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New and earlier unnoted mealybugs and felt scale (Homoptera: Coccinea: Pseudococcidae, Eriococcidae) from Morocco

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Summary. Two new species of mealybugs (Pseudococcidae), *Puto (Ceroputo) chetverikovi* n. sp. and *Fonscolombia toubkalensis* n. sp., are described and illustrated. Thirteen other species are noted for the first time to fauna of Morocco or to Africa as a whole. Additionally, one species of closely related family Eriococcidae, *Acanthococcus ericae* (Signoret, 1875), is also reported for the first time to Morocco.

Résumé. Cochenilles nouvelles ou non encore répertoriées du Maroc (Homoptera : Coccinea : Pseudococcidae, Eriococcidae). Deux nouvelles espèces de Cochenilles (Pseudococcidae), *Puto (Ceroputo) chetverikovi* n. sp. et *Fonscolombia toubkalensis* n. sp., sont décrites et illustrées. Treize autres espèces sont citées pour la première fois du Maroc ou de l'Afrique dans son ensemble. En outre, une espèce appartenant à une famille étroitement associée aux Eriococcidae, *Acanthococcus ericae* (Signoret, 1875), est également signalée pour la première fois au Maroc.

<http://zoobank.org/urn:lsid:zoobank.org:pub:4BDC0B86-6749-438E-AE6C-E8AD0649A17A>

Keywords: scale insects; taxonomy; morphology; new species

Mealybugs or Pseudococcidae (one of the two largest scale insect families) of North-Western Africa are significantly less known in comparison with other territories of Palaearctic, as was demonstrated in the recent total review of the Palaearctic fauna of the family (Danzig & Gavrilov-Zimin 2014, 2015). The main collections of these sap feeding insects in Morocco, Algeria, Tunisia and Libya ("countries of Maghreb") were by French specialists: S. Balachowsky, S. Rungs, P. Vayssière and L. Goux (Balachowsky 1930, 1936, 1938, 1952; Vayssière 1932, 1933; Goux 1938; Rungs 1948). As a result, only 18 species of mealybugs were known up to now from Morocco, which is probably less than 20% of the real species diversity. The faunistic data for Algeria, Tunisia and Libya are similar or even less complete. Conversely, about 130 species of mealybugs are known in South France and about 110 species in South Italy (ScaleNet online database – García et al. 2015). At the same time the fauna of North-Western Africa is especially interesting, because this territory is a border between two large natural regions, Mediterranean-Macaronesian and Saharo-Arabian, both with a lot of endemics of generic and specific ranks. In 2013 the present author visited Morocco and during short collecting trips (three localities only) was able to find and note four species new for the region and one species new to

science (Danzig & Gavrilov-Zimin 2014, 2015; Gavrilov-Zimin & Matile-Ferrero 2014). The present paper provides the results of my second expedition in Morocco in June 2015 (two species new to science and 13 species new for Morocco) and also reports the exact collecting data for four species, noted by me earlier for Morocco without such data (Danzig & Gavrilov-Zimin 2014, 2015). Thus, after both my expeditions, the number of known species in mealybug fauna of Morocco has doubled and now comprises 36 species.

Additionally, one species of scale insect family Eriococcidae (closely related to mealybugs) is also reported here for the first time to Morocco (see below).

Material and methods

The exact collecting data are provided below for each species. The general information about collecting trips is as follows. First expedition to Morocco: September–October 2013, Toubkal National Park (Asni and Imlil), Ouarzazate and oasis Fint. Second expedition: June 2015, Aourir, Inraren ("Paradise valley"), Toubkal National Park (Imlil), vicinity of Tanger (coast of Strait of Gibraltar).

Material is deposited in Zoological Institute, Russian Academy of Sciences (ZIN RAS), Natural History Museum, London (BMNH) and Muséum national d'Histoire naturelle, Paris (MNHN).

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The numbers with “K” mean unique collecting numbers on tubes with ethanol material and on appropriate slides.

The method of slide preparation was described earlier in detail in my previous publications (see, for example, Danzig & Gavrilov-Zimin 2014).

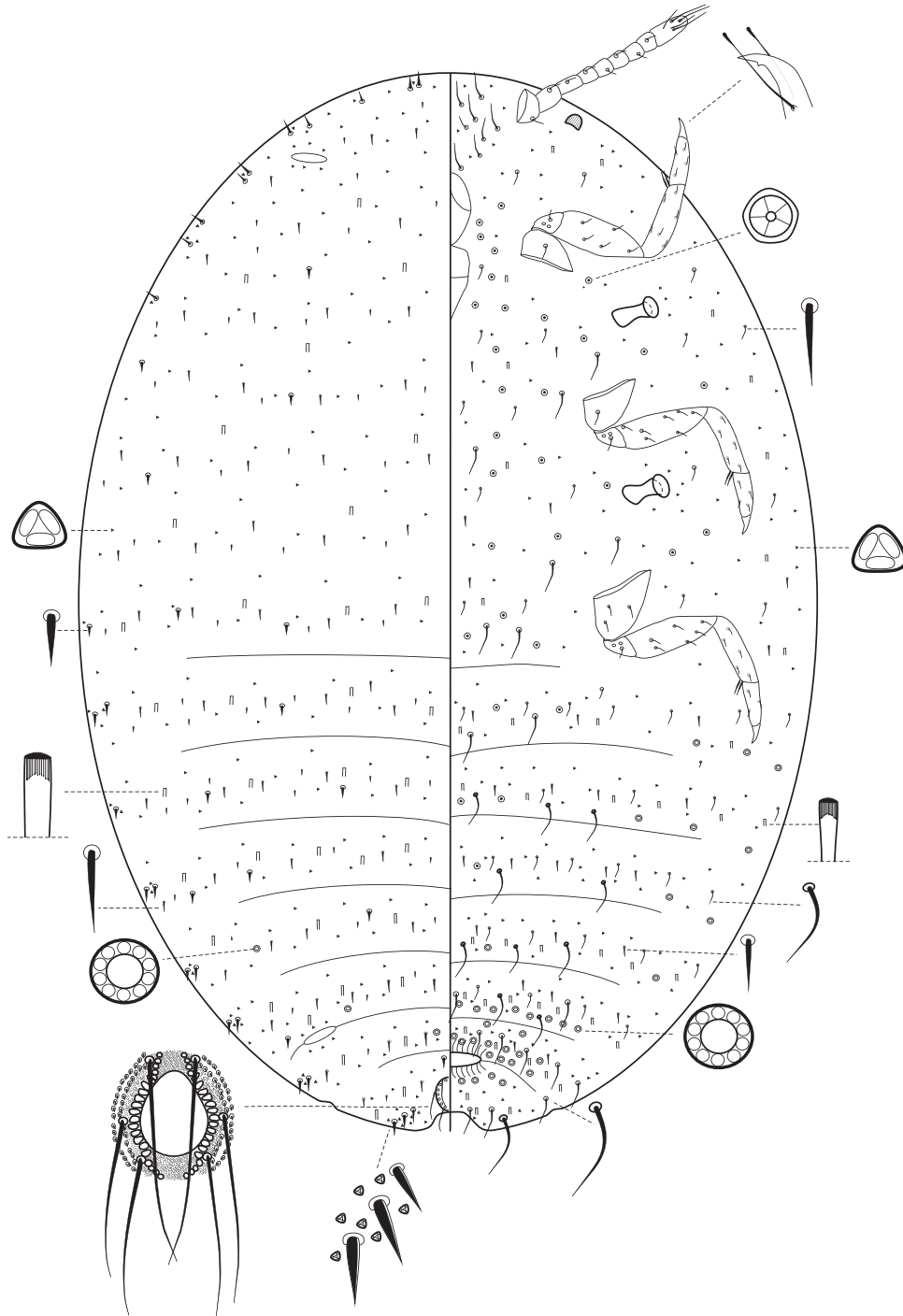


Figure 1. *Fonscolombia toubkalensis* n. sp., holotype.

Results and discussion

Descriptions of two new species (family Pseudococcidae)

Fonscolombia toubkalensis n. sp. (Figure 1)

Material. Holotype, female, K 1256, Morocco, Toubkal National Park, Imlil, on stem and rhizome of *Cladanthus scariosus* (Ball, 1873), 11.VI.2015, I. Gavrilov-Zimin, female in black circle on the slide. Paratypes: 9 females with the same collecting data and with two other collecting numbers: K 1090, 18.IX.2013 and K 1263, 12.VI.2015, both differ from the holotype in the collecting dates only. Holotype and 7 paratypes are preserved in ZIN RAS; one paratype – in BMNH and one paratype – in MNHN.

Description. Female. Body broadly oval, up to 2.5 mm long, pink in life. Antennae 9-segmented. Legs small, without translucent pores, with 2 sensilla on each side of trochanter; claw with a denticle. Anal apparatus complicated, with one inner row of pores, double outer row of spinulae and 6 setae which are about 1/5 times longer than diameter of anal ring. Both pairs of ostioles present. Circulus absent. Multilocular pores numerous around vaginal opening, sparsely present on posterior abdominal tergites and in marginal zone of abdominal sternites. Quinquelocular pores scattered in medial and submedial zone of thoracic and anterior abdominal sternites. Trilocular pores evenly scattered on all body surface. Simple tubular ducts of two sizes: larger ducts scattered on all dorsum; smaller ducts forming transverse rows on abdominal sternites and sparsely present on cephalothoracic sternites. Cerarii vary in number: 4–5 pairs on abdominal tergites usually well defined; each cerarius with 2 thin conical setae and several trilocular pores; other cerarii poorly distinguishable from usual dorsal conical setae and more or less clearly visible on head and thorax in some specimens of the type series. Dorsal surface of body covered by conical setae similar in size with cerarian ones and by short flagellate setae; ventral surface of body covered by longer and thinner flagellate setae of different size.

Males and morphology of larvae unknown.

Comments. A revision of the genus *Fonscolombia* Lichtenstein 1877 and a nearest genus *Phenacoccus* Cockerell 1893 was provided in the first volume of our “Palaeartic mealybugs” (Danzig & Gavrilov-Zimin 2014). The new species seems to be very similar with *F. herbacea* (Danzig 1971), known from the Eastern Palaeartic (Russian Siberia, Kazakhstan, Mongolia and China), and differs from the last in the absence of circulus, presence of occasional multilocular pores on dorsum and in pink color of live females in contrast to yellow females in *F. herbacea*. All

these characters are usually rather variable in mealybugs and perhaps the new species is in fact a western subspecies of *F. herbacea* that will be clarified in further coccidological studies.

Females of *F. toubkalensis* seem to be incompletely ovoviviparous. Six dissected females had eggs at different stages of development (including embryos with mouthparts) inside of the body and started to form wax ovisacs. Thus, the oviposition probably occurs at late phases of embryogenesis and eggs lay in ovisac some time before hatching of the larvae – the situation is well known in many other mealybugs (Trapeznikova & Gavrilov 2008).

Etymology. The new species name is constructed from the name of type locality, Toubkal.

Puto (Ceroputo) chetverikovi n. sp. (Figure 2)

Material. Holotype: female, K 1254, Morocco, about 15 km NE Agadir, “Paradise Valley”, 30°33'N 9°34'W, on branches and twigs of arboreal *Juniperus* sp., probably *J. oxycedrus* Linnaeus, 1753, 9.VI.2015, I.A. Gavrilov-Zimin. Paratypes: 7 females and one ultimolarva with the same collecting data. Holotype and 5 paratypes are preserved in ZIN RAS; one paratype – in BMNH and one paratype – in MNHN.

Description. Female. Body pyriform, with enlarged anterior part, up to 6 mm long, green in life. Antennae 9-segmented. Legs well developed, without translucent pores, with 2 sensilla on each side of trochanter; claw with one large denticle and 4–5 smaller denticles. Posterior spiracles larger than anterior ones. Anal apparatus complicated, with inner row of pores, double outer row of spinulae and with 6 shortened setae which are slightly longer than diameter of anal ring. Both pairs of ostioles present, well-developed. Circulus large, oval. Multilocular pores absent. Trilocular pores evenly scattered on all body surface. Tubular ducts of simple type, very few, present on three posterior abdominal sternites only. Cerarii numbering 18 pairs: C₁–C₃ each with 3–5 small and thin conical setae and 6–8 trilocular pores; C₄–C₁₆ each with 2–3 conical setae and 8–9 trilocular pores; C₁₇ with 9–11 conical setae, C₁₈ with 25–35 conical setae; both posterior pairs of cerarii with numerous trilocular pores; C₁₈ lies on sclerotized area. Dorsal surface of body covered by small conical setae, ventral surface – by flagellate setae of different size (see Figure 1).

Ultimolarva differs from imago in 8-segmented antennae and in the absence of circulus.

Males and morphology of primo- and secundolarvae unknown.

Comments. The new species differs from all other known species of the genus *Puto* Signoret 1876 in the presence of only 2 pairs of cerarii with multiple conical setae and in an additional 4–5 denticles on the claw (instead of only one denticle in other *Puto* spp.). According to other characters

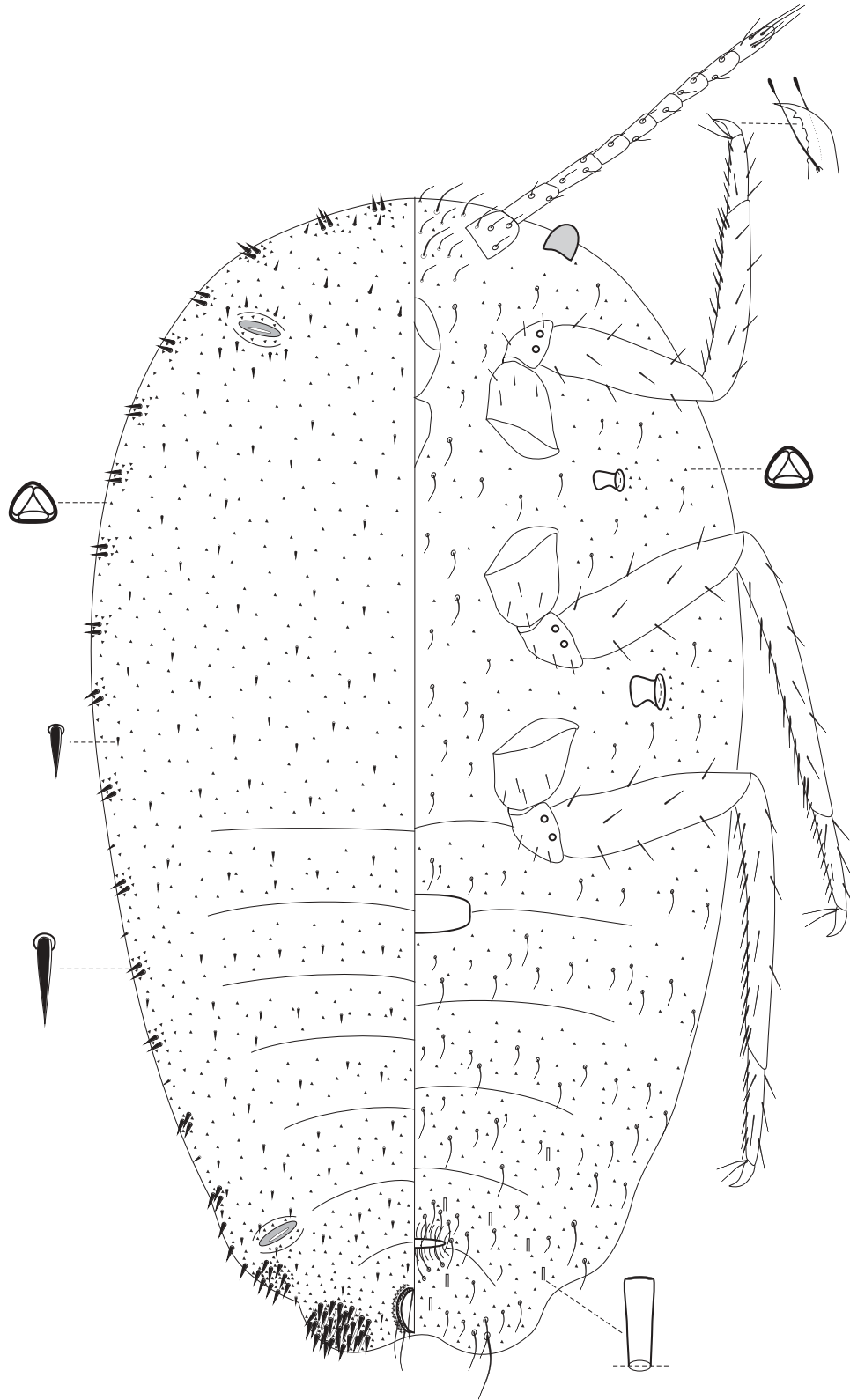


Figure 2. *Puto* (*Ceroputo*) *chetverikovi* n. sp., holotype.

(a presence of only two trochanter sensilla, total absence of multilocular and quinquelocular pores, few number of tubular ducts) *Puto* (*Ceroputo*) *chetverikovi* is rather similar with *P. (C.) graminis* Danzig 1972, distributed in the Eastern Palaearctic and connected with Poaceae and Cyperaceae plants.

The genus *Puto* is the most ancient and basal in the family Pseudococcidae (Gavrilov-Zimin & Danzig 2012; Danzig & Gavrilov-Zimin 2014); some of its species, belonging to subgenus *Ceroputo* Šulc 1898, probably gave origin to the large phylogenetic lineage of mealybugs, which is traditionally considered as a subfamily Phenacoccinae. Thus, the species of the huge worldwide distributed genus *Phenacoccus* Cockerell 1893 in fact differ from *Puto* (*Ceroputo*) in the lacking of multiple cerarian setae only. In view of this fact *P. (C.) chetverikovi* occupies an intermediate position between *Puto* and *Phenacoccus* and is probably a relict, "living fossil" of ancient Mediterranean fauna, which included much more numerous species of *Puto* and *Puto*-like forms, known as amber fossils (Koteja & Azar 2008). In the recent fauna *P. (C.) chetverikovi* probably has a very limited distribution, because these comparatively large, openly living noticeable insects, connected with arboreal host plant, have never been reported before from the rather well-studied Mediterranean region.

All studied females were before oviposition and without eggs inside of the body.

Etymology. The species is named in honour of my colleague and friend, acarologist Dr Philipp E. Chetverikov, who constantly collects scale insects from different plants in different regions.

List of previously unrecorded species

Family Pseudococcidae

Antonina graminis (Maskell 1897)

Material. K 1081, Morocco, Marrakesh, Menara gardens, under the leaf sheath of undetermined Poaceae grass, 15.IX.2013. K 1248, Morocco, vicinity of Agadir, Aourir, on underground stem of undetermined Poaceae grass, 7.VI.2015.

Remarks. The species is widely distributed in tropical and subtropical regions of the world, but has never been noted before in Morocco.

Antonina purpurea Signoret 1875

Material. K 1270, Morocco, vicinity of Tanger, coast of Strait of Gibraltar near the hotel "Mnar Castle", 35°48'N 5°43'W, under the low leaf sheathes of undetermined Poaceae grass, 16.VI.2015.

Remarks. The species was earlier recorded in Spain, France, Italy and Slovenia; it is noted here for the first time for Morocco and Africa as a whole.

Atrococcus achilleae (Kiritshenko 1936)

Material. K 1085, Morocco, Toubkal National Park, Imlil, on stem and rhizome of different dicotyledonous herbs, 16.IX.2013. K 1087, the same data, but collected 17.IX.2013. K 1111, Morocco, 10 km south of Ouarzazate, oasis Fint, on root of undetermined Fabaceae undershrub, 29.IX.2013.

Remarks. This species was noted for the first time in Morocco in the recent monograph of Danzig and Gavrilov-Zimin (2014) without the collecting data; these data are provided here.

Brevennia asphodeli (Bodenheimer 1927)

Material. K 1266, Morocco, vicinity of Tanger, coast of Strait of Gibraltar near the hotel "Mnar Castle", 35°48'N 5°43'W, under the low leaf sheathes of undetermined Apiaceae plant, 15.VI.2015.

Remarks. The species was earlier recorded in France, Italy, Cyprus, Turkey and Israel; it is noted here for the first time for Morocco and Africa as a whole.

Heliococcus destructor Borchsenius 1941

Material. K 1269, Morocco, vicinity of Tanger, coast of Strait of Gibraltar near the hotel "Mnar Castle", 35°48'N 5°43'W, on stem of undetermined Fabaceae undershrub, 16.VI.2015.

Remarks. The species is widely distributed in Eastern Europe, Transcaucasia, central Asia and China. It is noted here for the first time for Morocco and Africa as a whole.

Heliococcus radicola Goux 1931

Material. K 1100, Morocco, Toubkal National Park, Imlil, on root of perennial dicotyledonous herb, 22.IX.2013; K 1115, Morocco, eastern vicinity of Ouarzazate, on root of Fabaceae undershrub.

Remarks. It is widely distributed European species, which is also known from Transcaucasia and Turkey, but it was never noted before in Morocco and in Africa as a whole.

Nipaeococcus delassusi (Balachowsky 1925)

Material. K 1276, Morocco, vicinity of Tanger, coast of Strait of Gibraltar near the hotel "Mnar Castle", 35°48' N 5°43' W, on twigs of *Erica ?manipuliflora* Salisbury, 1802, 17.VI.2015.

Remarks. The species was earlier recorded in Spain, France, Italy and Algeria and is noted here for the first time for Morocco.

***Nipaeoccus nipae* (Maskell 1893)**

Material. K 1267, Morocco, vicinity of Tanger, coast of Strait of Gibraltar, territory of the hotel “Mnar Castle”, 35° 81'N 5°73'W, 15.VI.2015, on leaves of undetermined decorative palm.

Remarks. The species was earlier recorded in Spain, France, Italy and Algeria and is noted here for the first time to Morocco.

***Peliococcus mathisi* (Balachowsky 1953)**

Material. K 1082, Morocco, Toubkal National Park, Imlil, on stem of dicotyledonous herb, 16.IX.2013.

Remarks. This species was noted for the first time to Morocco in the recent monograph by Danzig and Gavrillov-Zimin (2014).

***Pelionella cycliger* (Leonardi 1908)**

Material. K 1102, Morocco, eastern vicinity of Ouarzazate, on stem of undetermined undershrub, 26.IX.2013; K 1112, Morocco, 10 km South of Ouarzazate, oasis Fint, on stem of undetermined undershrub, 29.IX.2013.

Remarks. This species was noted for the first time for Morocco in our recent monograph (Danzig & Gavrillov-Zimin 2014) without the collecting data; these data are provided here.

***Phenacoccus pumilus* Kiritschenko 1936**

Material. K 1252, Morocco, about 15 km NE Agadir, “Paradise Valley”, 30°33'N 9°34'W, under the leaf sheathes of *Asphodelus* sp., 8.VI.2015.

Remarks. It is widely distributed transpalaeartic species, but it has never been noted before in Morocco and in Africa as a whole.

***Phenacoccus yerushalmi* Ben-Dov 1985**

Material. K 1274, Morocco, vicinity of Tanger, coast of Strait of Gibraltar near the hotel “Mnar Castle”, 35°48'N 5°43'W, on twigs of *Pinus* sp., 17.VI.2015.

Remarks. The species is widely distributed in Mediterranean region, but is noted here for the first time for Morocco.

***Rhizoecus albidus* Goux 1942**

Material. K 1264, Morocco, Toubkal National Park, Imlil, on thin roots of undetermined Poaceae grass, 13.VI.2015.

Remarks. It is widely distributed transpalaeartic species, but it was never noted before in Morocco and in Africa as a whole.

***Seyneria porticcia* Goux 1990**

Material. K 1273, Morocco, vicinity of Tanger, coast of Strait of Gibraltar near the hotel “Mnar Castle”, 35°48'N 5°43'W, on roots of undetermined herbaceous plant, 17.VI.2015, 2 young females before oviposition and without eggs inside of body.

Remarks. The species was earlier noted in France (Var and Corsica) only and is noted here for the first time for Morocco and to Africa as a whole.

***Trabutina mannipara* (Hemprich & Ehrenberg 1829)**

Material. K 1094, Morocco, High Atlas Mountains, road from Marrakesh to Imlil, Asni village, about 1150 m altitude, on twigs of *Tamarix* sp., 20.IX.2013; K 1105, Morocco, Ouarzazate, on stem and branches of large tree of *Tamarix* sp., 26.IX.2013; K 1106, Morocco, 10 km south of Ouarzazate, oasis Fint, on twigs of *Tamarix* sp., 27.IX.2013; K 1114, the same collecting data, but 29.IX.2013.

Remarks. The species is widely distributed in Southern Palaeartic, but is noted here for the first time for Morocco.

***Trionymus masrensis* Hall 1925**

Material. K 1253, Morocco, about 15 km NE Agadir, “Paradise Valley”, 30°33'N 9°34'W, under the leaf sheathes of undetermined Poaceae grass, 8.VI.2015.

Remarks. The species was previously known from Egypt and Zimbabwe and is noted here for the first time for Morocco.

***Trionymus perrisii* (Signoret 1875)**

Material. K 1086, 1097, 1098, Morocco, Toubkal National Park, Imlil, under leaf sheathes of undetermined Poaceae grass, 16–21.IX.2013.

Remarks. This species was noted for the first time for Morocco in our recent monograph (Danzig & Gavrillov-

Zimin 2014) without the collecting data; these data are provided here.

Family Eriococcidae

Acanthococcus ericae (Signoret, 1875)

Material. K 1271, Morocco, vicinity of Tanger, coast of Strait of Gibraltar near the hotel “Mnar Castle”, 35°48'N 5°43'W, on twigs of *Erica ?manipuliflora* Salisbury, 1802, 16.VI.2015.

Remarks. The species was earlier recorded in Spain, France, Italy, Germany, Austria, Netherlands and Algeria; it is noted here for the first time for Morocco.

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