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A systematic study of *Peliococcus* Borchsenius (Hemiptera: Coccoidea: Pseudococcidae), with descriptions of a new Palaearctic genus and four new species from Turkey

MEHMET BORA KAYDAN

Imamoglu Vocational School, Çukurova University, Adana, 01330, Turkey. E-mail: bkaydan@cu.edu.tr

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Abstract

Within the Phenacoccinae (Hemiptera: Coccoidea: Pseudococcidae), there are four nominal genera that include species with clusters or groups of multilocular disc pores and/or oral collar tubular ducts of more than one size, namely *Peliococcus* Borchsenius (= *Spinococcus* Borchsenius and *Eupeliococcus* Săvescu), *Peliococcopsis* Borchsenius, *Erimococcus* Ezzat, and *Seyneria* Goux. This study analysed molecular data (from the mitochondrial gene cytochrome oxidase I, *COI*, and a fragment of the *D*₂ and *D*₃ regions of the large subunit ribosomal DNA gene, *28S*) from Palaearctic species of *Peliococcus*, *Peliococcopsis* and a new genus, *Pelionella* Kaydan to demonstrate: (i) that *Peliococcus* and several morphologically similar genera do not form a monophyletic group; (ii) *Peliococcus*, as currently understood, is not monophyletic, and (iii) the structure of the multilocular disc pores is important for recognising the systematic position of these genera. The morphological data were fitted to the molecular tree to allow reassessment of the generic classification and to produce mor-

phological diagnoses of the genera. Five species have been moved to the genus *Erimococcus* Ezzat: *Peliococcus kimmericus* Kiritchenko, *P. montanus* Bazarov & Babaeva, *P. multitubulatus* (Danzig), *P. salviae* Hadzibejli and *P. talhouki* Matille-Ferrero, as *E. kimmericus* (Kiritchenko) **comb. nov.**, *E. montanus* (Bazarov & Babaeva) **comb. nov.**, *E. multitubulatus* (Danzig) **comb. nov.**, *E. salviae* (Hadzibejli) **comb. nov.** and *E. talhouki* (Matille-Ferrero) **comb. nov.** In addition, a new species of *Erimococcus* is described, namely *Erimococcus ozani* Kaydan **sp. nov.** Also *Peliococcus ilamicus* Moghaddam **syn. nov.** is recognised as a junior synonym of *Phenacoccus kimmericus* Kiritchenko (previously in *Peliococcus*, now in *Erimococcus*). A new genus, *Pelionella* **gen. nov.** is introduced to take nine species, namely *Peliococcus balteatus* Green, *P. cycliger* Leonardi, *P. manifestus* Borchsenius, *P. stellarocheae* Goux, *P. glandulifer* Borchsenius, *P. tritubulatus* Kiritchenko, *P. sablius* Goux, *P. grassianus* Goux, *P. proeminens* Goux, as *Pelionella balteata* (Green) **comb. nov.**, *Pelionella cycliger* (Leonardi) **comb. nov.**, *Pelionella manifestata* (Borchsenius) **comb. nov.**, *Pelionella stellarocheae* (Goux) **comb. nov.**, *Pelionella glandulifer* (Borchsenius) **comb. nov.**, *Pelionella tritubulata* (Kiritchenko) **comb. nov.**, *Pelionella sablia* (Goux) **comb. nov.**, *Pelionella grassiana* (Goux) **comb. nov.** and *Pelionella proeminens* (Goux) **comb. nov.** In addition, two species are described as new: *Pelionella multipora* Kaydan **sp. nov.** and *Pelionella kansui* Kaydan **sp. nov.** Three species, namely *Peliococcus daganiae* (Bodenheimer), *P. orientalis* Bazarov and *Spinococcus giuliae* Pellizzari, are transferred to *Phenacoccus* as: *Phenacoccus daganiae* (Bodenheimer), **comb. nov.**, *Phenacoccus orientalis* (Bazarov), **comb. nov.** and *Phenacoccus giuliae* (Pellizzari), **comb. nov.** Three new species synonymies are recognised: *Peliococcus deserticola* Ben-Dov & Gerson **syn. nov.** of *Peliococcus cycliger* Leonardi (now *Pelionella cycliger*), *Peliococcus albertaccius* Goux **syn. nov.** of *Peliococcus manifestus* Borchsenius (now *Pelionella manifestata*) and *Peliococcus lycicola* Tang **syn. nov.** is recognised as a junior synonym of *Peliococcus chersonensis* Kiritchenko. In addition, a new *Peliococcus* species is described, namely *Peliococcus agriensis* Kaydan **sp. nov.**

Key words: new species, molecular phylogeny, multilocular disc pores, pore/duct clusters

Introduction

The common name mealybug is now used to describe members of two families, the Pseudococcidae and Rhizoecidae (Sternorrhyncha: Hemiptera: Coccoidea). These two families form the second largest scale insect family group worldwide, with over 2000 species in 270 genera (Ben-Dov *et al.*, 2014), of which 700 species in 106 genera are known from the Palearctic region (Kozár, 1998). The family group is characterized by the white mealy or powdery wax that covers the soft body of the insects (Williams, 1985, 2004; Gullan & Martin, 2009). Mealybugs feed on a variety of woody and herbaceous plants including deciduous trees and conifers, although most are found on herbaceous plants and grasses. Often these insects are specific to a feeding site such as leaves, stem, roots, etc. A number of species are found only under the leaf sheaths of Poaceae, whereas species of Rhizoecidae are mostly confined to the roots. The Pseudococcidae or true mealybugs are considered to consist of two subfamilies, namely Pseudococcinae and Phenacoccinae (Hardy *et al.*, 2008; Kaydan *et al.*, *in press*).

Within the Phenacoccinae, there are four nominal genera that include species with peculiar clusters or groupings of multilocular disc pores and/or oral collar tubular ducts of more than one size, namely *Peliococcus* Borchsenius (= *Spinococcus* Borchsenius and *Eupeliococcus* Săvescu; see below), *Peliococcopsis* Borchsenius, *Erimococcus* Ezzat, and *Seyneria* Goux. Danzig & Gavrilov-Zimin (2014) consider these genera, together with a new genus described here, to form their 'generic group *Peliococcus*' or the *Peliococcus* group of genera, which they suggested originated from *Phenacoccus* Cockerell. The largest genus, *Peliococcus*, is found mainly in the Palearctic and, more especially, an Irano-Turanian and Mediterranean distribution (Danzig, 2001). *Peliococcus* shows considerable variation in its main taxonomic characters. Thus, most *Peliococcus* species have cerarii of the usual type, similar to the cerarii on the majority of other mealybug genera (according to Danzig (2001), who referred to this type of cerarius as “*Peliococcus* type”), but in some cases (the type species of *Peliococcus* and species included previously in *Spinococcus*), each cerarius is on an elevated area with two enlarged conical setae situated close together, and with trilocular pores closely associated with the base of the enlarged setae, sometimes even touching the basal socket (Danzig, 2001) (Fig. 1b). The dorsal setae of these species are somewhat conical, and are similar to or smaller versions of cerarian setae, and are arranged in transverse rows. The synonymy of *Peliococcus* and *Spinococcus* was established by Danzig (1980) due to the total overlap of the generic diagnoses of these two genera and the close similarity of the type species, namely *Peliococcus chersonensis* (Kiritchenko) and *Spinococcus marrubii* (Kiritchenko). However, *Spinococcus* is still included as a valid genus in the catalogue of Ben-Dov (1994) and in ScaleNet (Ben-Dov *et al.*, 2014). *Eupeliococcus* was described by Săvescu (1985) with two species from Romania, but Săvescu did not designate a type species and, therefore, according to Article 13.3 of the

Venter. Setae of 2 types: (i) relatively short, slender hair-like setae, each 15–50 µm long; longest medially on head; and (ii) spine-like setae, each 5.0–7.5 µm long, in submarginal rows. Apical setae of anal lobes 135–145 µm long. Multilocular disc pores of 2 kinds: (i) pores, each 7–9 µm in diameter with a single ring of loculi, present in single rows on abdominal segments as follows: V 2–4, VI 34–36, VII 58–61, VIII + IX 22–29; and (ii) pores, each 6.0–7.5 µm in diameter with 2 rings of loculi, in clusters similar to those on dorsum; each cluster with 1–3 (usually 2) multilocular disc pores, a single small oral collar tubular duct, 9–10 µm long, 2–3 µm wide in centre, and 2–3 large oral collar tubular duct, each 7.5–9 µm long, 4–5 µm wide, among disc pores, plus 0–2 minute discoidal pores, each 2.0–2.5 µm in diameter; clusters present submarginally on most abdominal segments and medially on abdominal segments III and IV. Quinquelocular pores, each 5–6 µm in diameter, present medially on head, thorax and abdominal segments I–VI. Trilocular pores, each 3–4 µm in diameter, scattered throughout except medially. Minute discoidal pores, each 2 µm in diameter, few. Oral collar tubular ducts of 3 sizes: largest and smallest ducts in clusters as on dorsum; medium-sized ducts, each 10–11 µm long, 3–4 µm wide, present on body margins and in single rows on abdominal segments as follows: V 32–42, VI 35–45, VII 32 or 33, VIII + IX 25–27.

Comments. *P. stellarocheae* differs from all other species in the genus in having a reduced number of marginal cerarii. Cerarii are present on head and abdomen but are reduced or absent on the pro- and mesothorax.

Danzig & Gavrilov-Zimin (2014) used the name "*Pelionella stellarocheae*" before the genus name was made available in the present work. Refer to Comments under the genus *Pelionella* above for further information. Danzig & Gavrilov-Zimin (2014) listed "*Pelionella stellarocheae*" citing "Kaydan 2014?", without suggesting that this was a new combination. Here the new combination is made available in a manner that satisfies the requirements on the Code (ICZN, 1999). Danzig & Gavrilov-Zimin (2014) also reproduced Fig. 18 with minor (the illustration of multilocular disc pores) modification as their figure 2.1.3-31.

Host plants. On *Mentha* sp. (Lamiaceae).

Distribution. France (Rhône, Bessenay).

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