

Descriptive notes on a new and other little known species of *Anagrus* Haliday, 1833 (Hymenoptera: Mymaridae) from the New World tropics and subtropics

Serguei V. Triapitsyn

Entomology Research Museum, Department of Entomology, University of California, Riverside, California 92521, USA. E-mail: serguei@mail.ucr.edu

Abstract

TRIAPITSYN SV. 2002. Descriptive notes on a new and other little known species of *Anagrus* Haliday, 1833 (Hymenoptera: Mymaridae) from the New World tropics and subtropics. *Entomotropica* 17(3):213-223.

A new fairyfly species from the New World, *Anagrus stethynioides* Triapitsyn sp. n., is described and illustrated. A new species group of the subgenus *Anagrus* Haliday, 1833 s. str. is established based on this species, and its diagnosis is provided. *Anagrus armatus* (Ashmead, 1887) is redescribed from material from Florida and Puerto Rico. *Anagrus urichi* Pickles, 1932, a Neotropical species important for the natural biological control of several froghopper pests of sugarcane and other plants, is redescribed from specimens reared from the eggs of Cercopidae in Brazil and Guyana. An updated key to the Neotropical species of the genus *Anagrus* Haliday, 1833 is given and new information is provided about distribution and host associations of some of these species.

Additional key words: Cercopidae, fairyflies, egg parasitoid, Neotropics, taxonomy.

Resumen

TRIAPITSYN SV. 2002. Notas descriptivas sobre una nueva especie y otras poco conocidas de *Anagrus* Haliday, 1833 (Hymenoptera: Mymaridae) de los trópicos y subtrópicos del Nuevo Mundo. *Entomotropica* 17(3):213-223.

Se describe e ilustra una especie nueva de mimárido del Nuevo Mundo, *Anagrus stethynioides* Triapitsyn sp. n. Un nuevo grupo de especies del subgénero *Anagrus* Haliday, 1833 s. str. es establecido basado en esta especie y su diagnosis es presentada. Se describen *A. armatus* (Ashmead, 1887) de material de la Florida y Puerto Rico y también *A. urichi* Pickles, 1932, una especie neotropical importante para el control biológico natural de algunas plagas como las candelillas de la caña de azúcar y de otras plantas, de especímenes criados de los huevecillos de Cercopidae en Brasil y Guayana. Se da una clave para las especies neotropicales del género *Anagrus* Haliday, 1833, y también se presta información sobre distribución y huéspedes de algunas de estas especies.

Palabras clave adicionales: Cercopidae, mimáridos, parásito oófago, Neotropicos, taxonomía.

Introduction

This paper presents new information mainly on the little known Neotropical species of the fairyfly genus *Anagrus* Haliday, 1833, which has gained some additions since the relatively recent review by Triapitsyn (1997) of the taxa occurring in America south of the United States. Three new, very distinctive, Neotropical species were described after that publication, two from Argentina and Brazil (Triapitsyn 1999) and one from Guatemala and Mexico (Triapitsyn 2000). It has been found that the ranges of some of those species extend into the subtropics of the Nearctic, where the fauna of *Anagrus* was revised by Chiappini et al. (1996). The available keys do not include some of the previously described species because of lack, or

poor quality, of the type material. Two such species, *A. armatus* (Ashmead, 1887) and *A. urichi* Pickles, 1932, are redescribed and diagnosed below based on recently discovered specimens. Many new distribution and host records are added to the knowledge about other species included in this review and an updated key to the described Neotropical species of *Anagrus* is provided.

Several species of *Anagrus* are important egg parasitoids of various pests belonging to Auchenorrhyncha (Homoptera) as well as of a few mirid and tingid bugs (Heteroptera: Miridae and Tingidae, respectively). They were successfully used in a number of biological control programs (Triapitsyn

and Beardsley 2000). Identification of *Anagrus* species is difficult because of their minute size and also because of generally poor preservation techniques of the voucher specimens. Thus, most of the earlier identifications and especially catalog records of *Anagrus* species in the New World need confirmation.

Many new Neotropical taxa in this genus await description, that must be preceded by careful preparation and examination of several thousand specimens accumulated in CNCI, UCRC, and other major collections of Mymaridae. Unfortunately, most of these were collected by sweeping or various trapping methods and thus lack host information. Because of the enormity of the task, only one such species is described here as new, and only because it represents a very distinctive and previously unknown form of the “stethynioides” species group of *Anagrus*, which is defined herein.

Terminology for morphological features used in the key and descriptions is that of Gibson (1997). Measurements are given in microns (µm) as length or, if applicable, as length/width; when more than two specimens were measured, the average is followed by the range in parentheses. Abbreviations for depositories of specimens are as follows: CNCI, Canadian National Collection of Insects, Ottawa, Ontario, Canada; CSCA, California State Collection of Arthropods, Sacramento, California, USA; FSCA, Florida State Collection of Arthropods, Gainesville, Florida, USA; IMLA, Fundación e Instituto Miguel Lillo, San Miguel de Tucumán, Tucumán, Argentina; UCRC, Entomology Research Museum, University of California, Riverside, California, USA; USNM, National Museum of Natural History, Washington, D.C., USA. An abbreviation used in the text is: F = funicular (flagellar in males) segment.

Anagrus Haliday, 1833

Synonyms: *Pteratomus* Packard, 1864, *Packardiella* Ashmead, 1904, *Paranagrus* Perkins, 1905, *Anagrella* Bakkendorf, 1962. For the latest diagnoses of the genus, see Chiappini and Lin (1998) and Triapitsyn and Beardsley (2000). The complete list of references on *Anagrus* and the diagnoses of its three subgenera, *Anagrus* Haliday, 1833 s. str., *Paranagrus* Perkins, 1905 and *Anagrella* Bakkendorf, 1962, as well as of the species groups of *Anagrus* s. str., were given by Chiappini et al. (1996).

The “stethynioides” species group of the subgenus *Anagrus* s. str. is defined here based on *A. stethynioides*

sp. n. described below. This species group is characterized by the clava with six sensory ridges (Figure 1) and by the relatively wide (4.6-4.9 x as long as wide) forewing (Figures 2, 3) which superficially resembles in shape the forewing of *Stethynium* Enock, 1909, a genus closely related to *Anagrus*. The longest marginal cilia on the forewing of *A. stethynioides* sp. n. are subequal to or slightly longer than the maximum forewing width. In all other described species of *Anagrus*, the forewing is more than 5.5 x as long as wide and the longest marginal cilia are much longer than the maximum forewing width. Besides *A. stethynioides* sp. n., this group also includes one undescribed species, known to me from a single female specimen from Ecuador.

Members of *Anagrella* have not yet been formally recorded from the Neotropical region, but I have seen several undescribed species of this subgenus from specimens collected in Colombia, Costa Rica, Ecuador, Mexico, and Panama. The key below deals primarily with the already described Neotropical species of *Anagrus*, thus excluding six diagnosed and keyed, but unnamed species from Argentina (Triapitsyn 1999). Also excluded from the key are *A. takeyanus* Gordh, 1977, mistakenly recorded from Mexico (Triapitsyn 1997) from a specimen which was described later as a new species, *A. raygilli* (Triapitsyn 2000), as well as *A. incarnatus* Haliday, 1833 and *A. optabilis* (Perkins, 1905) because their respective records from Juan Fernández Islands (De Santis 1979) and Ecuador (De Santis and Fidalgo 1994) could not be confirmed (no voucher specimens are available). Annotations to the key include, besides of the described and redescribed species, those taxa for which new information (e.g., new distribution and host records) is presented.

Key to the Neotropical species of *Anagrus*, females

- 1 Ocelli on a well-defined triangular stemmaticum2
- 1' Ocelli not on a stemmaticum, which is absent (subgenus *Anagrella* Bakkendorf, 1962) *A. (Anagrella)* spp.
- 2(1) Paramedial plates of posterior scutellum very close to each other (subgenus *Anagrus* Haliday, 1833 s. str.)3
- 2' Paramedial plates on posterior scutellum widely separated (subgenus *Paranagrus* Perkins, 1905) *A. unilinearis* Soyka, 1950

- 3(2) Clava with 6 longitudinal sensilla; forewing (Figure 2) 4.6-4.9 x as long as wide, with longest marginal cilia subequal to or slightly longer than maximum forewing width (*stethynioides* species group)
 *A. stethynioides* sp. n.
- 3' Clava with 3 or 5 longitudinal sensilla; forewing more than 6.0 x as long as wide, with longest marginal cilia much longer than maximum forewing width4
- 4(3) Clava with 3 longitudinal sensilla (*atomus* species group)5
- 4' Clava with 5 longitudinal sensilla (*incarnatus* species group)7
- 5(4) F4 with 1 longitudinal sensillum6
- 5' F4 without longitudinal sensilla
 *A. ustulatus* Haliday, 1833
- 6(5) Bare area on forewing disc long and narrow (along posterior margin) *A. frequens* Perkins, 1905
- 6' Bare area on forewing disc short (subapical)
 *A. atomus* (Linnaeus, 1767)
- 7(4) F2 subglobular, about as long as F1
 *A. brasiliensis* Triapitsyn, 1997
- 7' F2 cylindrical, usually much longer than F18
- 8(7) Mesoscutum with a pair of adnotaular setae10
- 8' Mesoscutum without adnotaular setae9
- 9(8) F2 usually with 1 longitudinal sensillum; if without, then F3 or F4 with 2 sensory ridges
 *A. gonzalezae* Triapitsyn, 1997
- 9' F2 always without longitudinal sensilla; F3 and F4 each with only 1 sensory ridge
 *A. breviphragma* Soyka, 1955
- 10(8) F2 with a longitudinal sensillum
 *A. yawi* Fullaway, 1944
- 10' F2 without longitudinal sensilla11
- 11(10) Forewing disc with one incomplete row of at most 10 setae beyond venation (as in Figure 5)12
- 11' Forewing disc with at least with one complete row of more than 10 setae beyond venation or with several rows of setae13
- 12(11) Clava white; F3 with a longitudinal sensillum
 *A. ogloblini* Triapitsyn, 1999
- 12' Clava brown; F3 without longitudinal sensilla
 *A. urichi* Pickles, 1932
- 13(11) Forewing disc with only one complete row of setae beyond venation and without additional complete or incomplete rows, at most with a few scattered setae at apex14
- 13' Forewing disc with more than one (complete or incomplete) row of setae beyond venation, with or without bare area at broadest part15
- 14(13) F3 without longitudinal sensilla, much shorter than F4
 *A. lineolus* Triapitsyn, 1999
- 14' F3 with a longitudinal sensillum, about as long as F4
 *A. oahuensis* Triapitsyn & Beardsley, 2000
- 15(13) Broadest part of forewing disc with a more or less defined bare area near posterior margin16
- 15' Broadest part of forewing disc more or less uniformly setose, without bare area near posterior margin18
- 16(15) Ovipositor very long and strongly exerted beyond apex of gaster, ratio of total ovipositor length to length of its exerted part 3.5-3.7:1; ovipositor length/protibia length ratio about 3.7:1
 *A. armatus* (Ashmead, 1887)
- 16' Ovipositor not very long and only slightly exerted beyond apex of gaster, ratio of total ovipositor length to length of its exerted part greater than 6.0:1; ovipositor length/protibia length ratio about 2.2-2.5:117
- 17(16) F2 and F3 each much shorter than F4 or F5; F3 and F5 without longitudinal sensilla
 *A. raygilli* Triapitsyn, 2000
- 17' F2 and F3 each about as long as F4 or F5; F3 and F5 with a longitudinal sensillum
 *A. empoascae* Dozier, 1932
- 18(15) Body uniformly dark brown or black; F5 with 2 longitudinal sensilla (rare, known from southern Argentina only)
 *A. subfuscus* Foerster, 1847 sensu Debauche, 1948
- 18' Body color different; F5 usually with 1, sometimes without longitudinal sensilla (common)19
- 19(18) Body color more or less uniformly light brown to brown; F3 without longitudinal sensilla
 *A. flaveolus* Waterhouse, 1913
- 19' Body color contrastingly black and yellow; F3 with a longitudinal sensillum
 *A. nigriventris* Girault, 1911

***Anagrus (Paranagrus) unilinearis* Soyka, 1950**

Anagrus unilinearis Soyka, 1950: 124-125.
Anagrus (Paranagrus) unilinearis Soyka; Chiappini et al., 1996: 566.
Anagrus (Paranagrus) unilinearis Soyka; Triapitsyn, 1997: 3.

Material Examined

USA, **Louisiana**, Orleans Parish, New Orleans, 13.x.1934, H.L. Dozier, 2 ♂♂ (“Sweeping grass in back yard”) [USNM].

Distribution: Southern Palaearctic and Afrotropical (South Africa), southern Nearctic (Louisiana, USA) and Neotropical (Mexico and Trinidad).

Hosts: unknown.

Comments

Triapitsyn (1997) gave the background information about the distribution of this species and also provided an illustration of the forewing. It is for the first time recorded here from the United States and the Nearctic region.

Anagrus (Anagrus) stethynioides

Triapitsyn sp. n.

(Figures 1-3)

Material Examined

HOLOTYPE ♀ on point, GUATEMALA, **Sacatepequez**, Chylla (ca. 34 km from Guatemala City) lat 14°38'N, long 90°42'W, el 6877 ft, 26.x.1998, M. Hoddle (on avocado) [USNM]. PARATYPES: ARGENTINA, **Misiones**, Loreto, 23.viii.2000, P. Fidalgo, 1 ♀ on point ("YPT in Ruinas Jesuíticas") [IMLA]. GUATEMALA, same data as holotype, 1 ♀ on slide [UCRC]. MEXICO: **Nuevo León**, San Juan, Río San Juan, 14.vii.1983, A. González H., 1 ♀ on slide. **Yucatán**, Chichén Itza, 27.vii.1984, G. Gordh, 1 ♀ on point [UCRC]. TRINIDAD, Curepe, CIBC Lab. grounds, 26.ii-13.iii.1974, F.D. Bennett, 1 ♂ on slide [CNCI]. USA, **Texas**, Uvalde Co., Speir Ranch, 3 mi. NW Uvalde, 6.v.1977, T. Eichlin, M. Wasbauer, 1 ♀ on slide [CSCA].

Description

Female (holotype and paratypes): **Coloration**: General color yellow to light brown with the following parts darker (brown): transverse trabecula, gena, mouthparts, flagellum (clava dark brown), anterior half of mesoscutum, axillae, propodeum, legs, lateral spots on gastral terga, and tip of ovipositor sheaths. Eyes and ocelli dirty pink. Wings hyaline. **Head** about as wide as mesosoma; stemmaticum present. Mandible tridentate. **Antenna** (Figure 1) with scape about 3.0 x as long as wide; F1 oval, F2 and F3 very short, cylindrical, either subequal or F2 slightly longer than F3; F4-F6 subequal in length and width; longitudinal sensilla on F4 (2 or 3), F5 (2 or 3) and F6 (2 or 3); clava about as long as combined length of F5 and F6 or a little longer, with six longitudinal sensilla. **Mesosoma**: Mesoscutum with adnotaular setae. Posterior scutellum somewhat longer than in most known *Anagrus* species, 0.65-0.70 x as long as wide; each paramedial plate 1.40-1.45 x as long as wide. **Forewing** (Figure 2) 4.6-4.9 x as long as wide; longest marginal cilia subequal to or only slightly longer than maximum wing width; marginal vein usually without a microchaeta between proximal and distal macrochaetae. Forewing blade narrows just beyond venation before broadening

considerably; disc rather densely setose beyond narrowing, leaving two indistinct bare spots, one in the middle and the other near posterior margin. Lengths of distal and proximal macrochaetae in ratio 1.2-1.5:1. **Hind wing** blade bare except for rows of microtrichia along margins. **Metasoma**: Ovipositor barely reaches mesophragma anteriorly and posteriorly slightly exerted beyond its apex. Ratio of total ovipositor length to length of its exerted part 7.0-9.0:1. External plates of ovipositor each with two setae in distal half. Ovipositor length/protibia length ratio 2.5-2.6:1.

Measurements ($n=3$): Body (taken from dry specimens): 708 (583-812). Antenna: scape (including radicle): 96 (91-102); pedicel: 45 (40-47); F1: 18 (15-22); F2: 24 (19-29); F3: 24 (17-32); F4: 54 (44-62); F5: 54 (44-66); F6: 53 (44-60); clava: 111 (93-124). Forewing: 579 (482-683)/124 (99-150); proximal macrochaeta: 57 (52-66); distal macrochaeta: 79 (63-95); longest marginal cilia: 154 (102-193). Hind wing: 552 (462-646)/28 (25-31). Ovipositor: 317 (255-365).

Male: Similar to female in color. Antenna typical of the genus, flagellomeres subequal except F1 slightly shorter. **Forewing** (Figure 3) 4.5 x as long as wide; marginal vein with a microchaeta between proximal and distal macrochaetae; bare spots on disc more distinct than in female. **Genitalia** (not illustrated because the single available specimen is poorly mounted) elongated, appear to be similar in shape to male genitalia in some typical representatives of the "incarnatus" species group, as described and illustrated by Chiappini and Mazzoni (2000); digitus with two hooked spines.

Measurements ($n=1$): Body: 637. Antenna: 740. Forewing: 573/128; longest marginal cilia: 168. Genitalia: 156.

Diagnosis: This species is easily distinguished from all other described species of *Anagrus* in having the clava with six sensory ridges. It is the sole described member of the "stethynioides" species group of *Anagrus* s. str. as defined above.

Distribution: Southern Nearctic and Neotropical.

Hosts: Unknown.

Etymology: The name refers to the superficial resemblance of the new species to the members of *Stethynium*.

Anagrus (Anagrus) frequens Perkins, 1905

Anagrus frequens Perkins, 1905: 198.

Anagrus (Anagrus) frequens Girault; Chiappini et al., 1996: 571-572.

Anagrus (Anagrus) frequens Perkins; Triapitsyn, 1997: 5.

Material Examined

ST. KITTS, Basseterre, 1-30.x.1985, B. S. Bushland, 3 ♀♀ [CNCI].

Distribution: Australasian, Afrotropical, Oriental and eastern Palaearctic; Neotropical (Colombia, Ecuador, Mexico, St. Kitts, Trinidad); Oceania, Hawaiian Islands (introduced).

Hosts: See Triapitsyn (1997).

Comments

St. Kitts is a new distribution record for this widespread species, an egg parasitoid of various planthoppers (Triapitsyn and Beardsley 2000). It is very likely that *A. frequens* was long ago accidentally introduced into the Neotropics from Australia or the Orient with the sugarcane crop.

***Anagrus (Anagrus) breviphragma* Soyka, 1955**

Anagrus breviphragma Soyka, 1955: 55.

Anagrus (Anagrus) breviphragma Soyka; Triapitsyn, 1997: 6-7.

Anagrus (Anagrus) breviphragma Soyka; Triapitsyn, 1999: 214-215.

Material Examined

COLOMBIA, Bogotá, 22.ix.1975, Lazardo, Posada, 4 ♀♀ (“ex. *Dalbulus maidis*”) [USNM].

Distribution: Palaearctic and Neotropical (Argentina, Brazil, Colombia, Guadeloupe, Guyana).

Hosts: See Moratorio and Chiappini (1995), Triapitsyn (1997, 1999), and Virla (2001).

Comments

Colombia is a new country record for *A. breviphragma*, a common egg parasitoid of the corn leafhopper, *Dalbulus maidis* (De Long in Wolcott, 1923), in South America (Virla 2001).

***Anagrus (Anagrus) yawi* Fullaway, 1944**

Anagrus yawi Fullaway, 1944: 57.

Anagrus (Anagrus) yawi Fullaway; Triapitsyn, 1997: 8.

Anagrus (Anagrus) yawi Fullaway; Triapitsyn and Beardsley, 2000: 36-38.

Material Examined

ARGENTINA, Buenos Aires, Buenos Aires, ix.1999, S.G. Bado, 3 ♀♀, 9 ♂♂ (“Ex. eggs of *Tenthecoris bicolor* Scott (Miridae) on *Crinum zeylandicum* and *C. asiaticum* (Amaryllidaceae), Jardín Botánico Lucien Haumann, FAUBA”) [IMLA, UCRC]. HAITI, Port-au-Prince, 30.xii.1929, H.L. Dozier, 1 ♀, (“ex. sweetpotato foliage infested with *Protalebra*”) [USNM]. HONDURAS, Fco.

Morazán, San Antonio del Oriente, El Zamorano, 30.ix.1987, G. Evans, 1 ♀ (“on *Cupressus ?lusitanica*”) [FSCA].

Distribution: Nearctic (Mexico and USA) and Neotropical (Argentina, Haiti, Honduras, Mexico); introduced into Hawaii (USA).

Hosts: The mirid bug *Tenthecoris bicolor* Scott, 1886 is an additional host record to those indicated by Triapitsyn (1997).

Comments

This species was redescribed and illustrated by Triapitsyn and Beardsley (2000) based on the type specimens from Mexico and additional material from Hawaii.

***Anagrus (Anagrus) urichi* Pickles, 1932**

(Figures 4-7)

Anagrus urichi Pickles, 1932: 204-206.

Anagrus urichi Pickles; De Santis, 1979: 361.

Anagrus urichi Pickles; Triapitsyn, 1997: 11.

Material Examined

BRAZIL: **Distrito Federal**, Brasilia, 16.ix.1991, Ileana, 7 ♀♀, 3 ♂♂ on eight slides (ex. “*Deois flavopicta* (Cercopidae) on *Brachiaria decumbens*” [palisade grass]) [FSCA, UCRC]. **Goiás**, Campinaçu: lat 13°52’S, long 48°23’W, 19-25.ii.1996, 3 ♀♀ [UCRC]. GUYANA, Demerara, 11.viii.1944, H.C. James, 4 ♀♀ on points (“from soil contg. stages of *Tomaspis flavilatera*”) [USNM].

Redescription

Female: Coloration: body and appendages brown to dark brown except for the following parts lighter (pale to light brown): scape, pedicel, posterior scutellum, and legs. Wings slightly infuscated; venation brown. **Head** as wide as mesosoma; stemmaticum present. Mandible tridentate. Antenna (Figure 4) slender; scape with faint sculpturing (longitudinal and transverse on opposite sides), without distinct cross-ridges; F1 subglobular, F2 and F3 subequal in length, each markedly shorter than following segments; F4 slightly longer than F5 but a little shorter than F6; clava slightly longer than combined length of F5 and F6; longitudinal sensilla only on F4 (2), F5 (2), F6 (2 or 3), and clava (5). **Mesosoma:** Mesoscutum with adnotaular setae; mesoscutum, axillae, anterior scutellum and paramedical plates of posterior scutellum with weak cellulate sculpturing. **Forewing** (Figure 5) shorter than body, slightly curved, 9.0-9.5 x as long as wide; disc with one incomplete, irregular median row of six to ten setae in distal half. Lengths of distal and proximal

macrochaetae in ratio 1.3-1.5:1. Hind wing blade with one row of microtrichia beyond venation. **Metasoma** about as long as mesosoma or slightly longer. Ovipositor not overlapping mesophragma anteriorly and posteriorly notably exerted beyond apex of gaster. Ratio of total ovipositor length to length of its exerted part 4.9-5.3:1. External plates of ovipositor each usually with two, in some specimens with three, distal setae. Ovipositor length/protibia length ratio 2.5-2.6:1.

Measurements ($n=3$, specimens from Brasilia, Brazil): Body: 649 (628-683). Antenna: scape (including radicle): 89 (80-95); pedicel: 45 (44-47); F1: 18 (18-19); F2: 47 (44-51); F3: 47 (45-49); F4: 55 (51-58); F5: 53 (51-55); F6: 57 (55-59); clava: 115 (111-115). Forewing: 505 (485-533)/55 (51-58); proximal macrochaeta: 51 (48-55); distal macrochaeta: 71 (66-73); longest marginal cilia: 167 (160-172). Hind wing: 490 (482-507)/18 (17-19). Ovipositor: 307 (292-321).

Male: Similar to female in coloration and other morphological features except for sexually dimorphic characters. Unlike in female, scape with distinct cross-ridges, otherwise antenna (Figure 6) somewhat unusual for genus: F1 subglobular, either without longitudinal sensilla or with one short longitudinal sensillum, much shorter than other flagellomeres; F2 and apparently F3 with two, F4-F11 with four longitudinal sensilla each. Forewing 9.1-9.3 x as long as wide, with one incomplete median row of seven to eight setae in distal half of blade. Genitalia (Figure 7) very unusual both for "incarnatus" species group and genus: genital capsule subtriangular, aedeagus very short, and digitus without spine.

Measurements ($n=2$, specimens from Brasilia, Brazil): Body: 540-637. Forewing: 464-514/51-55. Genitalia: 68-69.

Diagnosis: This species belongs to the "incarnatus" species group of *Anagrus* s. str. It differs from all other described species in that group by the unique combination of antennal characters and the distinctive forewing that has only one incomplete median row of setae in the distal half of disc. The closest species to *A. urichi* appears to be *A. lineolus* Triapitsyn, 1999 which has the female antenna with only one longitudinal sensillum on F4 and F5 and also a complete median row of setae on the forewing disc. The male genitalia in *A. lineolus* are also triangularly shaped, but the genital capsule is much narrower and the aedeagus much longer (Triapitsyn 1999).

Distribution: Neotropical (Brazil, Guyana, Trinidad, ?Venezuela).

Hosts: De Santis (1979) recorded *A. urichi* from Brazil and Trinidad from the following froghopper (Cercopidae) hosts: *Aeneolamia varia saccharina* (Distant, 1909) (as *Tomaspis saccharina* Distant, 1909 and *Aeneolamia varia* (Fabricius, 1787)), *Mahanarva fimbriolata* (Stål, 1854), and *Tomaspis* sp., without, however, referring to any specimens. The material examined in this paper indicates two new records of the froghopper hosts of *A. urichi*: *Deois flavopicta* (Stål, 1854) in Brazil and *Aeneolamia flavilatera* (Urich, 1914) in Guyana. The latter host association may be traced to the work of James (1947). Additional froghopper hosts were indicated by Guagliumi (1962, 1971) for "*Anagrus* sp." in Brazil and Venezuela; it is quite likely that those unidentified species could be *A. urichi*. However, it is impossible to verify that without studying the voucher specimens, if such exist.

Comments

Triapitsyn (1997) gave the background information about the status of the type material of this species, which is apparently lost. The original description by Pickles (1932) is very poor as he indicated mainly the generic characters of *Anagrus*; however, there is no doubt that the two series of specimens studied here belong to the species described as *A. urichi*, based on a thorough comparison with his illustrations, the description, and also on the fact that all of them were reared from the eggs of Cercopidae. The specimens from Guyana are all on points and are shriveled, and therefore their body length (316-366) is much smaller than in the specimens measured above; the clava is pale, possibly due to fading. Therefore, the above redescription is made from the slide-mounted series of specimens from Brazil.

Anagrus (Anagrus) lineolus Triapitsyn, 1999

Anagrus (Anagrus) lineolus Triapitsyn, 1999: 217-218.

Material Examined

MEXICO, **Chiapas:** Ocozocoautla, "El Kikapu", 15-20.vii.1984, G. Gordh, 1 ♀. PERU, **Madre de Dios,** Manu National Park, lat 11°55'S, long 77°18'W, 1-30.ix.1986, K. Person, 1 ♀ [UCRC]. USA, **Florida:** Manatee Co., Bradenton: 8.vi.1990, 1 ♀ (on watermelon) [FSCA]; 20.vi.1990, 1 ♀ [UCRC]. Osceola Co., Canoe Creek, Turnpike Plaza, 21.vi.1991, F.D. Bennett, 1 ♀ ("*Bemisia tabaci* material on *Emilia sonchifolia*") [FSCA].

Distribution: Southern Nearctic (Florida, USA) and Neotropical (Argentina, Brazil, Mexico, Peru).

Hosts: unknown.

Comments

It is likely that *A. lineolus* is present throughout the tropics and subtropics of the Neotropical region, where it appears to be rather common in bulk samples. It is for the first time recorded here outside of the type localities in Argentina and Brazil.

Anagrus (Anagrus) oahuensis Triapitsyn & Beardsley, 2000

Anagrus (Anagrus) oahuensis Triapitsyn and Beardsley, 2000: 38-39.

Material Examined

MEXICO, **Sinaloa**: 11 mi. N La Concha, 25.x.1982, J.T. Huber, 1 ♀. 12 mi. N Mazatlán, 25.x.1982, J.T. Huber, 2 ♀ ♀. **Yucatán**, Chichén Itza, 27.vii.1984, G. Gordh, 2 ♀ ♀ [UCRC].

Distribution: Neotropical (Mexico); Hawaiian Islands.

Hosts: unknown.

Comments

Triapitsyn and Beardsley (2000) described this species from the Island of Oahu, Hawaii and supposed that it might be a native species there. The discovery of *A. oahuensis* in Mexico makes that assumption almost certainly incorrect because it is more likely that it was accidentally introduced from there to Oahu Island.

Anagrus (Anagrus) armatus (Ashmead, 1887) (Figures 8-9)

Litus armatus Ashmead, 1887: 193.

?*Eustochus xanthothorax* Ashmead, 1887: 193-194.

Anagrus armatus (Ashmead); Girault, 1911: 277, 289 (in part).

Anagrus armatus (Ashmead); Chiappini et. al., 1996: 573-574.

Type Material Examined

HOLOTYPE ♀ on slide, labeled: 1." *Litus armatus* Ashm., Jacksonville, Fla. Type"; 2." *Anagrus armatus* (Ashmead), ♀, USNM Type No. 13810" [USNM]. In the original description, Ashmead (1887) did not designate the type(s). According to Girault (1911), who slide-mounted many of Ashmead's types including probably this specimen, the type designation had been written in Ashmead's handwriting on the original label.

While visiting the USNM in 2000, I found the second specimen that likely belongs to the type series of Ashmead's *Litus armatus* and thus might represent a

paratype, labeled as follows: 1." *Litus armatus* Ashm."; 2."E. Fla Ashmead." [USNM]. This point-mounted female (length of body 512) is in a much better condition than the holotype and, very importantly, it has a complete set of wings that are missing on the holotype.

Other material examined: PUERTO RICO [USA], Lajas, 22.xi.1935, H.L. Dozier, 1 ♀ on slide ("Sweeping grass and small weed at small pond edge along border of Lake Cartagena") [USNM].

Redescription

Female: Coloration: General color light brown; head (except face), flagellum, anterior half of mesoscutum, basal terga of gaster, and sheaths of ovipositor darker (brown). **Head**: Width 164; stemmaticum present. Mandible tridentate. **Antenna** (Figure 8) with F1 almost cylindrical, F2 longest of funicle segments; F3-F6 progressively shorter than preceding segment; clava slightly shorter than combined length of F5 and F6; longitudinal sensilla on F3 (1), F4 (1), F5 (2), F6 (2), clava (5). **Mesosoma**: Mesoscutum with adnotaular setae. **Forewing** (Figure 9) slightly shorter than body, narrow, 10.5 x as long as wide; disc with one complete median row of setae and two additional incomplete rows of setae in the distal half, leaving narrow bare area along posterior margin. Lengths of distal and proximal macrochaetae in ratio 1.5:1. **Metasoma**: Ovipositor anteriorly broadly rounded, very much alike as in many species of *Omyomymar* Schauff, 1983, strongly overlapping mesophragma, and posteriorly markedly exserted beyond apex of gaster. Ratio of total ovipositor length to length of its exserted part 3.5-3.7:1. External plates of ovipositor apparently each with two distal setae. Ovipositor length/protibia length ratio 3.7:1.

Measurements: Holotype: Body: 551. Head: 114. Antenna: scape (including radicle): 91; pedicel: 46; F1: 22; F2: 72; F3: 67; F4: 65; F5: 63; F6: 57; clava: 110. Mesosoma: 0.171. Legs: [given as femur, tibia, tarsus]: fore (pro-): 129, 118, 167; middle (meso-): 114, 190, 163; hind (meta-): 123, 217, 160. Metasoma: 0.266; ovipositor: 437.

Non-type ♀, Puerto Rico (parts of antennae missing): Body: 637. Forewing: 610/58; proximal macrochaeta: 55; distal macrochaeta: 85; longest marginal cilia: 197. Hind wing: 573/18; longest marginal cilia: 161. Ovipositor: 500.

Male: unknown.

Diagnosis: This species belongs to the "incarnatus" species group of the subgenus *Anagrus* s. str. and is probably related to the Nearctic *A. delicatus* Dozier, 1936, which lacks a longitudinal sensillum on F3 of the female antenna.

Distribution: Southern Nearctic (Florida, USA) and Neotropical (Puerto Rico).

Hosts: Unknown.

Comments

Numerous previously published records of this species, other than of the original Ashmead's material from Florida, USA, are incorrect (Chiappini et al. 1996). Thus, the female from Puerto Rico is the only non-Ashmead's specimen of *A. armatus* known to date. I was thus wrong to assume that *A. armatus* does not occur there although the previous record of this species from Puerto Rico cited by De Santis and Fidalgo (1994) was almost certainly incorrect due to a misidentification (Triapitsyn 1997).

Anagrus (Anagrus) raygilli Triapitsyn, 2000

Anagrus (Anagrus) raygilli Triapitsyn, 2000: 90-94.

Material Examined

DOMINICAN REPUBLIC, Bani, Villa Sombrero, lat 18°16'N, long 70°21'W, 19.iv.2000, M. Hoddle, 3 ♀♀ (on avocado). MEXICO, **Baja California Sur**, Las Barracas (~30 km E Santiago, lat 23°28'20"N, long 109°27'10"W), P. DeBach: 16.xii.1984, 1 ♀; 14.iv.1985, 1 ♂. **Michoacán**, Uruapán, 18-20.x.1999, M. Hoddle, 6 ♀♀ (on avocado). USA, **Florida**, Manatee Co., Bradenton, 20.vi.1990, 1 ♀ [UCRC]. VENEZUELA, **Carabobo**, Samán Mocho, 3.viii.1982, Kinido Gómez, 1 ♀ (on cassava) [CNCI].

Distribution: Southern Nearctic (Mexico and Florida, USA) and Neotropical (Guatemala, Dominican Republic, Mexico, Venezuela).

Host: *Idona minuenda* (Moznette, 1919) (Cicadellidae).

Comments

This species appears to be present throughout the native range of avocado plant following its leafhopper host(s); the only one known, *I. minuenda*, is a minor pest of avocado in Mexico.

Anagrus (Anagrus) empoascae Dozier, 1932

Anagrus empoascae Dozier, 1932: 86-87.

Anagrus (Anagrus) empoascae Dozier; Triapitsyn, 1997: 8-9.

Material Examined

USA: **Delaware**, New Castle Co., Newark, 3.viii.1927, H. L. Dozier, 1 ♀ ("on window") [USNM]. **Florida**: Alachua Co., Gainesville: 17.v.1990, F.D. Bennett, 2 ♀♀ ("on *Cucumis melo*"); 6.x.1990, F.D. Bennett, 1 ♀ ("on *Euphorbia heterophylla*"); 1991, Stonaker, G. Evans, 1 ♀ ("on

Lycopersicon lycopersicum"). Orange Co., Turkey Creek, 12.vi.1990, F.D. Bennett, 1 ♀ "on *Solanum americanum*". Palm Beach Co., West Palm Beach, 13.vi.1992, F.D. Bennett, 1 ♀ ("on *Chamaesyce hyssopifolia*") [FSCA]. **Louisiana**, Webster Parish, Buckhorn, 27.vii.1937, H.L. Dozier, numerous ♀♀ and ♂♂ on three slides ("sweeping from *Helianthus* infested with *Empoasca erigeron* De Long"). **South Carolina**, Richland Co., Columbia, 10.ix.1916, A.H. Beyer, 2 ♀♀, 1 ♂ ("on alfalfa. Webster No. 12196, ex. *Holticus citri* eggs" [USNM]. VENEZUELA, **Lara**, El Taque, 24.iv.1991, F.D. Bennett, 1 ♂ ("on *Chamaesyce hyssopifolia*") [FSCA].

Distribution: Nearctic (Mexico and USA) and Neotropical (probably throughout, except South); Hawaiian Islands.

Hosts: See Triapitsyn (1997). Most likely, this species can parasitize eggs of many *Empoasca* spp. including *Empoasca erigeron* De Long, 1931 mentioned above. According to Beyer (1921), eggs of the mirid bug *Halticus bractatus* (Say, 1832) were parasitized by *Anagrus nigriventris* Girault, 1911; however, examination of his voucher specimens from Columbia, South Carolina, has shown that this record was incorrect due to a misidentification of *A. empoascae*.

Comments

This common New World species was redescribed and illustrated by Triapitsyn (1997) based on the type series from Haiti.

Anagrus (Anagrus) flaveolus Waterhouse, 1913

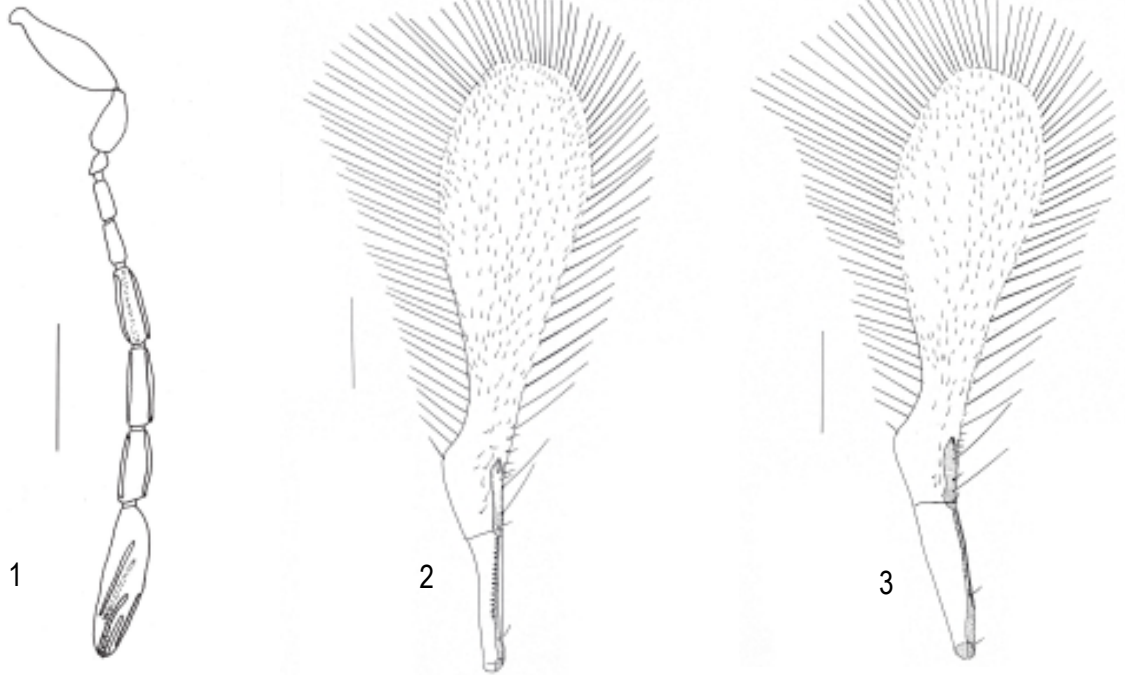
Anagrus flaveolus Waterhouse, 1913: 87-88.

Anagrus (Anagrus) flaveolus Waterhouse; Chiappini et al., 1996: 584-586.

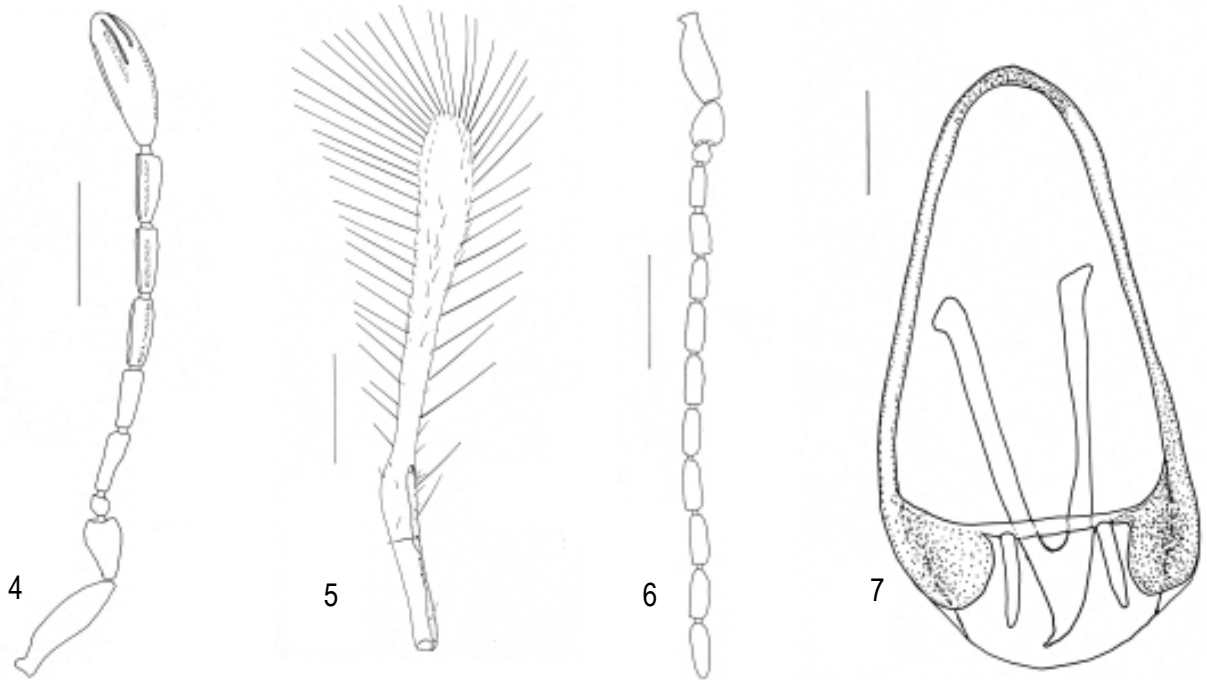
Anagrus (Anagrus) flaveolus Waterhouse; Triapitsyn, 1997: 10.

Material Examined

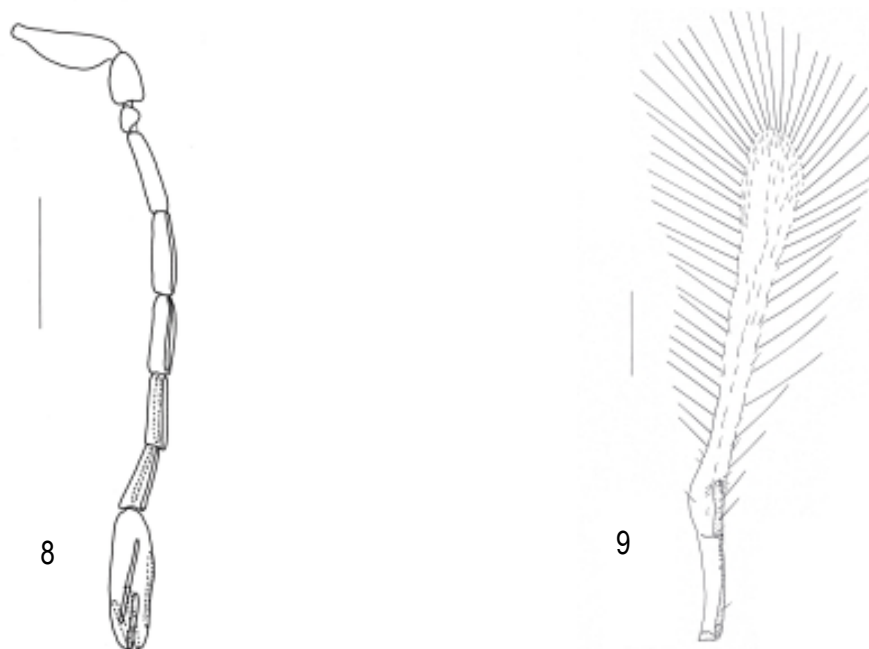
BELIZE, Tower Hill, iv.1966, numerous ♀♀ and ♂♂ ("ex. *Saccharosydne rostifrons* eggs"). CUBA, Baragua, 17.ii.1930, L.D. Christenson, 2 ♀♀ ("ex. eggs of *Saccharosydne saccharivora* (Westwood)"). HAITI: Damien, 25.i.1930, H.L. Dozier, 1 ♀ ("ex. *Peregrinus maidis* on corn"); Port-au-Prince, 9.viii.1930, H.L. Dozier, numerous ♀♀ and ♂♂ ("ex. eggs of *Saccharosydne saccharivora* on sugar cane"). JAMAICA: vii.1959, F.D. Bennett, numerous ♀♀ and ♂♂ on two slides ("ex. eggs of *Saccharosydne saccharivora*"); 4.viii.1966, 2 ♀♀, 2 ♂♂ ("ex. eggs of *Saccharosydne saccharivora* (Westwood)") [USNM]. USA: **Arizona**, Santa Cruz Co., 7 mi. S Patagonia, 27.viii.1979, J. LaSalle, 1 ♀. **California**, Orange Co., Huntington Beach, 23.xii.1981, H. Andersen, 2 ♀♀ [UCRC]. **Florida**, Hendry Co., Clewiston, 3.iv.1961, J.R. Gifford, 3 ♀♀, 1 ♂ ("ex. eggs of *Saccharosydne saccharivora*"). VENEZUELA,



FIGURES 1-3. *A. stethynioides* sp. n.: 1. Antenna, female (paratype, Guatemala); 2. Forewing, female (paratype, Guatemala); 3. Forewing, male (paratype, Trinidad). Scale bars = 0.1 mm.



Figures 4-7. *A. urichi* (Brazil): 4. Antenna, female; 5. Forewing, female; 7. Antenna, male. Scale bars = 0.1 mm; 7. Genitalia, male. Scale bar = 0.01 mm.



FIGURES 8-9. *A. armatus*: 8. Antenna, female (Holotype, Florida, USA); 9. Forewing, female (Puerto Rico). Scale bars = 0,1 mm.

Aragua, El Consejo, 5.viii.1950, P. Guagliumi, 1 ♀ ("ex. eggs of *Saccharosydne saccharivora* (Westwood)") [USNM].

Distribution: Nearctic (Mexico and southern USA) and Neotropical (probably throughout, except temperate South).

Hosts: see Triapitsyn (1997).

Comments

This common, mainly Neotropical species is an economically important biological control agent in Argentina (Triapitsyn 1997) and, according to the above host records, elsewhere in the New World as an egg parasitoid of the leafhopper and planthopper pests on corn and sugarcane.

Anagrus (Anagrus) nigriventris Girault, 1911

Anagrus armatus var. *nigriventris* Girault, 1911: 291.

Anagrus (Anagrus) nigriventris Girault; Chiappini et al., 1996: 581-583.

Anagrus (Anagrus) nigriventris Girault; Triapitsyn, 1997: 9-10.

Material Examined

BRAZIL, **Rio de Janeiro**, nr. Ipomena, 25.v.1991, F.D. Bennett, 1 ♀ ("on *Sonchus* sp.") [FSCA].

Distribution: Nearctic and Neotropical (probably throughout the New World from Canada to Argentina and Chile); Hawaiian Islands.

Hosts: See Chiappini et al. (1996) and Triapitsyn (1997).

Comments

This common species, especially in North America, is for the first time recorded from Brazil.

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