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### The microlepidopterous natural enemy *Brachymeria subrugosa* Blanchard, 1942 (Hymenoptera, Chalcididae): identity, hosts and geographic distribution

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**Abstract.** A lectotype is designated for *Brachymeria subrugosa* Blanchard 1942 (Hymenoptera: Chalcididae). The species is diagnosed, redescribed, and compared to *B. subconica* Bouček, both of which are illustrated by macrophotography. Taxonomic notes, new parasitoid/host associations and new geographical records are also given for *B. subrugosa*. *Brachymeria annulipes* (Costa Lima 1919), a junior secondary homonymy of *Chalcis annulipes* Walker 1834, is proposed as a junior synonym of *B. subrugosa* **syn. nov.**

**Key words:** parasitoid, Chalcidoidea, Lepidoptera

**Resumen.** Se designa lectotipo para *Brachymeria subrugosa* Blanchard 1942 (Hymenoptera: Chalcididae). Se realiza una diagnosis y una descripción de la especie y se compara con *B. subconica* Bouček; se proveen ilustraciones y macrofotografías de ambas especies. Se brindan notas taxonómicas, nuevas asociaciones hospedador/parasitoide y nuevos registros geográficos para *B. subrugosa*. *Brachymeria annulipes* (Costa Lima 1919), homónimo junior secundario de *Chalcis annulipes* Walker 1834, es propuesto como sinónimo junior de *B. subrugosa* **syn. nov.**

**Palabras clave:** parasitoide, Chalcidoidea, Lepidoptera

#### Introduction

The family Chalcididae is widely distributed, showing a high diversity in tropical lowlands (Delvare 1995). The family includes 87 genera and 1464 species classified in 5 subfamilies (Noyes 2015). The species of this family are predominantly solitary, primary endoparasitoids of Lepidoptera and Diptera, though a few species attack Hymenoptera, Coleoptera, Neuroptera and even Strepsiptera; a few may be gregarious (Noyes 2015) and species of Dirhinini (the former Dirhininae) are ectoparasitoids (Delvare 2006). *Brachymeria* Westwood belongs to the subfamily Chalcidinae and includes 51 species described from the Neotropical region (De Santis 1989; Tavares *et al.* 2006). Apparently, there are almost 300 species of *Brachymeria* in the world (Noyes 2015) and many dozens in the New World. Most of these develop in the pupae of Lepidoptera, Coleoptera, Diptera and Hymenoptera as primary parasitoids, idiobionts, but some develop as secondary parasitoids attacking the puparia or cocoons of Tachinidae, Braconidae and Ichneumonidae primary parasitoids. Some Neotropical *Brachymeria*, such as *B. subrugosa* Blanchard 1942, attack insects of economic importance (Tavares & Aquino 2014), but this species has been frequently misunderstood and misidentified. As a consequence, its host relationships have been linked to other *Brachymeria* species, mainly *B. subconica* Bouček 1992. In this contribution we clarify the identity of *B. subrugosa*, and report parasitoid/host associations and new geographic records at country or state level.

## Material and methods

The specimens herein examined are deposited in the following collections (curators of collections in parentheses): CIRAD, Centre de Coopération Internationale en Recherche Agronomique pour le Développement, Montpellier, France (G. Delvare); FIOC, Fundação Instituto Oswaldo Cruz, Rio de Janeiro, Brazil (S. S. de Oliveira); IBGE, Coleção Zoológica da Reserva Ecológica do IBGE, Brasília, Brazil (B. Dias); IBUS, Universidade Federal Rural do Rio de Janeiro, Seropédica, Brazil (F. Racca); FML, Fundación e Instituto Miguel Lillo, San Miguel de Tucumán, Tucumán, Argentina (E. Perez); INPA, Instituto Nacional de Pesquisa da Amazonia, Manaus, Brazil (C. Magalhães); MLPA, Museo de La Plata, La Plata, Buenos Aires, Argentina (J. Salas); MNRJ, Museu Nacional do Rio de Janeiro, Rio de Janeiro, Brazil (R. Tibana); MPEG, Museu Paraense Emílio Göeld, Belém, Brazil (T. P. de J. Chaves); QCAZ, Pontificia Universidad Católica del Ecuador, Quito, Ecuador (G. Onore); SEMC, Snow Entomological Museum, Lawrence, USA (R. W. Brooks); EMEC, Essig Museum of Entomology, University of California, Berkeley, USA (R. L. Zuparko); UFES, Coleção Entomológica da Universidade Federal do Espírito Santo, Vitória, Brazil; USNM, National Museum of Natural History, Washington, USA (M. Gates).

External morphological structures were studied using a Leica S8APO stereomicroscope and photographs were taken with a Leica DFC295 attached to the stereomicroscope. Serial digital images were combined into a single focused image using the open software CombineZM (Hadley 2011). The terminology and acronyms applied in the description follow Gibson (1997) and The Hymenoptera Glossary (Hymenoptera Anatomy Consortium 2014). Measurements are given in millimeters and were taken according Delvare (1992). Distribution or host records denoted with an asterisk (\*) indicate new records.

## Results

### *Brachymeria* Westwood

*Brachymeria* was recently diagnosed by Andrade & Tavares (2009) and is based on the following characteristics: hind tarsal claw with a falciform process (*Brachymeriini*); scrobal-malar carina absent; mandibular formula 2:3 or 2:2, in the later instance upper tooth at least half as long as lower tooth and never distant from the mandible apex; occipital carina not converging to occipital foramen; and diameter of mesonotal umbilicated fovea at least 0.25× as large as mid ocellar diameter.

### *Brachymeria subrugosa* Blanchard, 1942

(Figs 1–8)

*Trigonura annulipes* Costa Lima 1919: 57–58 [preoccupied by *Chalcis annulipes* Walker 1834, a junior synonym of *Brachymeria annulata* (Fabricius)]. Brasil: Maranhão.

*Brachymeria subrugosa* Blanchard 1942: 116–117, Fig. 11. Argentina: Charata. **Syn. nov.**

*Brachymeria subrugosa*: Parker, Berry & Guido 1953: 49 (hosts).

*Brachymeria* (*Pseudobrachymeria*) *conica* (Ashmead): Burks 1960: 270–271 (part, misidentification, hosts); De Santis 1979: 64 (part, misidentification, hosts); Terán 1980: 292 (part, misidentification, hosts); De Santis 1989: 13 (part, catalogue).

*Brachymeria* (*Brachymeria*) *subrugosa*: De Santis 1967: 209 (catalogue); 1979: 62 (catalogue); 1980: 253 (catalogue).

*Trigonura annulipes* Costa Lima: De Santis 1980: 249 (catalogue).

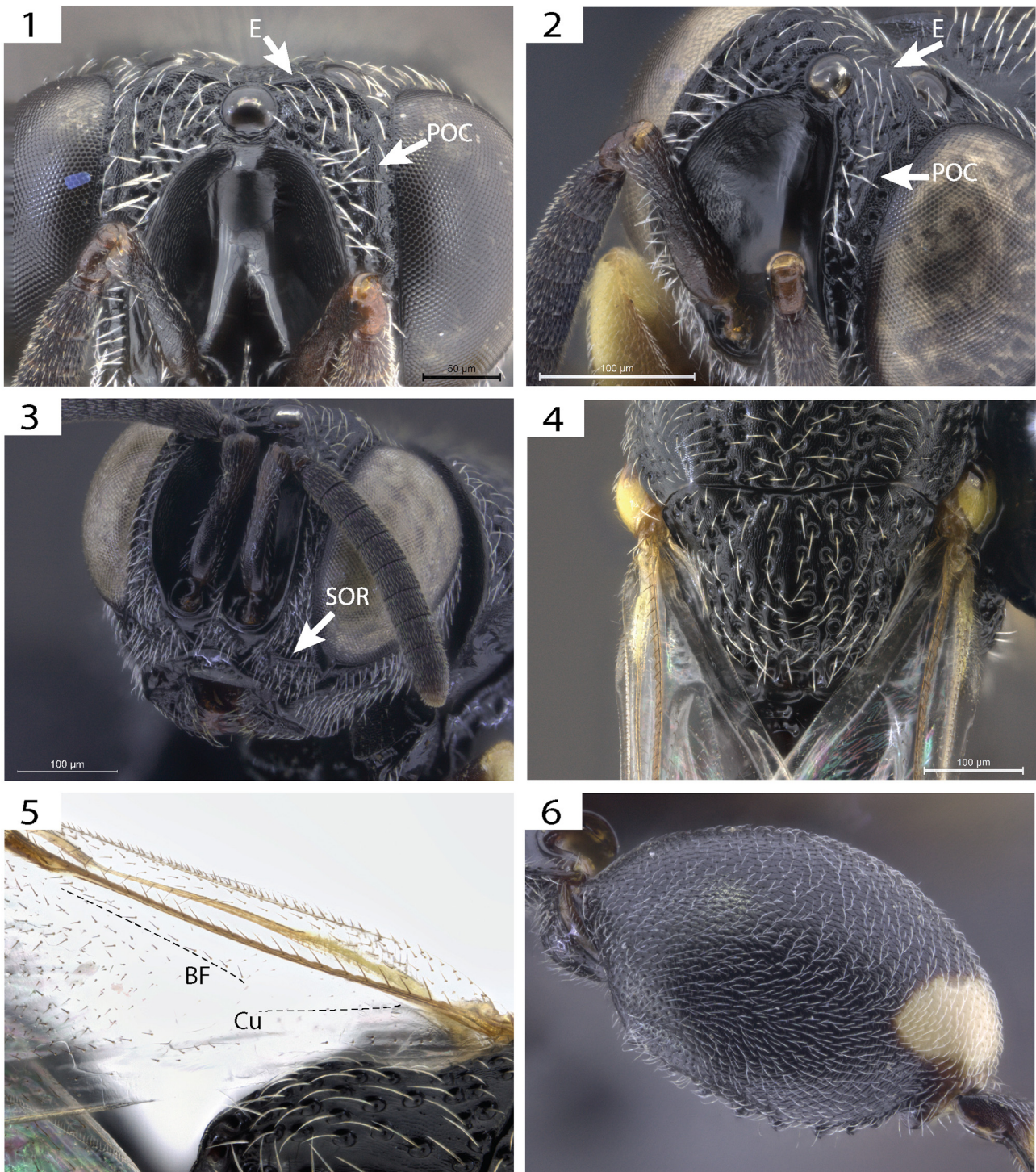
*Brachymeria annulipes*: Bouček 1992: 88 (combination).

*Brachymeria subconica*: Delvare 1993: 351, 361, Figs 5–7 (misidentification, key).

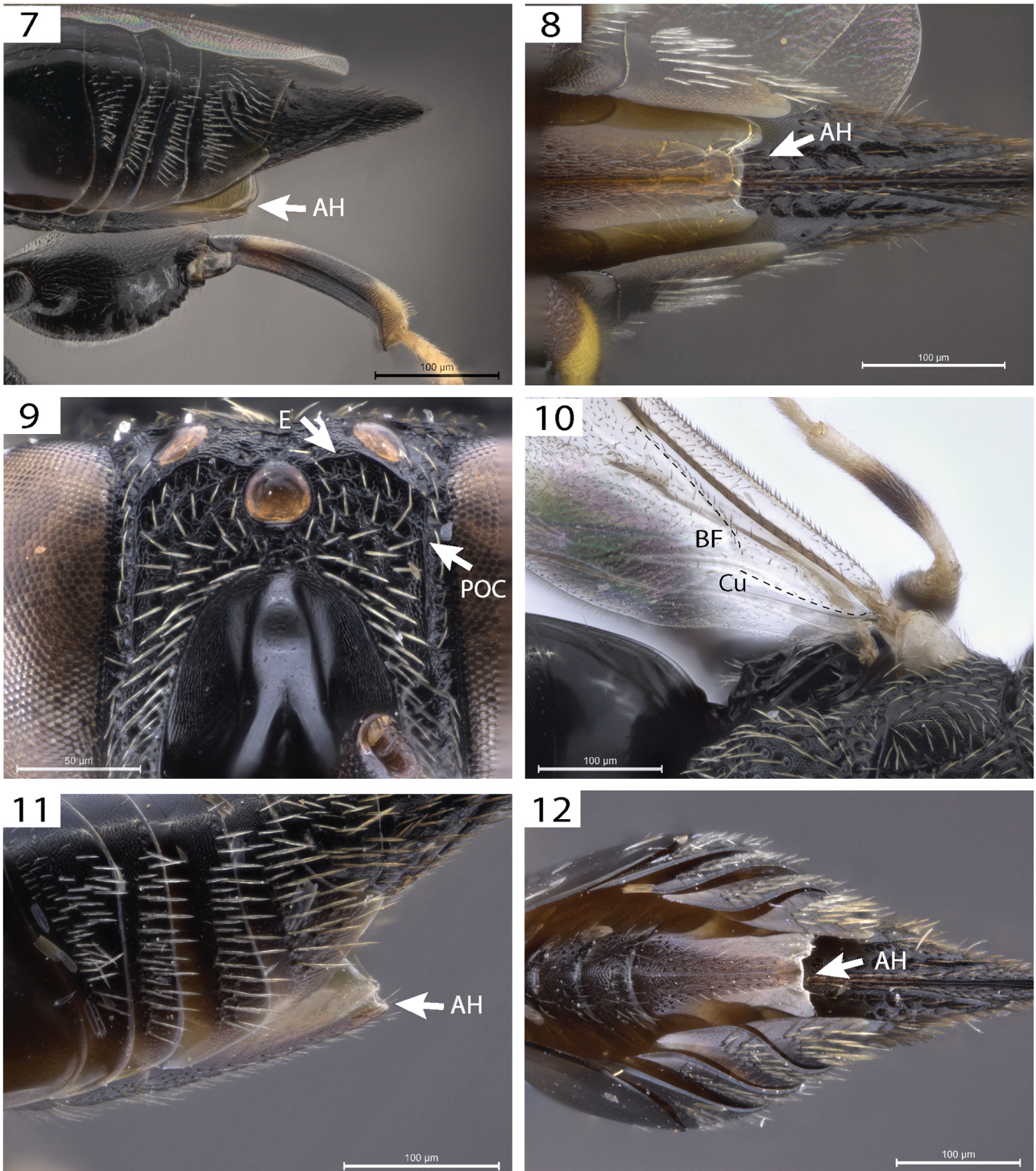
**Diagnosis.** Preorbital carinae present along upper third of orbit, curving in front of lateral ocelli to meet each other just on posterior margin of median ocellus (Figs 1, 2); scrobal margin completely carinate and carinae touching lateral margin of median ocellus (Figs 1, 2); area enclosed by scrobal margin and preorbital carinae flat to slightly concave; lower face with scrobal-orbital ruga delimiting upper and lower face, conspicuous and usually reaching orbit (Fig. 3); torular-clypeal ruga conspicuous and complete (Fig. 3); interantennal projection as a short carina (Fig. 3); fore wing with cubital fold glabrous and basal fold with a line of hairs (Fig. 5); metafemur subelliptic, ventral margin with 8–10 teeth, the basal one small, the medial ones the largest, outer surface coriaceous with dense and small piliferous punctures (Fig. 6); hypopygium at apex conspicuously emarginate (Figs 7, 8).

**Redescription.** FEMALE. Lectotype: 5.25 mm.

*Color.* Mainly black except as follows: eyes and ocelli brown; yellow on tegula, distal fifth of mesofemur, distal spot on external surface of metafemur, fore and mesotibiae, proximal and distal quarters of metatibia, and tarsi. Wings hyaline. Pilosity mainly white, brown on syntergum 7+8.



**FIGURES 1–6.** *Brachymeria subrugosa*, female: 1, frons and vertex, frontal, showing preorbital carina (POC) and its extension (E) in front of lateral ocellus; 2, *idem*, laterodorsal view; 3, head, laterodorsal view, showing scrobal-orbital rugae (SOR); 4, scutellum, dorsal view; 5, base of fore wing, showing cubital (Cu) and basal folds (BF); 6, metafemur, outer side.



**FIGURES 7–12.** 7–8, *Brachymeria subrugosa*, female: 7, gaster, lateral, showing apex of hypopygium (AH); 8, *idem*, ventral. 9–12, *B. subconica*, female: 9, frons and vertex, frontal, showing preorbital carina (POC) and its extension (E) in front of lateral ocellus; 10, base of fore wing, showing cubital (Cu) and basal folds (BF); 11, gaster, lateral, showing apex of hypopygium (AH); 12, *idem*, ventral.

*Head.* Preorbital carinae present along upper third of orbit, the carinae curving in front of lateral ocelli and meeting each other just on posterior margin of median ocellus (Figs 1, 2). Scrobal margin carinate, dorsally carinae touching lower margin of median ocellus, close or virtually tangent to median ocellus (Figs 1, 2); area enclosed by scrobal margin and preorbital carinae flat. Frons dorsally and vertex usually with umbilicate foveae, interstices coriaceous, foveae at most 0.3× median ocellar diameter; lower face with piliferous punctures, interstices coriaceous; scrobal-orbital ruga separating the lower face from frons, conspicuous and reaching orbit (Fig. 3); a torular-clypeal ruga conspicuous and complete. Lower margin of torulus at lower eye level. Interantennal projection as a short carina (Fig. 3). Malar carinae

curving posteriorly towards genal carina. Mandibular formula 2:3. Genal carina running towards lateral ocellus, upper portion not curving toward occiput. Antenna clavate, scape just reaching lower margin of median ocellus. Measurements: head height:width:length = 1.07:1.68:0.79; frontovertex = 0.82; DAO = 0.17; POL = 0.42; OOL = 0.10; malar space = 0.31; oral fossa = 0.42; eye height:width = 0.93:0.69; antennal segments (length:width) = scape 0.65:0.15; pedicel 0.10:0.10; anellus 0.10:0.3; Fu1 0.16:0.15; Fu2–Fu3 0.15:0.16; Fu4–Fu6 0.13:0.17; Fu7 0.13:0.18; clava 0.27:0.18.

**Mesosoma.** Pronotum, mid lobe of mesoscutum and scutellum with umbilicate foveae, foveae diameter 0.3–0.4× mid ocellar diameter; interstices coriaceous, as wide as 0.5–1.0× diameter of foveae; scutellum with a smooth and slightly elevated medial stripe (Fig. 4), usually inconspicuously coriaceous; lateral lobe of mesoscutum on inner half with shallow, scattered and smaller umbilicate foveae. Setation as long as 2× diameter of foveae. Frenal carinae medially slightly emarginate. Epicnemial carina ventromedially straight. Fore wing with basal cell and cubital fold glabrous; basal fold with a line of setae (Fig. 5); subcubital fold basally with line of fine setae. Metafemur subelliptic; on ventral margin with 8–10 teeth, the basal one small, the medial ones the largest; outer surface coriaceous with dense and small piliferous punctures (Fig. 6). Measurements (length or length:width): mesosoma = 2.31; mesoscutum = 0.98:1.64; scutellum = 1.00:0.90; fore wing = 3.35:1.42; submarginal vein = 1.69; marginal vein = 0.65; postmarginal vein = 0.17; stigmal vein = 0.08; metacoxa = 0.86:0.62; metafemur = 1.93:0.95.

**Metasoma.** Gaster acuminate (Fig. 7), at least 1.1× as long as head plus mesosoma; Tg1 smooth and shiny, except for a few fine dorsolateral punctures; Tg2–Tg5 coriaceous with 1 or 2 lateral rows of piliferous punctures; Tg6 coriaceous with shallow umbilicate foveae on side, dorsal foveae irregular; syntergum 7+8 coriaceous with piliferous punctures, 1.5× as long as wide. Exserted part of ovipositor sheaths as long as high. Hypopygium at apex broadly emarginate (Figs 7, 8). Measurements (length or length:width): gaster = 3.65:1.35; Gt1 = 1.15; Gt7+8 = 0.72:0.33.

**MALE.** Length: 3.6–4.8 mm. Very similar to female, except area around median ocellus slightly concave; apex of gaster not acuminate.

**Variation.** Female: Body length 4.0–7.2 mm; area around median ocellus flat to slightly concave; umbilicated foveae on former area sometimes shallow and irregular; scrobal-orbital ruga reaching orbits or not; Tg7+8 from 1.3–2.0× as long as wide.

**Type material.** *Brachymeria subrugosa*: Lectotype (here designated), ♀, labelled 's/ *A. argillaceae*, Charata, Parker, iii.40' '*Brachymeria subrugosa* sp.n., det. E. E. Blanchard' (MLPA). Blanchard (1942) described *B. subrugosa* based on two syntypes.

The specimen here designated as lectotype was received on loan by one of the authors (MTT) from Manfredo A. Fritz (Institute of Entomology of Salta, Salta Argentina). The specimen labels data (date, place and host) agree with the original description, except for the collector (indicated as "Roberto G. Mallo" in original description, but as "Parker" on the lectotype label). In addition to the specimen agreeing with the original description, the typical Blanchard's identification label with his handwriting and the indication "sp. n." reinforce it as one of the original syntypes.

***Trigonula annulipes*:** holotype, ♀ (damaged on right side of mesoscutum and scutellum), labelled '*Trigomura annulata* C.L.' 'G. de Entom. Esc. Sup. Agri. – Nitheroy – E. Rio, No 3266' (UFRR).

Costa Lima (1919) mentioned that the holotype of *B. annulipes* was deposited in the collection of Gabinete de Entomologia da Escola Superior de Agricultura (Niterói, Rio de Janeiro State, Brazil), but that collection is now in the Costa Lima Collection at the Instituto de Biologia of Universidade Federal Rural do Rio de Janeiro (Seropédica, Rio de Janeiro State, Brazil). The holotype has a red label written "*Trigomura annulata* C.L." (Costa Lima's handwriting) and a Niterói cabinet label with the number 3266. In the former collection's record book, under that number is registered: "*Hymenoptera/Chalcididae/Trigomura annulata, C.L./box #63/ Maranhão. ii.919/ I removed it from inside a chrysalis of Pectinophora gossypiella*". The type specimen was found into box #63 and the record book data corroborates the original description. The specific epithet *annulata* on the type label and in the book record clearly are mistakes.

**Other studied material.** USA. Texas: 1 ♀, 1 ♂, Victoria, ix.1920, J. D. Mitchell col. (USNM). MEXICO. 1 ♀, 28.iii.1934, O. C. Morris col. (USNM); 1 ♀, 10.ix.1952 [without collecting data] (USNM). Sinaloa: 1 ♀, 2.5 miles N. Mazatlan, 12.viii.1970, J. S. & M. S. Wasbauer colls. (EMEC). Nuevo Leon: 1 ♂, Villa del Carmen, 24.i.1972, ex. webworm on pecan [*sic.*], J. J. Ortiz col. (USNM); 1 ♀, Villa Garcia, iii.1964, ex. *Lespeyresia caryana*, Guajardo col. (USNM). Colima: 1 ♀, 21 miles N. Manzanillo, 25.vii.1970, M. S. & J. S. Wasbauer colls. (EMEC). Veracruz: 1 ♀, Cotaxtla, 03.viii.1958, ex. Stenomidae pupa on *Annona* fruits (USNM). HONDURAS. 1 ♀, 1 ♂, 10.v.1934, J. A. Ramos col. (USNM); 1 ♀, Punta Castilla, 29.iii.1924 (USNM). COSTA RICA. 1 ♀, [without collecting data] (USNM). Guanacaste: 1 ♀, Playas del Coco, 05.viii.1964, G. C. Eickwort col. (SEMC). Cartago: 1 ♀, Turrialba, 10.ix.1964 (M. G. Naumann) (SEMC); 1 ♀, Turrialba, 11.vii.1971, ex. *Anadasmus* pupa, Becker col. (MLPA); 1 ♀, Turrialba, 20.x.1972, on *Cedrella odorata* L., Grisjma col. (MLPA); 1 ♀, 640 m [without collecting data] ex. *H. grandella*, V. O. Becker col. (MLPA). PANAMA. Canal Zone: 1 ♀, Las Cascadas, 01.v.1911, on pyralid in cocoa poa [*sic.*] (USNM); 1 ♀, Porto

Bello, 09.iii.1911, A. Brusck col. (USNM). TRINIDAD Y TOBAGO. 1 ♀, Sagre Grande, 28.v.1958, ex. *Philornis* puparium, T. Aitken col. (USNM). COLOMBIA. Cesar: 2 ♀, 2 ♂, San Alberto, 23.v.1989, ex. pupae *Stenomoma cecropia*, P. Genty col. (CIRAD). Tolina: 2 ♀, Armero, 26.i–05.ii.1977, E. L. Peyton & Suarez cols. (USNM). VENEZUELA. Zulia: 1 ♀, Carasquero, 29–30.v.1976, A. S. Menke & D. Vincent col. (USNM); 1 ♀, Rosario, 14.vi.1976, A. S. Menke & D. Vincent col. (USNM); 1 ♀, Puerto de Cata, 10–11.vi.1976, A. S. Menke & D. Vincent col. (USNM). Aragua: 1 ♀, Ocumare de La Costa, 12.vi.1976, A. S. Menke & D. Vincent cols. (USNM); 1 ♀, Maracay, 24.ix.1952, ex. Stenomidae pupa on almond, F. Fernandez col. (USNM). EQUADOR. Napo: 2 ♀, Coca, iv.1985 e i.86, G. Onore col. (QCAZ). BRAZIL. 2 ♀, attacking material #11045 [without collecting data] (IBUS). Acre: 1 ♀, Rio Branco, 25.x–08.xi.1991, F. Ramos e eq. col. (MPEG). Amazonas: 1 ♀, Manaus, Reserva Ducke, 19.x.1981, J. A. Rafael col. (INPA); 1 ♀, *idem*, 05.xi.1986, B. Klein col. (INPA). Federal District: 1 ♀, Reserva Ecológica do IBGE, 06.x.1978, Malaise trap (IBGE). Mato Grosso: 1 ♀, Chapada dos Guimarães, 08–13.ii.1986, Malaise, I. Gorayeb col. (MPEG). Pará: 1 ♀, Belém, 25.viii.1935, ex. *Gnorimoschema* sp (FIOC); 1 ♀, Oriximiná, 07–25.x.1982, Malaise, J. A. Rafael & eq. cols. (INPA); 1 ♀, Tucuruí, Vila Brava, 27.vi.1980, Nunes de Mello & eq. cols. (INPA). Pernambuco: 1 ♀, Recife, 08.vii.1935, J. A. Albuquerque col. (IBUS). Espírito Santo: 2 ♀, Vitória, urban area, 03.vii.2004, 20.x–5.xii.2004, 20° 17' 27" S, 40° 17' 30" W, R. Kawada col. (UFES). Rio de Janeiro: 2 ♀, 1 ♂, Rio de Janeiro, viii.1943, ex. *Stenomoma annonella*, C. H. Ribbs col. (IBUS); 4 ♀, 1 ♂, Belfort Roxo, 11.ii.1935, #3191, ex. *Cerconota anonella* pupa in sugar–apple [*Annona squamosa*], M. Marques col. (IBUS); 2 ♀, 2 ♂, Guaratiba, 23.vi.1942, #6223, ex. *Cerconota anonella* pupa, A. Silva col. (IBUS); 1 ♀, Rio de Janeiro, Horto Florestal, vi.1942, A. Silva col. (IBUS); 1 ♀, 1 ♂, Rio de Janeiro, vii.1925, ex. *Cerconota anonella* pupa, J. Alves col. (MNRJ); 2 ♀, 2 ♂, São Bento, i.1943, ex. *Cerconota anonella* pupa, L. Portela col. (IBUS). São Paulo: 1 ♀, Campinas, ix.1992, ex. *Stenomoma catenifer* pupa, H. Z. Firsher col. (UFES). ARGENTINA. Salta: 1 ♀, 14 km S. Urundel, ex. *Calpodes ethlius* pupae (IFML); 1 ♀, Valle Morado, 18.ii.2013, ex. *H. grandella* on *Cedrela balansae*, E. Balducci (MLPA); Tucumán: 1 ♀, i.1929 (IFML); 1 ♀, San Miguel de Tucumán, x.1973, parasite of *Ceroplastes* sp on *Tabebuia* [probably attacking eggs predator lepidoptera] (IFML).

**Biology.** *Brachymeria subrugosa* usually is a solitary, primary parasitoid of Lepidoptera pupae, mainly microlepidoptera. It has also been recorded as hyperparasitoid of Lepidoptera and Cassidini (Coleoptera) beetles through Tachinidae (Parker, Berry & Guido 1953). The following host records for *B. subconica* actually refer to *B. subrugosa*: *Melitara dentata* (Grote) (Burks 1960); *Anadasmus porinodes* (Meyrick) (De Santis 1979); Stenomidae (Terán 1980); and *Stenomoma cecropia* Meyrick (Delvare 1993). Costa Lima (1945) mentioned that the specimens of *B. pseudovata*, identified by Jamirez Gomes, were obtained from pupae of *Cerconota annonella* (Sepp) (Lepidoptera: Oecophoridae), but this record corresponds to *B. subrugosa*. Of the examined specimens, one female is point mounted with a puparium of *Philornis* sp. (Diptera: Sarcophagidae) and one female of *B. podagrica* F. The latter was obtained from inside the puparium that was opened, suggesting that both specimens developed from the same host. These data suggest that beyond lepidopterans *B. subrugosa* may attack dipterans, not as a secondary parasitoid.

**Distribution.** USA\* (Texas), Mexico\*, Honduras\*, Costa Rica\*, Panama\*, Trinidad and Tobago\*, Colombia\*, Venezuela\*, Ecuador\*, Argentina\* (Salta and Tucumán), Brasil (Acre\*, Amazonas\*, Federal District\*, Maranhão, Minas Gerais, Mato Grosso do Sul\*, Pará\*, Rio de Janeiro\*, Roraima\* and São Paulo\*) and Uruguay.

**Hosts.** LEPIDOPTERA: *Pectinophora gossypiella* (Saunders) (Gelechiidae); *Calpodes ethlius*\* (Stoll) (Hesperiidae); *Megalopyge chacona*\* (Schaus) (Megalopygidae); *Alabama argillacea* (Hübner) (as primary and secondary host) (Noctuidae); *Anadasmus porinodes*\* (Meyrick), *Cerconota annonella*\* (Sepp), *Stenomoma cecropia*\* Meyrick and *S. catenifer*\* Walsingham (Oecophoridae); *Hypsipyla grandella*\* (Zeller), *Melitara dentata*\* (Grote) (Pyralidae); *Laspeyresia caryana*\* (Tortricidae). DIPTERA: *Eucelatoriopsis parkeri* Sabrosky and *Patelloa* sp. (Tachinidae). COLEOPTERA (secondary host): *Chelymorpha variabilis* Boheman (Chrysomelidae).

**Comments.** Bouček (1992) pointed out that *B. annulipes* (Costa Lima) was a junior homonym of *Chalcis annulipes* Walker, 1834, a junior synonym under *B. annulata* (Fabricius), but he did not replace the former name. Once *B. subrugosa* Blanchard is considered a synonym of *B. annulipes* (Costa Lima), the former replaces the later one according to ICZN (1999) (Art. 60.2).

*Brachymeria subrugosa* belongs to a species group that would agree with the subgenus *Pseudobrachymeria* Burks 1960 because it is extremely close to *B. subconica*, the type species of that subgenus. Both species have a cross carina in front of the lateral ocelli (regarded here as an extension of the preorbital carinae) (Figs 1, 2, 9) in addition to the following: the preorbital carinae are absent at least along the lower half of orbit; the scrobal-ocular carinae are present (Fig. 3); and the metafemur on the outer surface has dense pilliferous punctures and conspicuous coriaceous interstices (Fig. 6). *Brachymeria subrugosa* differs from *B. subconica* by the following: the scrobal margin virtually reaches the lower margin of the median ocellus, whereas the upper scrobal margin is somewhat distant from the median ocellus in *B. subconica* (Fig. 9); the fore wing has the cubital fold glabrous and the basal fold with a line of setae, whereas a line of

setae are present on the cubital fold and 2–3 lines on the basal fold in *B. subconica* (Fig. 10); and the hypopygium is broadly emarginate medially at its apex conversely to being narrowly emarginate in *B. subconica* (Figs 11, 12). The geographic distribution of *B. subconica* is similar to that of *B. subrugosa* (Paraguay, from south to north of Brazil, Ecuador, El Salvador and Mexico).

Specimens of *B. subrugosa* have been frequently misidentified. One of the authors (MTT) found specimens identified as *B. subconica*, *B. pseudovata* Blanchard and *B. producta* (Olivier). Consequently, at least part of the following citations of *B. subconica* refers to *B. subrugosa*: Burks (1960), De Santis (1980, 1989), Terán (1980), and Delvare (1993) (see the items Hosts and Studied material). The illustrations of *B. subconica* provided by Delvare (1993) clearly refer to *B. subrugosa*.

## Conclusion

*Brachymeria subrugosa* is widely distributed in America from USA to Argentina and among their main hosts are lepidopteran pests that cause heavy economic losses to agricultural and forestry crops including *Annona* sp., *Gossypium* sp., *Cedrela* sp., *Elaeis* sp., *Persea* sp. and *Aspidosperma* sp. The use of the native parasitoids of a region is an essential factor in increasing the probability of success in biological control (Loera–Gallardo *et al.* 2008). Several *Brachymeria* species have been introduced as biological control agents against various Lepidoptera, without much success (Clausen 1978). Augmentative releases of *B. nosatoi* Habu were carried out successfully against the oecophorid coconut leaf-eating caterpillar, *Opsina arenosella* Walker (Kenis & Cugala 2006) in India (Sathiamma *et al.* 1996). Although some species were observed on insect pests, various records showed that the control is limited, the range of parasitism generally between 5–20% (Delvare & Arias Penna 2006). It is possible that some species of Chalcididae have an important role as natural enemies of pests but more studies are necessary to verify this (Tavares & Aquino 2014). The novel host records found in this work demonstrate how necessary is increasing the knowledge about parasitoids and the impact that they have on host populations. A detailed knowledge about biology, ecology and taxonomy is essential to satisfactorily perform biological control and/or integrated pest management.

## References

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