Ichneumonid wasps of the subfamily Mesochorinae: new replacement names, combinations and an updated key to the World genera
(Hymenoptera: Ichneumonidae)

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Abstract

Mesochorinae is a relatively small but widely distributed subfamily of Ichneumonidae, with most species occurring in the Neotropical Region. Currently, there are two classifications in use regarding mesochorine genera, causing numerous taxonomic conflicts. To resolve nomenclature conflicts, seven new replacement names and twelve new combinations are proposed for species now recognized as members of *Mesochorus* Gravenhorst. Herein the synonymy of *Plectochorus* Uchida and *Stictopisthus* Thomson with the genus *Mesochorus* s. lat. is reaffirmed, supported by the following shared character states: transverse subantennal carina partially or completely developed; supraclypeal area evenly convex, without median protrusion; clypeus not separated from supraclypeal area by depression or groove; and hind wing without vein Cu1b. An updated key to the World genera of Mesochorinae is also presented.

Key words: Ichneumonoidea, parasitoid wasps, *Mesochorus*, synonymy

Introduction

Mesochorinae is a relatively small, cosmopolitan subfamily of Ichneumonidae, with approximately 900 described species (Yu et al., 2012), with the highest species richness in the Neotropical region (Dasch, 1974; Hanson & Gauld, 2006). Wahl (1993a) proposed the following synapomorphies for the subfamily: glymmae long and deep, almost meeting in the middle of first tergite; female hypopygium large and triangular in lateral view (not projected beyond the apex of the metasoma); male gonoforceps apically well-developed, resembling a long rod; ovipositor short and needle-like (1.0–2.0× as long as the length of the metasomal apex); and ovipositor sheath rigid.

Background of the Mesochorinae classification.

Difficulties in classifying Mesochorinae genera result partially from the morphological heterogeneity of the group, but are also related to the two conflicting classifications that are currently adopted for Mesochorinae: Wahl (1993a, b), which recognizes nine genera; while Schwenke (1999) recognizes 14 genera. In addition to describing a new genus, *Planochorus*, Schwenke (1999) recognizes as valid a number of genera that are treated as junior synonyms under Wahl’s (1993) classification: *Dolichochorus* Strobland and *Mesochorella* Szepligeti (otherwise under *Astiphromma* Forster); and *Plectochorus* Uchida and *Stictopisthus* Thomson (otherwise under *Mesochorus* Gravenhorst).
The first comprehensive revisionary work for Mesochorinae recognized seven genera (Townes, 1971): Astiphromma (already including Dolichochorus and Mesochorella as synonyms); Cidaphus Forster; Latilumbus Townes; Lepidura Townes; Mesochorus; Plectochorus and Stictopisthus. Three years later, Dasch (1974) described three new genera: Oncocotta, Piestetron and Rhaibaspi.

The first phylogenetic revision was performed by Wahl (1993a), the first work to code morphological characters for all known Mesochorinae genera. Wahl (1993a) also suggested a synonymy between Oncocotta, Piestetron, Plectochorus, Rhaibaspi and Stictopisthus with Mesochorus, on the basis of the presence of a transverse subantennal carina, which is considered synapomorphic for Mesochorus. In that paper, Wahl (1993a) also described the genera Artherola, Chineater, Thamester and Varnado.

Schwenke (1999), revising the European species of Mesochorinae, proposed the revalidation of the genera Dolichochorus and Mesochorella. Both taxa had previously been considered synonyms of Astiphromma (Townes et al. 1965; Townes 1971; Lee 1992a; Wahl, 1993a, b) on the basis of the presence of the dorsolateral carina of tergite I; Schwenke (1999) argued that in fact neither genus had the carina and hence should be considered as separate taxa. This author also revalidated Plectochorus and Stictopisthus, claiming that that neither possesses the transverse subantennal carina, thus not warranting their placement in Mesochorus. Later, Schwenke (2004) published Planochorus as a new genus of the subfamily. Both these works present simple, brief descriptions, with few illustrations (Riedel et al., 2014). Horstmann (2006) aimed to correct taxonomic conflicts originated by Schwenke (1999).

Riedel (2015) revised the European species of Astiphromma and also confirmed the presence of the dorsolateral carina in Dolichochorus and Mesochorella, once again synonymizing both genera with Astiphromma. Currently, the divergence between the Wahl and Schwenke classifications is restricted to the recognition of Plectochorus and Stictopisthus as either valid taxa in the latter or as synonyms of Mesochorus in the former.

This study aims to resolve this conflict between classifications based on the taxonomic study and verification of the original descriptions of specimens. A new, illustrated key for the World genera is also provided.

Material and methods

We examined type specimens of species representing all genera of Mesochorinae, in addition to Plectochorus and Stictopisthus (Table 1). Specimens were examined directly, when possible, or through extended-focus photographs. The specimens belong to the following institutions (curators in parentheses): NMNH: National Museum of Natural History, Washington, U.S.A. (Robert Kula); UACH: Universidad Austral de Chile, Valdivia, Chile (Dolly Lanfranco); USUC: Utah State University, Logan, U.S.A. (D. Wahl); ZSM: Zoologische Staatssammlung des Bayerischen Staates, München, Germany (Olga Schmidt). We also examined the original descriptions of 245 species of Mesochorus (Dasch, 1974); eleven species of Stictopisthus (Dasch, 1974); and ten species of Plectochorus (Lee, 1992b).

General morphological terminology follows Gauld et al. (2002), except wing venation which follows Sharkey & Wharton (1997). Photographs were prepared using either a Leica DFC 450 camera attached to a Leica M205C stereomicroscope, the EntoVision (GTVision, Hagerstown, M.A, U.S.A.) or Macropod (Macroscopic Solutions, Tolland, C.T, U.S.A.). All images were treated using Adobe Photoshop® (v. CS5).

Results

Generic classification of Mesochorus, Plectochorus and Stictopisthus

Although Schwenke (1999) stated that the transverse subantennal carina is absent in Plectochorus and Stictopisthus, we confirmed that species of both genera show a partially to completely developed transverse subantennal carina. While some morphological variation can be found regarding the shape and distinctiveness of the carina, the same degree of variability is found within Mesochorus, as follows: rounded corners (Fig. 1) or straight edges (Fig. 2); dipped ventrally at center (Fig. 3) or straight at center (Fig. 2); strong (Figs. 1, 2) or weak (Fig. 3). In all studied specimens, as well as in all original descriptions verified, the transverse subantennal carina is present at least at the center of the upper margin of the supraclypeal area. Species of Plectochorus and Stictopisthus also share the other character states used to define the taxonomic limits of Mesochorus, such as the supraclypeal area evenly convex, not medially produced; clypeus not separated from supraclypeal area by depression or groove; and vein
Cu1b in the hind wing is absent. Hence, we reaffirm the synonym made by Wahl (1993a) and treat species of Plectochorus and Stictopisthus as part of Mesochorus s. lat.

**TABLE 1.** Type specimens of species of Mesochorinae examined for this study. Species examined: “Directly” means specimens of that species were physically examined.

<table>
<thead>
<tr>
<th>Taxon Specimens examined</th>
<th>Locality</th>
<th>Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artherola sima Wahl Photograph</td>
<td>South Africa</td>
<td>AEI</td>
</tr>
<tr>
<td>Astiphromma pectorale Ashmead Directly</td>
<td>U.S.A.</td>
<td>USNM</td>
</tr>
<tr>
<td>Chinncer masneri Wahl Photograph</td>
<td>Chile</td>
<td>AEI</td>
</tr>
<tr>
<td>Cidaphus occidentalis Cushman Directly</td>
<td>U.S.A.</td>
<td>USNM</td>
</tr>
<tr>
<td>Cidaphus paniscoides (Ashmead) Directly</td>
<td>U.S.A.</td>
<td>USNM</td>
</tr>
<tr>
<td>Lepidura collaris Dasch Directly</td>
<td>Chile</td>
<td>AEI</td>
</tr>
<tr>
<td>Lepidura tuberosa Dasch Directly</td>
<td>Chile</td>
<td>AEI</td>
</tr>
<tr>
<td>Mesochorus acuminatus Thomson Directly</td>
<td>U.S.A.</td>
<td>USNM</td>
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<tr>
<td>Mesochorus agilis Cresson Directly</td>
<td>U.S.A.</td>
<td>USNM</td>
</tr>
<tr>
<td>Mesochorus americanus Cresson Directly</td>
<td>U.S.A.</td>
<td>USNM</td>
</tr>
<tr>
<td>Mesochorus expansus Dasch Directly</td>
<td>Argentina</td>
<td>UACH</td>
</tr>
<tr>
<td>Mesochorus ibericus Schwenke Photograph</td>
<td>Spain</td>
<td>ZSM</td>
</tr>
<tr>
<td>Mesochorus politus Gravenhorst Directly</td>
<td>Poland</td>
<td>USNM</td>
</tr>
<tr>
<td>Planochorus ibericus Schwenke Photograph</td>
<td>Spain</td>
<td>ZSM</td>
</tr>
<tr>
<td>Plectochorus iwatensis (Uchida) Directly</td>
<td>Philippines</td>
<td>USNM</td>
</tr>
<tr>
<td>Stictopisthus argaleus Dasch Directly</td>
<td>U.S.A.</td>
<td>USNM</td>
</tr>
<tr>
<td>Stictopisthus hilinaticus (Thomson) Directly</td>
<td>U.S.A.</td>
<td>USNM</td>
</tr>
<tr>
<td>Stictopisthus electilis (Cresson) Directly</td>
<td>U.S.A.</td>
<td>USNM</td>
</tr>
<tr>
<td>Thamester japonicus Wahl Photograph</td>
<td>Japan</td>
<td>AEI</td>
</tr>
<tr>
<td>Varnado mauros Wahl Photograph</td>
<td>Morocco</td>
<td>AEI</td>
</tr>
</tbody>
</table>

**New replacement names**

The synonymy of Plectochorus and Stictopisthus with Mesochorus, proposed by Wahl and reinforced herein, generated a need for new replacement names for several species, as per the article 53.2 of the ICZN (2012).

**Mesochorus acutus new name**


**Etymology:** From Latin “acutus” (sharp, pointed), a slight adaptation of the original specific epithet.

**Mesochorus altus new name**


**Etymology:** From Latin “altus” (high), a slight adaptation of the original specific epithet.

**Mesochorus ecuatorialis new name**

*Mesochorus depressus* Dasch, 1974: 162 non *Oncotta depressa* Dasch, 1974: 34 (=Mesochorus depressus)

**Etymology:** This new name refers the country from where this species was described.

**Mesochorus eumekes new name**


**Etymology:** From Greek “eumekes” (good length, tall), referring to the original specific name.
Mesochorus lasallei new name
**Etymology**: Posthumous tribute to Dr. John La Salle, entomologist recognized for his invaluable contributions to Hymenoptera research.

Mesochorus nigricans new name
**Etymology**: This name is a slight adaptation of the original specific epithet.

Mesochorus physus new name
**Etymology**: From Greek “physao” (distend, inflate), referring to the original specific name.

**New combinations**

Mesochorus delicatus (Lee & Suh). **Comb. nov.**

Mesochorus fraxini (Schwenke). **Comb. nov.**

Mesochorus hispanicus (Schwenke). **Comb. nov.**

Mesochorus madeirensis (Schwenke). **Comb. nov.**
Stictopisthus madeirensis Schwenke, 1999.

Mesochorus maroccanus (Schwenke). **Comb. nov.**
Stictopisthus maroccanus Schwenke, 1999.

Mesochorus moravius (Schwenke). **Comb. nov.**
Stictopisthus moravius Schwenke, 1999.

Mesochorus nemoralis (Schwenke). **Comb. nov.**
Stictopisthus nemoralis Schwenke, 1999.

Mesochorus oranae (Schwenke). **Comb. nov.**
Stictopisthus oranae Schwenke, 1999.

Mesochorus polonius (Schwenke). **Comb. nov.**
Stictopisthus polonius Schwenke, 1999.

Mesochorus russicus (Schwenke). **Comb. nov.**
Stictopisthus russicus Schwenke, 1999.

Mesochorus sacromontis (Schwenke). **Comb. nov.**
Stictopisthus sacromontis Schwenke, 1999.

Mesochorus teniigaster (Schwenke). **Comb. nov.**
Stictopisthus teniigaster Schwenke, 1999.
FIGURES 1–3. Head, frontal view: 1 Plectochorus iwatensis (Uchida); 2 Stictopisthus argaleus Dasch; 3 Mesochorus agilis Cresson. Scale bars (mm): Figs. 1–3 = 0.5.

FIGURES 4–7. 4–5 Hind wing: 4 Astiphromma pectorale Ashmead; 5 Mesochorus politus Gravenhorst. 6–7 Tergite I, lateral view: 6 Astiphromma pectorale Ashmead; 7 Lepidura collaris Townes. Scale bars (mm): Figs. 4–7 = 1.0.

FIGURES 8–10. 8 Fore wing of Astiphromma pectorale Ashmead. 9–10 Metasoma, lateral view: 9 Lepidura tuberosa Dasch; 10 Astiphromma pectorale Ashmead. Scale bars (mm): Figs. 8–10 = 1.0.
**FIGURES 11–12.** Head, frontal view: 11 *Chineater masneri* Wahl; 12 *Lepidura collaris* Townes. Scale bars (mm): Figs. 11–12 = 0.4.

**FIGURES 13–15.** 13 Fore wing of *Lepidura tuberosa* Dasch; 14 Head, frontal view of *Varnado maurus* Wahl. 15 Fore wing of *Cidaphus paniscoides* (Ashmead). Scale bars (mm): Figs. 13 and 15 = 1.0; Fig. 14 = 0.5.

**Key to the World genera of Mesochorinae (Modified from Wahl, 1993a)**

The two recently described genera *Planochorus* Schwenke, 2004 and *Incurvarion* Kasparyan, 2008 were added to this updated identification key. The key is designed to work with both male and female specimens.

1. Dorsal margin of supraclival area with transverse carina below antennal sockets, even if weak or only partially developed (Figs. 1–3). Distribution: Cosmopolitan  
   - Dorsal margin of supraclival area without transverse carina  
   2

2(1) Vein Cu1b of hind wing present (Fig. 4).  
   - Vein Cu1b of hind wing absent (Fig. 5)  
   3

3(2) Pospetiole with lateral longitudinal carina distinct (Fig. 6)  
   - Pospetiole without lateral longitudinal carina (Fig. 7)  
   4

4(3) Clypeus with apical margin truncate and apex sharp. Anterior tentorial pits open. Areola of propodeum small and rectangular, height 1.0× its width (see Fig. 83 in Townes, 1971). Distribution: Chile  
   - Clypeus with apical margin usually convex, if truncate then apex thick and blunt. Anterior tentorial pits closed. Areola usually elongate, height 2.0× its width (Fig. 8). Distribution: Cosmopolitan except Neotropical  
   5

5(3) Tergites III–V elongate, posterior margin medially concave, tergites seemingly overlapping (Fig. 9)  
   - Tergites III–V not elongate, posterior margins straight (Fig. 10)  
   6

6(5) Clypeus width 5.0× its height. Apical margin of clypeus with long and thick setae. Mandible elongate, ventral tooth strongly impressed inward so that mandible appears unidentate (Fig. 11). Propodeal carinae complete. Females with ovipositor sheath slender  
   - Clypeus width 2.0× its height. Apical margin of clypeus with short setae. Mandible not elongate, ventral tooth visible (Fig. 12). Propodeal carinae reduced, with at most anterior and posterior transverse carina present. Females with ovipositor sheath stout, scale-like  
   7

7(5) Areolet rhombic, vein 2RS and rs-m touching 3RSa independently (Fig. 13). Mandible with ventral tooth 2.0× as long as dorsal tooth (Fig. 14). Distribution: Morocco  
   - Areolet triangular, vein 2RS and rs-m touching 3RSa independently (Fig. 13). Mandible with ventral tooth 2.0× as long as dorsal tooth (Fig. 14). Distribution: Morocco  
   8
- Areolet lightly petiolate, vein 2RS joining rs-m shortly before touching 3RSa (Fig. 15). Mandible with dorsal tooth as long as ventral tooth or longer ................................................................. 8

8(7) Fore wing with vein M+Cu and RS&M strongly curved (see Fig. 1 in Kasparyan, 2008), thickened and more sclerotized than other veins. Hind wing with 1–3 distal hamuli. Ocelli not enlarged, lateral ocellus separated from eye margin by 0.5× its greatest diameter. Propodeal spiracle circular. Distribution: Vietnam ................................. Incurvarion Kasparyan

- Fore wing with vein M+Cu and RS&M slightly curved, as thick and sclerotized as the other veins. Hind wing with 6–12 distal hamuli. Ocelli usually enlarged, lateral ocellus touching or almost touching eye margin. Propodeal spiracle usually elongate, height 2.0× its width (Fig. 16). Distribution: Cosmopolitan except New Zealand ........................ Cidaphus Forster

9(2) Ventral tooth of mandible about 1.0× as long as dorsal tooth (Fig. 17). Propodeum with anterior transverse carina obsolescent. Distribution: Japan ................................................................. Thamester Wahl

- Ventral tooth of mandible 1.5×–2.0× as long as dorsal tooth (Fig. 18). Propodeum with anterior transverse carina distinct ................. 10

10(9) Clypeus separated from supraclypeal area by distinct groove. Ventral tooth of mandible about 1.5× as long as dorsal tooth. Hind coxa elongated, 2.0× as long as wide (Fig. 19), projecting itself to the center of the petiole. Head with whitish orbits. Distribution: Spain ................................................................. Planochorus Schwenke

- Clypeus separated from supraclypeal area by faint groove. Ventral tooth of mandible about 2.0× as long as dorsal tooth. Hind coxa 1.0–1.5× as long as wide. Head without whitish orbits. Distribution: South Africa .................. Artherola Wahl

*Contrary to what appears in its original description, Varnado does not possess the lateral longitudinal carina of Tergite I.

FIGURES 16–19. 16 Mesopleuron and metapleuron, lateral view: Cidaphus occidentalis Cushman. 17–18 Head, frontal view: 17 Thamester japonicus Wahl. 18 Artherola sima Wahl. 19 Lateral habitus of Planochorus ibericus Schwenke. Scale bars (mm): Figs. 16 and 19 = 1.0; Figs. 17–18 = 0.5.
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References


https://doi.org/10.1080/00305316.1992.10432252


https://doi.org/10.1080/00305316.1992.10432253


https://doi.org/10.1080/09397140.2014.939815


https://doi.org/10.1111/j.1365-3113.1993.tb00673.x