

Three new species of the genus *Coccobius* Ratzeburg, 1852 (Hymenoptera: Aphelinidae) from Mexico

Три новых вида рода *Coccobius* Ratzeburg, 1852 (Hymenoptera: Aphelinidae) из Мексики

S.N. Myartseva
С.Н. Мярцева

Facultad de Ingeniería y Ciencias, Universidad Autónoma de Tamaulipas, Ciudad Victoria 87149, Tamaulipas, México. E-mail: myartseva@mail.ru

Факультет инженерного дела и наук, Автономный университет Тамаулипаса, Сьюдад Виктория 87149, Тамаулипас, Мексика.

KEY WORDS: Aphelinidae, *Coccobius*, taxonomy, Mexico, new species.

КЛЮЧЕВЫЕ СЛОВА: Aphelinidae, *Coccobius*, таксономия, Мексика, новые виды.

ABSTRACT. Three new species of the genus *Coccobius* Ratzeburg are described from Mexico: *C. averini* Myartseva **sp.n.**, *C. mariae* Myartseva **sp.n.** and *C. mexicanus* Myartseva **sp.n.** All species were collected in the state of Baja California Sur.

РЕЗЮМЕ. Описаны три новых вида рода *Coccobius* из Мексики: *C. averini* Myartseva **sp.n.**, *C. mariae* Myartseva **sp.n.** и *C. mexicanus* Myartseva **sp.n.** Все виды собраны в штате Южная Нижняя Калифорния.

Introduction

The genus *Coccobius* Ratzeburg, 1852 belongs to the superfamily Chalcidoidea (Hymenoptera). 94 *Coccobius* species are known in the world fauna [Noyes, 2015]. Seven species of this genus were recorded from the Nearctic as well as from the Neotropical region of the New World. 14, also 14 and 16 *Coccobius* species were found in different countries of the Old World, i.e. in Africa [Prinsloo, 1995], India [Hayat, Khan, 2010] and China [Wang et al., 2013] respectively. 48 species of the world fauna were included into the key provided by Hayat [1984].

Species of the genus *Coccobius* are parasitoids of armored scale insects (Hemiptera: Diaspididae). Various *Coccobius* species are of economic importance as natural enemies of diaspidid pests. These parasitoids are used for biological control of hemipteran pests in several countries. For example, *Coccobius annulicornis* Ratzeburg, 1852 was introduced into California (USA) [as *C. testaceus* (Masi, 1909)] to control scales *Lepidosaphes ulmi* Linnaeus, 1758 and *L. conchiformis* (Gmelin, 1790) [Hayat, 1984], *C. fulvus* (Compere et Anneck, 1961) was introduced against *Lepidosaphes beckii* (Newman, 1869) [Tachikawa, 1981], and *C. varicornis* (Howard, 1881) was used to control *Diaspidiotus perniciosus* (Comstock, 1881) and *Aspidiotus destructor* (Signoret, 1869) [Peck, 1963].

Aspidiotus perniciosus (Comstock, 1881) and *Aspidiotus destructor* (Signoret, 1869) [Peck, 1963].

The genus *Coccobius* was discovered in Mexico more than a decade ago [Myartseva, 2000]. Two species are currently known from this country [Noyes, 2015]. *Coccobius donatellae* Pedata et Evans, 1997 successfully controls *Comstockiella sabalis* (Comstock, 1883), the scale pest of the palm *Sabal mexicana* Martius, 1838 in Ciudad Victoria [Myartseva et al., 2003]. Judging from material on this parasitoid genus collected in Mexico and deposited in the Entomological Research Museum of the University of California, Riverside (USA), I expect that the local fauna of the genus *Coccobius* in Mexico is more speciose than it is currently known. Three new *Coccobius* species from this collection are described in the present paper.

All specimens used in this study were collected about 30 years ago using pan traps in the state of Baja California Sur, in the locality of Las Barracas situated in the southern part of the Baja California Peninsula. Insects were mounted on cardboard points. Microscopic slides were prepared for studying morphological characters and identifying new species.

Taxonomic part

Family Aphelinidae

Genus *Coccobius* Ratzeburg, 1852

The genus *Coccobius* differs from other genera of the subfamily Coccophaginae by combination of the following morphological characters.

Female. Antenna with 7 segments, club 2-segmented. Mandible with two teeth and a truncation. Pronotum entire. Mid lobe of mesoscutum large, with numerous setae. Side lobes small, each lobe with two setae. Axillae small, hardly projecting forwards, each axilla with a single seta. Scutellum large, usually with 4–6 setae (rarely more). Propodeum not much longer than metanotum, medially slightly triangularly

produced, and with two setae distad of each spiracle. Fore wing uniformly setose, without linea calva, with specially shaped stigmal vein, the latter with four sensilla arranged in a characteristic manner. Submarginal vein with 5 or more setae. Postmarginal vein usually absent. All tarsi 5-segmented, mid tibial spur large. Hypopygium not extending to apex of gaster. Ovipositor of variable shape.

Male similar to female, but its antenna with 8 segments, and scape with a sensory area. Genitalia elongate, with apex bifid, digital sclerites and parameres absent.

Description of new species

Coccobius averini Myartseva, sp.n.

Fig. 1

MATERIAL. Holotype: ♀, Mexico, Baja California Sur, Las Barracas, pan trap, 1.IV.1986 (col. P. DeBach). UCRC Ent. 54186.

Paratypes: same locality, 5.IV.1986, 1♀, UCRC Ent. 54121; 3♀, 8.IV.1985, UCRC Ent. 54109, 54115, 54124; 1♀, 20.IV.1984, UCRC Ent. 54125; 2♀, 26.IV.1986, UCRC Ent. 54118, 54169.

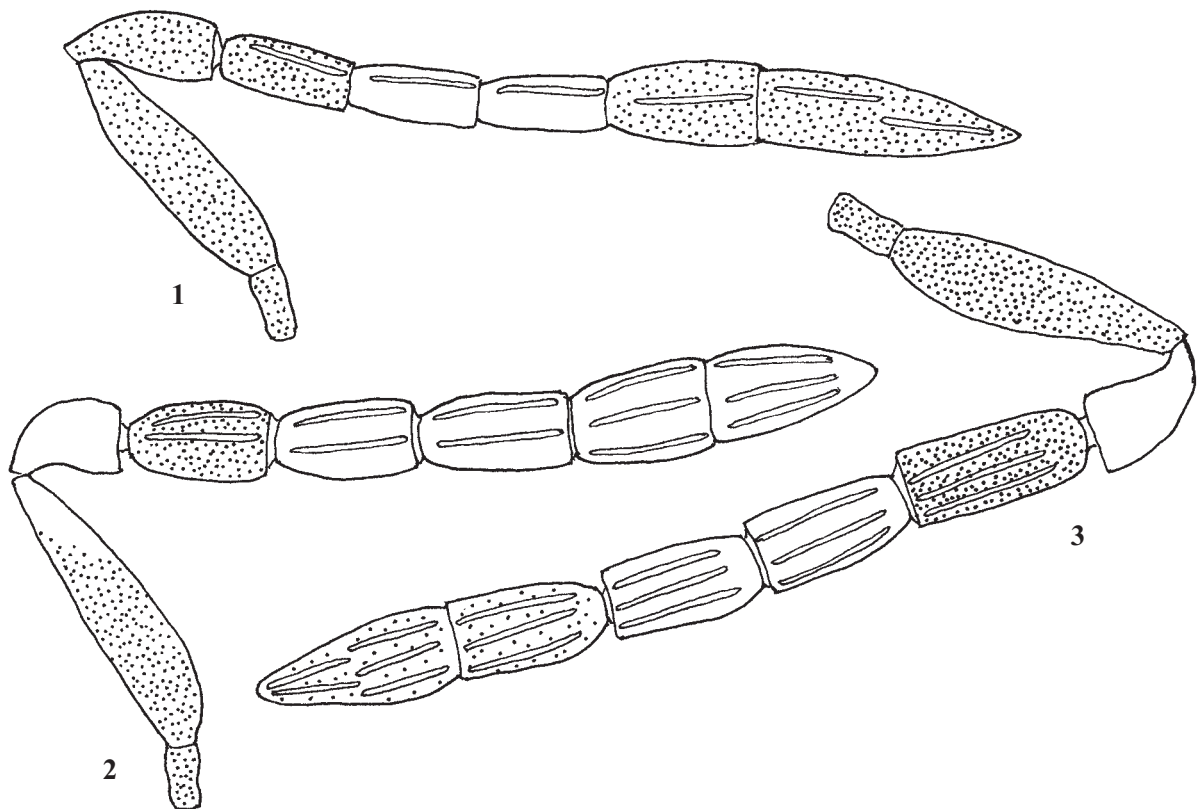
Holotype and 3 paratypes are deposited in UCRC (University of California, Riverside, California), 2 paratypes — in NHM (The Natural History Museum, London, UK), and 2 paratypes — in ZIN (Zoological Institute of the Russian Academy of Sciences, St. Petersburg).

Female. Body length: 0.8–0.9 mm.

Coloration. Head brown. Antennae brown, second and third segments of funicle brownish yellow. Mandible brown, tips of teeth black. Mesosoma dark brown, metanotum medially or completely brownish yellow. Fore wings faintly infumate, venation infusate. Legs brown, apex of mid tibia pale,

tarsi whitish with apical segment infusate. Gaster (including ovipositor) brown.

Structure. Head not wider than mesosoma, slightly wider than high. Frontovertex about 0.6 times as wide as head width. Distance between hind ocelli 3.0 times as long as distance from hind ocellus to eye. Eyes 1.7 times as high as cheeks. Mandible with two teeth and a truncation. Antennae (Fig. 1) inserted below the level of lower eye margin. Antennal radicle 2.0 times as long as wide. Scape 4.0 times as long as wide. Pedicel 2.4 times as long as wide, slightly longer than first funicular segment. First to third funicular segments of the same length, first two segments 2.0 times as long as wide, third segment 1.8 times as long as wide. Basal segment of club slightly longer and wider than third funicular segment, 1.7 times as long as wide; apical segment 1.8 times as long as basal segment. Club about as long as funicle. Each funicular segment with a single longitudinal sensillum, basal and apical segment of club with one and two sensilla respectively. Mid lobe of mesoscutum with many slender scattered setae, and with transversely reticulate sculpture. Scutellum with 6 setae, 0.8 times as long as mid lobe, with lineolate longitudinal sculpture medially, between scutellar placoid sensilla, and elongate reticulate lateral sculpture. Axilla with a single seta, each side lobe with two setae. Fore wing 2.5 times as long as wide, its marginal fringe 0.2 times as long as maximum width of wing. Submarginal vein with 7–8 setae along its anterior margin. Marginal vein slightly shorter, with 9–10 setae along its anterior margin. Postmarginal vein present, although very short. Mid tibial spur slightly shorter than mid basitarsus (18:21). Ovipositor slightly exerted, 2.3–2.5 times as long as mid tibia; third valvula 0.3 times as long as second valvifer and 1.8–2.0 times as long as mid basitarsus.



Figs 1–3. *Coccobius* spp., female antennae: 1 — *C. averini* sp.n., 2 — *C. mariae* sp.n., 3 — *C. mexicanus* sp.n.
Рис. 1–3. Усики самок *Coccobius* spp.: 1 — *C. averini* sp.n., 2 — *C. mariae* sp.n., 3 — *C. mexicanus* sp.n.

Table 1. Differences between *Coccobius averini* sp.n. and related species.
Таблица 1. Differences between *Coccobius averini* sp.n. and related species.

Characters	<i>averini</i> sp.n.	<i>stanfordi</i>	<i>reticulatus</i>
Scape	brown	dark brown	infusate basally
Legs	brown	mostly dark brown	mostly yellow
Fore wing	slightly infumate, 2.5 times as long as wide	hyaline, 3.0 times as long as wide	hyaline, 2.8 times as long as wide
Number of setae on marginal vein	9–10	14–15	11
Postmarginal vein	present	absent	present
Length of ovipositor vs. mid tibia	2.3–2.5 times	2.0 times	1.6–1.8 times
Length of second valvifer vs. third valvula	3.0 times	3.4 times	2.8–3.0 times
Length of third valvula vs. mid basitarsus	1.8–2.0 times	1.7 times	1.5 times

Male unknown.

COMMENTS. *Coccobius averini* sp.n. keys out to *C. stanfordi* (Howard, 1914) according to Hayat [1984] and to *C. reticulatus* (Compere et Annecke, 1961) according to Hayat & Khan [2010], but can easily be distinguished from both species by the following characters (Table 1).

We also compared other undescribed new species of *Coccobius* with the two latter species, but *C. averini* sp.n. distinctly differs from that species. Specifically, in *C. averini* sp.n. fore wing infumate, postmarginal vein present, club as long as funicle, its apical segment 1.8 times as long as basal segment, pedicel brown and longer than first funicular segment, ovipositor 2.3–2.5 times as long as mid tibia. In other undescribed species, fore wing hyaline, postmarginal vein absent, club shorter than funicle, its apical segment 1.5 times as long as basal segment, pedicel whitish and shorter than first funicular segment, ovipositor 1.4 times as long as mid tibia.

Coccobius mariae Myartseva, sp.n.

Fig. 2

MATERIAL. Holotype: ♀, Mexico, Baja California Sur, Las Barracas, pan trap, 2.IV.1984 (col. P. DeBach). UCRC Ent. 54110.

Paratypes: same locality, 3♀, 8.IV.1985, UCRC Ent. 54119, 13.V.1985, UCRC Ent. 54111, 17.IV.1986, UCRC Ent. 54114.

Holotype and 2 paratypes are deposited in UCRC, 1 paratype — in NHM.

Female. Body length: 0.8–0.9 mm.

Coloration. Head dark brown. Antennal radicle and first funicular segment brown, scape brownish, paler at apex, pedicel, second and third funicular segments and club whitish. Mesosoma dark brown, metanotum medially yellowish. Fore wings hyaline. Legs yellowish white. Gaster yellow, with strong brown bands on sides from base to cercal plates. Ovipositor yellow.

Structure. Head as wide as mesosoma, 1.3 times as wide as high. Frontoververtex 0.6 times as wide as head width, with irregular transversely striate sculpture. Distance between

hind ocelli 3.5 times as long as distance from ocellus to eye. Eyes 1.3 times as high as cheeks. Antennae (Fig. 2) inserted immediately under the level of lower margin of eyes. Distance between toruli 0.7 times as long as distance from torulus to eye and 1.5 times as long as distance to mouth margin. Antennal radicle 2.0 times as long as wide. Scape 4.8 times as long as wide. Pedicel 1.6 times as long as wide and equal in length to first funicular segment. First funicular segment 1.8 times as long as wide, second and third segments of equal length and width, both 2.0 times as long as wide. First segment of club as long as and slightly wider than third funicular segment, 1.5 times as long as wide; second segment 1.5 times as long as first segment and 2.3 times as long as wide. Club longer than two preceding funicular segments. Each funicular segment with two longitudinal sensilla, each segment of club with three sensilla. Mid lobe of mesoscutum with many thin scattered setae, two basal setae longer than the others. Mid lobe with fine transverse reticulate sculpture. Scutellum with four setae and distinctly elongate reticulate sculpture, with shorter basal cells. Axilla with a single seta, each side lobe with two setae. Fore wing 2.7 times as long as wide, its marginal fringe 0.1 times as long as maximum width of wing. Submarginal vein with 7–9 setae along its anterior margin. Marginal vein slightly longer, with 10–11 setae along its anterior margin. Postmarginal vein absent. Mid tibial spur shorter than mid basitarsus (18:23). Ovipositor slightly exerted, 1.7–1.8 times as long as mid tibia; third valvula 0.4 times as long as second valvifer and 1.9–2.2 times as long as mid basitarsus.

Male unknown.

COMMENTS. *Coccobius mariae* sp.n. keys out to Oriental species *C. debachi* (Compere et Annecke) and *C. intermedius* (Gahan) according to Hayat [1984] and also to *C. debachi* according to Hayat & Khan [2010]. All three species have four setae on scutellum and yellow gaster with brown sides, but differ in structure of antenna and ovipositor (Table 2).

Table 2. Differences between *Coccobius mariae* sp.n. and related species.
Таблица 2. Differences between *Coccobius mariae* sp.n. and related species.

Characters	<i>mariae</i> sp.n.	<i>debachi</i>	<i>intermedius</i>
Length of pedicel vs. first funicular segment	equal	less than 1	less than 1
Length of first vs. second funicular segment	less than 1	less than 1	equal
Club	whitish	brownish	whitish
Length vs. width of fore wing	2.7 times	2.7 times	2.3 times
Length of ovipositor vs. mid tibia	1.7–1.8 times	1.3 times	1.5 times
Length of second valvifer vs. third valvula	2.2–2.4 times	3.5 times	—
Length of third valvula vs. mid basitarsus	1.9–2.2 times	—	1.2 times

Table 3. Differences between *Coccobius mexicanus* sp.n. and related species.
Таблица 3. Differences between *Coccobius mexicanus* sp.n. and related species.

Characters	<i>mexicanus</i> sp.n.	<i>howardi</i>	<i>townsendi</i>
Number of scutellar setae	6	6	4
Club	brownish yellow	dark brown	brown to dusky
Gaster	brown, with yellow base	—	dark brown
Length vs. width of scape	3.8–4.0 times	5.0 times	less than 3.0 times
Pedicel	whitish	dorsally brownish at base	whitish
Length of ovipositor vs. mid tibia	1.4 times	1.6 times	1.5 times
Length of second valvifer vs. third valvula	2.4 times	4.0 times	3.1 times
Length of third valvula vs. mid basitarsus	1.4 times	1.3 times	1.4 times

Coccobius mexicanus Myartseva, sp.n.

Fig. 3

MATERIAL. Holotype: ♀, Mexico, Baja California Sur, Las Barracas, pan trap, 2.VI.1986 (col. P.DeBach), UCRC Ent. 54130.

Paratypes: same locality, 2.VI.1986, 2♀, UCRC Ent. 54116, 54127; 5.XII.1984, 1♀, UCRC Ent. 54126.

Holotype and 2 paratypes are deposited in UCRC, 1 paratype — in NHM.

Female. Body length: 0.8–0.9 mm.

Coloration. Head brown. Antennal radicle, scape, first funicular segment dark brown, second and third funicular segments whitish, club brownish yellow. Mesosoma dark brown, metanotum medially yellow. Fore wings hyaline. Legs brown, apex of mid coxae pale, apex of femora, apex of fore and hind tibiae, apical 1/3 of mid tibiae whitish, tarsi whitish with apical segments infuscate. Gaster brown, yellow at base. Ovipositor brown, its second valvifer yellow.

Structure. Head not wider than mesosoma, 1.3 times as wide as high. Frontoververtex 0.5 times as wide as head width. Distance from hind ocellus to eye 0.4 times as long as distance between hind ocelli. Eyes 1.4 times as high as cheeks. Antennae (Fig.3) inserted immediately under the level of lower margin of eyes. Distance between toruli 0.6 times as long as distance from torulus to eye and 1.2 times as long as distance to mouth margin. Antennal radicle 2.0 times as long as wide. Scape 3.8–4.0 times as long as wide. Pedicel 1.3–1.4 times as long as wide. First funicular segment 2.1–2.4 times as long as wide, and about 1.5 times as long as pedicel. Second to fourth flagellomeres about the same length, 1.8–1.9, 1.6–1.8 and 1.5 times as long as wide, respectively. Apical segment of club 1.4–1.7 times as long as basal segment. Club slightly longer than two preceding funicular segments combined. Each funicular segment with three longitudinal sensilla, basal and apical segments of club with three and five sensilla, respectively. Mid lobe of mesoscutum with many slender scattered setae and with fine reticulate sculpture with slightly elongate medial cells. Scutellum with six setae and elongate reticulate sculpture, distinctly lineolate medially. Fore wing 2.6 times as long as wide, its marginal fringe 0.1 times as long as maximum width of wing. Submarginal vein with seven setae along its anterior margin. Marginal vein slightly shorter and with eight setae along its anterior margin. Postmarginal vein absent. Mid tibial spur shorter than mid basitarsus (20:24). Each tergite of gaster (second to seventh) with 4 setae. Ovipositor slightly exerted, 1.4 times as long as mid tibia; third valvula 0.4 times as long as second valvifer and 4.0 times as long as mid basitarsus.

Male unknown.

COMMENTS. *Coccobius mexicanus* sp.n. keys out to *C. howardi* (Compere, 1928) described from USA and to *C.*

townsendi (Howard, 1914) described from Peru according to Hayat [1984], but can be distinguished by the following characters (Table 3).

ACKNOWLEDGEMENTS. The author is grateful to Dr. Serguei Triapitsyn (Entomological Research Museum of University of California, Riverside, California, USA) for providing an opportunity to study Aphelinidae collected by Californian entomologists in Mexico. The author also acknowledges financial support of this work within the frame of the project «Taxonomy and ecology of the fauna and fungal biota in forest and agricultural communities of Mexico».

References

- Hayat M. 1984. Notes on some species of *Coccobius* and *Prophyscus* (Hymenoptera: Aphelinidae), with special reference to Girault and Howard types // *Oriental Insects*. Vol.18. P.289–334.
- Hayat M., Khan F.R. 2010. Additions to the Aphelinidae of India (Hymenoptera — Chalcidoidea): 1. On species of *Ablerus* Howard, *Coccobius* Ratzeburg, *Coccophagus* Westwood, *Pteroptrix* Westwood and *Idiococcobius* Hayat gen. nov. // *Colemania*. Vol.21. P.1–31.
- Myartseva S.N. 2000. The genus *Coccobius* new for Mexico, with description of a new species and key to Nearctic species (Hymenoptera: Aphelinidae) // *Zoosystematica Rossica*. Vol.8. No.2. P.331–334.
- Myartseva S.N., Gaona-García G., Ruiz-Cancino E. 2003. Parasitoides (Hymenoptera: Aphelinidae) de *Comstockiella sabalis* (Homoptera: Diaspididae) en México y redescrpción de *Coccobius donatellae* (Pedata & Evans) (Hymenoptera: Aphelinidae) // *BioTam*, Nueva Serie. Vol.14. No.2. P.21–26.
- Noyes J.S. 2015. Universal Chalcidoidea Database. Worldwide Web electronic publication. www.nhm.ac.uk/chalcidoids. (Last updated: April 2015).
- Peck O. 1963. A Catalogue of the Nearctic Chalcidoidea (Insecta; Hymenoptera) // *Canadian Entomologist*. Vol.30 (Supplement). 1092 pp.
- Prinsloo G.L. 1995. Revision of the southern African species of *Coccobius* Ratzeburg (Hymenoptera: Aphelinidae), parasitoids of armored scale insects (Homoptera: Diaspididae) // *Journal of Natural History*. Vol.29. P.1517–1541.
- Tachikawa T. 1981. Rediscovery of *Physcus fulvus* Compere et Annecke from Szechwan, China (Hymenoptera: Chalcidoidea: Aphelinidae) // *Transactions of Shikoku Entomological Society*. Vol.15. P.179–181.
- Wang Zh.H., Huang J., Pan D.M. 2013. Taxonomic review of *Coccobius* species (Hymenoptera: Aphelinidae) from China, with notes on their use in biological control of scale insect pests (Homoptera: Diaspididae), and description of a new species // *Journal of Natural History*. Vol.48. No.5–6. P.359–373.