

Catalogue of Inbiomyiidae (Diptera, Carnoidea) Catálogo de Inbiomyiidae (Diptera, Carnoidea)

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Abstract: The first catalogue of the Inbiomyiidae (Diptera, Carnoidea) is presented. The family includes 11 described species in the single genus *Inbiomyia* Buck, known from Bolivia, Colombia, Costa Rica, Ecuador, French Guiana, Peru and Venezuela. Four unnamed species, from Guatemala, Honduras, Ecuador and Bolivia, are listed. Information about author, year of publication, page number, type genus, type species, type locality, geographical distribution and references are given to the categories of family, genus and species. Referential maps are included to all described species.

Keywords: *Inbiomyia*. List of species. Neotropical region. Schizophora.

Resumo: O primeiro catálogo de Inbiomyiidae (Diptera, Carnoidea) é apresentado. A família inclui 11 espécies, descritas no único gênero *Inbiomyia* Buck, conhecido para Bolívia, Colômbia, Costa Rica, Equador, Guiana Francesa, Peru e Venezuela. Quatro espécies não descritas, da Bolívia, do Equador, de Guatemala e de Honduras, são listadas. Informações sobre autor, ano de publicação, número de página, gênero-tipo, espécie-tipo, localidade-tipo, distribuição geográfica e referências são dadas para as categorias de família, gênero e espécie. Mapas referenciais estão incluídos para todas as espécies descritas.

Palavras-chave: *Inbiomyia*. Lista de espécies. Região Neotropical. Schizophora.

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INTRODUCTION

Inbiomyiidae comprises a little family of diminute flies characterized by several highly unusual and unique morphological features as: short head; eye protruding, hemispherical; one pair of inclinate orbital bristles; ocellar and postvertical bristles absents; vibrissa present; antenna porrect; first flagellomere rounded; arista pubescent, longer than head, and dorsoapically inserted; labella divergent, directed on opposite sides; two notopleural bristles; anepisternum bare; costa with humeral and subcostal break; subcosta not reaching costa; tibiae without bristles besides features of male and female genitalia, and egg (Buck, 2006, 2010). Inbiomyiids, as far we known, are distributed throughout the tropical area of the Neotropical region, occurring from sea level and lowland forest up to rain and cloud forest (+ 2,000 m),

from Guatemala to French Guiana and south to Bolivia (Buck, 2010) (Figures 1-3). This was the first family of Cyclorrhapha to be described based in a new discovered genus in this century. The Afro-tropical Natalimyzidae Barraclough & McAlpine and Oriental Circumphallidae Papp complete the extant Schizophora described as new in these terms (Barraclough & McAlpine, 2006; Papp, 2011).

Adult biology is unknown, but apparently the flies are microbial grazers (based in the amounts of fungal, algal and probably bacterial material found in the guts of dissected specimens). Immature stages (larva and pupa) and biology also remains unknown, but the low number of mature eggs per female and its unusual macrotype morphology suggests a specialized biology, probably indicative of a parasitic lifestyle (Buck & Marshall, 2006).

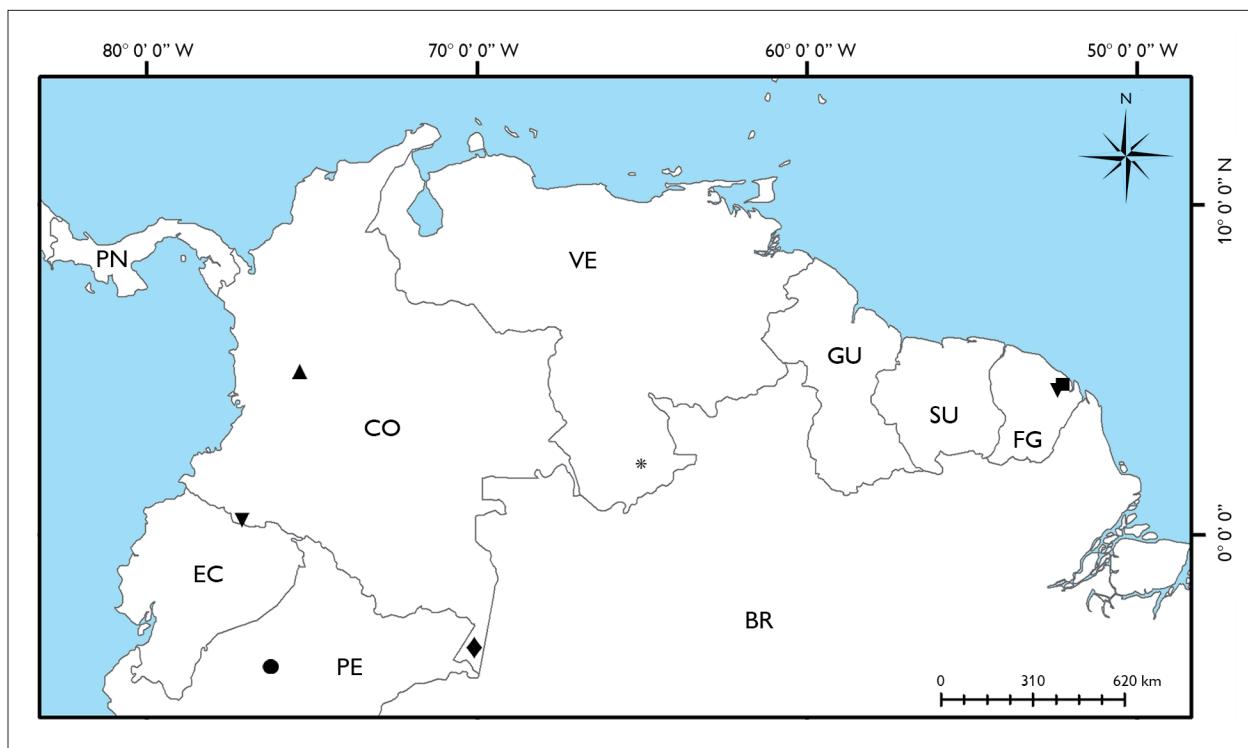


Figure 1. Described *Inbiomyia* species recorded to North South America: *I. acmophallus* (rhomb); *I. anemosyris* (circle, rhomb); *I. matamata* (asterisk, rhomb); *I. regina* (square); *I. anodonta* (triangle); *I. zeugodonta* (inverted triangle, rhomb). Legends: BR = Brazil; CO = Colombia; EC = Ecuador; FG = French Guiana; GU = Guyana; PE = Peru; PN = Panama; SU = Suriname; VE = Venezuela.



The family is rich in apomorphic characters and appears no close resemblance to any other Schizophora. Buck (2006) placed Inbiomyiidae as the sister group of the monotypic Australasian family Australimyzidae Griffiths, within the superfamily Carnoidea Newman, by the fact of both families share the followings synapomorphies: pitilinum very small and apparently nonfunctional; presence of a slender anterior hypandrial apodeme; hypandrium rigidly connected to ventral margin of epandrium, extending posteriorly to base of surstyli; and ovipositor shortened.

The current taxonomical arrangement of the family is the proposed by Buck & Marshall (2006), dividing Inbiomyiidae in four species-groups: *Inbiomyia anemosyris*-group [*I. acmophallus* Buck, *I. anemosyris* Buck, *I. matamata* Buck, *I. pterygion* Buck and *I. regina* Buck], *I. exul*-group [*I. exul* Buck, sp. 1 included], *I. mcalpineorum*-group [*I. empheres* Buck and *I. mcalpineorum* Buck; spp. 2 and 3 included] and *I. scoliostylus*-group [*I. anodonta* Buck, *I. scoliostylus* Buck and *I. zeugodonta* Buck; sp. 4 included].

The type-series is listed in full (see Table 1). Taxonomic and systematic literature, with notes to photos and drawings, is given. Distribution records are listed by country in alphabetical order, with respective provinces, departments and states in parentheses. The acronyms of the museums and collections cited are: American Museum of Natural History (AMNH), New York, USA; Colección Boliviana de Fauna (CBFC), La Paz, Bolivia; Canadian National Collection of Insects (CNCI), Ottawa, Canada; Department of Environmental Biology (DEBU), University of Guelph, Guelph, Canada; Instituto Nacional de Biodiversidad (INBio), Santo Domingo de Heredia, Costa Rica; Natural History Museum of Los Angeles County (LACM), Los Angeles, USA; Museo de Historia Natural, Instituto de Ciencias Naturales, Universidad Nacional de Colombia (UNCB), Sante Fé de Bogotá, Colombia.

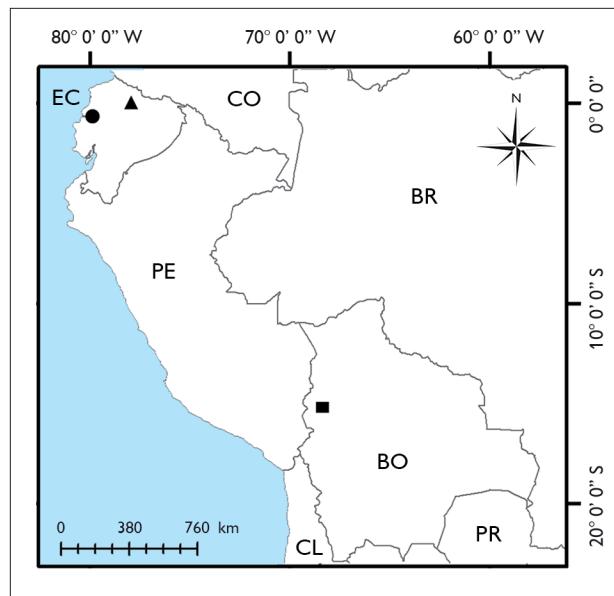


Figure 2. Described *Inbiomyia* species recorded to West South America: *I. exul* (circle); *I. pterygion* (rectangle); *I. empheres* (triangle). Legends: BO = Bolivia; BR = Brazil; CL = Chile; CO = Colombia; EC = Ecuador; PE = Peru; PR = Paraguay.

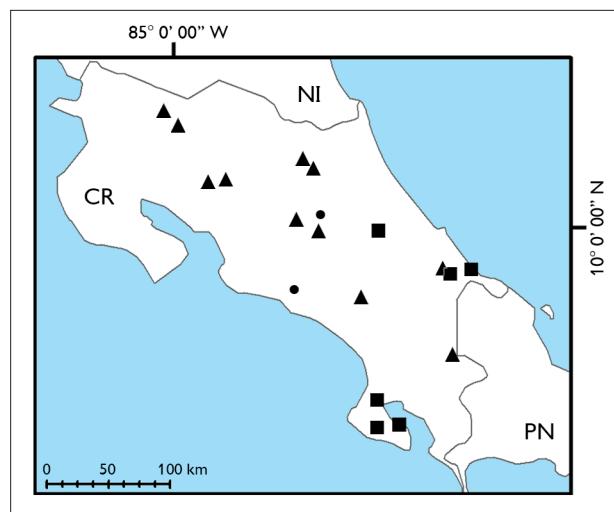


Figure 3. Described *Inbiomyia* species recorded to Costa Rica: *I. exul* (square); *I. mcalpineorum* (triangle); *I. scoliostylus* (circle). Legends: CR = Costa Rica; NI = Nicaragua; PN = Panama.

This catalogue follows the context of the updated catalogues for the Neotropical region, presenting for the first time compiled data to inbiomyiid flies.



Table 1. Type material of the Inbiomyiidae.

Species	Holotype	Paratypes
<i>I. acmophallus</i> Buck, 2006	♂, UNCB	4 ♂♂ 9 ♀♀ DEBU; 3 ♂♂ 8 ♀♀ LACM; 8 ♂♂ 20 ♀♀ UNCB
<i>I. anemosyris</i> Buck, 2006	♂, UNCB	5 ♂♂ 2 ♀♀ LACM; 10 ♂♂ 4 ♀♀ UNCB; 8 ♂♂ 4 ♀♀ DEBU
<i>I. anodonta</i> Buck, 2006	♂, UNCB	
<i>I. empheres</i> Buck, 2006	♂, CNCI	1 ♀ CNCI
<i>I. exul</i> Buck, 2006	♂, INBio	4 ♂♂ 6 ♀♀ INBio; 4 ♂♂ 5 ♀♀ DEBU; 1 ♂ CNCI
<i>I. matamata</i> Buck, 2006	♂, AMNH	5 ♂♂ AMNH; 1 ♀ DEBU; 1 ♀ LACM; 1 ♂ 2 ♀♀ UNCB
<i>I. mcalpineorum</i> Buck, 2006	♂, INBio	13 ♂♂ 11 ♀♀ INBio; 16 ♂♂ 20 ♀♀ DEBU; 1 ♀ CNCI
<i>I. pterygion</i> Buck, 2006	♂, CBFC	1 ♀ DEBU
<i>I. regina</i> Buck, 2006	♂, INBio	2 ♂♂ 4 ♀♀ LACM; 1 ♂ 1 ♀ DEBU
<i>I. scoliostylus</i> Buck, 2006	♂, INBio	1 ♂ 1 ♀ CNCI
<i>I. zeugodonta</i> Buck, 2006	♂, UNCB	2 ♂♂ 2 ♀♀ DEBU; 3 ♂♂ 2 ♀♀ LACM; 6 ♂♂ 4 ♀♀ UNCB

CATALOGUE OF INBIOMYIIDAE

Family Inbiomyiidae Buck, 2006

Inbiomyiidae Buck, 2006, p. 379. Type-genus: *Inbiomyia* Buck, 2006.

Inbiomyiidae; Buck & Marshall, 2006, p. 1-32 (revision).

Inbiomyiidae; Buck et al., 2009, p. 137 (key).

Inbiomyiidae; Buck, 2010, p. 1105-1108 (manual).

Inbiomyiidae; Marshall, 2012, p. 374-375 (notes), 592 (key).

Genus *Inbiomyia* Buck, 2006

Inbiomyia Buck, 2006, p. 379. Type-species: *I. mcalpineorum* Buck, 2006 (original designation).

References: Buck, 2006, p. 379 (description), 380 (figure 2, *Inbiomyia* sp., habitus); Buck et al., 2009, p. 153 (*Inbiomyia* sp., habitus); Buck, 2010, p. 1107 (biology, classification), 1108 (synopsis of the fauna); Marshall, 2012, p. 103 (figure), 505 (figure 5, *Inbiomyia* sp., habitus).

ACMOPHALLUS BUCK, 2006, P. 9

Type-locality: Colombia, Comisaría Amazonas, Amacayacu National Park, Sector Matamata, 150 m. Distribution: Colombia (Amazonas). Holotype ♂, UNCB.

References: *Inbiomyia* sp.; Buck, 2006, p. 384 (figures 5b-5c: b, spermathecae and ventral receptacle, ventral view; c, egg, dorsal view [as *Inbiomyia* sp.]).

Inbiomyia acmophallus; Buck & Marshall, 2006, p.

3 (figure 2, phylogeny relationships), 4 (figure 5, head capsule, frontal view), 5 (figure 11, egg, dorsal view), 9 (key, description), 10 (figures 14-21: 14, left postgonite, anterior view; 15, hypopygium, left lateral view; 16, hypopygium, posterior view; 17, segments 5-8, ventral view; 18, left ventral epandrial process, anterior view; 19, phallapodeme and basiphallus, dorsal view; 20, phallus, ventral view; 21, ejaculatory apodeme, posterodorsal view), 11 (figure 22, female terminalia and spermathecae).

ANEMOSYRIS BUCK, 2006, P. 12

Type-locality: Colombia, Comisaría Amazonas,

Amacayacu National Park, Sector Matamata, 150 m.

Distribution: Colombia (Amazonas), Peru (Loreto).

Holotype ♂, UNCB.

References: *Inbiomyia anemosyris*; Buck & Marshall, 2006, p. 3 (figure 2, phylogeny relationships), 4 (figure 8, male, left foretibia), 5 (figure 10, wing), 8 (key), 11 (figure 23, female terminalia and spermathecae), 12 (description), 13 (figures 24-29, p. 24, left postgonite, anterior view; 25, hypopygium, left lateral view; 26, hypopygium, posterior view; 27, segments 5-8, ventral view; 28, left ventral epandrial process, anterior view; 29, phallapodeme and phallus, ventral view).



ANODONTA BUCK, 2006, P. 25

Type-locality: Colombia, Departamento Chocó, Parque Nacional Natural Utría, Cocalito, 20 m, 6.02° N and 77.35° W. Distribution: Colombia (Chocó). Holotype ♂, UNCB.

References: *Inbiomyia anodonta*; Buck & Marshall, 2006, p. 3 (figure 2, phylogeny relationships), 8 (key), 24 (figures 67-73: 67, left postgonite, anterior view; 68, hypopygium, left lateral view; 69, hypopygium, posterior view; 70, segments 5-8, ventral view; 71, ejaculatory apodeme; 72, left ventral epandrial process, anterior view; 73, phallus and base of phallapodeme, ventral view), 25 (description).

EMPHERES BUCK, 2006, P. 22

Type-locality: Ecuador, Província Napo, El Chaco, 2,000 m. Distribution: Ecuador (Napo). Holotype ♂, CNCI.

References: *Inbiomyia empheres*; Buck & Marshall, 2006, p. 3 (figure 2, phylogeny relationships), 9 (key), 22 (description), 23 (figures 61-66: 61, left postgonite, outer surface view; 62, hypopygium, left lateral view; 63, hypopygium, posterior view; 64, segments 5-8, ventral view; 65, left ventral epandrial process, lateral view; 66, left ventral epandrial process, anterior view), 27 (figure 80, female terminalia, dorsal view); Marshall, 2012, p. 505 (figures 6-7, ?? *I. empheres*, habitus).

EXUL BUCK, 2006, P. 19

Type-locality: Costa Rica, Província Puntarenas, Golfito, Corcovado National Park, Los Patos Biological Station, trail to Sirena, 70 m. Distribution: Costa Rica (Cartago, Limón, Puntarenas), Ecuador (Pichincha). Holotype ♂, INBio.

References: *Inbiomyia exul*; Buck & Marshall, 2006, p. 3 (figure 2, phylogeny relationships), 4 (figure 6, head capsule, frontal view), 5 (figures 9 and 13, p. 9, wing; 13, egg, dorsal view), 8 (key), 19 (description), 20 (figures 52-54, p. 52, female terminalia and spermathecae, dorsal view; 53, hypandrium and left ventral epandrial process, ventral view; 54, segments 5-8, ventral view), 21 (figures 55-60, p. 55, apex of prong of hypandrial fork, lateral view; 56, hypopygium,

left lateral view; 57, hypopygium, posterior view; 58, right ventral epandrial process, inner surface view; 59, right surstyli, inner surface view; 60, phallus, ventral view).

MATAMATA BUCK, 2006, P. 12

Type-locality: Venezuela, Amazonas, Río Mavaca Camp, 2° 29' N and 65° 06' W, 150 m. Distribution: Colombia (Amazonas), Venezuela (Amazonas). Holotype ♂, AMNH.

References: *Inbiomyia matamata*; Buck & Marshall, 2006, p. 3 (figure 2, phylogeny relationships), 4 (figure 4, head capsule, frontal view), 9 (key), 12 (description), 14 (figures 30-35: 30, left postgonite, anterior view; 31, hypopygium, left lateral view; 32, hypopygium, posterior view; 33, segments 5-8, ventral view; 34, left ventral epandrial process, anterior view; 35, phallapodeme and phallus, ventral view), 16 (figure 36, female terminalia and spermathecae, dorsal view).

MCALPINEORUM BUCK, 2006, P. 384

Type-locality: Costa Rica, Província Alajuela, Sarapiquí, Hacienda La Cayuga. Distribution: Costa Rica (Alajuela, Cartago, Guanacaste, Heredia, Limón, Puntarenas, San José). Holotype ♂, INBio.

References: *Inbiomyia mcalpineorum*; Buck, 2006, p. 380 (figure 1, female, habitus), 381 (figure 3: a, head, frontal view; b, left scape, posterior [inner] view; c, proboscis, anterior view; d, male left forefemur, outer surface; e, wing), 383 (figure 4: a, male terminalia, left lateral view; b, male terminalia, right lateral view; c, male terminalia, dorsal view; d, epandrium and postgonites, ventral view; e, hypandrium and associated structures, ventral view; f, phallic complex, left lateral view), 384 (description; figure 5: a, female reproductive system, dorsal view), 386 (figure 6: a, apex of left postgonite, outer surface view; b, hypopygium, left lateral view; c, hypopygium, posterior view; d, segments 5-8, ventral view; e, left ventral epandrial process, anterior view; f, phallus, ventral view; g, ejaculatory apodeme, posterodorsal view), 387 (figure 7: a, female terminalia and spermathecae, dorsal view; b, female



terminalia, ventral view; c, ventral spicules of segment 8; d, male phallapodeme and basiphallus, dorsal view; e, hypandrium, ventral view), 394 (figure 9, c, occiput, posterior view), 395 (figure 10, g, left maxilla, lateral view), 396 (figure 11, g, fulcra, dorsal view); Buck & Marshall, 2006, p. 3 (figure 2, phylogeny relationships), 4 (figure 3, head, frontal view), 9 (key), 23 (diagnosis and distribution); Buck et al., 2009, p. 136 (figure 6.183, head, frontal view); Brake & Mathis, 2007, p. 273-274 (systematics, outgroup in Australimyzidae); Buck, 2010, p. 1106 (figures 87.2-87.4, 6-7, p. 2, head, frontal view; 3, wing; 4, forefemur, posterior view; 6, male terminalia, lateral view; 7, female terminalia and spermathecae, dorsal view).

PTERYGION BUCK, 2006, P. 15

Type-locality: Bolivia, Departamento La Paz, Mapiri, Arroyo Tuhiri. Distribution: Bolivia (La Paz). Holotype ♂, CBFC.

References: *Inbiomyia pterygion*; Buck & Marshall, 2006, p. 3 (figure 2, phylogeny relationships), 9 (key), 15 (description), 16 (figures 37-38, p. 37, female terminalia and spermathecae, dorsal view; 38, spermatheca, lateral view), 17 (figures 39-44: 39, left postgonite, anterior view; 40, hypopygium, left lateral view; 41, hypopygium, posterior view; 42, segments 5-8, ventral view; 43, left ventral epandrial process, anterior view; 44, phallapodeme and phallus, ventral view).

REGINA BUCK, 2006, P. 16

Type-locality: French Guiana, Régina, Kaw Mt., Patawa, 4° 54' N and 52° 15' W, 400 m. Distribution: French Guiana (Régina). Holotype ♂, LACM.

References: *Inbiomyia regina*; Buck & Marshall, 2006, p. 3 (figure 2, phylogeny relationships), 4 (figure 7, male, left foretibia), 8 (key), 16 (description), 18 (figures 45-50, p. 45, left postgonite, anterior view; 46, hypopygium, left lateral view; 47, hypopygium, posterior view; 48, segments 5-8, ventral view; 49, right ventral epandrial process, posteromedial view; 50, phallus, ventral view), 20 (figure 51, female terminalia and spermathecae, dorsal view).

SCOLIOSTYLOS BUCK, 2006, P. 25

Type-locality: Costa Rica, Provincia San José, Tarrazú, San Carlos, Reserva Riosparaíso, Albergue Pecarí near hot springs, 405 m, 9° 33' 53" N and 84° 7' 32" W. Distribution: Costa Rica (Heredia, San José). Holotype ♂, INBio.

References: *Inbiomyia* sp.; Buck, 2006, p. 383 (figure 4: d, epandrium and postgonites, ventral view; e, hypandrium and associated structures, ventral view [as *Inbiomyia* sp.]).

Inbiomyia scoliostylus; Buck & Marshall, 2006, p. 3 (figure 2, phylogeny relationships), 8 (key), 25 (description), 26 (figures 74-79, p. 74, left postgonite, anterior view; 75, hypopygium, left lateral view; 76, hypopygium, posterior view; 77, segments 5-8, ventral view; 78, left ventral epandrial process, anterior view; 79, phallus, ventral view), 27 (figure 81, female terminalia and spermathecae, dorsal view).

ZEUGODONTA BUCK, 2006, P. 28

Type-locality: Colombia, Comisaría Amazonas, Amacayacu National Park, Sector Matamata, 150 m. Distribution: Colombia (Amazonas, Nariño), French Guiana (Régina). Holotype ♂, UNCB.

References: *Inbiomyia zeugodonta*; Buck & Marshall, 2006, p. 3 (figure 2, phylogeny relationships), 5 (figure 12, egg, dorsal view), 8 (key), 27 (figure 82, female terminalia and spermathecae, dorsal view), 28 (description), 29 (figures 83-88, p. 83, right postgonite, inner surface view; 84, hypopygium, left lateral view; 85, hypopygium, posterior view; 86, segments 5-8, ventral view; 87, left ventral epandrial process, anterior view; 88, phallus and base of phallapodeme, ventral view); Buck, 2010, p. 1106 (figure 5, egg, dorsal view).

SP. 1 BUCK, 2006, P. 22

Locality: ♀, Guatemala, Departamento Zacapa, 3.5 km SE La Unión, 1,500 m, DEBU.

SP. 2 BUCK, 2006, P. 24

Locality: ♀, Bolivia, Departamento La Paz, Chulumani, Apa-Apa Reserve, 2,000 m, LACM.



SP. 3 BUCK, 2010, P. 1108

Locality: ♀, Honduras.

SP. 4 BUCK, 2006, P. 29

Locality: ♀, Ecuador, Província Pichincha, Río Palenque, 0° 35' S and 79° 22' W, 150 m, CNCI.

REMARKS

Although all species are assigned to "Buck, 2006", in fact only *I. mcalpineorum* was described in Buck (2006). All other species were described in Buck & Marshall (2006), being them attributed only to the first author. The four unnamed species still undescribed since they are known only by females.

SPECIES-GROUP REFERENCES

I. anemosyris-group Buck & Marshall, 2006. References: Buck & Marshall, 2006, p. 9 (diagnosis); Buck, 2010, p. 1108 (key).

I. exul-group Buck & Marshall, 2006. References: Buck & Marshall, 2006, p. 19 (diagnosis); Buck, 2010, p. 1107 (key).

I. scoliostylus-group Buck & Marshall, 2006.

References: Buck & Marshall, 2006, p. 25 (diagnosis); Buck, 2010, p. 1108 (key).

I. mcalpineorum-group Buck & Marshall, 2006.

References: Buck & Marshall, 2006, p. 22 (diagnosis); Buck, 2010, p. 1108 (key).

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