Mealybugs of the genus *Rhodania* Goux, 1934 (Homoptera: Coccinea: Pseudococcidae) from Russia and neighbouring countries

Мучнистые червецы рода *Rhodania* Goux, 1934 (Homoptera: Coccinea: Pseudococcidae) России и сопредельных стран

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A taxonomic revision of the genus *Rhodania* is given, including the original key for all 5 nominal species of the genus and a figure of the type species, *Rh. porifera* Goux, 1934, from Teberda (North Caucasus, Russia). Two species, *Rh. porifera* and *Rh. festucae* Hadzibejli, 1959 are noted for the territory of Russia and neighboring countries. The morphological variation of these species is discussed.

Статья представляет собой таксономическую ревизию рода *Rhodania* и включает оригинальный определительный ключ для всех пяти номинальных видов, а также рисунок типового вида *Rh. porifera* Goux, 1934, изготовленный на основе материала из Теберды (Северный Кавказ, Россия). На территории России и сопредельных стран отмечены два вида, *Rh. porifera* и *Rh. festucae* Hadzibejli, 1959, морфологическая изменчивость которых обсуждается в статье.

Key words: mealybugs, *Rhodania*, morphology, taxonomy

Ключевые слова: мучнистые червецы, *Rhodania*, морфология, таксономия

This paper is part of a series of papers of E.M. Danzig and I.A. Gavrilov on a comprehensive revision of the family Pseudococcidae from the territory of Russia and adjacent countries. All material studied is deposited in Zoological Institute, Russian Academy of Sciences.

Genus ***Rhodania*** Goux, 1934

Rhodania Goux, 1934: 291
Rhodania – Goux, 1936: 39; Borchsenius, 1949: 187; Tereznikova, 1975: 254; Ter-Grigorian, 1973: 113; Kosztarab, Kozár, 1988: 146.

Type species: *Rhodania porifera* Goux, France, by original designation.

Adult female. Body egg-shaped or broadly oval. Eyes present. Antennae 6 or 7-segmented. Legs well developed; claw usually without denticle. Ostioles and circuli present. Anal ring broadly oval, heavy sclerotized, with pores and 6 short setae. Trilocular pores absent. Quinque- and 6-locular pores present. Tubular ducts of one type only – with deep collar. Cerarii and conical setae absent. Thin flagellate setae present on both body sides.

Males are known for three species: *Rh. porifera* Goux, 1934, *Rh. flava* Goux, 1936 и *Rh. festucae* Hadzibejli, 1959 (see original descriptions).

The genus has Palaearctic distribution and includes six nominal species: *Rh. aeluropi* Williams & Moghaddam, 2007, *Rh. festucae* Hadzibejli, 1959, *Rh. flava* Goux, 1936, *Rh. hypogea* (Leonardi, 1908), *Rh. occulta* Schmutterer, 1952 and *Rh. porifera* Goux, 1934. Meanwhile, *Rh. hypogea*,

originally described in the genus *Ripersia* Signoret, 1875, was tentatively transferred to *Rhodania* by Kozár and Walter (1985). I suppose, that this species does not belong to *Rhodania* because Leonardi (1920) clearly illustrated conical setae on C_{18}, which are always absent in *Rhodania*; moreover, the anal ring on the Leonardi' figure significantly differs from the anal rings of other *Rhodania* species.

The recently described *Rh. aeluropi* differs from other species in several noticeably characters (see original description); to my opinion, the most important of these characters is the presence of pointed conical digitules in contrast to clavate ones in other species of the genus. Usually this character shows constant intrageneric stability and is often stable in related genera or even in groups of related genera.

Formally only two species of the genus were noted in the territory of Russia and neighbouring countries – *Rh. porifera* and *Rh. festucae*. However, the other species can be theoretically collected in the region, thus they have been included in the following identification key.

Key to species of *Rhodania*

1(8) Claw digitules clavate.
2(5) Diameter of 5 and 6-locular pores significantly bigger than diameter of tubular duct openings.
3(4) Antennae 7-segmented, hind tibiae enlarged ..... ***Rh. porifera***
4(3) Antennae 6-segmented; hind tibiae approximately the same size as fore and median ones ..... ***Rh. occulta***
5(2) Diameter of 5 and 6-locular pores significantly smaller than diameter of tubular duct openings.
6(7) Antennae 6-segmented ..... ***Rh. flava***
7(6) Antennae 7-segmented ..... ***Rh. festucae***
8(1) Claw digitules pointed ..... ***Rh. aeluropi***

Rhodania porifera Goux, 1935
(Figs 1, 2)

Fonscolombia radicicola Kiritshenko, 1931: 312 (nomen nudum).

Rhodania porifera Goux, 1935: 291 (France)
Rhodania porifera – Borchsenius, 1949: 187; Tereznikova, 1975: 254; Ter-Grigorian, 1973: 113; Kosztarab, Kozár, 1988: 147; Gavrilov, 2003: 109.

Material examined. Twelve series (about 100 females); **Russia** (Voronezh Province, Upper Volga Area, North Caucasus, Yakutia), **Transcaucasia**, **Ukraine**, **Kazakhstan**, **Mongolia**.

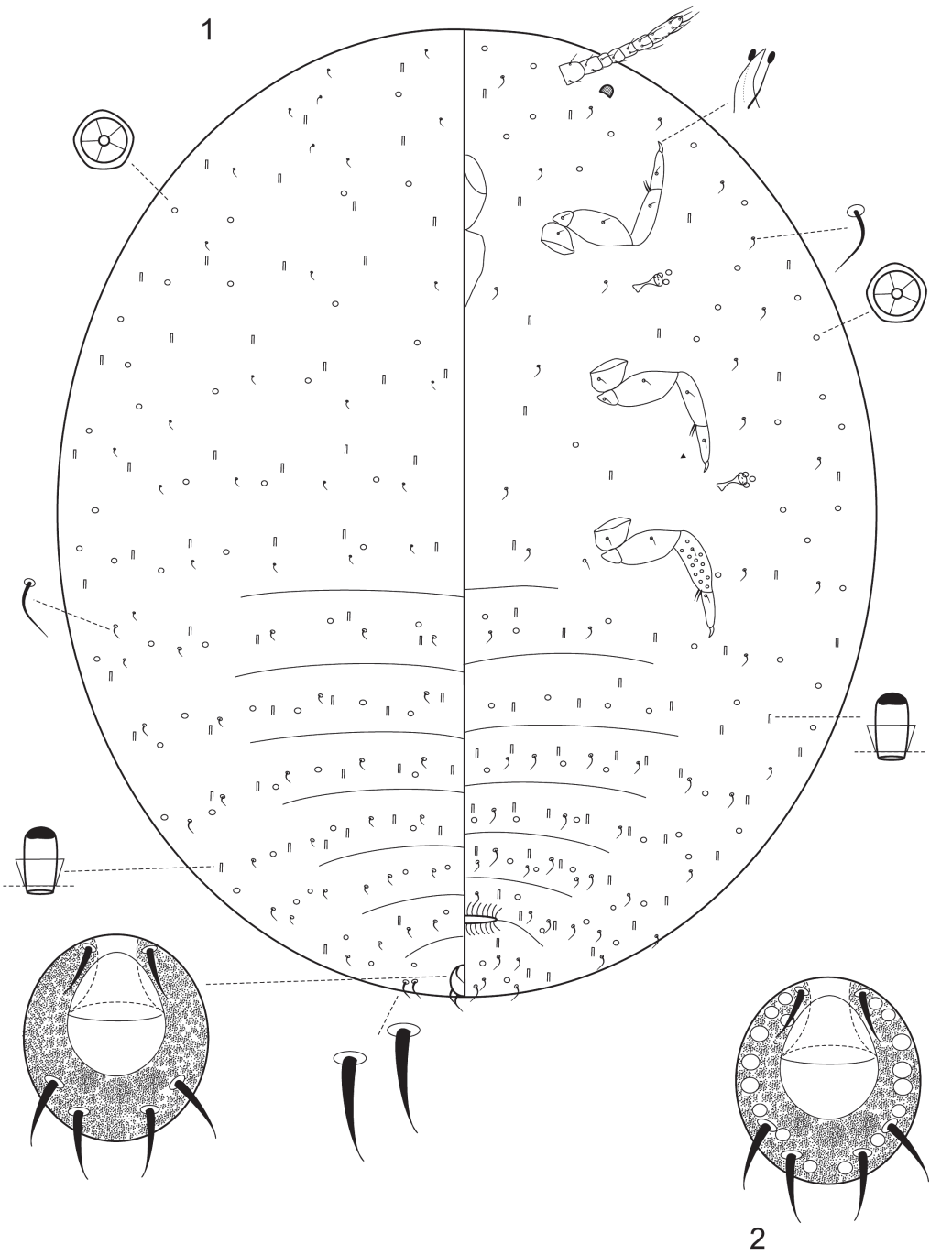
Adult female. Body of live female pinkish, round or broadly oval, 1.5–2.5 mm long and 1–2 mm wide. Antennae 7-segmented. Peritremes with several 5-locular pores each. Claw usually without a denticle, however, two females from Kazakhstan (Dzhanybek) have small denticles in contrast to other females collected in the same place. Hind tibiae enlarged, with numerous translucent pores.

Most descriptions of this species note the presence of numerous pores on the anal ring. However, in the material of the collection at the Zoological Institute RAS (see below), the number of these pores can significantly vary from 0 to 30 per anal ring. Diameter of pores is also variable. Quinque- and 6-locular pores, about 4–5 μm in diameter, numerous on both body surfaces. Tubular ducts (about 5 μm long and 2 μm wide at their openings) with deep collar, numerous on both body surfaces. Short and thin flagellate setae present on both body surfaces.

Adult male (briefly after Goux, 1934). Body of live male pink, about 800 μm long, with two short (approximately 2 times longer than aedeagus) wax filaments surpassing the apex of abdomen. Head with three pairs of simple eyes. Antennae 10-segmented. Wings well developed.

For the description of the larvae of both sexes see Goux (1934), and for the second instar female larva see also Tereznikova (1975).

Taxonomic notes. In the original description and a subsequent paper, Goux (1935, 1936) noted the absence of quinquelocular pores as a diagnostic feature of *Rh. porifera*. Borchsenius (1949), based on the Goux (1935, 1936) descriptions, supposed even



Figs 1–2. *Rhodania porifera*, adult female. **1**, total view (Teberda (North Caucasus, Russia)); **2**, anal ring (Armenia).

that the material from USSR could be a separate species. However, in all subsequent descriptions of this species by other European authors and in all specimens herein studied there are several quinquelocular pores around the peritreme, so it is likely that Goux (1935) overlooked this feature.

Distribution. Russia (known from Voronezh, Volgograd and Orenburg provinces, Krasnodar region, Karachaevo-Cherkessia, Yakutia), France, Germany, Poland, Italy, Turkey, Ukraine, countries of Transcaucasia, Kazakhstan, Mongolia.

Mode of life. It lives on small roots of different gramineous plants and sedges, most often on Festuca spp. Wintering, probably, as imago.

Rhodania festucae Hadzibejli, 1959

Rhodania festucae Hadzibejli, 1959: 65 (Georgia).

Material examined. Syntype, a half of molting larva, slide 82–50; **Eastern Georgia**, Dzhavacheti, pasture, 2 Sept. 1950; coll. Z. Hadzibejli.

Adult female (briefly after Hadzibejli, 1959). Body of live female pink, egg-shaped, up to 1.3 mm long and up to 1 mm wide. Antennae 7-segmented. Legs with very large tibiae. Trochanters, femora and tibiae with small translucent pores. Anal ring with 20–25 small pores. Quinquelocular pores numerous on both body sides and forming together with tubular ducts broad bands on abdominal segments. Tubular ducts of two sizes; smaller ones present near spiracles and on cephalothorax only.

Adult male (briefly after Hadzibejli, 1959). Body of live male deep-pink. Abdomen broadly oval. Antennae 10-segmented; all antennal segments with flagellate setae; two apical segments with special sensorial setae of approximately the same size as hair-like setae. Two pairs of simple eyes of equal size present. Legs thin; hind coxa: 33.6 μm long, hind trochanter: 47.6 μm long, hind femur: 98 μm long, hind tibia: 168 μm long, hind tarsus: 61.6 μm long and hind claw: 22.4 μm long. Two pairs of cerarii present; each with 20 to 25 quinquelocular pores of different sizes and paired flagellate setae.

Taxonomic notes. The original description of this species was published in Georgian and was inaccessible for most coccidologists for many years. Fortunately, in the Zoological Institute of the Russian Academy of Sciences there is a hand-written Russian translation of this description, prepared by Hadzibejli herself. Based on this translation, the discussed nominal species does not have diagnostic differences with the previously described *Rhodania flava*. The single concrete difference, 7-segmented antennae (in contrast to 6-segmented in *Rh. flava*), was not used as a diagnostic character by Hadzibejli herself, probably because this feature was variable in the type series. One syntype (it is the only material present in the collection of the Zoological Institute), written in Hadzibejli's handwriting as "one half of female", is a molting larva and has 6-segmented antennae. Furthermore, Hadzibejli (1959) pointed out the presence of males in *Rh. festucae* in contrast to *Rh. flava* which she thought had no males. However, this argument is incorrect, because Goux (1936) described the second instar larva of the male of *Rh. flava*. So, it is likely that the species of Hadzibejli is a junior synonym of Goux's species. However, without having studied all the type material, the formal synonymisation of *Rh. festucae* with *Rh. flava* has been avoided here.

Distribution. The species is known from Georgia only.

Mode of life. It occurs under leaf sheaths of Festuca sulcata.

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