

Review of Mexican species of *Coccophagus* Westwood, with a key and description of new species (Hymenoptera: Chalcidoidea: Aphelinidae)

S.N. Myartseva

Myartseva, S.N. 2006. Review of Mexican species of *Coccophagus* Westwood, with a key and description of new species (Hymenoptera: Chalcidoidea: Aphelinidae). *Zoosystematica Rossica*, **15**(1): 113-130.

A key to Mexican species of *Coccophagus* is given. Five new species from Mexico are described: *C. femoralis* sp. n., *C. lunai* sp. n., *C. mazatlan* sp. n., *C. nigrans* sp. n. and *C. sostenesi* sp. n. Diagnosis, host record, distribution and examined material are given for each of the 23 Mexican species.

S.N. Myartseva, *División de Estudios de Postgrado e Investigación, UAM Agronomía y Ciencias, Universidad Autónoma de Tamaulipas, Ciudad Victoria, 87149, Tamaulipas, Mexico. E-mail: smyartse@uat.edu.mx*

Introduction

The genus *Coccophagus* Westwood, 1833 comprises over 200 described species and has a cosmopolitan distribution. It is one of the largest genera in Aphelinidae. Complete up-to-date information on the fauna, taxonomy, host record and distribution of world *Coccophagus* species was presented by Noyes (2002, 2003).

The females of *Coccophagus* are endoparasitoids of homopteran insects, mainly soft scales (Coccidae) and rarely mealybugs (Pseudococcidae) and other Coccoidea (Herting, 1972). Males are generally hyperparasitoids on other primary parasitoids, including conspecific females. Several species are of importance in agriculture, because have been used in the biological control of pests (Clausen, 1978; Greathead, 1986; Altieri & Nicholls, 1999).

In the New World, 59 species of the genus *Coccophagus* are known, including 39 species distributed in the Neotropics and 32 species distributed in the Nearctic region (Woolley, 1997; Noyes, 2002). Ten species were known to occur in Mexico (Myartseva & Ruíz Cancino, 2000; Myartseva & Coronado Blanco, 2003; Myartseva et al., 2004a). Most of species registered from Mexico were described by H. Compere and A.A. Girault.

Material and methods

The author is studying Aphelinidae of Mexico since 1998. Most of the material was obtained by rearing, the recommended method (Noyes,

1982) yielding most of biological information and more specimens of aphelinids. Parts of plants with colonies of soft scales were placed for rearing of parasitoids in plastic or glass containers of different sizes. Additional material was collected by sweeping, Malaise traps, and yellow-pan traps. Emerged and collected parasitoids were transferred for preserving to 70% alcohol and partly were mounted on card points. Some specimens were dissected and mounted on slides in Canada balsam. The author examined also collections of the Museum of Insects of UAM Agronomía y Ciencias of the Autonomous University of Tamaulipas (Ciudad Victoria, Tamaulipas, Mexico) and the Research Entomological Museum of the University of California (Riverside, California, USA).

Coccophagus is found to be one of the most speciose genera of Aphelinidae in Mexico. Of the 23 species included in this work, 8 were described by me as new previously and 5, in this paper; 2 species are new records for Mexico.

C. grenadensis Hayat, 1994 (*howardi* Ashmead, 1900, nom. praeocc.; *ashmeadi* Gahan, 1924, nom. praeocc.) described from Grenada and listed from Mexico by De Santis & Fidalgo (1994) is not included in the key and review. Its original description is based on a male and does not give sufficient details to determine this species; no redescription was published.

The following abbreviations are used for depositories of the material: BMNH – the Natural History Museum, London, U.K.; NHRM – Naturhistoriska Riksmuseet, Stockholm, Sweden; UAT – Universidad Autónoma de Tamaulipas,

Ciudad Victoria, Tamaulipas, México; UCRC – Research Entomological Museum of the University of California, Riverside, California, USA; USNM – U.S. National Museum of Natural History, Washington, D.C., USA; ZISP – Zoological Institute of Russian Academy of Sciences, St.Petersburg, Russia.

In the “Material”, Spanish words are cited like in labels. Scientific names of soft scale insects are given according to Ben-Dov (1993).

Coccophagus Westwood, 1833

Coccophagus Westwood, 1833: 344 (type species *Entedon scutellaris* Dalman, designated by Westwood, 1839: 73). For synonyms, see Noyes, 2002, 2003.

Revisions, reviews and keys to *Coccophagus* are published by Compere, 1931a; De Santis, 1948: 162-189; Nikolskaya & Yasnosh, 1966: 212-232; Annecke & Insley, 1974: 1-62; Huang, 1994: 174-192; Hayat, 1998: 134-175.

Compere (1931a), Annecke & Insley (1974) and Hayat (1988, 1992, 1993, 1998) recognized in the genus *Coccophagus* the following species groups: *lycimnia*, *malthusi*, *ochraceus*, *pseudococci*, *tshirchii*, *varius* and *zebratus*. The *redini* species group was proposed for three species with unusual setation of the axillae (*C. redini* Girault, *C. debachi* Myartseva & Ruíz and *C. neocomperei* Myartseva & Ruíz) by Myartseva & Ruíz-Cancino (2005).

Distribution. Cosmopolitan.

Hosts. Coccoidea: Coccidae, Pseudococcidae and rarely other families of Homoptera.

Key to species of the genus *Coccophagus* of Mexico, females

- 1. Scutellum with three pairs of setae 2
- Scutellum with numerous scattered setae 6
- 2. Fore wing distinctly or slightly infusate 3

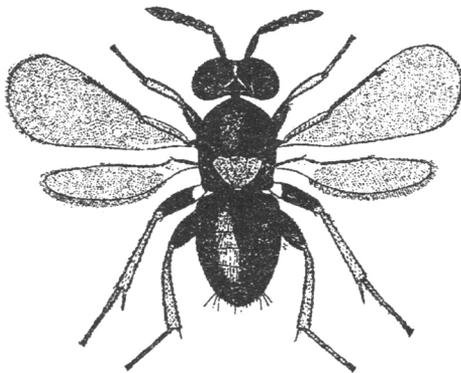


Fig. 1. *Coccophagus lycimnia* (Walker), female (from Smith & Compere, 1928).

- Fore wing hyaline 5
- 3. Scutellum yellow, at most the anterior margin very narrowly blackish. Legs yellow, middle and hind coxae infusate basally (Fig. 15). Fore wing faintly and uniformly infusate ... 16. ***C. pulvinariae*** Compere
- Scutellum entirely black or dark brown 4
- 4. Scutellum black. Propodeum black. Hind coxae, trochanters and femora black (Fig. 2). Club longer than two preceding funicle segments combined (Fig. 22) 1. ***C. atratus*** Compere
- Scutellum dark brown. Propodeum light yellow. Hind coxae, trochanters and femora light yellow (Fig. 18). Club shorter than two preceding funicle segments combined (Fig. 24) 19. ***C. rusti*** Compere
- 5. Antenna with funicle segments ventrally connected, longer ventrally than dorsally (Fig. 23). First funicle segment the smallest, shorter than pedicel and without sensilla. Scape longer than funicle segments combined. Coloration of legs as in Fig. 12 13. ***C. ochraceus*** Howard
- Antenna with funicle segments centrally connected, ventral and dorsal margins equal. First funicle segment the longest, longer than pedicel and with sensilla (Fig. 25). Scape shorter than funicle segments combined. Coloration of legs as in Fig. 7 7. ***C. lycimnia*** (Walker)
- 6. Fore wing distinctly or faintly infusate 7
- Fore wing hyaline 19
- 7. Scutellum entirely yellow or partly so 8
- Scutellum black 12
- 8. Hind coxa fully or partly white 9
- Hind coxa black. Fore and middle femora and tibiae yellow, hind femora black (Fig. 19). Scape slender, not expanded to apex (Fig. 30). Mandible with one obtuse tooth and wide truncation 20. ***C. scutellaris*** (Dalman)
- 9. Scape flattened and expanded towards apex, 2.5 times as long as wide (Fig. 27). Axilla with four setae. Antenna with contrasting white and dark coloration of segments 23. ***C. tobiasi*** Myartseva
- Scape slender, not flattened and not expanded towards apex. Axilla with two setae 10
- 10. Scutellum fully orange-yellow. Mesoscutum orange-yellow. Antenna with third funicular segment wider than long (Fig. 29). Coloration of legs as in Fig. 6 ... 6. ***C. lunai*** sp. n.
- Scutellum only partly yellow. Mesoscutum black 11
- 11. Scutellum with apical 1/2-2/3 yellow, with infusate spot. Fore wings with a large and distinct infuscation beneath the apical half of marginal vein. Second funicular segment about 1.2 times as long as third, and third segment about 1.2 times as long as pedicel (Fig. 26). Coloration of legs as in Fig. 21 2. ***C. teceeni*** Myartseva
- Scutellum with apical 1/4 yellow. Fore wings slightly infusate under the marginal vein. Second funicular segment as long as third, and third segment as long as pedicel. Coloration of legs as in Fig. 9 9. ***C. mexicanus*** Girault
- 12. Propodeum laterally white. First funicular segment 1.6 times as long as wide and as pedicel (Fig. 31). Coloration of legs as in Fig. 14 15. ***C. propodealis*** Myartseva
- Propodeum entirely black 13
- 13. Fore wing with two oval infuscations, beneath base and apical part of marginal vein 14
- Fore wing with other infuscations or only faintly infusate 15
- 14. First funicular segment 2.3 times as long as wide; second and third segments distinctly longer than wide

- (Fig. 28). Coloration of legs as in Fig. 3 2. **C. bimaculatus** Myartseva
- First funicular segment 1.5 times as long as wide; second and third segments not longer than wide. Coloration of legs as in Fig. 13 14. **C. pallidiceps** Compere
 - 15. Fore wing infusate beneath apical half of marginal vein 16
 - Fore wing faintly and uniformly infusate 19
 - 16. Mesosoma completely black 17
 - Mesosoma with yellow sides of pronotum and anterior part of midlobe of mesoscutum. First funicular segment less than 1.5 times as long as pedicel (Fig. 32). Coloration of legs as in Fig. 8 6. **C. mazatlan** sp. n.
 - 17. Hind coxae generally white 18
 - Hind coxae black. Coloration of legs as in Fig. 11. Antennal scape 3.3 times as long as wide (Fig. 33) 12. **C. nigrans** sp. n.
 - 18. Hind femora black. Coloration of legs as in Fig. 17. Antennal scape 4.5 times as long as wide (Fig. 34) 18. **C. ruizi** Myartseva
 - Hind femora white. Coloration of legs as in Fig. 5. Antennal scape 3.6 times as long as wide (Fig. 39) 4. **C. femoralis** sp. n.
 - 19. Tibiae of middle and hind legs dark brown to black (Fig. 16) 17. **C. quaestor** Girault
 - Tibiae of middle and hind legs pale yellow to whitish (Fig. 10) 10. **C. mexicensis** Girault
 - 20. First funicular segment more than 3 times as long as wide. Propodeum bicolored 21
 - First funicular segment about 1.5 times as long as wide (Fig. 36). Propodeum brownish black. Coloration of legs as in Fig. 20 21. **C. sostenesi** sp. n.
 - 21. First funicular segment more than 4.5 times as long as wide; second segment 4.5 times as long as wide (Fig. 35). Coloration of legs as in Fig. 4 5. **C. gonzalezi** Myartseva
 - First funicular segment not more than 4 times as long as wide; second segment not more than 2.5 times as long as wide 22
 - 22. Propodeum with white longitudinal straight stripe behind spiracles. Second funicular segment 2.5 times as long as wide, third 0.8 times as long as second (Fig. 37). Ovipositor 0.9 times as long as middle tibia. Coloration of legs as in Fig. 4 3. **C. debachi** Myartseva & Ruíz z
 - Propodeum laterally uniformly yellowish. Second funicular segment 1.7 times as long as wide, third subequal to second segment (Fig. 38). Ovipositor 0.7 times as long as middle tibia. Coloration of legs as in Fig. 4 11. **C. neocomperei** Myartseva & Ruíz z

1. *Coccophagus atratus* Compere, 1926
(Figs 2, 22)

Compere, 1926: 2-4, ♀ (*Coccophagus*; type: ♀, South Africa; USNM); 1931a: 12, 29; Annecke, 1964: 20, 32; Annecke & Insley, 1974: 15-16; Hayat, 1998: 136; Noyes, 2002; Myartseva & Coronado Blanco, 2004: 10; Myartseva et al., 2005: 22-25 (redescription).

Material. Mexico, San Luis Potosí: 4 ♀, ex *Ceroplastes* sp. on *Prosopis* sp., 11.XI.1999 (S.N. Myartseva), preserved at UAT.

Diagnosis. *C. atratus* is close to *C. anthracinus* Compere, also a species of African origin, recorded from California, USA. Its most substan-

tial differences from this species are as follows: metanotum medially white; margin of mouth medially with two spines; bristles on the outer margin of hind tibia thin; stigmal vein with apex produced towards apex of wing; second funicle segment longer than third; two apical segments of legs dusky (fore tarsi fully dusky); sides of fifth and sixth tergites with characteristic markings. Our redescription of *C. atratus* (Myartseva et al., 2005) includes some new information on its morphological characteristics.

Distribution. South Africa, Mexico (San Luis Potosí). *C. atratus* is the second species of the genus *Coccophagus* of African origin registered in Mexico. The record from India was based on misidentified material (Hayat, 1998).

Hosts. Coccidae: *Ceroplastes elytropappi* (Brain), *C. rufus* De Lotto, *C. rusticus* De Lotto, *C. tachardiaformis* Brain, *C. sp.*, *Coccus anneckei* De Lotto, *C. hesperidum* L., *Lecanium* sp., *Lichtensia gemina* (De Lotto). In Mexico, it was reared from *Ceroplastes* sp.

Comment. In South Africa, the biology of *C. atratus* was studied: adult behaviour and sex ratios, oviposition, larval development (Donaldson et al., 1986; Donaldson & Walter, 1998).

2. *Coccophagus bimaculatus* Myartseva, 2004
(Figs 3, 28)

Myartseva, 2004a: 37-39, ♀ (*Coccophagus*; type: ♀, Mexico, Tamaulipas; UCRC).

Material. Mexico, Tamaulipas: 1 ♀, Ciudad Victoria, Huerta 21 Blv. López M., ex Coccidae on *Citrus sinensis*, 18.X.1996 (M.R. Thompson F.).

Diagnosis. *C. bimaculatus* is readily recognized by the two infusate oval spots on the fore wing beneath the marginal vein. Similar infuscation of the fore wing is known only in *C. pallidiceps* Compere described from Brazil and recorded also for Argentina and Mexico (De Santis, 1989). *C. bimaculatus* differs from *C. pallidiceps* in the elongate all funicle segments of antenna, whereas in *C. pallidiceps* the 2nd and 3rd segments are subquadrate.

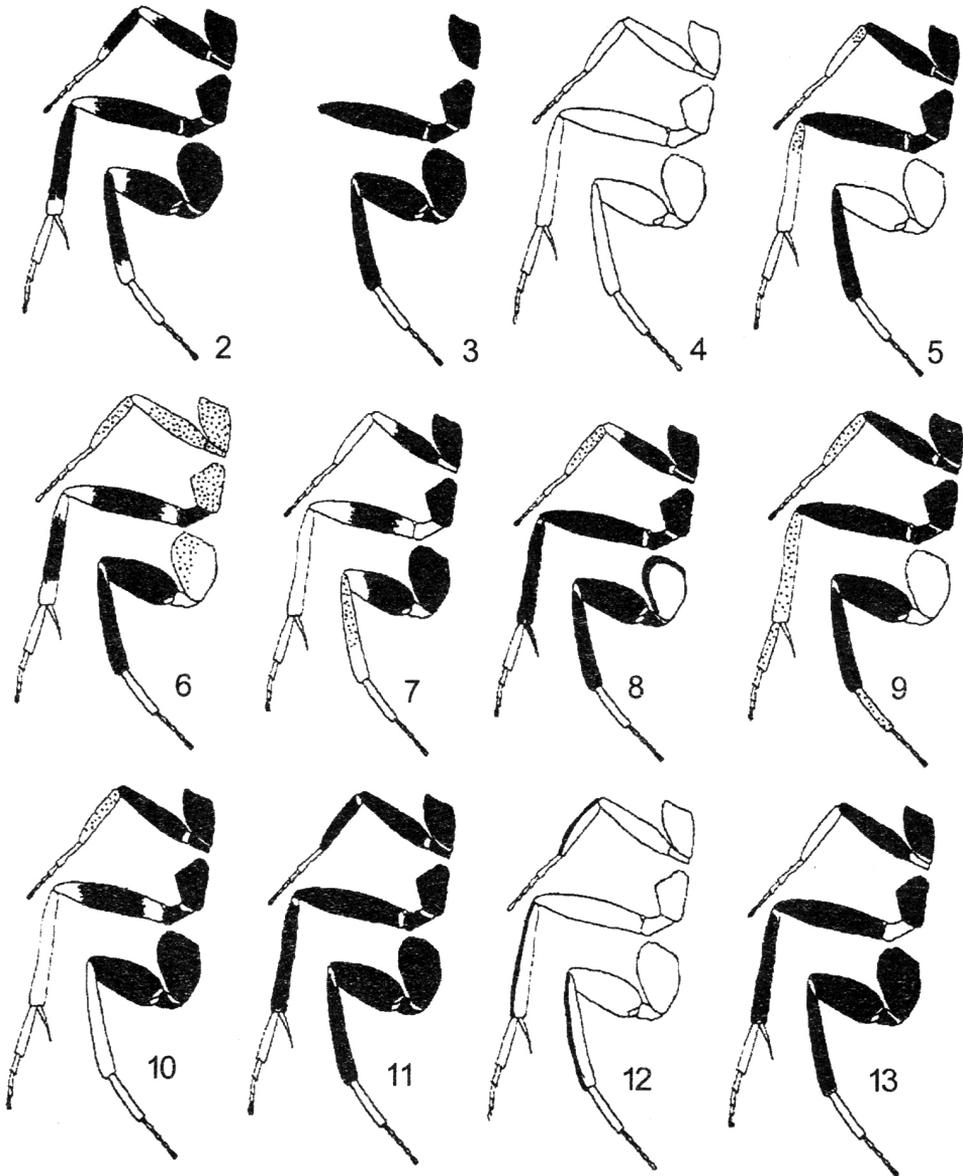
Distribution. Mexico (Tamaulipas).

Host. Coccidae.

3. *Coccophagus debachi* Myartseva & Ruíz z, 2005
(Figs 4, 37)

Myartseva & Ruíz z-Cancino, 2005: 45-48, ♀ (*Coccophagus*; type: ♀, Mexico, Baja California Sur; UCRC).

Material. Mexico, Baja California Sur, all specimens from Las Barracas, ca. 30 km E of Santiago: 1 ♀, 20.IV.1984; 1 ♀, 23.IV.1984; 1 ♀, 5.II.1984; 1 ♀, 20.IV.1985; 1 ♂, 30.IV.1985; 1 ♂, 1.VI.1985; 1 ♀, 4.VI.1985; 1 ♀, 15.VI.1985;

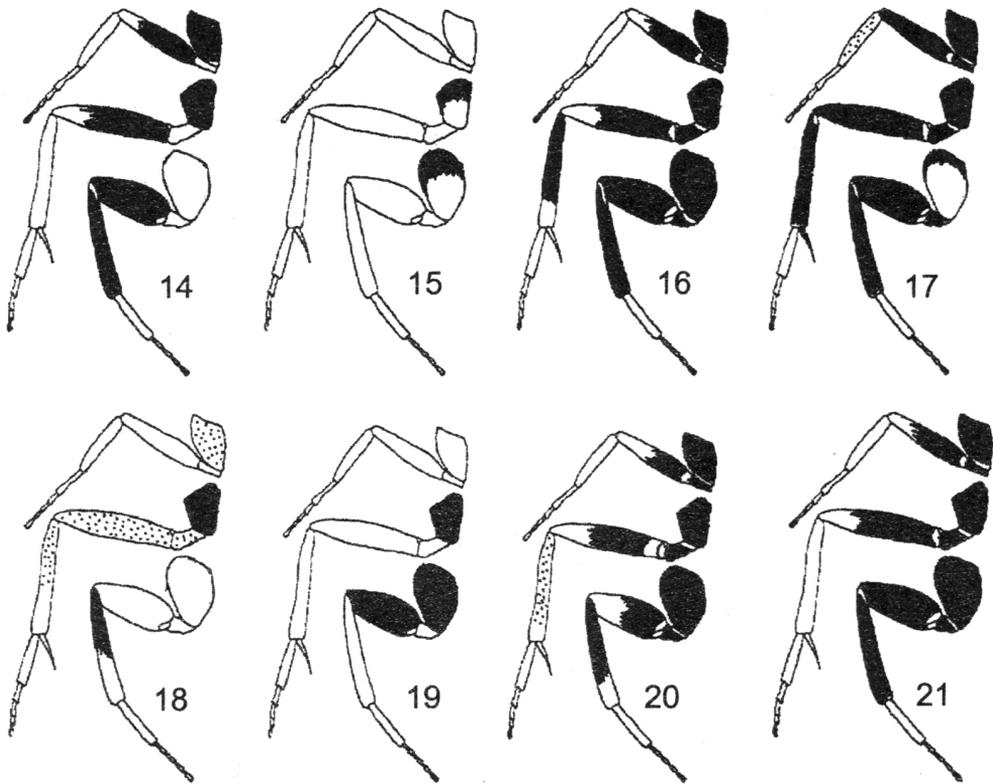


Figs 2-13. *Coccophagus*, female, colour pattern of legs, lateral view, schematic. 2, *C. atratus* Compere; 3, *C. bimaculatus* Myartseva (fore leg, middle tibia and tarsi lost); 4, *C. debachi* Myartseva & Ruíz (also *C. gonzalezi* Myartseva; *C. neocomperei* Myartseva & Ruíz and *C. tobiasi* Myartseva); 5, *C. femoralis* sp. n.; 6, *C. lunai* sp. n.; 7, *C. lycimnia* (Walker); 8, *C. mazatlan* sp. n.; 9, *C. mexicanus* Girault; 10, *C. mexicensis* Girault; 11, *C. nigrans* sp. n.; 12, *C. ochraceus* Howard; 13, *C. pallidiceps* Compere.

1 ♀, 27.V.1986; 1 ♀, 21.IV.1986; 1 ♂, 12.VI.1986; 1 ♀, 5.V.1986 (P. De Bach). Paratypes are deposited at UCRC, USNM, BMNH, ZISP and UAT.

Diagnosis. *C. debachi* is readily recognized from other species in the *redini*-group by the pale

yellow coloration of occiput and 3rd gastral tergite, and propodeum with longitudinal straight stripe behind spiracle on each side. 2nd funicular segment is 2.5 times as long as wide, 3rd seg-



Figs 14-21. *Coccophagus*, female, colour pattern of legs, lateral view, schematic. **14.** *C. propodealis* Myartseva; **15.** *C. pulvinariae* Compere (from Annecke & Insley, 1974); **16.** *C. quaestor* Girault; **17.** *C. ruizi* Myartseva; **18.** *C. rusti* Compere; **19.** *C. scutellaris* (Dalman) (from Annecke & Insley, 1974); **20.** *C. sostenesi* sp. n.; **21.** *C. teeceeni* Myartseva.

ment 0.8 times as long as 2nd. Ovipositor 0.9 times as long as middle tibia, 3rd valvula 0.7 times as long as 2nd valvifer.

Distribution. Mexico (Baja California Sur).

Host. Unknown.

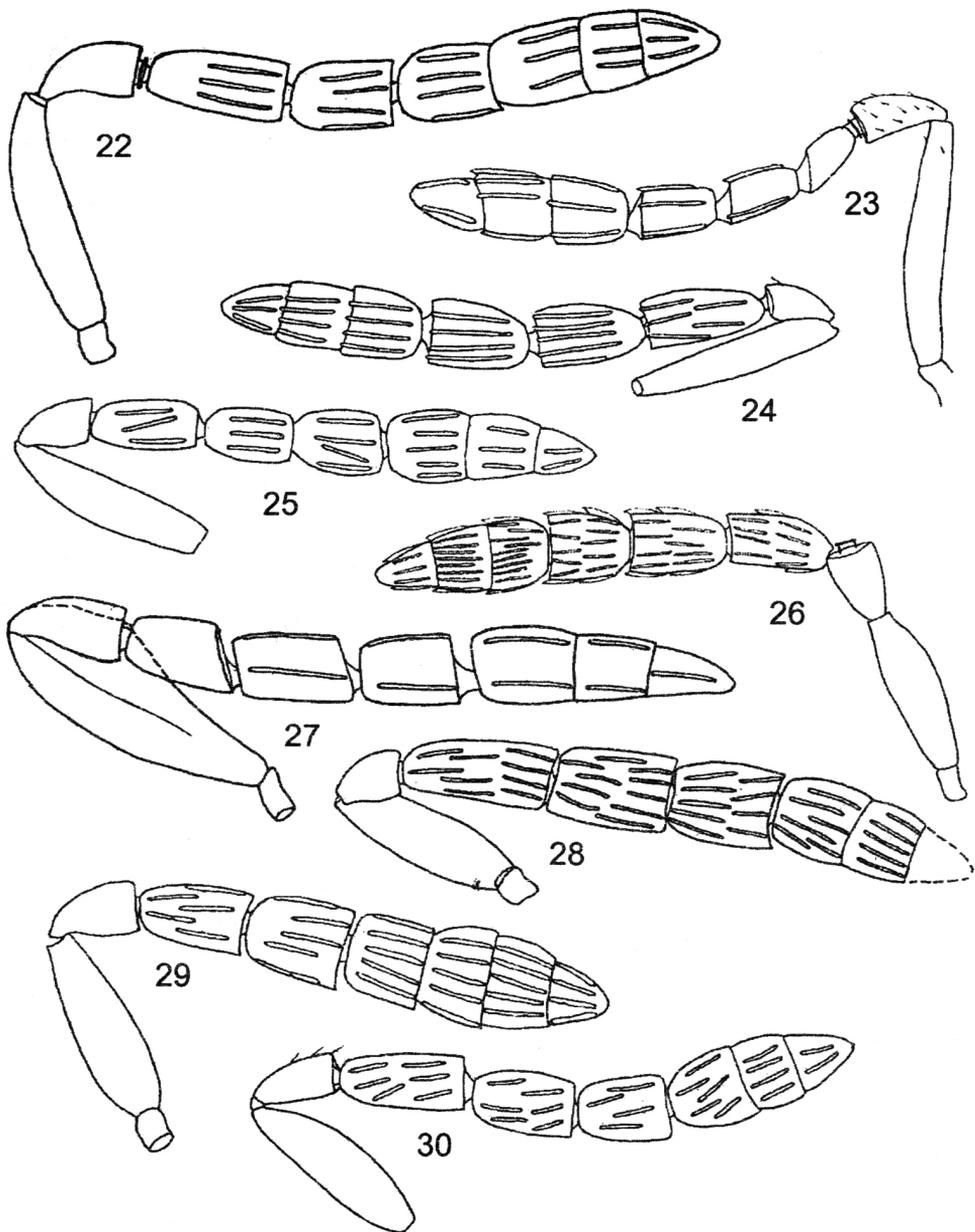
4. *Coccophagus femoralis* sp.n.
(Figs 5, 39, 45, 46)

Holotype. ♀, **Mexico**, *Tamaulipas*, 14 km W Jaumave, La Florida, Malaise trap, 13-20.V.2005 (D.R. Kasparyan & O. Pinson D.); deposited at UCRC.

Description. Female (holotype). Body length 1.33 mm.

Coloration. Head and body black; antennal scape and pedicel yellowish, with base infuscate; funicle fuscous; clava brown. Fore wings slightly infuscate, more visible beneath marginal vein; marginal and stigmal veins infuscate. Legs black; fore and middle tibiae yellowish, basally infuscate; hind coxae and femora and all tarsi (except last segment) white.

Structure. Head slightly wider than mesosoma and its own height, twice as wide as long. Frontovortex width about half of head width. Frontovortex, face and cheeks with punctate sculpture (finer on cheeks) and short setae. Ocelli forming an obtuse apical triangle; posterior ocellus separated from eye by about one diameter of an ocellus and from occipital margin by less than one diameter of an ocellus. Eyes finely setose, about twice as long as cheeks. Antennae (Fig. 40) inserted at the level of lower margin of eyes; distance from toruli to eyes about 1.5 times the distance from toruli to mouth margin. Scape 3.6 times as long as wide; pedicel 1.5 times as long as wide; first funicle segment 1.8 times as long as wide and 1.6 times as long as pedicel; second segment 1.4 times as long as wide; third segment 1.2 times as long as wide; all funicle segments of subequal width; club twice as long as wide and slightly shorter than two preceding funicular segments combined. Funicle segments with



Figs 22-30. *Coccophagus*, female, antenna. **22**, *C. atratus* Compere; **23**, *C. ochraceus* Howard (from Annecke & Insley, 1974); **24**, *C. rusti* Compere; **25**, *C. lycimnia* (Walker) (from Nikolskaya & Yasnosh, 1966); **26**, *C. teeceeni* Myartseva; **27**, *C. tobiasi* Myartseva; **28**, *C. bimaculatus* Myartseva; **29**, *C. lunai* sp. n.; **30**, *C. scutellaris* (Dalman) (from Nikolskaya & Yasnosh, 1966).

many longitudinal sensilla in two rows; club segments with many sensilla in one row. Mesosoma with mesoscutum and scutellum densely setose, with punctuate sculpture; axillae finely striate; side lobes of mesoscutum smooth; scutellum also

with two pairs of slender bristles; posterior bristles about 1.7 times as long as anterior bristles and slightly shorter than scutellum. Scutellum slightly shorter than mesoscutum, both about 1.5 times as wide as long. Side lobes of mesoscutum

each with four setae; axillae each with two setae. Propodeum divided medially. Fore wing about twice as long as wide; submarginal vein with 7 setae; marginal vein about 1.3 times as long as submarginal; stigmal vein slightly expanded (Fig. 41). Midtibial spur slightly shorter than basitarsus. Gaster slightly shorter than mesosoma. Ovipositor not exerted, shorter than middle tibia.

Male. Unknown.

Comparison. *C. femoralis* sp. n. is readily recognized by the combination of white hind coxae and femora. White hind femora have also *C. malthusi* Girault and *C. saintebeauvei* Girault, but their hind coxae are black. Morphologically, the new species is close to *C. quaestor* Girault and *C. coracinus* Compere, which have also white hind coxae, but their hind femora are black.

5. *Coccophagus gonzalezi* Myartseva, 2006 (Figs 4, 35)

Myartseva, 2006: 97-99, ♀ (*Coccophagus*; type: ♀, Mexico, Nuevo León; UCRC).

Material. Mexico, Nuevo León: 2 ♀, Guadalupe, Rincón de la Sierra, 11.VII.1983 (A. González H.).

Diagnosis. *C. gonzalezi* is a very distinctive species, it differs from all the other species of the genus in the unusually long and thin 1st and 2nd funicular segments: both more than 4 times as long as wide. An unusually long and thin 1st segment have only the Indian *C. longicornis* Hayat, 1971 and the Australian *C. redini* Girault, 1924.

Distribution. Mexico (Nuevo León).

Host. Unknown.

6. *Coccophagus lunai* sp. n. (Figs 6, 29, 40-44)

Holotype. ♀, Mexico, Sinaloa: Mazatlán, ex Coccidae, 16.V.2004 (S.N. Myartseva & E. Ruf z Cancino); deposited at UCRC.

Description. *Female* (holotype). Body length 1.2 mm.

Coloration. Head yellow with brownish tinge. Frontovortex brown. Mandible, labial and maxillary palpi yellow. Antennae yellow; flagellum with blackish longitudinal sensilla. Mesosoma dark yellow with light brownish tinge. Fore wings lightly uniformly infuscate; submarginal and marginal veins dusky. Legs brownish; hind coxae partly whitish; fore and middle tibiae apically whitish; tarsi white with last segment infuscate. Gaster brown; hind margin of first-sixth tergites narrowly whitish.

Structure. Head as wide as thorax, 1.2 times as wide as high. Frontovortex width about half of head width. Ocelli forming an obtuse apical triangle; posterior ocellus separated from eye margin by about two diameters of an ocellus. Eyes finely setose, about 1.6 times as long as cheeks.

Mandible (Fig. 42) with one notch and broad truncation. Antennae (Fig. 43) inserted immediately under the level of lower margin of eyes. Distance between antennal toruli slightly less than that from torulus to mouth margin and about 0.6 times as long as distance to eye margin. Scape 3.3 times as long as wide; pedicel about 1.6 times as long as wide; first funicle segment slightly longer than pedicel and 1.6 times as long as wide; second segment slightly longer than wide; third segment slightly shorter than second segment and slightly wider than long; club 1.8 times as long as wide and scarcely longer than two preceding funicle segments combined. All flagellar segments with 5-6 longitudinal sensilla, on first and second segments placed in two rows. Mesosoma with mesoscutum and scutellum densely setose; scutellum also with two pairs of long slender bristles: apical bristles about 0.6 of scutellum length; second pair of bristles about 0.3 of scutellum length, i.e. half as long as apical bristles. Mesoscutum 1.7 times as wide as long; scutellum slightly longer than mesoscutum and slightly wider than long. Side lobes of mesoscutum each with four setae; axillae each with two setae. Propodeum divided medially, with 9-10 short setae laterad to spiracles. Metanotum with two short setae laterally. Fore wing with very short marginal fringe. Marginal vein a little longer than submarginal; postmarginal vein slightly shorter than stigmal vein (Fig. 44). Midtibial spur scarcely shorter than basitarsus (Fig. 45); basitarsus scarcely shorter than next three tarsal segments combined. Ovipositor (Fig. 46) about 1.5 times as long as middle tibia; third valvula 0.2 times as long as second valvifer and 0.8 times as long as midtibial spur.

Male. Unknown.

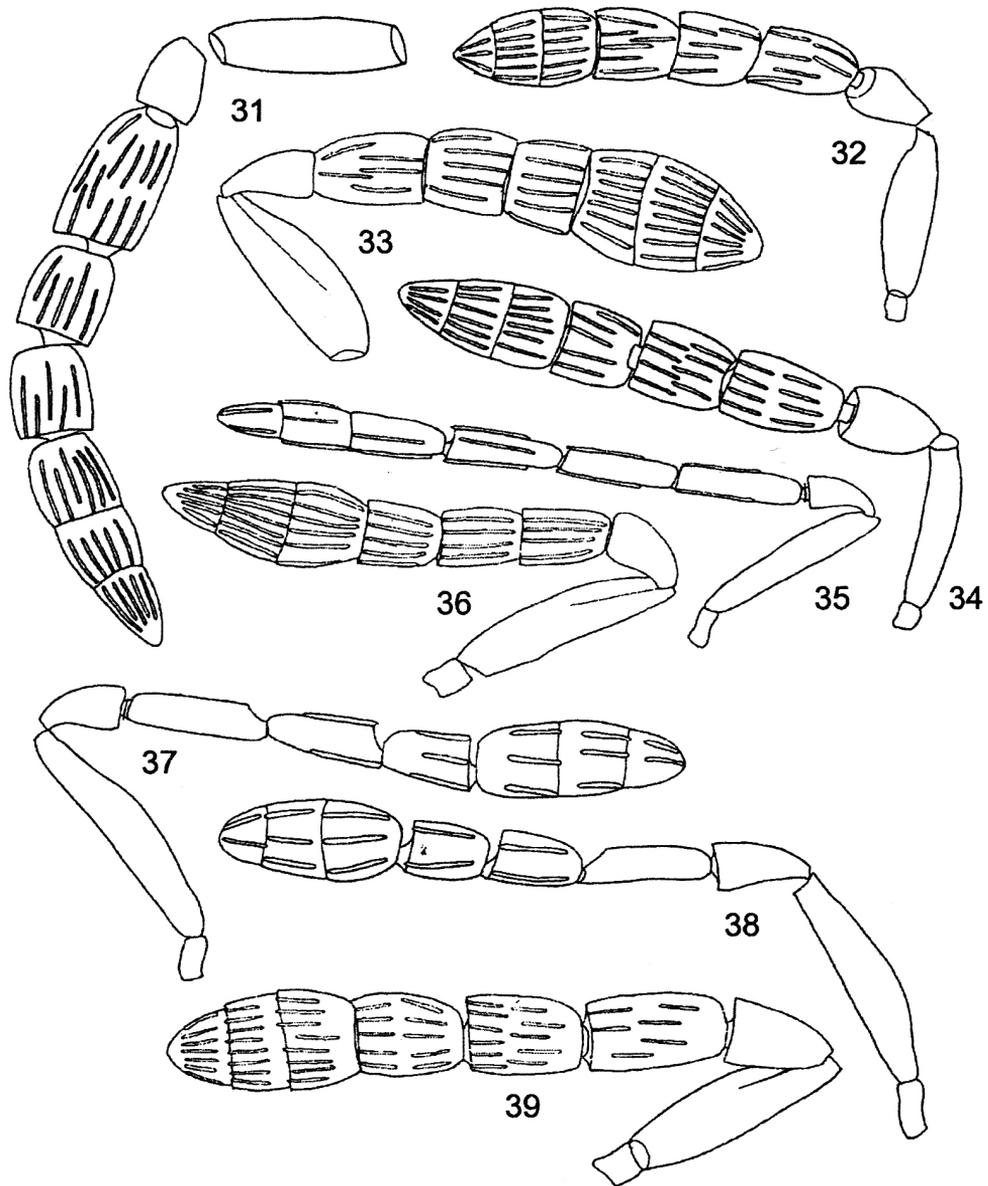
Comparison. *C. lunai* sp. n. is close to the African species *C. nigropleurum* Girault, which is very varied in coloration, but can be most easily distinguished by the following characters: in *C. lunai*, mandible with notch and broad truncation, third valvula 0.8 times as long as midtibial spur, third funicle segment wider than long; in *C. nigropleurum*, mandible tridentate, third valvula equal in length to midtibial spur, third funicle segment longer than wide.

Etymology. *C. lunai* is named in honour of Juan Fidencio Luna Salas, Mexican entomologist from the state of Tamaulipas, who is working many years in the biological control of insect pests.

7. *Coccophagus lycimnia* (Walker, 1839)

Walker, 1839: 11, ♀ (*Aphelinus*; type: ♀, Ireland; ?BMNH). For synonyms, see Noyes, 2002, 2003.

Redescriptions. Compere, 1931a: 59-61; Mercet, 1931: 400-402; De Santis, 1948: 176-181; Ferrière, 1965: 118-120; Nikolskaya & Yasnosh, 1966: 219-221.



Figs 31-39. *Coccophagus*, female, antenna. 31, *C. propodealis* Myartseva; 32, *C. mazatlan* sp. n.; 33, *C. nigrans* sp. n.; 34, *C. ruizi* Myartseva; 35, *C. gonzalezi* Myartseva; 36, *C. sostenesi* sp. n.; 37, *C. debachi* Myartseva & Ruíz; 38, *C. neocompereii* Myartseva & Ruíz; 39, *C. femoralis* sp. n.

Previous records from Mexico. De Santis, 1979; De Santis & Fidalgo, 1994; Myartseva & Ruíz z-Cancino, 2000; González-Hernández, 2000; Noyes, 2002; Ruíz z-Cancino & Coronado Blanco, 2002.

Material. More than 70 specimens of *C. lycimnia* (almost all females) are preserved at UAT. They were collected in 1998-2004 in the states of Tamaulipas, Guerrero, Guanajuato and Veracruz. Most of them were reared from different Coccidae, including *Philephedra lutea*, *Coccus hesperidum*, *Saissetia* spp. and *Pulvinaria* spp.

Diagnosis. Head blackish or brownish, with a pattern of orange lines. Antennal scape and pedicel more or less fuscous; flagellum yellowish. Apical two-thirds (or slightly more) of scutellum and the metanotum medially yellow, the remainder of thorax and metasoma black. All coxae and femora mostly black; tibiae yellow; hind tibia more or less extensively fuscous at base. Scutel-

lum with 3 pairs of bristles. Mandible with 2 short teeth and truncation.

Distribution. Almost cosmopolitan, but the published data require confirmation, as the species is difficult for identification. Hayat (1998) considered the record of *C. lycimnia* from India to be most likely a misidentification for *C. cowperi* Girault. The records of *C. lycimnia* from Africa in Smith & Compere (1928), Mercet (1931) and Essig (1931) all undoubtedly referred to *C. cowperi* Girault (Annecke & Insley, 1974). In Mexico, the species was recorded from Chihuahua, Durango, Morelos, Sonora, Tamaulipas (González-Hernández, 2000); we collected this species also in Guerrero, Guanajuato and Veracruz (new records).

Hosts. Mainly Coccidae, but also Pseudococcidae, Eriococcidae and other Homoptera Coccoidea. Noyes (2002) lists 91 host species of *C. lycimnia*. *C. lycimnia* is used in biological control of *Coccus hesperidum* and *Saissetia oleae*, dangerous pests of crops.

8. *Coccophagus mazatlan* sp. n. (Figs 8, 32, 47-50)

Holotype. ♀, **Mexico, Sinaloa:** Mazatlán, ex Coccidae, 16.VI.2004 (S.N. Myartseva & E. Ruíz); deposited at UCRC.

Paratypes. **Mexico, Sinaloa:** 2 ♀, same data as in holotype; deposited at UAT.

Description. Female. Body length 1.20-1.30 mm. Coloration. Head fuscous yellow; frontovertex brownish below anterior and posterior ocelli; occiput brownish around foramen; eyes with narrow yellow band along inner margin. Antennae brownish black; scape fuscous yellow. Mesosoma brownish black; pronotum yellowish on sides; midlobe of mesoscutum with yellow transverse band medially. Fore wing infusate below apical halves of marginal and stigmal veins, infuscation not reaching posterior margin of wing, veins slightly infusate. Legs black; hind coxae white with black upper margin; fore tibiae and tarsi slightly infusate; middle and hind tarsi white; midtibial spur infusate. Gaster brownish black.

Structure. Head slightly wider than mesosoma, slightly wider than high and about twice as wide as long. Frontovertex slightly wider than long, its width about half of head width. Frontovertex, face and cheeks setose, setae longer on mouth margin. Ocelli forming an obtuse apical triangle; posterior ocellus separated from eye by about two diameters of an ocellus and from occipital margin by about one diameter of an ocellus. Eyes setose, twice as long as cheeks. Mandible with two teeth and truncation. Antennae (Fig. 47) inserted immediately under the level of lower margin of eyes. Distance between toruli subequal to that from torulus to mouth margin and about 0.67 times as long as distance to eye margin. Antennal radicle

short, subquadrate. Scape slightly less than 3.5 times as long as wide; pedicel about 1.5 times as long as wide; first funicular segment 1.7 times as long as wide and 1.3-1.4 times as long as pedicel; second and third segments subequal in length and width, each slightly longer than wide and shorter than first segment; club slightly wider than funicle, 1.8 times as long as wide and slightly shorter than two preceding segments combined. Funicle and club segments with 5-6 longitudinal sensilla, third segment of club with three sensilla. Mesosoma with mesoscutum densely setose; scutellum widely rounded at apex, slightly longer than mesoscutum and slightly wider than long, setose on anterior half, before first pair of long slender bristles, and with two pairs of long slender bristles on posterior part; all setae arranged more or less symmetrically. Distance between anterior pair of bristles 1.3 times that between posterior pair of bristles. Side lobes of mesoscutum each with four setae; axillae each with two setae. Propodeum divided medially, with longitudinal carinae before spiracles. Metanotum with two setae on each side. Fore wing reaches only apex of gaster, 2.2 times as long as wide, with short marginal fringe. Marginal vein slightly longer than submarginal (15 : 13); postmarginal vein present (Fig. 48). Hind wing 3.5 times as long as maximum width of wing, with marginal fringe about 1/7 wing width. Midtibial spur slightly shorter than basitarsus; basitarsus slightly longer than two next tarsal segments combined (Fig. 49). Gaster slightly longer than mesosoma. Ovipositor (Fig. 50) not exerted, about 1.3 times as long as middle tibia; third valvula 0.25 times as long as second valvifer.

Male unknown.

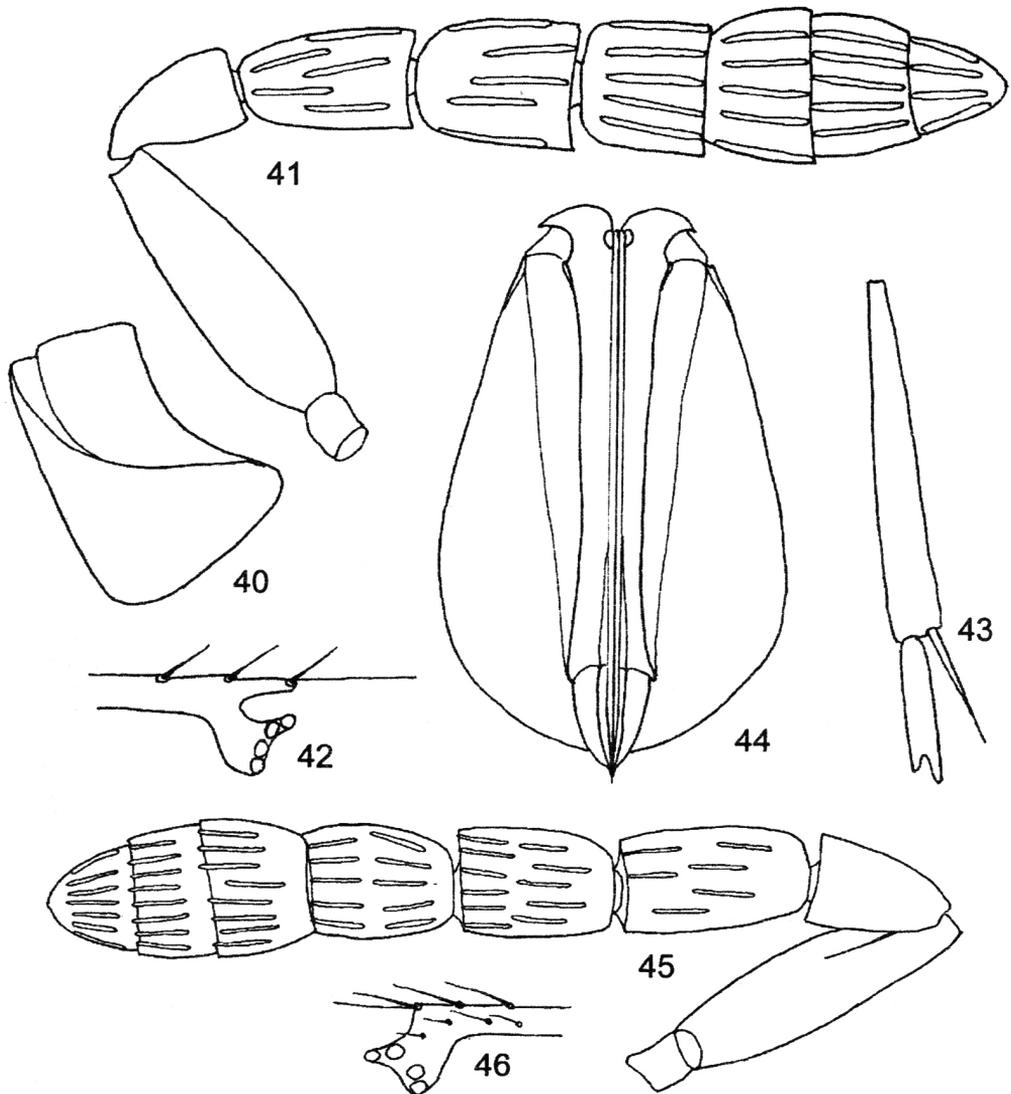
Comparison. *C. mazatlan* sp. n. is close to *C. ruizi* Myartseva, but can be distinguished by the following characters: in *C. mazatlan*, head fuscous yellow, pronotum with yellowish sides, midlobe of mesoscutum with yellow transverse band medially, antennal scape about 3.5 times as long as wide, second and third segments of funicle equal in length and in width; in *C. ruizi*, head brownish black, mesosoma black, antennal scape 4.5 times as long as wide, second funicle segment distinctly longer than third segment.

Etymology. *C. mazatlan* is derived from the city of Mazatlan, where it was collected.

9. *Coccophagus mexicanus* Girault, 1915 (Fig. 9)

Girault, 1915: 34, ♀ (*Coccophagus*; type: ♀, Panama; USNM).

Records from Mexico. Girault, 1915; De Santis, 1979; Myartseva & Ruíz z-Cancino, 2000; Noyes, 2002; Myartseva et al., 2004a.



Figs 40-46. *Coccophagus*, female. **40-44.** *C. lunai* sp. n. (40, mandible; 41, antenna; 42, stigmatal and postmarginal veins; 43, midtibial spur and middle tarsus; 44, ovipositor); **45, 46.** *C. femoralis* sp. n. (45, antenna; 46, stigmatal and postmarginal veins).

Diagnosis. Head with face, frons and occipital border, antennal scape and pedicel yellowish. Body black; apical one-fourth of the scutellum yellow. Hind coxae white; fore and middle tibiae fuscous; the rest of legs black. Scutellum densely setose. Fore wing slightly infuscated under the marginal vein.

Distribution. Bermuda, Panama, Mexico.

Host. Coccidae: *Lecanium* sp.

10. *Coccophagus mexicensis* Girault, 1917 (Fig. 10)

Girault, 1917: 2, ♀ (*Coccophagus*; type: ♀, Mexico; USNM); Compere, 1931a: 93-94 (redescription).

Previous records from Mexico. Girault, 1917; Compere, 1931a; Domínguez & Carrillo, 1976; De Santis, 1979; Alvarado-Mejía & González-Hernández, 1990; De Santis & Fidalgo, 1994; González-Hernández, 2000; Myartseva & Ruíz-Cancino, 2000; Myartseva et al., 2004a.

Material. **Mexico, Tamaulipas:** 1 ♀, Gomez Farías, Reserva El Cielo, Canindo, 2.X.1995 (V.A. Trjapitzin); **Distrito Federal:** 3 ♀, ex Coccidae, 23.VII.2000 (Arriola P., V.). Material preserved at UAT.

Diagnosis. Head and body entirely black. Legs black; middle and hind tibiae whitish yellow. Scutellum densely setose. Fore wings faintly and uniformly infuscated. This species cannot be separated from *C. niger* Masi on the basis of its original description, and may prove to be its synonym (Compere, 1931a).

Distribution. Brazil, USA (California), Mexico (Aguascalientes, Chihuahua, D.F., San Luis Potosí, Tamaulipas). The species was introduced from Mexico to USA for biological control of *Saissetia oleae* and released in California (Peck, 1963; Gordh, 1979; Lampson & Morse, 1992).

Hosts. Coccidae: *Coccus viridis* (Green), *Saissetia oleae* (Olivier).

11. *Coccophagus neocomperei* Myartseva & Ruíz z, 2005 (Figs 4, 38)

Myartseva & Ruíz z-Cancino, 2005: 43-45, ♀ (*Coccophagus*; type: ♀, Mexico; UCRC).

Material. **Mexico, Guerrero:** 20 ♀, 7 ♂, Acapulco, ex Coccidae on *Leucaena* sp., 12.VI.2000 (S.N. Myartseva); **Campeche:** 1 ♀, Cd. Del Carmen, 30.VII.1984 (G. Gordh); **Veracruz:** 1 ♂, 85 km S of Veracruz, 180-200 m, 31.VII.1984 (G. Gordh). Paratypes deposited at UCRC, USNM, BMNH, ZISP and UAT.

Diagnosis. *C. neocomperei* is similar to the Australian species *C. redini* Girault and Mexican species *C. debachi* Myartseva & Ruíz z, which have also densely setose axillae, but it can be easily distinguished from these species of the *C. redini* group by the occiput with black elongate spot on sides of foramen, 3rd gastral tergite black dorsally, propodeum brownish yellow on sides, 2nd funicular segment 1.7 times as long as wide, 3rd segment subequal to 2nd, ovipositor 0.7 times as long as middle tibia, 3rd valvula 0.2 times as long as 2nd valvifer.

Distribution. Mexico (Guerrero, Campeche, Veracruz).

Host. Coccidae.

12. *Coccophagus nigrans* sp. n. (Figs 11, 33, 51-55)

Holotype. ♀, **Mexico, Tamaulipas:** San Carlos, ex *Differococcus argentinus* on *Celtis pallida*, 12.II.2000 (S.N. Myartseva); deposited at UCRC.

Description. **Female** (holotype). Body length 1.16 mm.

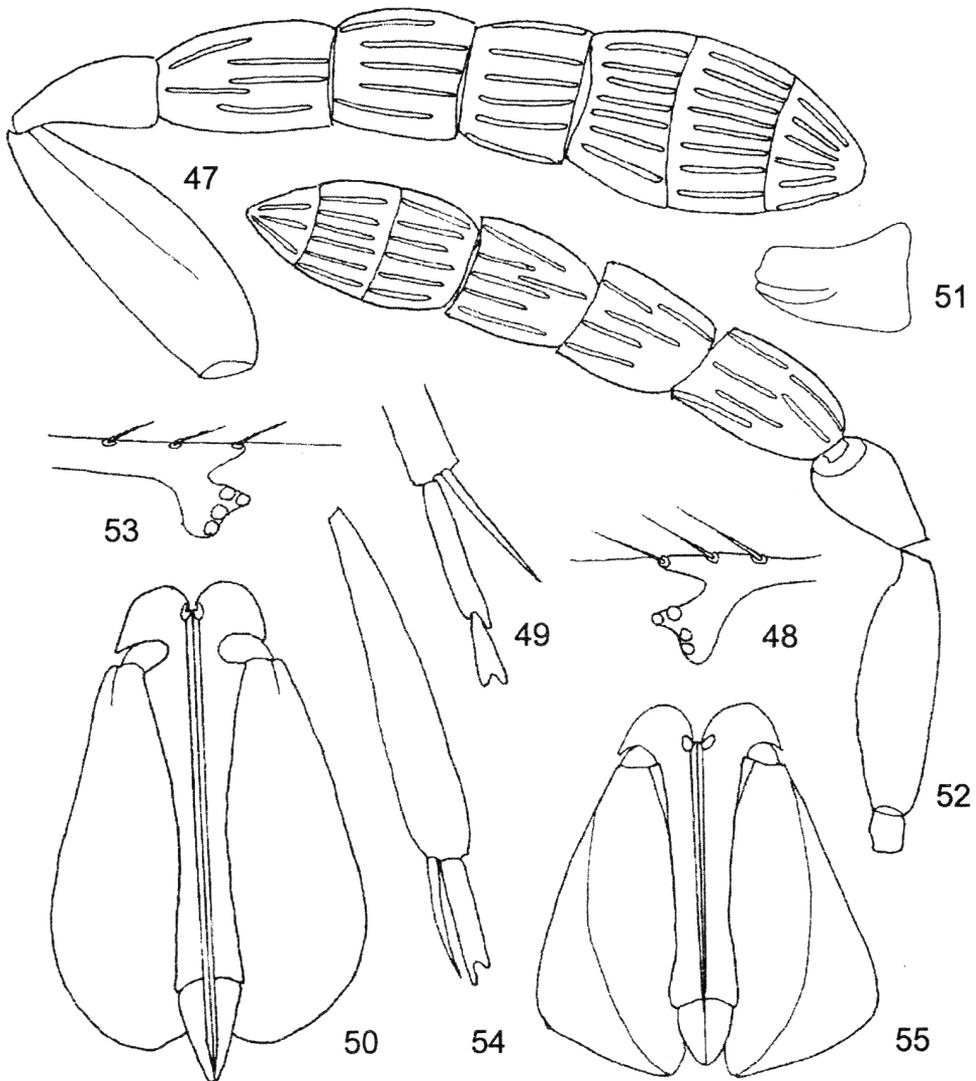
Coloration. Head black; antennae black; scape brownish; labial and maxillary palpi brownish. Mesosoma black. Fore wing infuscated below

marginal and stigmal veins, infuscation not reaches posterior margin of wing; veins slightly infuscated. Legs black; tarsi yellowish white; apical segment of tarsi and midtibial spur slightly infuscated. Metasoma black.

Structure. Head slightly wider than high and than mesosoma. Frontoververtex transversely striate, slightly less than half of head width. Frontoververtex, face and cheeks shortly setose. Ocelli forming an obtuse apical triangle; posterior ocellus separated from eye by about one diameter of an ocellus. Eyes setose, 2.5 times as long as cheeks. Mandible (Fig. 51) with two short obtuse teeth and wide truncation. Antennae (Fig. 52) inserted under the level of lower margin of eyes; distance between toruli slightly longer than that from torulus to eye and 1.6 times longer than distance to mouth margin. Antennal scape 3.3 times as long as wide; pedicel twice as long as wide; first funicle segment about 1.5 times as long as wide and slightly longer than pedicel; second segment subquadrate; third segment wider than long and scarcely shorter than second segment; club longer than two preceding funicle segments combined, slightly more than 1.5 times as long as wide and 1.6 times as wide as first funicle segment. Funicle and club segments with more longitudinal sensilla, on first segment sensilla placed in two rows. Mesosoma with mesoscutum densely setose. Scutellum with many setae (about 40), as long as midlobe, widely rounded at apex and glabrous, with a pair of long slender bristles, which are slightly shorter than scutellum. Propodeum divided medially. Fore wing about twice as long as wide. Submarginal vein with 7 setae, subequal to marginal vein; postmarginal vein short, subequal in length to stigmal vein (Fig. 53). Hind wing about 3 times as long as width of wing, marginal fringe about 1/7 wing width. Midtibial spur (Fig. 54) slightly shorter than basitarsus; basitarsus slightly shorter than next three tarsal segments combined. Hind tibia with strong suberect setae on dorsal margin and with two equal setae at apex. Gaster slightly shorter than mesosoma. Ovipositor (Fig. 55) not exerted, about as long as middle tibia; third valvula about 0.2 times as long as second valvifer and about half as long as midtibial spur.

Male. Unknown.

Comparison. *C. nigrans* sp. n. is close to several African species from the *malthusi* species group, according to Hayat, 1992 (*C. modestus* Silvestri, *C. capensis* Compere, *C. quaestor* Compere) and to the Mexican species *C. ruizi* Myartseva. Differences of *C. nigrans* from these species are as follows: antennal scape 3.3 times as long as wide, pedicel slightly shorter than first funicle segment, which is 1.5 times as long as wide, third segment wider than long, ovipositor



Figs 47-55. *Coccophagus*, female. **47-50**, *C. mazatlan* sp. n. (47, antenna; 48, stigmatal and postmarginal veins; 49, midtibial spur and middle tarsus; 50, ovipositor); **51-55**, *C. nigrans* sp. n. (51, mandible; 52, antenna; 53, stigmatal and postmarginal veins; 54, midtibial spur and middle tarsus; 55, ovipositor).

subequal in length to middle tibia, with third valvifer half as long as midtibial spur. In *C. modestus*, antennal scape 5 times as long as wide, pedicel subequal to first funicle segment, which is twice as long as wide, third segment subquadrate, ovipositor 1.3-1.4 times as long as middle tibia. In *C. capensis*, scape 4.7 times as long as wide, third funicle segment longer than wide, ovipositor 1.3-1.6 times as long as middle tibia, with third valvula 0.8 times as long as midtibial spur. In *C. quaestor*, scape 4.5 times as long as wide, first

funicle segment twice as long as wide, third segment longer than wide, marginal vein 1.5 times as long as submarginal (in *C. nigrans*, veins subequal in length). In *C. ruizi*, scape 4.5 times as long as wide, first funicle segment 1.7-1.8 times as long as wide, third segment longer than wide, marginal vein 1.3 times as long as submarginal, hind coxae white (in *C. nigrans*, black), ovipositor 1.1 times as long as middle tibia, clava subequal to or shorter than two preceding funicular segments combined (in *C. nigrans*, longer).

13. *Coccophagus ochraceus* Howard, 1895 (Fig. 12)

Howard, 1895: 38, ♀ (*Coccophagus*; type: ♀, USA, California; USNM). – *bifasciaticorpus* Girault, 1916: 44 (*Coccophagus*; syn. by Gahan, 1924: 13).

Redescriptions. Smith & Compere, 1928: 259; Compere, 1931a: 80-81; Annecke & Insley, 1974: 29-30.

Records from Mexico. Domínguez & Carrillo, 1976; Alvarado-Mejía & González-Hernández, 1990; De Santis & Fidalgo, 1994; González-Hernández, 2000; Myartseva & Ruíz-Cancino, 2000; Noyes, 2002; Myartseva et al., 2004a.

Diagnosis. *C. ochraceus* can be easily recognized by the yellow colour of body with black to dark brown apical tergites of gaster, pronotum medially and mesoscutum anteriorly; also antennal scape usually longer than funicle.

Distribution. Bermuda, Chile, Eritrea, Hawaii, Israel, Kenya, New Zealand (Noyes & Valentine, 1989), South Africa, USA, Mexico (Aguascalientes, Chihuahua, D.F.) (González-Hernández, 2000). Specimens from India were erroneously recorded as *C. ochraceus* (Hayat, 1998).

Hosts. Coccidae: *Ceroplastes pseudoceriferus* Green, *Coccus hesperidum* L., *C. viridis* (Green), *Parasaissetia nigra* (Nietner), *Parthenolecanium corni* (Bouché), *Pulvinaria psidii* Maskell, *Saissetia coffeae* (Walker), *S. oleae* (Olivier). Introduced into California, Chile and Israel from South Africa for biological control of *Saissetia oleae*.

14. *Coccophagus pallidiceps* (Compere, 1939) (Fig. 13)

Compere, 1939: 88, ♀ (*Aneristus*; type: ♀, Brazil; USNM); De Santis, 1989: 60 (*Coccophagus*).

Records from Mexico. De Santis, 1989; Myartseva & Ruíz-Cancino, 2000; Noyes, 2002; Myartseva et al., 2004a.

Diagnosis. *C. pallidiceps* can be distinguished by the infuscated patterns of the fore wing: one large oval spot under apical half and one small oval spot under base of marginal vein, and light infuscation along middle part of posterior margin of wing. Head and body black; face and antennal scape yellowish; fore tibiae whitish.

Distribution. Argentina, Brazil, Mexico.

Hosts. Coccidae: *Akermes bruneri* Cockerell, *Milviscutulus (Coccus) mangiferae* (Green), *Saissetia oleae* (Olivier).

15. *Coccophagus propodealis* Myartseva, 2004 (Figs 14, 31)

Myartseva, 2004a: 39-40, ♀ (*Coccophagus*; type: ♀, Mexico; UCRC).

Material. Mexico, Tamaulipas: 1 ♀, Gomez Farías, Estación Los Cedros, 340 m, 14.IV.2002 (A. Córdoba-Torres M.T.).

Diagnosis. *C. propodealis* is readily recognized by the white propodeal sides, hind coxae and all trochanters contrasting to the black coloration of body.

Distribution. Mexico (Tamaulipas).

Host. Unknown.

16. *Coccophagus pulvinariae* Compere, 1931

Compere, 1931a: 53; ♀ (*Coccophagus*; type: ♀, South Africa; USNM); Annecke, 1964: 20, 26-27 (redescription); Ferrière, 1965: 23, 26, 114, 121 (redescription). – *eritreaensis* Compere, 1931b: 254 (*Coccophagus*; syn. by Peck, 1963: 313).

Records from Mexico. Aburto-Valencia, 1942; Contreras-Coronado, 1972; Myartseva & Ruíz-Cancino, 2000; Noyes, 2002; Myartseva et al., 2004a, 2004c.

Diagnosis. *C. pulvinariae* has the general colour black, yellow are only face, cheeks, antennae, scutellum (sometimes anterior margin very narrowly blackish) and legs, except for middle and hind coxae. Scutellum with 3 pairs of setae. Fore wing faintly and uniformly smoky.

Distribution. Africa, Cuba, Chile, Peru, Mexico. Introduced to USA (California) and Israel for biological control of *Saissetia oleae* (Peck, 1963; Gordh, 1979; Argov & Rössler, 1988; Lampson & Morse, 1992).

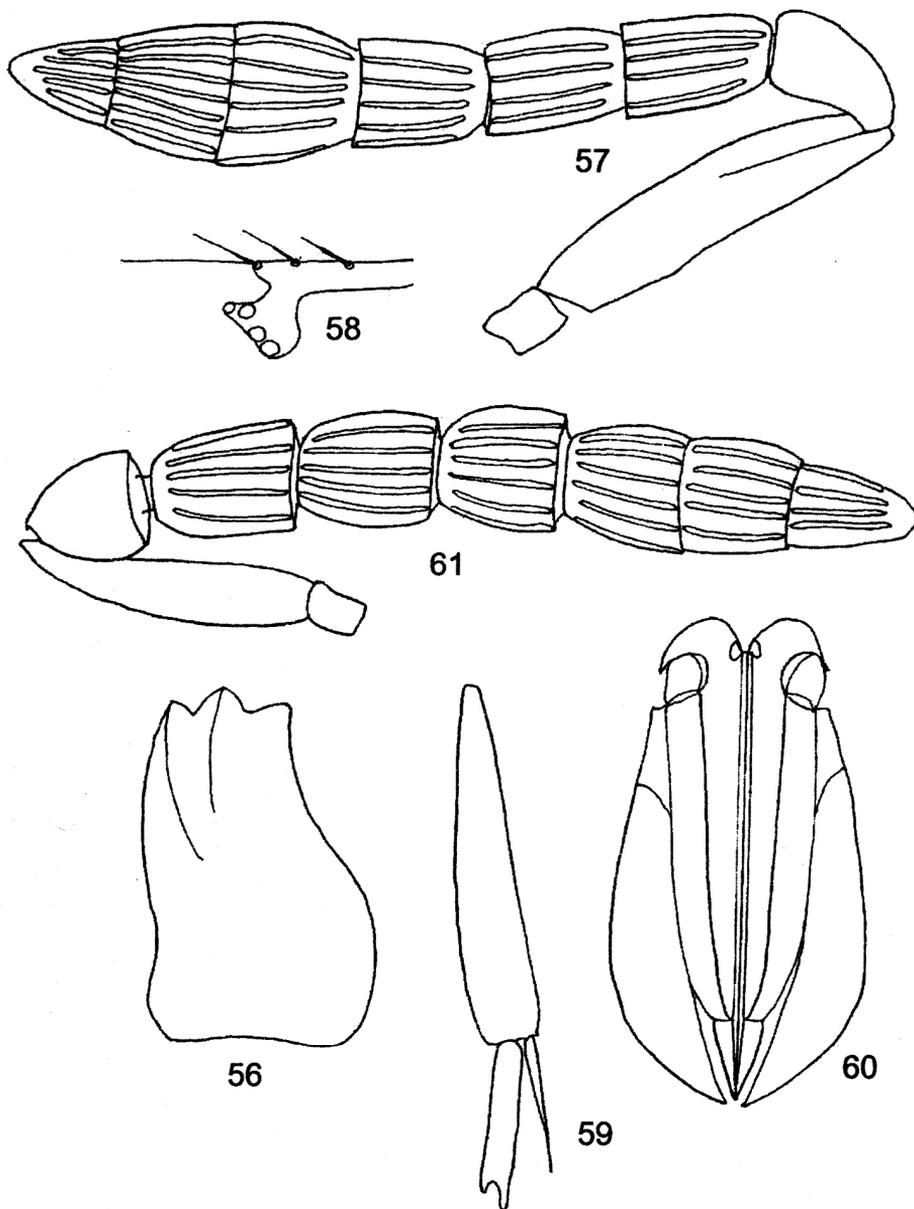
Hosts. Coccidae: *Ceroplastes* sp., *Coccus hesperidum* L., *C. pseudomagnoliarum* (Kuwana), *C. viridis* (Green), *Cribrolecanium andersoni* (Newstead), *Etiennaea villiersi* Matile-Ferrero, *Filippia* sp., *Inglisia* sp., *Macropulvinaria jacksoni* (Newstead), *Milviscutulus (Coccus) mangiferae* (Green), *Parasaissetia nigra* (Nietner), *Parthenolecanium corni* (Bouché), *Pulvinaria aethiopica* (De Lotto), *P. merwei* Joubert, *P. mesembryanthemi* (Vallot), *Saissetia jocunda* De Lotto, *S. oleae* (Olivier), *S. somereni* (Newstead). In Mexico, recorded from *Coccus hesperidum*.

17. *Coccophagus quaestor* Girault, 1917 (Fig. 16)

Girault, 1917: 2, ♀ (*Coccophagus*; type: ♀, Mexico; USNM); Compere, 1931a: 97-98 (redescription).

Previous records from Mexico. Girault, 1917; De Santis, 1979; Alvarado-Mejía & González-Hernández, 1990; González-Hernández, 2000; Myartseva & Ruíz-Cancino, 2000; Noyes, 2002; Ruíz-Cancino & Coronado Blanco, 2002; Myartseva et al., 2004a, 2004c.

Material. Mexico, Baja California Norte: 1 ♀, 13 km N Rosarito (114° W; km. 40), 27.III.1980 (J.D. Pinto) (UCRC Ent. 54604); Tamaulipas, Cd. Victoria: 1 ♀, ex *Coccus hesperidum* on *Psidium guajava*, 28.III.1999; 1 ♀, 1 ♂, same host species, 27.X.1999 (S.N. Myartseva); 4 ♀, ex *Saissetia miranda* on *Nerium oleander*, 9.I.1999; 18 ♀, 1 ♂, ex *Pulvinaria* sp., 12.III.2000; 2 ♀, ex Coccidae on *Ficus benjamina*, 7.V.1999; 2 ♀, ex Coccidae, 2.IX.1998 and 27.II.2000 (S.N. Myartseva); 8 ♀, ex *Coccus hesperidum* on *Bauhinia variegata*, 5.VIII.1999 (G. Gaona); 1 ♀, same host species, 9.IX.1999 (G. Gaona &



Figs 56-61. *Coccophagus sostenesi* sp. n. **56**, antenna, female; **57**, mandible; **58**, stigmal and postmarginal veins; **59**, midtibial spur and middle tarsus; **60**, ovipositor, **61**, antenna, male.

C. Salazar); 1 ♀, ex *Coccus hesperidum* on *Schefflera actinophylla*, 10.II.2000 (J.M. Coronado Blanco). Specimens are preserved at UAT and UCRC.

Diagnosis. *C. quaestor* has general colour black; antennae brown, fore tibiae, apex of middle femora and middle tibiae pale. Scutellum

densely setose. Fore wing faintly uniformly infuscated. Basitarsus of middle leg as long as all following segments combined.

Distribution. Canada, USA, El Salvador, Peru, Mexico (Baja California Norte, D.F., Morelos, Nuevo León, Tamaulipas).

Hosts. Coccidae: *Coccus hesperidum* L., *Saissetia coffeae* (Walker), *S. oleae* (Olivier), *Toumeyella parvicornis* (Cockerell). In Mexico, was reared from *Toumeyella parvicornis* (as *numismaticum*), also from *Coccus hesperidum*, *Saissetia miranda* and *Pulvinaria* sp.

18. *Coccophagus ruizi* Myartseva, 2004
(Figs 17, 34)

Myartseva, 2004a: 40-42, ♀ (*Coccophagus*; type: ♀, Mexico; UCRC).

Material. Mexico, Tamaulipas: 1 ♀, Tampico, ex *Saissetia* sp., 27.III.2001 (S.N. Myartseva); 1 ♀, Gomez Farías, Estación Los Cedros, 340 m, 14.IV.2002 (A. Córdoba-Torres M.T.), deposited at UAT.

Diagnosis. *C. ruizi* can be distinguished from close species as follows: from *C. nigrinus* Compere, by the shorter ovipositor, which is slightly shorter than middle tibia, seventh tergite not elongate, hind coxae mostly white; from *C. coracinus* Compere, by the basitarsus of middle and hind legs, which is entirely white and slightly longer than two next segments combined.

Distribution. Mexico (Tamaulipas).

Host. Coccidae: *Saissetia* sp.

19. *Coccophagus rusti* Compere, 1928
(Figs 18, 24)

Compere, 1928: 261, ♀ (*Coccophagus*; type: ♀, South Africa; USNM).

Redescriptions. Compere, 1931a: 30-31; Annecke, 1964: 20, 31; Myartseva & Coronado Blanco, 2003: 741-742.

Material. México, Oaxaca: 2 ♀, Puerto Angel, Hotel, ex *Saissetia ?oleae*, 19.XII.1997 (E.Ya. Shuvakhina); *Veracruz:* 12 ♀, 14 ♂, Tuxpan, Ojito, ex Coccidae on *Dioon edule*, 14.III.1999 (S.N. Myartseva); *Tamaulipas:* 6 ♀, Cd. Victoria, ex *Saissetia miranda* on *Nerium oleander*, 12.X.1998, 8.I.1999, 20.I.1999, 28.I.2000 (S.N. Myartseva); 4 ♀, 1 ♂, same locality and host, 29.VII.1999 (G. Gaona); 1 ♀, same locality, ex *Saissetia ?oleae* on *Psidium guajava*, 11.III.1998 (E.Ya. Shuvakhina); 1 ♀, 1 ♂, Paseo Mendez, 15.IV.1998 (L. Monrreal H.); *Guanajuato:* 1 ♀, León, Zoo, ex *Saissetia miranda* on *Nerium oleander*, 13.VIII.1998 (S.N. Myartseva); *San Luis Potosí:* 23 ♀, 2 ♂, San Luis Potosí, ex *Parasaissetia nigra*, 13.XI.1999 (S.N. Myartseva). All specimens are preserved in Entomological Collection of UAT.

Diagnosis. *C. rusti* is a distinctive species, with 3 pairs of setae on the scutellum; fore wings distinctly infuscated; head, mesoscutum and parapsides ferrugino-testaceous; metanotum medially and propodeum entirely, hind coxae and femora light yellow.

Distribution. South Africa, Uganda, Kenya, Peru, USA (California), Mexico (Guanajuato, Oaxaca, San Luis Potosí, Tamaulipas, Veracruz). Introduced to Peru, Israel and California from South Africa for biological control of *Saissetia oleae* and *S. coffeae* (Peck, 1963; Argov &

Rössler, 1988; Canales-Canales & Valdivieso-Jara, 1999; Lampson & Morse, 1992).

Hosts. Coccidae: *Coccus hesperidum* L., *C. viridis* (Green), *Pulvinaria aethiopia* (De Lotto), *Saissetia coffeae* (Walker), *S. jocunda* De Lotto, *S. oleae* (Olivier). In Mexico, was reared from *Saissetia miranda* (Cockerell & Parrot), *S. oleae* and *Parasaissetia nigra* (Nietner).

20. *Coccophagus scutellaris* (Dalman, 1825)
(Figs 19, 30)

Dalman, 1825: 365, ♀ (*Entedon*; type: ♀, Sweden; NHRM). For synonyms, see Noyes, 2002, 2003.

Redescriptions. Compere, 1931a: 101-102; Annecke, 1964: 20, 34-36, Figs 95-99; Ferrière, 1965: 123-125, Fig. 51; Nikolskaya & Yasnosh, 1966: 228-230.

Records from Mexico. Alvarado-Mejía & González-Hernández, 1990; Myartseva & Ruiz-Cancino, 2000; Myartseva et al., 2004b.

Diagnosis. *C. scutellaris* is more easily separated by the yellow colour of apical portion of scutellum, also legs, except middle and hind coxae and hind femora, blackish. Scutellum densely setose. Fore wing faintly and uniformly infumated.

Distribution. Almost cosmopolitan. Hayat (1998) not recorded this species for India. Introduced into California from South Africa for biological control of *Saissetia oleae* and from California to British Columbia for control of *Coccus hesperidum* (Peck, 1963; Lampson & Morse, 1992).

Hosts. More than 40 species of Coccidae from the genera *Coccus*, *Ceroplastes*, *Eulecanium*, *Pulvinaria*, *Saissetia*, etc.; several species of Diaspididae, Pseudococcidae and Margarodidae. In Mexico, was reared from *Coccus viridis* (Green).

21. *Coccophagus sostenesi* sp. n.
(Figs 56-61)

Holotype. ♀, **Mexico, Tamaulipas:** Ciudad Victoria, ex *Pulvinaria* sp., 27.II.2000 (S.N. Myartseva); deposited at UCRC.

Paratypes. **Mexico, Tamaulipas,** Ciudad Victoria, ex *Pulvinaria* sp.: 3 ♀, 1 ♂, 27.II.2000; 1 ♀, 12.III.2000 (S.N. Myartseva); deposited at UCRC and UAT.

Description. Female. Body length 0.8-1.0 mm.

Coloration. Head black; face below antennal toruli, interantennal prominence, mandibles, labial and maxillary palpi whitish yellow; outer edges of occiput narrowly dark yellow. Antennae yellowish with scape whitish yellow; flagellum with dense blackish sensilla. Mesosoma black; anterior part of side lobes of mesoscutum, the adjoining outer end of prepectus and prosternum, tegulae basally yellow. Fore wings hyaline; marginal and submarginal veins infuscate. Legs blackish; all femora apically, apical 1/4 of hind tibiae, tarsi whitish yellow; fore and middle ti-

biae, last segments of all tarsi lightly tinged with brownish. Metasoma black.

Structure. Head slightly wider than mesosoma and 1.3 times as wide as high. Frontovortex about half as wide as head, with cellulose-reticulate sculpture. Ocelli forming an obtuse apical triangle; posterior ocellus placed closer to eye margin than to occipital margin. Eyes finely setose, 1.8 times as long as cheeks. Cheeks with striate sculpture and sparse small setae. Mandible (Fig. 56) with two teeth and short truncation, therefore seeming as with three teeth. Antennae (Fig. 57) inserted immediately under the level of lower margin of eyes. Distance between toruli subequal to that from torulus to mouth margin and 0.67 times as long as distance from torulus to eye. Antennal scape 3.3-3.4 times as long as wide; pedicel 1.8 times as long as wide; first funicle segment as long as pedicel and about 1.5 times as long as wide; second segment about 1.3 times as long as wide and slightly shorter than first segment; third segment scarcely longer than wide and as long as second segment; club 2.4 times as long as wide and a little shorter than funicle. Funicle and club segments with many longitudinal sensilla in one row. Mesosoma with mesoscutum densely setose. Scutellum with 12-14 setae placed more or less symmetrically and with a pair of long slender bristles on glabrous apex, these bristles half as long as scutellum. Scutellum about 0.6 times as long as mesoscutum and slightly wider than long. Side lobes of mesoscutum each with four setae; axillae each with two setae. Propodeum divided medially. Mesoscutum and scutellum with reticulate sculpture. Fore wing 2.2 times as long as wide; submarginal vein with 7-8 setae; marginal vein as long as submarginal; stigmal vein slightly expanded (Fig. 58); postmarginal vein absent. Hind wing 4.2 times as long as wide, marginal fringe about 1/4 wing width. Midtibial spur scarcely shorter than basitarsus (Fig. 59); basitarsus about as long as next two tarsal segments combined. Gaster slightly shorter than mesosoma. Ovipositor (Fig. 60) not exerted, about 1.3 times as long as middle tibia; third valvula about 0.2 times as long as second valvifer and 0.7 times as long as midtibial spur.

Male. Body length 0.9 mm.

Coloration. Similar to that of female.

Structure. Differs from female in having frontovortex slightly more than half as wide as head. Eyes 1.5 times as long as cheeks. Truncation of mandible slightly wider. Antennae (Fig. 61) inserted on the level of lower margin of eyes. Antennal scape 4.5 times as long as wide; pedicel slightly longer than wide; first funicle segment about 1.3 times as long as wide and about 1.5 times as long as pedicel; second segment 1.2 times as long as wide and slightly shorter than

first segment; third segment subquadrate and slightly shorter than second segment; club 2.7 times as long as wide, shorter and not wider than funicle. Fore wing 1.8 times as long as its maximum width; marginal vein scarcely longer than submarginal vein.

Comparison. *C. sostenesi* sp. n. is close to *C. malthusi* Girault, mainly in body colour, but differs in the following characters: in *C. sostenesi*, mandible with two teeth and short truncation, fore coxae black, all femora blackish with apical 1/4 whitish, first funicle segment half as long as club and 1.2 times as long as pedicel; in *C. malthusi*, mandible with notch and broad truncation, fore coxae whitish, first funicle segment 2.1 times as long as pedicel and 0.8 times as long as club.

Etymology. *C. sostenesi* is named in honour of Sostenes Edmundo Varela Fuentes, Mexican biologist from the state of Tamaulipas, Mexico, specialist in integrated pest management.

22. *Coccophagus teeceeni* Myartseva, 2004 (Figs 1, 26)

Myartseva, 2004b: 310-312, ♀ (*Coccophagus*; type: ♀, Mexico; UCRC).

Material. Mexico, Chiapas: 3 ♀, Berriozabal, Cierro ombligo, matorral, 5.IV.1997 (A. Martí nez). Two specimens (paratypes) are deposited in USNM and UAT.

Diagnosis. *C. teeceeni* is readily recognized from similar species with pale hind coxae in contrast to the blackish coloration of legs, by the scutellum yellow in apical 1/2-2/3, basitarsus of middle and hind legs and midtibial spur entirely whitish, fore wing with a large infuscated cloud beneath the apical half of the marginal vein.

Distribution. Mexico (Chiapas).

Host. Unknown.

23. *Coccophagus tobiasi* Myartseva, 2004 (Figs 4, 27)

Myartseva, 2004c: 188-189, ♀ (*Coccophagus*; type: ♀, Mexico; UCRC).

Material. Mexico, Morelos: 1 ♀, Amatlan, 14 km N Yauatepec, "screen sweeping", 29.X.1982 (J.T. Huber, A. González) (UCR No. 54602); *Veracruz:* 1 ♀, 1 ♂, Cañ. Rio Metlac, 3 km W Fortin, 6.VII.1981 (J. LaSalle) (UCR No. 54601, 54578); *Michoacán:* 1 ♀, 30 km N Lazaro Cardenas, 7.VIII.1984 (G. Gordh) (UCR No. 54600); *Sinaloa:* 1 ♀, 12 mi N Mazatlán, "screen sweeping", 25.X.1982 (J.T. Huber) (UCR No. 54603); *Nuevo León:* 1 ♀, 5 km W Bustamante, 13.VII.1983 (A. González) (UCR No. 54599); 1 ♂, Villa de Santiago, San Juan Bautista, 17.V.1984 (Sierra, Rodríguez) (UCR No. 54575); 1 ♂, Mun. Santiago, El Cercado, Hta Las 3 Blanquitas, 9.VII.1983 (G. Gordh) (UCR No. 54577). Paratypes are deposited in UCRC, USNM, ZISP and UAT.

Diagnosis. *C. tobiasi* is quite unlike the all other species of the *C. varius* group. It is similar to

the African *C. varius* (Silvestri), but can be easily distinguished by the characters of antenna (funicle and club without white or pale segments, first funicular segment without sensilla, scape of male without longitudinal ventral whitish band).

Distribution. Mexico (Michoacán, Morelos, Nuevo León, Sinaloa, Veracruz).

Hosts. Unknown.

Acknowledgements

The author thanks for the loan of material of *Coccophagus* species collected in Mexico Dr. S.V. Triapitzyn (UCRC), also my colleagues Dr. E. Ruíz Cancino, Dra. J.M. Coronado Blanco, Dra. G. Gaona Garcí a, J.M. Martí nez Ramí rez (UAT). I extend my thanks for sending valuable papers on Aphelinidae, including those on the genus *Coccophagus*, to Dr. G.A. Evans (USDA/APHIS c/o Systematic Entomology Laboratory, Beltsville, MD, USA). I thank my colleague Dr. D.R. Kasparyan (UAT and ZISP) for friendly help of various kinds throughout the period of my study of Aphelinidae in Mexico. Thanks to División de Estudios de Postgrado e Investigación, UAM Agronomía y Ciencias, Universidad Autónoma de Tamaulipas, Ciudad Victoria, Tamaulipas, Mexico for financial support of this work.

References

- Aburto-Valencia, H.** 1942. El control biológico de los insectos mediante el uso de predadores. *Fitófilo*, **1**(4): 3-11.
- Altieri, M.A. & Nicholls, C.I.** 1999. Classical biological control in Latin America. In: Bellows, T.S. & Fisher, T.W. (Eds.). *Handbook of Biological Control*: 975-991. Academic Press, San Diego, California, USA.
- Alvarado-Mejía, G. & González-Hernández, A.** 1990. Taxonomía de las especies de *Aphytis* Howard (Hymenoptera: Aphelinidae) y otros géneros en el área citrí cola de Nuevo León. *Biotam*, **2**(3): 42-51.
- Annecke, D.P.** 1964. The Encyrtid and Aphelinid parasites (Hymenoptera: Chalcidoidea) of soft brown scale, *Coccus hesperidum* Linnaeus (Hemiptera: Coccidae) in South Africa. *Entomol. Mem. Dep. Agric. Tech. Serv. Rep. S. Afr.*, **7**: 1-74.
- Annecke, D.P. & Insley, H.P.** 1974. The species of *Coccophagus* Westwood, 1833 from the Ethiopian region (Hymenoptera: Aphelinidae). *Entomol. Mem. Dep. Agric. Tech. Serv. Rep. S. Afr.*, **37**: 62 p.
- Argov, Y. & Rössler, Y.** 1988. Introduction of beneficial insects into Israel for the control of insect pests. *Phytoparasitica*, **16**(4): 303-315.
- Ben-Dov, Y.** 1993. *A systematic catalogue of the soft scale insects of the World (Homoptera: Coccoidea: Coccidae) with data on geographical distribution, host plants, biology and economic importance*. Sandhill Crane Press, Inc., Gainesville, Florida. 536 p. (Flora & Fauna Handbook No. 9).
- Canales-Canales, A. & Valdivieso-Jara, L.** 1999. *Manual de control biológico para la conducción del cultivo del olivo*. Servicio Nacional de Sanidad Agraria, Jesús Marí a, Perú. 37 p.
- Clausen, C.P.** (Ed.). 1978. Introduced parasites and predators of arthropod pests and weeds. A world review. *USDA Agricultural Handbook*, **480**. 545 p.
- Compere, H.** 1926. Descriptions of new coccid-inhabiting chalcidoid parasites (Hymenoptera). *Univ. Calif. Publ. Entomol.*, **4**(1): 1-31.
- Compere, H.** 1928. New coccid-inhabiting chalcidoid parasites from Africa and California. *Univ. Calif. Publ. Entomol.*, **4**: 209-230.
- Compere, H.** 1931a. A revision of the species of *Coccophagus*, a genus of hymenopterous, coccid-inhabiting parasites. *Proc. U.S. nat. Mus.*, **78**. 132 p.
- Compere, H.** 1931b. A discussion of the parasites of *Saissetia oleae* (Bern.) collected in Eritrea. *Univ. Calif. Publ. Entomol.*, **5**: 247-255.
- Compere, H.** 1939. The insect enemies of the Black Scale, *Saissetia oleae* (Bern.) in South America. *Univ. Calif. Publ. Entomol.*, **7**: 75-90.
- Contreras-Coronado, A.** 1972. Clave práctica para algunas familias de Hymenoptera relacionadas con el combate biológico en la República Mexicana. *Fitófilo*, **25**(67): 27-30.
- Dalman, J.** 1825. Om några Svenska arter af *Coccus*, samt de inuti dem förekommande parasit Insekter. *K. Svenska Vetensk. Akad. Handl.*, **46**: 350-374.
- De Santis, L.** 1948. Estudio monográfico de los Afelí nidos de la República Argentina (Hymenoptera, Chalcidoidea). *Rev. Mus. La Plata (N.S.) (Zool.)*, **5**. 280 p.
- De Santis, L.** 1979. *Catálogo de los himenópteros calcidoideos de América al sur de los Estados Unidos*. Publicación Especial, Comisión de Investigaciones Científicas, Provincia de Buenos Aires. 488 p.
- De Santis, L.** 1989. Catálogo de los Himenópteros Calcidoideos (Hymenoptera) al Sur de los Estados Unidos, segundo suplemento. *Acta entomol. Chilena*, **15**: 9-90.
- De Santis, L. & Fidalgo, P.** 1994. Catálogo de los Himenópteros Calcidoideos de América al Sur de los Estados Unidos, Tercer suplemento (Insecta). *Ser. Acad. nac. Agron. Vet.*, **13**. 154 p.
- Domí nguez, G.R. & Carrillo, I.L. S.** 1976. Lista de los insectos en la colección entomológica del Instituto Nacional de Investigaciones Agrícolas. Segundo Suplemento. *SAG. Folleto Misc.*, **29**. 245 p.
- Donaldson, J.S., Clark, M.M. & Walter, G.H.** 1986. Biology of the heteronomus parasitoid *Coccophagus atratus* Compere (Hymenoptera: Aphelinidae). Adult behaviour and larval development. *J. entomol. Soc. S. Afr.*, **49**(2): 349-357.
- Donaldson, J.S. & Walter, G.H.** 1998. Effects of egg availability and egg maturity on the ovipositional activity of the parasitic wasp *Coccophagus atratus*. *Physiol. Entomol.*, **13**(4): 407-417.
- Essig, E.O.** 1931. *A history of Entomology*. N.Y., Mac-Millan Co. 1029 p.
- Ferrière, C.** 1965. Hymenoptera Aphelinidae d'Europe et du Bassin Méditerranéen. *Faune de l'Europe et du Bassin Méditerranéen*, **1**. Masson et Cie, Paris. 206 p.
- Gahan, A.B.** 1924. Some new parasitic Hymenoptera with notes on several described forms. *Proc. U.S. Nat. Mus.*, **65**: 1-23.
- Girault, A.A.** 1915. Australian Hymenoptera Chalcidoidea - VII. The family Encyrtidae with descriptions of new genera and species. *Mem. Queensland Mus.*, **4**. 184 p.
- Girault, A.A.** 1916. Notes on described chalcidoid Hymenoptera with new genera and species. *Societas Entomol.*, **31**: 42-44.
- Girault, A.A.** 1917. *Descriptiones stellarum novarum*. Private publication, Washington. 22 p.
- González-Hernández, A.** 2000. Chalcidoidea (Hymenoptera). In: Llorente Bousquets, J., González Soriano, E. & Papaverio, N. (Eds.). *Biodiversidad, taxonomía y biogeografía de artrópodos de México: Hacia una síntesis de su conocimiento*, **2**: 649-659. México, UNAM.

- Gordh, G.** 1979. Family Encyrtidae, Subfam. Aphelininae. In: Krombein, K.V., Hurd, P.D. jr., Smith, D.R. & Burks, B.D. (Eds.). *Catalog of Hymenoptera in America North of Mexico*, 1: 890-910. Smithsonian Institution Press, Washington D.C.
- Greathead, D.J.** 1986. Parasitoids in classical biological control. In: Waage, J. & Greathead, D. (Eds.). *Insect parasitoids*: 289-318. Academic Press, London.
- Hayat, M.** 1988. The *varius* and *pseudococci* groups of *Coccophagus* (Hymenoptera: Aphelinidae), with notes and descriptions of a new species from Sri Lanka. *Oriental Insects*, 22: 163-174.
- Hayat, M.** 1992. The *zebratus* and *ochraceus* groups of *Coccophagus* (Hymenoptera: Aphelinidae) with a new generic synonymy. *Oriental Insects*, 26: 111-117.
- Hayat, M.** 1993. The *malthusi*-group of *Coccophagus* (Hymenoptera: Aphelinidae), with descriptions of three new species from India. *Oriental Insects*, 27: 175-184.
- Hayat, M.** 1998. Aphelinidae of India (Hymenoptera: Chalcidoidea): a taxonomic revision. *Mem. Entomol. int.*, 13. Associated Publishers, Florida, USA. 416 p.
- Herting, B.** 1972. Homoptera. *A catalogue of parasites and predators of terrestrial arthropods*. Section A. Host or Prey/Enemy. 2. Commonwealth Agricultural Bureaux, Slough, U.K. 210 p.
- Howard, L.O.** 1895. Revision of the Aphelinidae of North America a subfamily of hymenopterous parasites of the family Chalcididae. *Tech. Ser. Bur. Entomol. U.S. Dep. Agric.*, 1, 44 p.
- Huang, J.** 1994. Systematic studies on Aphelinidae of China (Hymenoptera: Chalcidoidea). *Contrib. biol. Control res. Inst. Fujian agric. Univ. spec. Publ.*, 5, 348 p.
- Lampson, L.J. & Morse, J.G.** 1992. A study of black scale, *Saissetia oleae* (Hom.: Coccidae) parasitoids (Hym.: Chalcidoidea) in Southern California. *Entomophaga*, 37(3): 373-390.
- Mercet, R.G.** 1931. Notas sobre Aphelinidos (Hym. Chalc.) 4a nota. *Eos*, 7: 395-410.
- Myartseva, S.N.** 2004a. Three new species of *Coccophagus* Westwood from Tamaulipas, Mexico (Hymenoptera: Aphelinidae). *Zoosyst. Ross.*, 13(1): 37-42.
- Myartseva, S.N.** 2004b. A new species of *Coccophagus* from Chiapas, Mexico (Hymenoptera: Chalcidoidea: Aphelinidae). In: Raymohana, K., Sudheer, K., Girish Kumar, P. & Santosh, S. (Eds.). *Perspectives on Biosystematics and Biodiversity. T.C.N. Com. Vol. March 2004*: 309-313. India, SERSA.
- Myartseva, S.N.** 2004c. A new Mexican species of *Coccophagus* Westwood of the *C. varius* species group (Hymenoptera: Chalcidoidea, Aphelinidae). *Trudy Russ. entomol. Obsch.*, 75(1): 187-190.
- Myartseva, S.N.** 2006. A new species of *Coccophagus* from Nuevo León, Mexico (Hymenoptera: Chalcidoidea: Aphelinidae). *Acta zool. Mex. (n.s.)*, 22(1): 95-101.
- Myartseva, S.N. & Coronado-Blanco, J.M.** 2003. *Coccophagus rusti* Compere: una especie de Africa en México. *Entomol. Mex.*, 2: 740-744.
- Myartseva, S.N. & Coronado-Blanco, J.M.** 2004. Nuevo registro para América de la especie africana *Coccophagus atratus* Compere (Hym.: Aphelinidae). *Encuentro de Investigación científica y tecnológica del Golfo de México*, 16: 10. Cd. Mante, Tamaulipas, México.
- Myartseva, S.N. & Ruíz-Cancino, E.** 2000. Annotated checklist of the Aphelinidae (Hymenoptera: Chalcidoidea) of Mexico. *Folia entomol. Mex.*, 109: 7-33.
- Myartseva, S.N. & Ruíz-Cancino, E.** 2005. New species of *Coccophagus* with densely setose axilla from Mexico (Hymenoptera: Aphelinidae). *Florida Entomol.*, 88(1): 43-48.
- Myartseva, S.N., Ruíz-Cancino, E. & Coronado-Blanco, J.M.** 2004a. Aphelinidae (Hymenoptera). In: Llorente Bousquets, J.E., Morrone, J.J., Yáñez Ordóñez, O. & Vargas Fernández, I. (Eds.). *Biodiversidad, taxonomía y biogeografía de artrópodos de México: hacia una síntesis de su conocimiento*, 4: 753-757. México, UNAM.
- Myartseva, S.N., Ruíz-Cancino, E. & Coronado-Blanco, J.M.** 2004b. Parasitoids (Hymenoptera: Chalcidoidea) of *Saissetia* spp. (Homoptera: Coccidae) in Mexico. *Fruits*, 59(2): 141-150.
- Myartseva, S.N., Gaona García, G., Ruíz-Cancino, E. & Coronado-Blanco, J.M.** 2004c. Escamas suaves (Homoptera: Coccidae) y sus parasitoides del género *Coccophagus* Westwood (Hymenoptera: Aphelinidae) en áreas urbanas de Tamaulipas. *Entomol. Mex.*, 3: 425-429.
- Myartseva, S.N., Coronado-Blanco, J.M. & Ruíz-Cancino, E.** 2005. Redescrpción de *Coccophagus atratus* Compere (Hymenoptera: Aphelinidae), una especie africana en San Luis Potosí, México. In: Bujanos Muñiz, R., Delgado Castillo, J.C., Tamayo Mejía, A. F. & Marín Jarillo, A. (Eds.). *Memorias. XXVIII Congreso Nacional de Control Biológico, San Miguel de Allende, Gto., 17-18.XI.2005*: 22-25.
- Nikolskaya, M.N. & Yasnosh, V.A.** 1966. Aphelinids of the European part of the USSR and the Caucasus (Hymenoptera, Aphelinidae). *Opredeliteli po faune SSSR*, 91. Moscow & Leningrad: Nauka. 296 p. (In Russian).
- Noyes, J.S.** 1982. Collecting and preserving chalcid wasps (Hymenoptera: Chalcidoidea). *J. natur. Hist.*, 16: 315-334.
- Noyes, J.S.** 2002. *Interactive catalogue of world Chalcidoidea 2001*. Compact disc. Taxapad, Vancouver, Canada.
- Noyes, J.S.** 2003. *Universal Chalcidoidea Database*. World Web electronic publication. www.nhm.ac.uk/entomology/chalcidoidea/index.html (updated 30.IX.2003).
- Noyes, J. & Valentine, E.W.** 1989. Chalcidoidea (Insecta: Hymenoptera) – introduction and review of genera in smaller families. *Fauna of New Zealand*, 18. 96 p.
- Peck, O.** 1963. A catalogue of the Nearctic Chalcidoidea (Insecta; Hymenoptera). *Can. Entomol.*, 30(suppl.). 1092 p.
- Ruíz-Cancino, E. & Coronado-Blanco, J.M.** 2002. *Artrópodos terrestres de los estados de Tamaulipas y Nuevo León, México*. 377 p. (Serie Publicaciones Científicas CIDAFF-UAT, No. 4).
- Smith, H.S. & Compere, H.** 1928. A preliminary report on the insect parasites of the black scale, *Saissetia oleae* (Bernard). *Univ. Calif. Publ. Entomol.*, 4: 231-334.
- Walker, A.** 1839. *Monographia Chalciditum*, 1. Bailliere, London. 333 p.
- Westwood, J.O.** 1833. Descriptions of several new British forms amongst the parasitic hymenopterous insects. *Phil. Mag.*, London, 3(32): 342-344.
- Westwood, J.O.** 1838-1840. Synopsis of the genera of British insects. In: *An introduction to the modern classification of insects*, 2 (Appendix). London. 158 p. [1838: 1-48, 1839: 49-80, 1840: 81-158].
- Woolley, J.B.** 1997. Aphelinidae. In: Gibson, G.A.P., Huber, J.T. & Woolley, J.B. (Eds.). *Annotated keys to the genera of Nearctic Chalcidoidea (Hymenoptera)*: 134-150. NRC Research Press. Ottawa, Canada.