 7-segmented. Legs well developed, slender, without translucent pores. Claw with slight denticle. Anal apparatus complete, with inner row of pores, one (partly doubling) outer row of spinulae and 6 long setae. Multilocular pores few, forming transverse rows on V–VIII abdominal sternites. Quinquelocular pores forming transverse rows on abdominal sternites and sparsely scattered on sternites of cephalothorax. Trilocular pores scattered on all body surface and forming groups near spiracles. Simple tubular ducts slightly vary in size (they are similar in size or slightly shorter than large conical setae) scattered on all body surface. Large conical setae forming 15 groups with 1–3 setae along each margin of dorsum in place of real cerarii; some groups include also 1–2 smaller additional conical setae. Singular conical setae, similar in size with marginal ones present on dorsum of cephalothorax. On head 6 individual large conical setae present along margin in place of cerarii. Few single conical setae, similar in size with marginal ones present on dorsum of cephalothorax and abdomen. Long cylindrical setae evenly scattered on dorsum.

Males and morphology of larvae unknown.

Comments. To our mind this species is not related to the type species and other American species of the genus *Amonostherium* and must be considered in *Coccidohystrix*, in view of the presence of groups of large dorsal conical setae, peculiar cylindrical setae, characteristic “bottle-shaped” simple tubular ducts as well as an absence of ostioles and real cerarii (with trilocular or quinquelocular pores).

Distribution. Southeastern France: *Alpes Maritimes* and *Var*.

Mode of life. The species lives on *Fumana spachii* (Cistaceae).

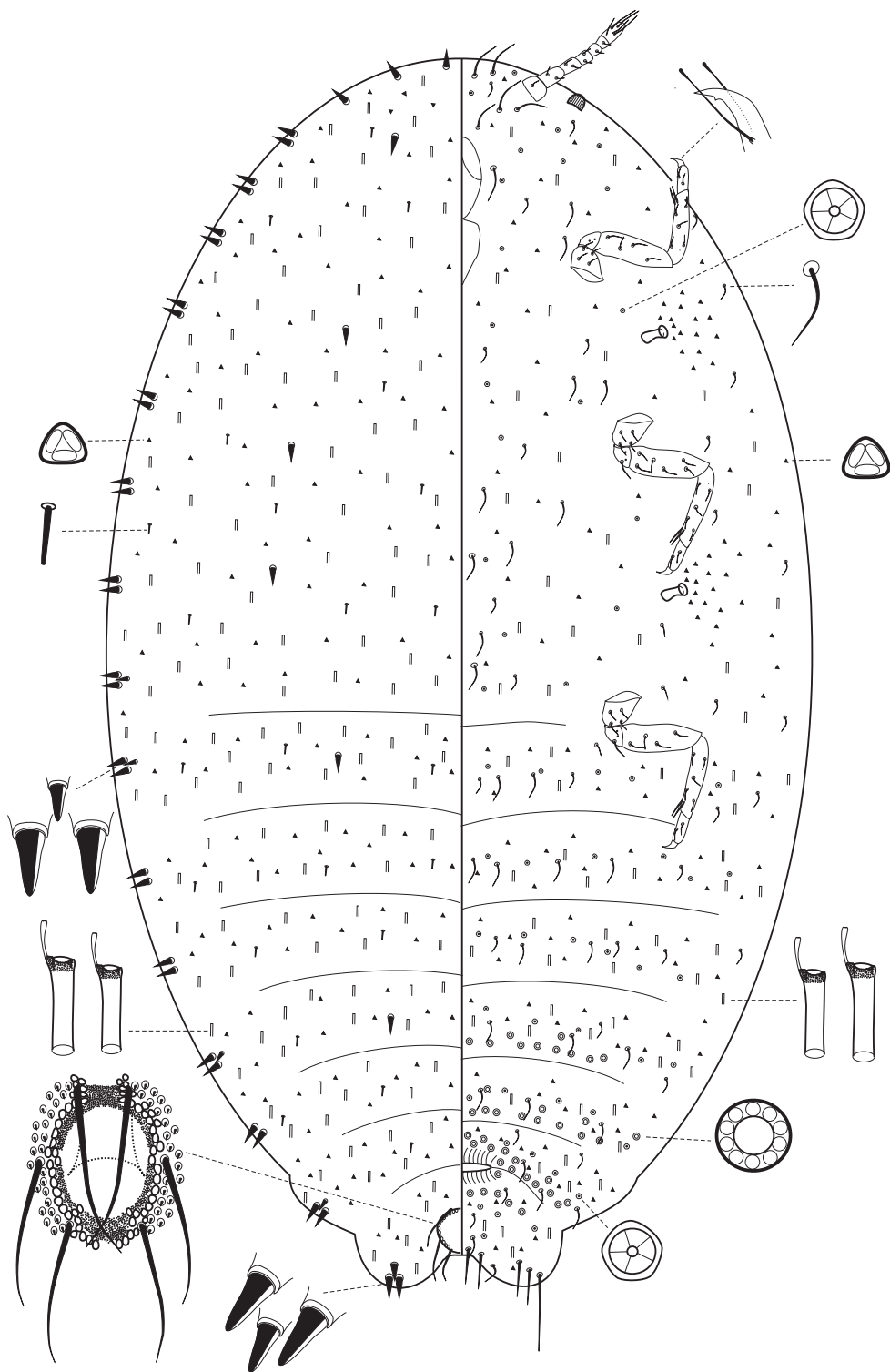


Fig. 1. *Coccidohystrix echinata*, **comb. n.**, paralectotype.

***Coccidohystrix maghribiensis* sp. nov.**
(Fig. 2)

Material. *Holotype*: adult female, **Morocco**, border of Sahara desert, 10 km South of Ouarzazate, oasis Fint, on undetermined dicotyledonous herb (perhaps *Veronica* sp.), 28.IX.2013, I. Gavrilov-Zimin; *paratypes*: 3 adult females with the same collecting data, ZIN RAS, K 1110.

Description. Adult female. Body broadly oval, about 2 mm long. Antennae 7-segmented. Legs well developed, slender, without translucent pores. Claw with a slight denticle. Anal apparatus complete, with inner row of pores, double outer row of spinulae and 6 long setae. Multilocular pores occasionally present on last abdominal tergite and forming transverse rows on five posterior abdominal sternites. Quinquelocular pores occasionally present on dorsum and scattered on all medial zone of ventrum. Trilocular (rarely 4-locular) pores present near spiracles only: 8–14 pores near each spiracle. Minute discoidal pores occasionally present on both body surfaces. Simple tubular ducts of three sizes; largest ones forming transverse rows on all tergites; medial and smaller ducts forming together transverse rows on abdominal sternites and present in small number on sternites of cephalothorax. Most of large conical setae present in mamelons in transverse rows on most tergites; each mamelon includes 2–5 conical setae; singular conical setae, similar in size with conical setae in mamelons or smaller also present on dorsum. Minute, almost cylindrical setae scattered on dorsum and grouping around each mamelon.

Males and morphology of larvae unknown.

Comments. This species as well as *C. monicae* sp. nov. differs from all other species of *Coccidohystrix* in the presence of very few trilocular pores, which can be found near spiracles only. In contrast to Tunisian species, *C. maghribiensis* shows numerous mamelons, scattered on dorsum and additionally very small dorsal setae instead of long cylindrical setae in *C. monicae*.

Etymology. The species name is derived from the geographical name “Maghreb” (Al-Mahgrib, in Arabic language) which is usually defined as much or most of the region of North Africa west of the Nile.

Distribution. Morocco, type locality only.

Mode of life. The females inhabit stems and leaf of undetermined plant (perhaps *Veronica* sp.).

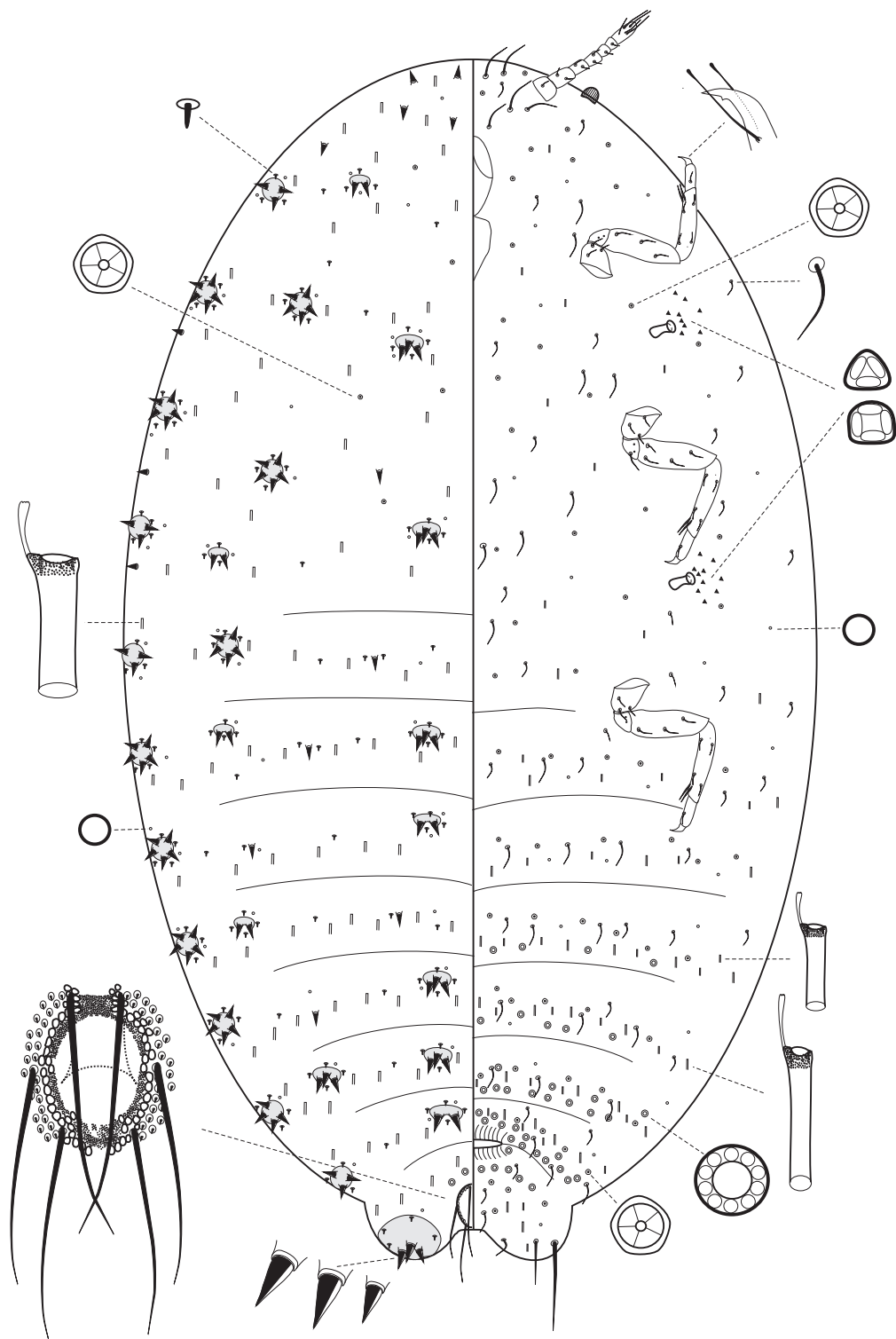
***Coccidohystrix monicae* sp. nov.**
(Fig. 3)

Material. *Holotype*: adult female, **Tunisia**, Kairouan, km 8, road from Ousseltia to Haffouz, on roots of *Paronychia* sp., 7.IV.1979, D. Matile-Ferrero, slide No 7747-1, MNHN.

Description. Adult female. Body broadly oval, about 2 mm long. Antennae 7-segmented. Legs well developed, slender, without translucent pores. Claw with slight denticle. Anal apparatus complete, with inner row of pores, one outer row of spinulae and six long setae. Multilocular pores forming transverse rows on five last abdominal sternites. Quinquelocular pores occasionally present on dorsum and scattered on all medial zone of ventrum. Trilocular (rarely 4-locular) pores present near spiracles only; 5–6 pores near each spiracle. Simple tubular ducts of three sizes; largest ones forming transverse rows on all tergites; medial and smaller ducts forming together transverse rows on five last abdominal sternites. Groups of large conical setae (each group with 2–3 setae) present on margin of dorsal surface of abdomen; some groups include also 1–2 smaller conical setae. Occasional small conical setae present only along margin of dorsal surface of thorax. Cylindrical setae evenly scattered on dorsum.

Males and morphology of larvae unknown.

Comments. This species as well as *C. maghribiensis* sp. nov. differs from all other species of *Coccidohystrix* in the presence of very few trilocular pores, which can be found near spiracles only. In contrast to *C. maghribiensis*, the Tunisian species shows



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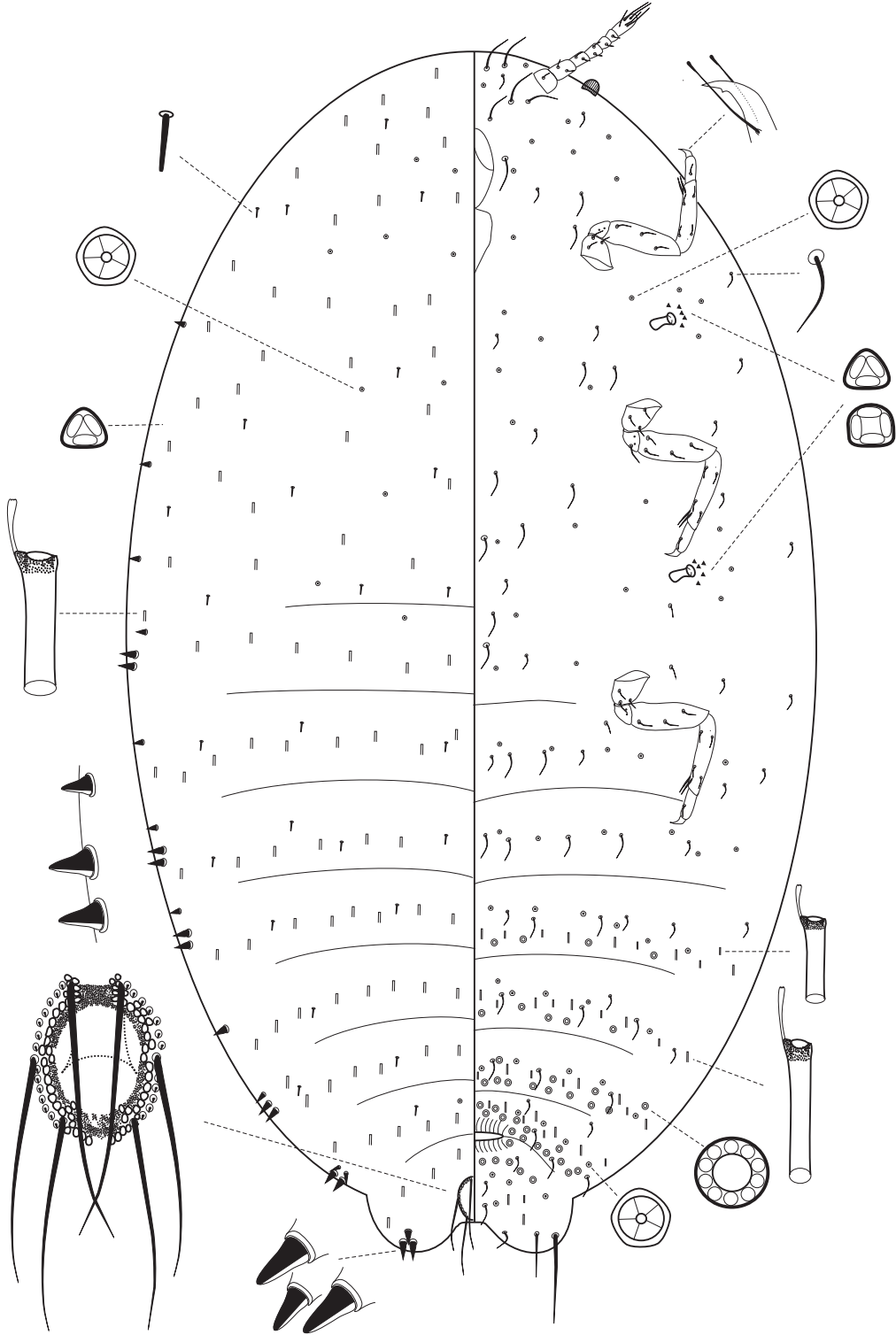


Fig. 3. *Coccidohystrix monicae* sp. nov., holotype.

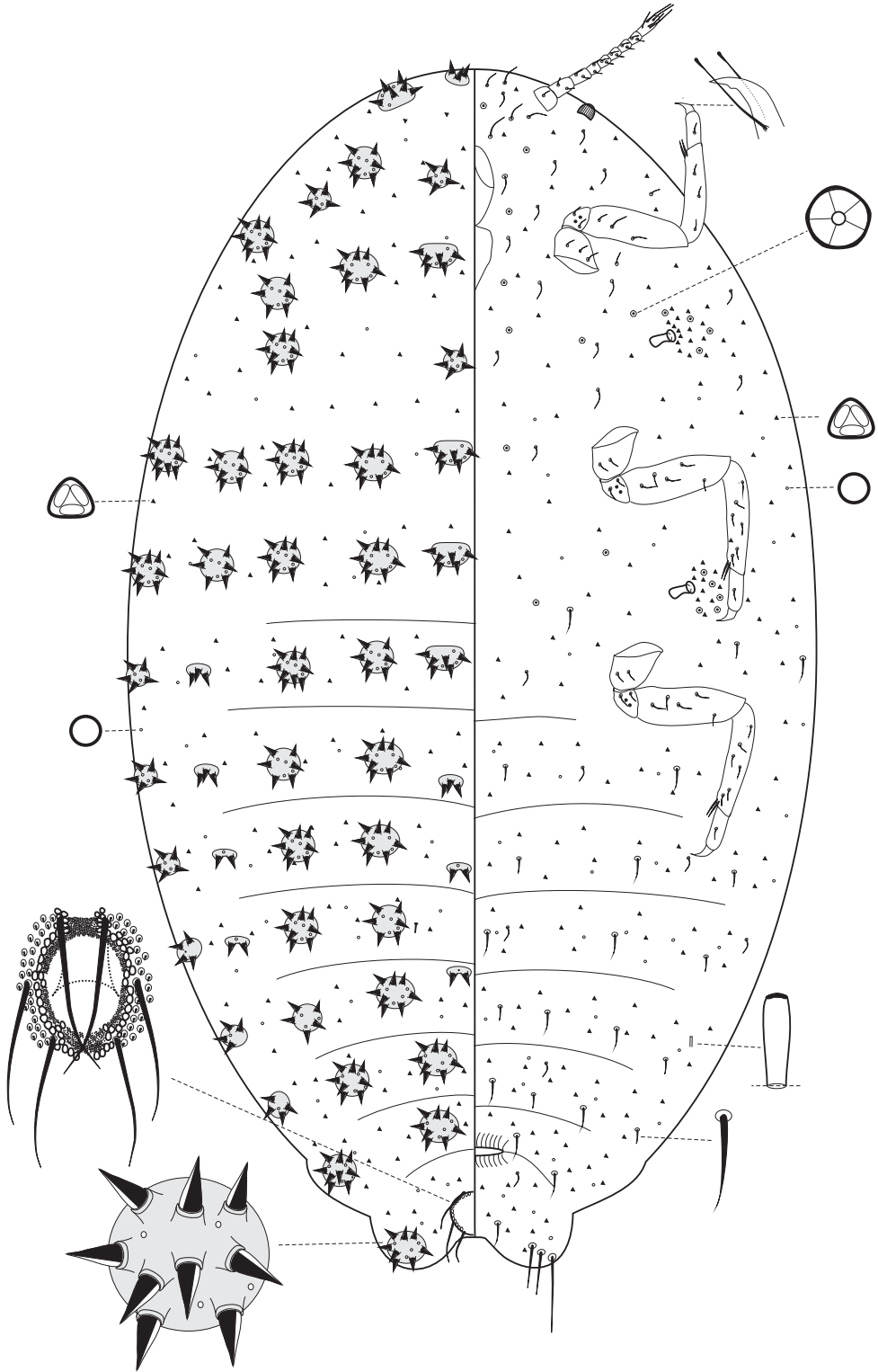


Fig. 4. *Coccidohystrix splendens*, holotype of *C. echinata*.

small number of conical setae, which are located along body margin only and are not grouped in mamelons.

Etymology. The species is dedicated to Monique Péricart, wife of the famous French hemipterist Jean Péricart. She was driving us during the entire trip in Tunisia from March 23 to April 17, 1979.

Distribution. Tunisia, type locality only.

Mode of life. The holotype female was collected on roots of *Paronychia* sp. (Caryophyllaceae).

Coccidohystrix splendens (Goux, 1946), a substitute name for *Coccidohystrix echinata* (Balachowsky, 1936), a junior secondary homonym of *C. echinata* (Balachowsky, 1930) (Fig. 4)

Balachowsky, 1936: 157 (*Echinococcus*). Lindinger, 1943: 219 (*Coccidohystrix*). Borchsenius, 1948: 953 (*Centrocooccus*).

Echinococcus splendens Goux, 1946. Balachowsky, 1953: 146 (*Centrocooccus*). Kozár & Walter, 1985: 68 (*Coccidohystrix*). **syn. nov.**

Material. Holotype of *C. echinata*, **Morocco**, Souss, Agadir (dunes), on roots of undetermined plant, Ch. Rungs, 4.III.1934, MNHN 5308. Holotype and 2 paratypes (2 slides) of *C. splendens*, **France**, Bouches-du-Rhône, Marseille, La Mardrague-de-Montredon, on *Cistus albidus*, L. Goux, 17.V.1946 (LG 1259) in MNHN.

Description. Adult female. Body elongate-oval, about 2 mm long. Antennae 8–9-segmented. Legs well developed, slender, without translucent pores. Claw with a slight denticle. Anal apparatus complete, with inner row of pores, one outer row of spinulae and six setae, which are slightly longer than diameter of anal ring. Multilocular pores absent. Quinquelocular pores few, present in medial zone of ventral surface of cephalothorax and near spiracles. Trilocular pores scattered on all body surface and forming groups near spiracles. Minute discoidal pores scattered on both body surfaces and present in marginal and dorsal mamelons. Single tubular duct pres-

ent on posterior abdominal sternites (in holotype of *C. echinata*). Holotype of *C. splendens* possess several tubular ducts. Large conical setae present only in mamelons, which forming transverse rows on tergites of body, each bearing 2–9 conical setae. Any dorsal setae outside of mamelons absent.

Males and morphology of larvae unknown.

Comments. We have studied all type series of *C. splendens* (Goux) (holotype and two paratypes). These females differ from the holotype of *C. echinata* in smaller number of antennal segments only (8 instead of 9). However, the number of antennal segments is one of the most variable characters of mealybugs; it always varies in large series of females. In the result, we consider *C. splendens* as a junior synonym, but use it as a substitute name for *Coccidohystrix echinata* (Balachowsky, 1936) which is a junior secondary homonym of *C. echinata* (Balachowsky, 1930).

Distribution. Southeastern France, Morocco, Central Italy: Abruzzes (Marotta, 1990). Schmutterer (1956) reported it from Germany.

Mode of life. The species was originally collected from roots of an undetermined plant; in France it was found on *Cistus albidus*. Marotta (1990) found the species on roots of an unknown Compositae. Oviparous species; holotype female of *C. echinata* includes numerous totally developed first-instar larvae inside of the body.

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