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# **Contribution to the taxonomy of Mesochorinae (Hymenoptera, Ichneumonidae) with description of a new genus from Northern Africa**

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## **Abstract**

In this taxonomical contribution, we re-describe and illustrate a little-known species of Mesochorinae, *Planochorus ibericus* SCHWENKE, 2004, and synonymize it with *Varnado maurus* WAHL, 1993, **syn. n.**

In addition, we describe and illustrate a new genus from North Africa, *Mesochoroides* RIEDEL & ARAUJO **gen. n.**, with a single new species, *Mesochoroides ocellator* **sp. n.** and present an updated key of the World genera of the Mesochorinae.

## **Introduction**

The subfamily Mesochorinae is a moderately large group of Ichneumonidae containing almost 900 described species worldwide, about 90% of them belonging to the cosmopolitan genus *Mesochorus* GRAVENHORST. The species of Mesochorinae are probably all obligate hyperparasitoids, though some authors have mentioned a few (questionable) cases of primary parasitism (BROAD et al. 2018).

A comprehensive cladistic analysis of the Mesochorine genera was published by WAHL (1993) who also presented a key for the World genera of Mesochorinae. Meanwhile, some additions of new genera (SCHWENKE 2004, KASPARYAN 2008) were published, followed by corrections of the generic concept (ARAUJO et al. 2018, ARAUJO 2018, BROAD & WATANABE 2019, RESHCHIKOV et al. 2014).

The European members of the subfamily Mesochorinae were revised by SCHWENKE (1999, 2002, 2004), giving short descriptions without illustrations that are often not useful for an unequivocal determination (RIEDEL 2019). In his last publication (SCHWENKE 2004), he shortly described a new genus and species, *Planochorus ibericus* SCHWENKE, 2004, but did not discuss the generic revision of WAHL (1993). Therefore, the correct position and relation of this enigmatic genus remained unclear within the Mesochorinae to date.

We had the opportunity to study his holotype deposited in the personal collection of C. J. ZWAKHALS (Netherlands) together with some unidentified Mesochorinae from the Natural History Museum London (NHM). Here, we present a revision of these specimens to establish the taxonomic position of *Planochorus* within Mesochorinae and describe a new aberrant genus of Mesochorinae from North Africa.

## **Material and methods**

For the descriptions, morphological terms follow BROAD et al. (2018). For the measurements, the following relations were used: length of 1<sup>st</sup> flagellomere (without anellus) was measured in lateral view; length of temple and eye was measured from dorsal view, and length and width of hind femur and ovipositor sheath in lateral view. For the punctuation of body parts the following definitions were used: very scattered = distance between punctures >2× their diameter; scattered = distance 1-2× their diameter; dense = diameter of punctures larger than the distance between them. For the length of face + clypeus, the distance between apical margin of the clypeus and the ventral margin of antennal sockets was used, and for the width of face the minimal distance between the inner margins of compound eyes.

For the measurements, an Olympus SZX 7 stereo microscope with a dividing eyepiece was used. The figures were taken with an Olympus SC 50 CCD-camera using the CellSens Imaging and Helicon Focus Pro software and processed with the Microsoft Office Picture Manager.

## Descriptions

### *Planochorus ibericus* SCHWENKE, 2004 (figs 1-5)

Holotype: (♀) Spain (And) Istan, 13.IV.1985, J. PFENNINGS (coll. ZWAKHALS), type studied.

Additional material: (♀) Marrakech 114 Alluud; *Mesochorus* sp. J.F. PERKINS det. IV.1937 (NHM).

Description: ♀. Body length 4.5-5.3 mm (holotype 5.3 mm). Antenna with >19 (tips broken off in both specimens), very slender; 1<sup>st</sup> flagellomere 8.5× longer than wide and 1.0× as long as eye; 2<sup>nd</sup> flagellomere 5.4× longer than wide. Head granulate and dull, not distinctly punctate. Temple roundly narrowed behind the eye, dorsally 0.5-0.6× as long as eye. Ocelli moderately large, distance between lateral ocellus and eye 0.90-0.95× ocellar diameter. Face very wide, 1.05× as wide as the combined length of clypeus+face and 1.05× as wide as eye length, without transversal carina below antennal sockets, facial sides divergent ventrally. Malar space 0.9-1.0× as long as the width of the mandibular base. Groove between clypeal margin and eye margin absent. Clypeus slightly convex, apical margin truncate or slightly rounded and sharp in median 2/3. Anterior tentorial pit large. Mandible with two teeth, the lower tooth much longer than the upper one. Occipital carina complete, present medially. Genal carina joining hypostomal one far from mandibular base, both carinae low.

Mesoscutum finely granulate, but shining. Mesopleuron with coarse, but very superficial punctures ventrally. Propodeum completely carinate. Propodeal spiracle round. Area basalis trapezoid or shortly stalked apically, 1.0-1.5× longer than wide. Area superomedia 2.2-2.4× longer than wide and 1.5-1.8× longer than area petiolaris; anterior transverse carina reaching area superomedia at its frontal 0.3. Area petiolaris 0.9× as long as wide. Hind leg slender; hind femur 6.3× longer than wide; hind metatarsus 0.42× as long as hind tibia. Hind claw with c. four long teeth in its basal 2/3.

Areolet diamond-shaped, shortly stalked frontally; vein 2m-cu reaching its middle. Vein 1cu-a slightly antefurcal. Pterostigma wide, 2.6-2.7× longer than wide; vein 2r&RS reaching its distal 0.6-0.7. Distal part of vein RS slightly sinusoid. Vein Cu1b (nervellus) of hind wing intercepted at 7/10 of its length, discoidella present but weak. Hind wing with two proximal and five distal hamuli

1<sup>st</sup> tergite short, 1.8-2.1× longer than wide, continuously widened from base to apex. Petiolus shorter than postpetiolus; postpetiolus with complete but weak dorsolateral carina, smooth. 2<sup>nd</sup> tergite 0.67-0.76× as long as wide. Thyridium transverse, comma-shaped. Ovipositor sheath completely pilose, 8.3-9.0× longer than wide and 1.0-1.3× as long as hind metatarsus, slightly narrowed in apical 0.3.

Color: chestnut-red. Mandible except for black teeth, wide facial, frontal, vertical and outer orbits, frontal margins and hind edge of pronotum, two lateral and two submedian longitudinal stripes on mesoscutum (confluent frontally), scutellum except for basal reddish spot, small frontal and posteroventral spots on mesopleuron, central spot on mesosternum cream-yellow. Metasoma reddish; 2<sup>nd</sup> to 7<sup>th</sup> tergites with cream yellow hind margins, 3<sup>rd</sup> and 4<sup>th</sup> tergites centrally brownish. Legs reddish-yellow; hind tibia not infuscate apically. Pterostigma yellowish-hyaline.

Male and hosts unknown.

Taxonomical remark: We were able to compare the above mentioned specimens with high-quality photos from the holotype and the original description of *Varnado maurus* WAHL, 1993.

The generic position of the genus *Varnado* was confused in the past by inconsistent descriptions of the carination of the postpetiolus. Although WAHL (1993) mentioned a dorsolateral carina on postpetiolus in his original description, he keyed his new genus within the genera without this carina. ARAUJO et al. (2018) stated that *Varnado* does not possess this carina on the 1<sup>st</sup> tergite, but the available photos of *Varnado maurus* show a weak but distinct dorsolateral carina on postpetiolus. We could also find a weak but distinct dorsolateral carina in our material of *Planochorus* described above. Besides the different length of ovipositor sheath (1.3× longer than hind metatarsus in the type of *Varnado maurus* and 1.0× as long as hind metatarsus in *Planochorus ibericus*), all other morphological features and coloration do not show significant differences. We, therefore, treat both species as synonyms here.

Valid name: *Varnado maurus* WAHL, 1993, **syn. n.** *Planochorus ibericus* SCHWENKE, 2004.



**Figs 1-5:** Holotype of *Planochorus ibericus* SCHWENKE, 2004:  
 (1) habitus, (2) face, (3) propodeum, (4) head, (5) ovipositor sheath.

***Mesochoroides* RIEDEL & ARAUJO, gen. n.**

Type species: *Mesochoroides ocellator* sp. n.

Diagnosis: Temple very short. Ocelli strongly enlarged. Occipital carina shortly obsolete medially. Face without dorsal transverse carina below antennal grooves. Clypeus almost flat, c 2.0× wider than long, with sharp apical margin. Groove between clypeus and eye margin absent. Mandible with two teeth of equal size.

Propodeum completely carinate. Propodeal spiracle roundish. Legs slender; claws pectinate. Areolet diamond-shaped, shortly stalked frontally. Vein 1cu-a slightly antefurcal. Vein Cu1b (nervellus) of hind wing not intercepted, discoidella absent. Petiolus with deep glymma; postpetiolus without dorsolateral carina.

Taxonomical remark: This new genus is related to *Dolichochorus* STROBL, but differs by its wider clypeus, narrow malar space, large ocelli and smooth postpetiolus.

***Mesochoroides ocellator* sp. n. (figs 6-10)**

Holotype: (♀) Ohed Nça, Mzab country, April 16.-30. 1914 (E.H. & C.H.); Brit. Mus. 1924-292 (NHM).

Paratype: (♀) Algeria: Ghásdaice 19-IV-1911 MORICE coll.; Brit. Mus. 1926-381 (NHM).

Description of holotype: ♀. Body length 5 mm. Antenna with 32 flagellomeres; 1<sup>st</sup> flagellomere 6.4× longer than wide and 0.6× as long as eye; 2<sup>nd</sup> flagellomere 4.3× and preapical flagellomere 1.5× longer than wide. Temple short, strongly and roundly narrowed behind eye, dorsally 0.25 as long as eye. Ocelli very large, distance between lateral ocellus and eye 0.35× ocellar diameter. Face rather narrow, 1.0× as wide as the combined length of clypeus+face and 0.75× eye length, with parallel sides, without transversal carina below antennal sockets, densely punctate, intervals smooth and shining. Clypeus almost flat, separated from face by a fine rim, 2.2× wider than long; apical margin sharp, rounded. Anterior tentorial pit large. Malar space narrow, 0.15× as long as width of the mandibular base. Groove between clypeal margin and eye margin absent. Mandible with two teeth, lower tooth equal to or slightly longer than the upper one. Occipital carina shortly obsolete medially. Genal carina joining hypostomal one far from mandibular base, both carinae low.

Mesoscutum with scattered superficial punctures, shining. Mesopleuron with scattered coarse punctures ventrally. Metapleuron almost smooth, shining. Propodeum completely carinate. Propodeal spiracle round. Area basalis short, triangular, with long apical stalk. Area superomedia 2.0× longer than wide and 1.4× longer than area petiolaris; anterior transverse carina reaching area superomedia in its frontal 0.3. Area petiolaris about as long as wide. Hind femur 5.7× longer than wide; hind metatarsus 0.48× as long as the hind tibia. Hind claw with c. three long basal teeth.

Areolet obliquely diamond-shaped, shortly stalked; vein 2m-cu reaching its middle. Vein 1cu-a slightly antefurcal (by 1× its width). Pterostigma wide, 2.6× longer than wide; vein 2r&RS reaching its distal 0.6. Distal part of vein RS straight. Vein Cu1b (nervellus) of hind wing not intercepted, discoidella absent. Hind wing with three proximal and six distal hamuli.

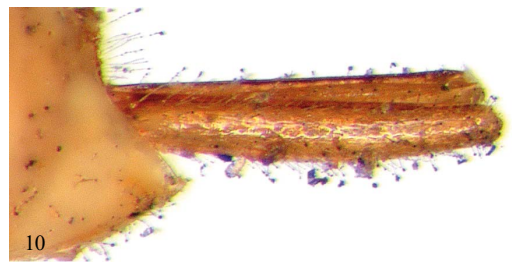
1<sup>st</sup> tergite 2.4× longer than wide, with large basal glymma; postpetiolus without lateral carina, smooth. 2<sup>nd</sup> tergite is about as long as wide. Thyridium rather large, roundish. Ovipositor sheath completely pilose, slightly sabre-shaped, 6.5× longer than wide and 0.8× as long as hind metatarsus, slightly narrowed in apical 0.2.

Color: Reddish with extended ivory coloration. Head red; ivory are palps, mandible except for black teeth, clypeus and face, wide orbits, scape and pedicel ventrally. Mesosoma red. Mesoscutum largely ivory, except two lateral and one frontomedial red stripes and a posteromedial red spot. Ventral and upper margins of pronotum, tegula, subtegular ridge, three spots and a ventral longitudinal stripe on mesopleuron and central spot on propodeum ivory. Scutellum except for reddish median stripe ivory. Tergites reddish, with wide apical ivory bands (band on 3<sup>rd</sup> tergite interrupted medially). Ovipositor sheath reddish. Legs red; stripes on coxae and trochanters, dorsal stripes on all femora and external stripes on all tibiae ivory.

Wings hyaline; pterostigma pale ochreous centrally, with almost hyaline margins.

Etymology: The specific epithet refers to the strongly enlarged ocelli present in this species. Male and hosts unknown.

Distribution: Algeria.



**Figs 6-10:** *Mesochoroides ocellaris* sp. n.: (6) habitus, (7) face, and (8) wing of holotype, (9) head and (10) ovipositor sheath of paratype.

## Updated key of the World genera of Mesochorinae

1. Face with transverse carina below antennal sockets, even if weak or only partly developed. Groove between edge of clypeus and eye present. Discoidella and lateral carina of 1<sup>st</sup> tergite absent. Distribution: Worldwide ..... **Mesochorus GRAVENHORST**
- Face without transversal carina below antennal sockets and without groove between edge of clypeus and eye ..... 2
2. Nervellus of hind wing intercepted; discoidella of hind wing present (sometimes weak). Clypeus wider than long ..... 3
- Nervellus of hind wing not intercepted; discoidella of hind wing absent (if  $\pm$  present as vestigial vein in *Dolichochorus*, then clypeus about as long as wide) ..... 8
3. Postpetiolus with dorsolateral longitudinal carina present (sometimes weakly developed in *Varnado*) ..... 4
- Postpetiolus without dorsolateral longitudinal carina ..... 6
4. Clypeus with apical margin usually convex; if truncate, then apex thick and blunt. Distribution: Worldwide except for Neotropics ..... **Astiphromma FOERSTER**
- Clypeus with apical margin truncate and apex sharp ..... 5
5. Mandible with equal teeth. Malar space shorter than width of the mandibular base. Inner eye margins parallel. Area superomedia small and short, about as long as wide. Distribution: Chile ..... **Latilumbus TOWNES**
- Mandible with ventral tooth 1.5-2 $\times$  longer than upper tooth. Inner eye margins strongly divergent ventrally. Malar space about as long as width of the mandibular base. Distribution: Spain and Maroc ..... **Varnado WAHL**
6. Fore wing with vein M+Cu and RS&M slightly curved, areolet slightly petiolate. Propodeal spiracle usually oval. Distribution: Worldwide except for New Zealand ..... **Cidaphus FOERSTER**
- Fore wing with vein M+Cu and RS&M almost straight, areolet rhombic, vein 2RS and rs-m touching 3RSa independently. Propodeal spiracle usually round. Distribution: Chile ..... 7
7. Clypeus 5 $\times$  wider than long. Apical margin of clypeus with long and thick setae. Mandible elongate, ventral tooth strongly curved inwards, so that mandibles appear unidentate. Propodeum completely carinate. Ovipositor sheath slender ..... **Chineator WAHL**
- Clypeus 2 $\times$  wider than long, apical margin with short setae. Mandible not elongate, lower tooth visible. Propodeal carinae reduced, with at most anterior and posterior transverse carina present. Ovipositor sheath stout, scale-like ..... **Lepidura TOWNES**
8. Ventral tooth of mandible about 2 $\times$  longer than upper tooth. Clypeus 2 $\times$  wider than long. Postpetiolus not striate. Distribution: South Africa ..... **Artherola WAHL**
- Ventral tooth of mandible about as long as dorsal tooth or slightly longer ..... 9
9. Clypeus about as long as wide, with blunt apical margin. Malar space about as long as width of the mandibular base. Postpetiolus longitudinally striate. Ocelli small, distance between lateral ocellus and eye larger than ocellar diameter. Distribution: Palaearctic region ..... **Dolichochorus STROBL**
- Clypeus about 2 $\times$  wider than long, with a sharp apical margin. Malar space very short, about 0.2 $\times$  as long as width of the mandibular base. Postpetiolus smooth. Ocelli very large, distance between lateral ocellus and eye shorter than ocellar diameter. Distribution: North Africa ..... **Mesochoroides gen. n. RIEDEL & ARAUJO**

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## Zusammenfassung

In dieser taxonomischen Studie wird die wenig bekannte Art *Planochorus ibericus* SCHWENKE, 2004 ausführlich beschrieben und illustriert und mit *Varnado maurus* WAHL, 1993 synonymisiert.

Zusätzlich beschreiben wir eine neue Gattung der Mesochorinae aus Nordafrika, *Mesochoroides* RIEDEL & ARAUJO **gen. n.** mit der einzigen bekannten Art *Mesochoroides ocellator* **sp. n.** und geben einen aktualisierten Bestimmungsschlüssel für die weltweit bekannten Gattungen der Mesochorinae.

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