



УДК 595.792.13

## NORTH AND CENTRAL AMERICAN SPECIES OF THE GENUS *FLACOPIMPLA* GAULD (HYMENOPTERA: ICHNEUMONIDAE: PIMPLINAE), WITH DESCRIPTION OF A NEW SPECIES FROM MEXICO

A. I. Khalaim<sup>1, 2\*</sup> and E. Ruíz-Cancino<sup>1</sup>

<sup>1</sup>División de Estudios de Postgrado e Investigación, UAM Agronomía y Ciencias, Universidad Autónoma de Tamaulipas, Cd. Victoria 87149, Mexico; e-mail: eruiz@uat.edu.mx

<sup>2</sup>Zoological Institute of the Russian Academy of Sciences, Universitetskaya Emb. 1, 199034 Saint Petersburg; Russia; e-mail: ptera@mail.ru

### ABSTRACT

Five species of the genus *Flacopimpla* Gauld occur in North and Central America. Two species are known from the USA and Canada, *F. kaspanyi* sp. nov. is described from north-eastern Mexico in this paper, and two species occur in Costa Rica. A key to the five species of *Flacopimpla* of North and Central America is provided.

**Key words:** *Flacopimpla*, Ichneumonidae, Pimplinae, Mexico, North America, systematics, Central America

## СЕВЕРО И ЦЕНТРАЛЬНОАМЕРИКАНСКИЕ ВИДЫ РОДА *FLACOPIMPLA* GAULD (HYMENOPTERA: ICHNEUMONIDAE: PIMPLINAE) С ОПИСАНИЕМ НОВОГО ВИДА ИЗ МЕКСИКИ

А. И. Халаим<sup>1, 2\*</sup> и Э. Руиц-Кансино<sup>1</sup>

<sup>1</sup>División de Estudios de Postgrado e Investigación, UAM Agronomía y Ciencias, Universidad Autónoma de Tamaulipas, Cd. Victoria 87149, Mexico; e-mail: eruiz@uat.edu.mx

<sup>2</sup>Зоологический институт Российской академии наук, Университетская наб. 1, 199034 Санкт-Петербург, Россия; e-mail: ptera@mail.ru

### РЕЗЮМЕ

В Северной и Центральной Америке обитают пять видов рода *Flacopimpla* Gauld. Два вида известны из США и Канады, *F. kaspanyi* sp. nov. описан из северо-восточной Мексики в этой работе, и еще два вида обитают в Коста-Рике. Предложен определительный ключ пяти видов *Flacopimpla* Северной и Центральной Америки.

**Ключевые слова:** *Flacopimpla*, Ichneumonidae, Pimplinae, Мексика, Северная Америка, систематика, Центральная Америка

### INTRODUCTION

*Flacopimpla* Gauld is a small New World genus of the *Polysphincta* group of genera (Gauld and Dubois 2006). The *Polysphincta* group of genera is a monophyletic lineage of Pimplinae comprising 21 genera worldwide. All those species of the group with known

biology are koinobiont ectoparasitoids of adult spiders (Gauld et al. 2002; Gauld and Dubois 2006). According to recent phylogenetic analysis (Gauld and Dubois 2006) some genera in this group, including *Flacopimpla* and *Zatypota*, are not clearly delimited, and require further investigation.

In the *Polysphincta* genus-group, *Flacopimpla* belongs to the *Eruga/Acrodactyla/Zatypota* genus-complex (Gauld and Dubois 2006). In North and

\*Corresponding author / Автор корреспондент

Central America this complex is represented by the genera *Acrodactyla*, *Eruga*, *Flacopimpla*, and *Zatypota*. It also includes the recently described genus from the Colombian Andes, *Lamnatibia* (Palacio et al. 2007), and several genera outside the New World (Gauld and Dubois 2006).

*Flacopimpla* can be distinguished from other genera in this group by the following complex of features (Gauld and Dubois 2006; Palacio et al. 2007): upper tooth of mandible unusually long and upcurved, mid trochanter of female with slight ventral swelling (absent in *F. kasparyani* sp. nov.), fore and mid femora unspecialized, hind tibia with a hairless longitudinal groove internally, and granulate sculpture of the metasoma and propodeum.

The genus *Flacopimpla* is represented in North and Central America by five known species: *F. nigriceps* (Walsh) and *F. parva* (Cresson) from the USA and Canada, *F. kasparyani* sp. nov. from north-eastern Mexico, and *F. varelae* Gauld and *F. gerardoi* (Gauld et al.) from Costa Rica (Gauld et al. 1998; Gauld & Dubois 2006). One more species, *F. sulina* Graf et Kumagai, has been described from southern and south-eastern Brazil (Graf and Kumagai 1998). In comparison to the three Central American species from Mexico and Costa Rica, which are extremely rare in collections, the Brazilian *F. sulina* is reported to be one of the dominant pimpline species in some localities (Kumagai and Graf 2002).

Very little is known about the biology of this genus. In the USA and Canada, *F. nigriceps* was reared from cocoons on *Alnus* and *Malus* (Townes and Townes 1960), and *F. parva* is known as a parasitoid of *Theridion punctipes* Emerton (Theridiidae) (Cushman 1926). Both species are commonly collected on and near deciduous woods (Townes and Townes 1960).

## MATERIALS AND METHODS

Ichneumonid collections of the Universidad Autónoma de Tamaulipas (Cd. Victoria, Mexico; further UAT) and the Instituto Nacional de Biodiversidad (Santo Domingo, Costa Rica; further INBio) have been studied. The holotypes of *F. varelae* and *F. gerardoi* from the collection of INBio have been examined by the first author. From the material of UAT, one species, *F. kasparyani* sp. nov., is described from Tamaulipas in north-eastern Mexico. We have not seen the types of two Nearctic species, *F. nigri-*

*ceps* and *F. parva*. However, we have studied the descriptions of these species published in Townes and Townes (1960). In that book and many following publications, these species were treated in the genus *Zatypota*, but recently were transferred to *Flacopimpla* (Gauld and Dubois 2006).

Morphological terminology predominantly follows Gauld (1991). Classification follows that of Gauld and Dubois (2006). The holotype of *F. kasparyani* sp. nov. is deposited at the Insect Museum of UAT.

## SYSTEMATICS AND RESULTS

### Family Ichneumonidae Latreille, 1802

#### Subfamily Pimplinae Wesmael, 1845

#### Genus *Flacopimpla* Gauld, 1991

#### Key to North and Central American species of *Flacopimpla*

1. Lateral lobe of mesoscutum mat, with micro-reticulation. Canada, USA . . . . . *F. nigriceps* (Walsh)
  - Mesoscutum entirely polished . . . . . 2
2. Metapleuron white. Hind leg white with black marks on coxa externoventrally, along outer side of femur, and on basal and apical thirds of tibia; tarsus black, basitarsus narrowly pale basally (Fig. 7). Metasoma black with tergites 2–5 pale along anterior margin. Ovipositor weakly upcurved. Costa Rica . . . . . *F. varelae* Gauld
  - Metapleuron reddish orange or black. Hind leg predominantly whitish, with coxa sometimes orange basally, femur and tibia white or with weaker amount of black; tarsus predominantly blackish, but at least basal half of basitarsus whitish (Figs. 5, 6). Metasoma black with tergites 2–5 sometimes slightly brownish basally. Ovipositor straight or slightly decurved (Fig. 8) . . . . 3
3. Mesothorax black with subalar prominence of mesopleuron white. Hind coxa entirely white. Costa Rica . . . . . *F. gerardoi* (Gauld et al.)
  - Mesothorax reddish orange. Hind coxa whitish, basally orange or brown (Figs. 5, 6) . . . . . 4
4. Hind leg with third tarsomere 3.6 times as long as broad (Fig. 5). Prothorax extensively black with pronotum dorsoposteriorly reddish orange and with extreme hind corner white. Mesepimeron reddish orange. Hind femur entirely white (Fig. 5). Hind tibia white with extreme base and apical 0.2 blackish (Fig. 5). North-eastern Mexico . . . . . *F. kasparyani* Khalaim et Ruíz-Cancino sp. nov.
  - Hind leg with third tarsomere about 2.5 times as long as broad (Fig. 6). Prothorax black with more or less extensive white markings. Mesepimeron whitish. Hind femur white, brownish basally, with broad brownish

anterodorsal stripe, and often similar but paler and smaller posterodorsal stripe (Fig. 6). Hind tibia white, fuscous in basal and apical thirds (Fig. 6). Canada and north-eastern USA . . . . . *F. parva* (Cresson)

**1. *Flacopimpla gerardo* (Gauld, Ugalde-Gómez et Hanson, 1998)**

**Material.** 1 female (holotype, examined), COSTA RICA, San José Prov., Cerro de la Muerte, 6 km N San Gerardo de Dota, 2800 m; January 1993; coll. Janson and Godoy (INBio). 1 female; COSTA RICA, Puntarenas Prov., Cerro Frantzius, 2134 m; 28 February–28 March 1997; coll. R. Villalobos (INBio).

**Distribution.** Costa Rica (San José Prov. and Puntarenas Prov., 2000–2800 m) (Gauld et al. 1998).

**2. *Flacopimpla kasparyani* Khalaim et Ruíz-Cancino sp. nov.**  
(Figs. 1–5, 8)

**Holotype.** Female, MEXICO: Tamaulipas, Gómez Farías, La Gloria, red entomologica, 11 March 1995, coll. D.A. Zuñiga. Deposited in Universidad Autónoma de Tamaulipas, Cd. Victoria, Mexico (UAT).

**Etymology.** This species is named in honor of Dr. D.R. Kasparyan (Zoological Institute RAS, St. Petersburg, Russia), who has made a great contribution to the study of Ichneumonidae in Mexico.

**Comparison.** We classify the new species in the genus *Flacopimpla* as it has a slender mandible with upper tooth conspicuously upcurved (Fig. 3), a hairless longitudinal furrow on the hind tibia, clearly delineated rhombic area on tergite 2 and D-shaped area on tergite 3, and extensively granulate propodeum and central areas of metasomal tergites. Gauld and Dubois (2006) also recorded for this genus a slight ventral swelling on the mid trochanter of the female, but the new Mexican species does not possess a noticeable swelling on its mid trochanter. Nevertheless we describe this species in *Flacopimpla* because other characters correspond to this genus well.

The new species is apparently closely related to the Nearctic *F. parva* as both are structurally similar and have a rather similar color pattern. Unlike *F. parva*, *F. kasparyani* sp. nov. has an extensively black prothorax with the pronotum dorsoposteriorly reddish orange and with the extreme hind corner white (*F. parva* has a black prothorax with extensive white markings); reddish orange mesepimeron (whitish in

*F. parva*); entirely white hind femur, white hind tibia with the extreme base and apical 0.2 blackish (Fig. 5) (*F. parva* has extensively brown and blackish marked hind femur and tibia, Fig. 6); mesoscutum with lateral lobes entirely hairless; and the hind leg with the third tarsomere 3.6 times as long as broad (2.5 times in *F. parva*) (compare Figs. 5 and 6).

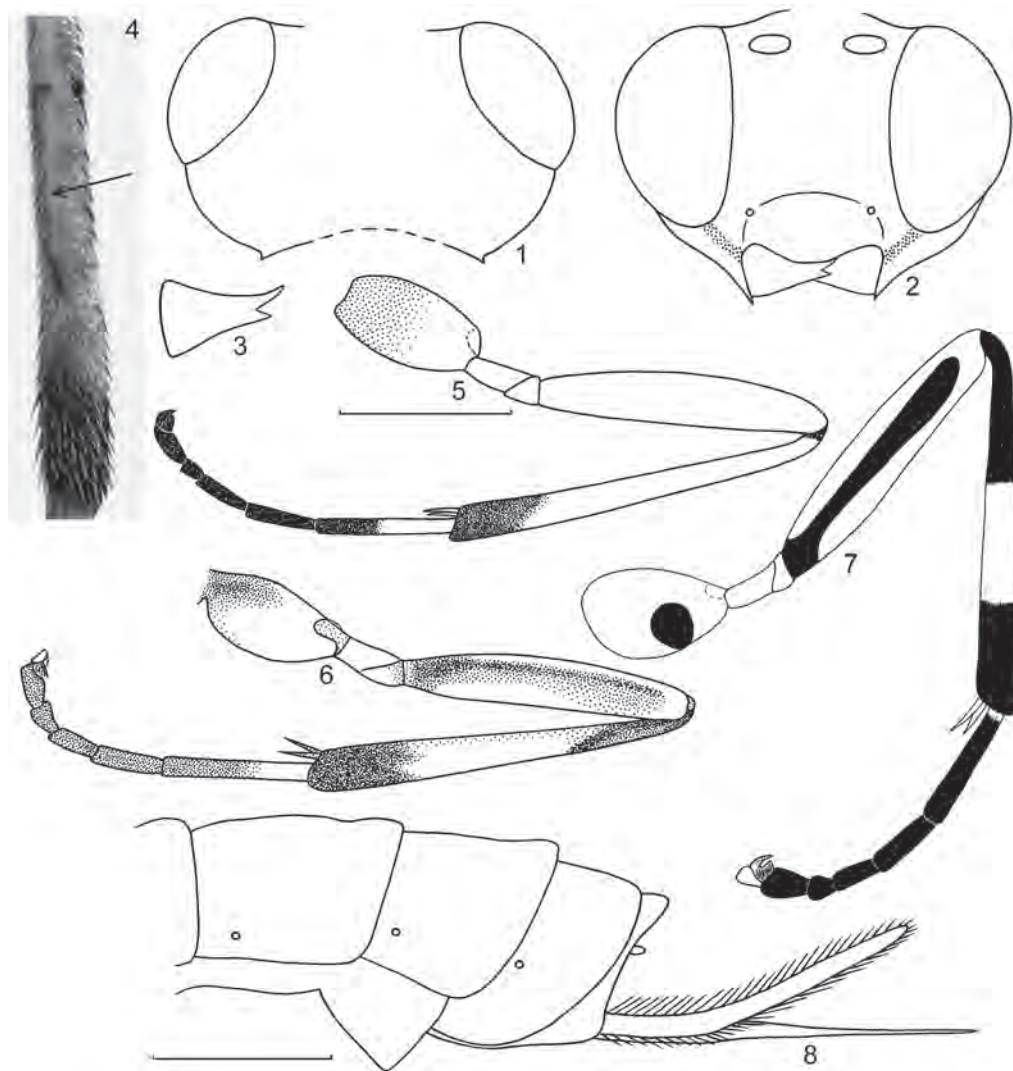
These two species are also well isolated geographically – *F. parva* occurs in Canada and north-eastern USA (to Wisconsin in the west, and North Carolina in the south), and *F. kasparyani* sp. nov. is described from north-eastern Mexico.

**Description.** Female. Small insect with body length 5.7 mm and length of fore wing 4.8 mm.

Head strongly and roundly narrowed behind eyes in dorsal view (Fig. 1). Palp formula 5 : 4, the maxillary palp not exceptionally long. Mandible slender, strongly narrowed, with upper tooth much longer than lower tooth, distinctly upcurved (Fig. 3). Malar space 0.9 times as long as basal width of mandible, with a band of coriaceous sculpture extending from eye margin to mandibular base (Fig. 2). Clypeus prominent, in profile moderately convex, apically slightly truncate (Fig. 2), smooth with scattered setiferous punctures. Lower face almost as broad as high (from supraclypeal suture to level of insertion of antenna), smooth with scattered setiferous punctures. Antenna with scape very obliquely truncate, angled at about 45°; flagellum with 24 flagellomeres. Lateral ocellus separated from eye margin by 1.1 times its maximum diameter. Occipital carina complete, ventrally joining hypostomal carina well away from mandibular base.

Epomia distinct. Mesoscutum polished, with isolated hairs on median lobe. Mesopleuron smooth and shining. Epicnemial carina weak, extending laterally distinctly above level of lower corner of pronotum. Metapleuron smooth. Submetapleural carina incomplete, present as short ridge on anterior 0.35 of metapleuron. Propodeum evenly declivous in lateral view, weakly granulate except small smooth area posteriorly, with petiolar area enclosed only laterally and broadly open medially. Median longitudinal carinae entirely absent. Propodeal spiracle round. Pleural carina present.

Tarsal claws with large basal lobe. Mid trochanter without conspicuous ventral swelling. Hind femur about 5.6 times as long as broad. Hind tibia with glabrous longitudinal area on inner surface (Fig. 4). Hind tarsus with third segment 3.6 times as long as broad, fourth segment slightly elongate (Fig. 5).



**Figs. 1–8.** *F. kaspariyani* sp. nov., female (holotype, 1–5, 8): 1 – head, dorsal view; 2 – head, anteroventral view; 3 – mandible; 4 – hind tibia, inner side; 5 – hind leg, lateral view; 8 – apex of metasoma with ovipositor, lateral view. *F. parva*, female (from Townes and Townes 1960, with minor changes). *F. varelae*, female (holotype): 7 – hind leg, lateral view (from Gauld 1991, with minor changes). Scale bars: 0.4 mm (upper scale bar) = 5; 0.3 mm (lower scale bar) = 1, 2, and 8.

Fore wing with vein *2rs-m* very short. Nervulus distad of basal vein by about half its length. Hind wing with first abscissa of *M+Cu1* strongly bowed well distal to its centre. Nervellus intercepted in its lower 0.35, distal abscissa of *Cu1* distinct.

Metasoma depressed. First tergite 1.28 times as long as posteriorly broad, dorsally finely shagreened, with oblique posterolateral V-shaped grooves; lateromedian longitudinal carinae present on anterior 0.3 of segment; lateral carina weak, reaching from anterior margin of segment to spiracle and entirely

absent behind spiracle. Tergites 2 and 3 with clearly defined rhombic area centrally. Second tergite 0.96, third tergite 0.88 times as long as broad. Tergites 4 and 5 with impressed grooves defining a somewhat D-shape area. Tergites 2–5 with central areas finely shagreened, smooth peripherally. Ovipositor straight, thin and rather evenly narrowed towards apex in its apical third (Fig. 8), projecting beyond margin of subgenital plate by 0.7 times length of hind tibia.

Head black, clypeus reddish brown distally. Mouthparts, mandible (except reddish teeth), scape



and pedicel of antenna ventrally white. Flagellum pale brown basally, gradually darkening towards apex. Propleuron black. Pronotum extensively black, reddish orange dorsoposteriorly and with extreme hind corner white. Mesothorax reddish orange. Tegula white. Postscutellum centrally reddish orange. Propodeum black. Pterostigma pale brown, transparent. Legs whitish; mid leg with apical tarsomere blackish; hind leg with coxa orange in its basal half, tibia blackish at extreme base and in apical 0.2, tarsus blackish with basal half of basitarsus white (Fig. 5). Metasomal tergites and ovipositor sheath black, tergites 3–5 slightly brownish basally.

**Male.** Unknown.

**Distribution.** North-eastern Mexico (Tamaulipas).

**Biology.** Unknown.

### 3. *Flacopimpla nigriceps* (Walsh, 1873)

**Distribution.** Canada, almost entire USA (to California and Texas in the south) (Townes and Townes 1960).

**Biology.** Reared from cocoons on *Alnus* and *Malus*, and one specimen was taken at light (Townes and Townes 1960).

### 4. *Flacopimpla parva* (Cresson, 1870)

(Fig. 6)

**Distribution.** Canada (Quebec), north-eastern USA (to Wisconsin in the west, and North Carolina in the south) (Townes and Townes 1960).

**Biology.** Reared from *Theridion punctipes* Emerton (Theridiidae) (Cushman 1926).

### 5. *Flacopimpla varelae* Gauld, 1991

(Fig. 7)

**Material.** Female (holotype, examined), COSTA RICA, Guanacaste Prov., Guanacaste National Park, Arenales, on SW side of Volcán Cacao, 900 m; February–May 1989; coll. Janzen and Gauld (INBio).

**Distribution.** Costa Rica (Guanacaste Prov.) (Gauld 1991).

## ACKNOWLEDGEMENTS

We would like to thank Dr. Ilari E. Sääksjärvi (University of Turku, Finland) for review of the manuscript and useful criticism, Dr. Darren Ward (Landcare Research,

Auckland, New Zealand), for providing language corrections, and Dr. Ronald Zuñiga (INBio, Costa Rica) for his help with organising work of the first author in INBio, Costa Rica, and for the loan of valuable material. This work was supported by the Russian Foundation for Basic Research (grant no. 10-04-00265), the Presidium of the Russian Academy of Sciences Program “Origin and evolution of Biosphere, Subprogram II”, the PROMEP Project “Taxonomía y ecología de fauna y microbiota en comunidades forestales y cultivos”, and the UAT.

## REFERENCES

- Cushman R.A. 1926.** Some types of parasitism among Ichneumonidae. *Proceedings of the Entomological Society of Washington*, **28**(2): 29–51.
- Gauld I.D. 1991.** The Ichneumonidae of Costa Rica, 1. Introduction, keys to subfamilies, and keys to the species of the lower Pimpliform subfamilies Rhyssinae, Poemeniinae, Acaenitinae and Cyloceriinae. *Memoirs of the American Entomological Institute*, **47**: 1–589.
- Gauld I.D. and Dubois J. 2006.** Phylogeny of the *Polysphincta* group of genera (Hymenoptera: Ichneumonidae; Pimplinae): a taxonomic revision of spider ectoparasitoids. *Systematic Entomology*, **31**: 529–564.
- Gauld I.D., Ugalde-Gómez J.A. and Hanson P. 1998.** Guía de los Pimplinae de Costa Rica (Hymenoptera: Ichneumonidae). *Revista de Biología Tropical*, **46**, suppl. 1: 1–189.
- Gauld I.D., Wahl D.B. and Broad G.R. 2002.** The suprageneric groups of the Pimplinae (Hymenoptera: Ichneumonidae): a cladistic re-evaluation and evolutionary biological study. *Zoological Journal of the Linnean Society*, **136**: 421–485.
- Graf V. and Kumagai A.F. 1997 (1998).** A ocorrência de *Flacopimpla* Gauld no Brasil (Hymenoptera, Ichneumonidae, Pimplinae). *Revista Brasileira de Zoologia*, **14**(4): 773–777.
- Kumagai A.F. and Graf V. 2002.** Biodiversidade de Ichneumonidae (Hymenoptera) e monitoramento das espécies de Pimplinae e Poemeniinae do Capão da Imbuia, Curitiba, Paraná. *Revista Brasileira de Zoologia*, **19**(2): 445–452.
- Palacio E., Sääksjärvi I.E. and Vahtera V. 2007.** *Lamnatibia*, a new genus of the *Polysphincta* group of genera from Colombia (Hymenoptera: Ichneumonidae; Pimplinae). *Zootaxa*, **1431**: 55–63.
- Townes H.K. and Townes M. 1960.** Ichneumon-flies of America north of Mexico: 2. Subfamilies Ephialtinae, Xoridinae, Acaenitinae. *United States National Museum Bulletin*, **216**(2): 1–676.

Submitted January 30, 2010; accepted January 19, 2011.