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## Phylogeny and revision of *Messatoporus* Cushman (Hymenoptera, Ichneumonidae, Cryptinae), with descriptions of sixty five new species

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## Abstract

The large New World genus *Messatoporus* Cushman is diagnosed, redefined, described, and its species revised. A total of 89 valid species are recognized, of which 65 are described as new. All previously known species are redescribed and illustrated. The following synonyms are proposed: *M. jocosus* (Provancher) and *M. rufiventris* Cushman under *M. discoidalis* (Cresson), **syn. nov.** and *M. tricolor* (Szépligeti) under *M. variegatus* (Szépligeti) **syn. nov.** The following new species are proposed: *M. advenus*, *M. albiaterartus*, *M. allomeros*, *M. amarelus*, *M. amazonensis*, *M. amplithorax*, *M. andinus*, *M. anepomius*, *M. apiopharkis*, *M. argentinus*, *M. atlanticus*, *M. atrifoveus*, *M. aurantius*, *M. badius*, *M. basiflavus*, *M. bennetii*, *M. bicolor*, *M. bimaculatus*, *M. campanulatus*, *M. caxiuanensis*, *M. citreocephalus*, *M. complexifemur*, *M. concavivenus*, *M. convexus*, *M. copiosus*, *M. depressifrons*, *M. dialeipsis*, *M. dissidens*, *M. dominicanus*, *M. elektor*, *M. ellipsicavus*, *M. euryoikos*, *M. igneus*, *M. interceptus*, *M. keraiopetalus*, *M. laevilatus*, *M. latissulcus*, *M. longicaudis*, *M. longitergus*, *M. lordos*, *M. lunatus*, *M. maculiscus*, *M. matucanus*, *M. nigriangulatus*, *M. nigriscapus*, *M. nigriscutus*, *M. occidentalis*, *M. opacus*, *M. orientalis*, *M. paeneater*, *M. pallidus*, *M. paradoxus*, *M. paralissonotus*, *M. pleuriflavus*, *M. semialbiventris*, *M. semiaurantigaster*, *M. subalaris*, *M. tenuiorbis*, *M. tenuissimus*, *M. teutonicus*, *M. titans*, *M. unidentatus*, *M. unimaculatus*, *M. versicolor* and *M. xanthogaster* **spp. nov.** As well, a lectotype is designated for *M. townesi* Alayo and Tzankov, and *Messatoporus nigrispina* (Cameron) is transferred to *Prosthoporos* Porter, **comb. nov.** A key to species based on both sexes is also presented, and new distribution records and distribution maps are provided.

The validity and relationships of the genus are investigated cladistically using 162 morphological characters for 27 species of *Messatoporus* and 105 outgroup taxa. Tree search was conducted using TNT under implied weighting, with values of 1–6 for the concavity constant (*K*). All analyses recovered *Messatoporus* as a monophyletic group, supported by 7–11 synapomorphies. The results also support the monophyly of the six studied genera of Osprynchotina, in a clade including also *Dotocryptus* Brèthes. *Messatoporus* is diagnosed by the combination of the following features: apicolateral corners of clypeus projected; mandible long and tapered, ventral tooth much shorter than dorsal one or indistinct; transverse sulcus at base of propodeum long and shallow; anterior margin of propodeum concave; posterior area of propodeum almost always transversely wrinkled; first metasomal spiracle placed approximately on midlength; median dorsal carina of first metasomal segment absent; ovipositor basally cylindrical, apically depressed, with ventral valve enclosing completely dorsal valve as a sheath. A second analysis including all species of the genus was performed

to evaluate the phylogeny at the genus level. The character set for that analysis included 104 characters considered of phylogenetic importance within the genus, and used the same tree searching protocol as the first one. A distinct and gradual transition is detected, from species more similar to the remaining Osprynchotina to a significantly different morphotype with several convergences with the Gabuniina. These convergences are interpreted as adaptations to host location and substrate perforation, and may be related to use of more deeply concealed hosts.

**Key words:** Cryptini, Osprynchotina, Nematopodiina, Phygadeuontinae, implied weighting

## Introduction

*Messatoporus* Cushman (1929) is a large New World cryptine genus, proposed to accommodate a group of North American species defined mainly by the broadly truncate clypeus, mandible very long with dorsal tooth much longer than ventral tooth, propodeum transversely striated, areolet small and first metasomal tergite long, with spiracle near the middle. This generic definition was reviewed by Townes and Townes (1962), Townes (1970) and Kasparyan and Ruíz (2005), but without significant changes. The type species, *M. discoidalis* Cresson, has been formerly placed in *Mesostenus* Gravenhorst. In the same work, Cushman (1929) described other three new species: *M. compressicornis*, *M. major* and *M. rufiventris*. Cushman (1929) also synonymized *Mesostenus jocosus* Provancher with *M. discoidalis*. *Messatoporus major* was later considered a synonym of *M. compressicornis* (Townes 1962).

Nine other species were added to *Messatoporus* by Townes (1946) and Townes & Townes (1966) from combinations of Neotropical species previously placed in *Mesostenus* Gravenhorst (*M. apertus* Taschenberg, *M. arcuatus* Cresson, *M. nigrispinus* Cameron, *M. transversostriatus* Spinola and *M. zonatus* Cresson), *Neomesostenus* Schmiedeknecht (*N. paraguayensis* Szépligeti, *N. tricolor* Szépligeti and *N. variegatus* Szépligeti) and *Glodianus* Cameron (*G. lissonotus* Cameron). Alayo and Tzankóv (1974) described *M. townesi* from Cuba.

Kasparyan and Ruíz (2005) revised the North American species of the genus, described twelve new species from Mexico and revalidated *M. jocosus*. Kasparyan (2006) described an additional Mexican species. Kasparyan and Ruíz (2008) described a new Mexican species and provided an updated key for the North American species. Hence, prior to this study, the genus included twenty eight valid species recorded for seven countries: Canada, United States, Mexico, Cuba, Guyana, Brazil and Paraguay.

Species of the genus are apparently parasitoids of mud nesting wasps, but host records are available only for the three Nearctic species: *M. discoidalis* is known to attack *Ageniella conflictata* Banks, *Phanagenia bombycina* (Cresson), *Auplopus mellipes* (Say) and *Ceropales maculata fraterna* Smith (Pompilidae) (Cushman 1929); *M. rufiventris* was reared from *Phanagenia bombycina* (Townes & Townes 1962); and *M. compressicornis* was reared from *Ancistrocerus tuberculocephalus sutterianus* Saussure (Vespidae, Eumeninae) and *Trypoxylon collinum rubrocinctum* (Crabronidae) (Carlson, 1979). Almost all species of Cryptinae for which the biology is known are idiobiont parasitoids—that is, their larvae develop on a host for which development has been interrupted (Askew and Shaw 1986). Based on that, and in their apparently low host specificity (see records above; low host specificity is expected in idiobiont parasitoids; see Askew and Shaw, *op. cit.*), species of *Messatoporus* are assumed to be idiobionts, although biological information for the genus is very scarce.

The monophyly and relationships of *Messatoporus* have never been deeply investigated. It was placed by Townes in the Nematopodiina (currently referred as Osprynchotina—see Fitton and Gauld 1978), but the subtribal arrangement of cryptine genera is apparently highly artificial (e.g. Gauld 1984, Laurenne *et al.* 2006). Although Gauld (1984) stated that the Osprynchotina were an “almost certainly holophyletic” group, the only extensive analyses available (Laurenne *et al.* 2006; Quicke *et al.* 2008),—using molecular data and including seven of the nine genera in the subtribe—did not recover these taxa as a monophyletic group, but mostly scattered along a large clade. *Messatoporus* was recovered as sister group of *Photocryptus* Viereck, also placed in Osprynchotina. However, these analyses included only one species of *Messatoporus*, so the monophyly of the genus was not tested. The main goal of this study is to provide a phylogenetic and taxonomic revision of *Messatoporus* Cushman, and to address its biology, diversity and distribution.