

Geographic note on species of the genus *Upa* Kimsey, 1991 (Hymenoptera: Tiphidae, Thynninae) in the Atlantic Forest, Brazil

Cíntia Eleonora Lopes Justino^{1*}, Eduardo Fernando dos Santos² and Fernando Barbosa Noll¹

1 Universidade Estadual de São Paulo, Instituto de Biociências, Letras e Ciências Exatas de São José do Rio Preto, Department of Zoology and Botany, Cristóvão Colombo, 2265. CEP 15054-000. São José do Rio Preto, SP, Brazil.

2 Universidade de São Paulo, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Department of Biology, Avenue Bandeirantes, 3900. CEP 14040-901. Ribeirão Preto, SP, Brazil.

* Corresponding author. E-mail: cintiaelju@gmail.com

ABSTRACT: *Upa* Kimsey is a poorly known genus of Tiphidae with seven species. This genus has records in forest areas and in this paper we present new records for four species. All specimens were collected by malaise traps in four areas of Atlantic Rain Forest and three of Atlantic Semi-deciduous forest, mainly from high and mid-elevations. The new records indicate that species of *Upa* are not as rare as others genera of Tiphidae, which are virtually unknown in many Neotropical regions.

Neotropical Tiphidae has been highly neglected in a general way (Genise and Kimsey, 1991; Kimsey 1991, 1992). Genise and Kimsey (1991) highlight such problem for the Neotropical Thynninae and describe several genera, among of them the genus *Upa* Kimsey. Posteriorly, Kimsey (1996) described other species and nowadays it includes seven species from Eastern and Southeastern South America (Kimsey 1996). Like other Thynninae, *Upa* shows strong sexual dimorphism, with apterous females and winged males (Genise and Kimsey 1991; Kimsey 1996), but species biology is virtually unknown. Taxonomy of *Upa* is essentially based on the male morphology, since females are known only for *U. porteri* Kimsey and *U. impressiceps* (Turner).

All species of this genus have been recorded only in forested areas, with four of them: *U. nasuta* Kimsey, *U. longispina* Kimsey, *U. ligulata* Kimsey, and *U. porteri* Kimsey known only from the type locality. The type locality of *Upa nasuta* is Brazil: São Paulo, Serra da Bocaina, S. J. Barreiros, *U. longispina* is from Brazil: São Paulo, H. Florestal, *U. ligulata* is from Brazil: Rio Grande do Sul, Arroio Arapua, and *U. porteri* is from Argentina: Corrientes, Las Marias (Kimsey 1996). Herein, we present new records of *U. longispina*, *U. nasuta*, *U. porteri* and *U. tridentata* Kimsey from the Atlantic Forest, Brazil.

The Atlantic Forest is composed of two main phytophysiognomies: Atlantic Rain Forest and Atlantic Semi-deciduous Forest (Morellato and Haddad 2000). These phytophysiognomies correspond respectively to the Brazilian Atlantic Forest Province and Parana Forest Province + *Araucaria angustifolia* Forest Province, which form the Parana Subregion proposed by Morrone (2006) for the Neotropical Region.

All specimens were collected with Malaise traps in four areas of Atlantic Rain Forest: (1) Núcleo Picinguaba - Parque Estadual da Serra do Mar, SP - 23°20'10"S; 44°50'15"W, 100m altitude; 23°17'43"S; 44°47'56.24"W, 840m altitude; (2) Estação Ecológica de Boracéia, SP - 23°21'55"S; 45°50'47"W, 660m altitude; (3) Parque Estadual Intervales,

SP - 24°18'18"S; 48°21'55"W, 854m altitude; (4) Estação Ecológica Juréia-Itatins, SP - 24°31'06"S; 47°12'06"W, 19m altitude and three of Atlantic Semi-deciduous forest: (1) Barretos, SP - 20°29'05" S; 48°49'21" W, 477m altitude; (2) União Paulista, SP - 20°55'16" S; 49°55'34" W, 450m altitude; (3) Matão, SP - 21°37'14" S; 48°32'14" W, 502 m altitude. *Upa tridentata* (Figure 1) and *U. nasuta* (Figure 2) occur in the Brazilian Atlantic Forest and Parana Forest provinces, while *U. longispina* (Figure 3) is restricted to the first province, and *U. porteri* (Figure 4) to the latter. Species distribution maps (Figure 5) were prepared with PANMAP (Diepenbroek *et al.* 2000). The type locality of *U. nasuta* (São José do Barreiro, SP - 22° 46'25.1" S; 44° 13'49.5" W) was incorrectly displayed in the distribution map presented by Kimsey (1996), indicating that it is located in the interior of the São Paulo State. However, it is located near to the Brazilian coastline (Figure 5).

The specimens used in this study were deposited in the Hymenoptera Collection at the Department of Zoology and Botany of the São Paulo State University, in São José do Rio Preto, São Paulo, Brazil, and in the Hymenoptera Collection at the Museum of Zoology of the University of São Paulo, São Paulo, Brazil. Identification of species was made using a stereomicroscope Leica MZ 16 coupled to a digital camera Leica DFC 295. Images were captured using the software Leica Application Suite (LAS) Version 3.8 and the construction of the final images was done by the software Auto Montage Pro Version 5.03.0061. Posterior treatment was performed in Photoshop®.

Some studies suggest that the Parana Subregion is historically related to the Andean Region (Vanin 1976; Roig-Alsina 1989; Morrone and Lopretto 1994), while others indicate historical relationships with the Amazonian Subregion (Costa 2003; Sigrist and Carvalho; 2009). In some cases, close relationships between the Parana Subregion and the Andean Region is established by groups with amphinotic distribution, such as Thynninae. However, the lack of complete phylogenetic studies for Thynninae, and the lack of information on its fauna from

the Amazonian Subregion restrict the prediction of any inference. *Upa* was described in Genise and Kimsey (1991) by monotypy and the description presented the most distinctive features for the genus. Later, Kimsey (1996) described six new species of *Upa* and showed distribution for the species. However there are no diagnostic characters or synapomorphies to delimit the genus, which complicate their identification.

Several other Atlantic Rain Forest areas between Santa Catarina and Paraíba States were also sampled using

Malaise traps, but species of *Upa* were never collected. Moreover, searches for species of this genus were done in Tiphiidae collection of various institutions, and they were never found. In this way, we could conclude that *Upa* is really restricted to the Atlantic Forest, mainly to high and mid-elevations, as suggested by Kimsey (1996). In addition, such records indicate that species of *Upa* are not rare, and that the Thynninae fauna, as well other groups of Hymenoptera Aculeata (Santos and Noll 2010), of several South American regions is very poorly known.



FIGURE 1. *Upa tridentata* Kimsey. A Face. B Lateral habitus.



FIGURE 2. *Upa nasuta* Kimsey. A Face. B Lateral habitus.



FIGURE 3. *Upa longispina* Kimsey. A Face. B Lateral habitus.

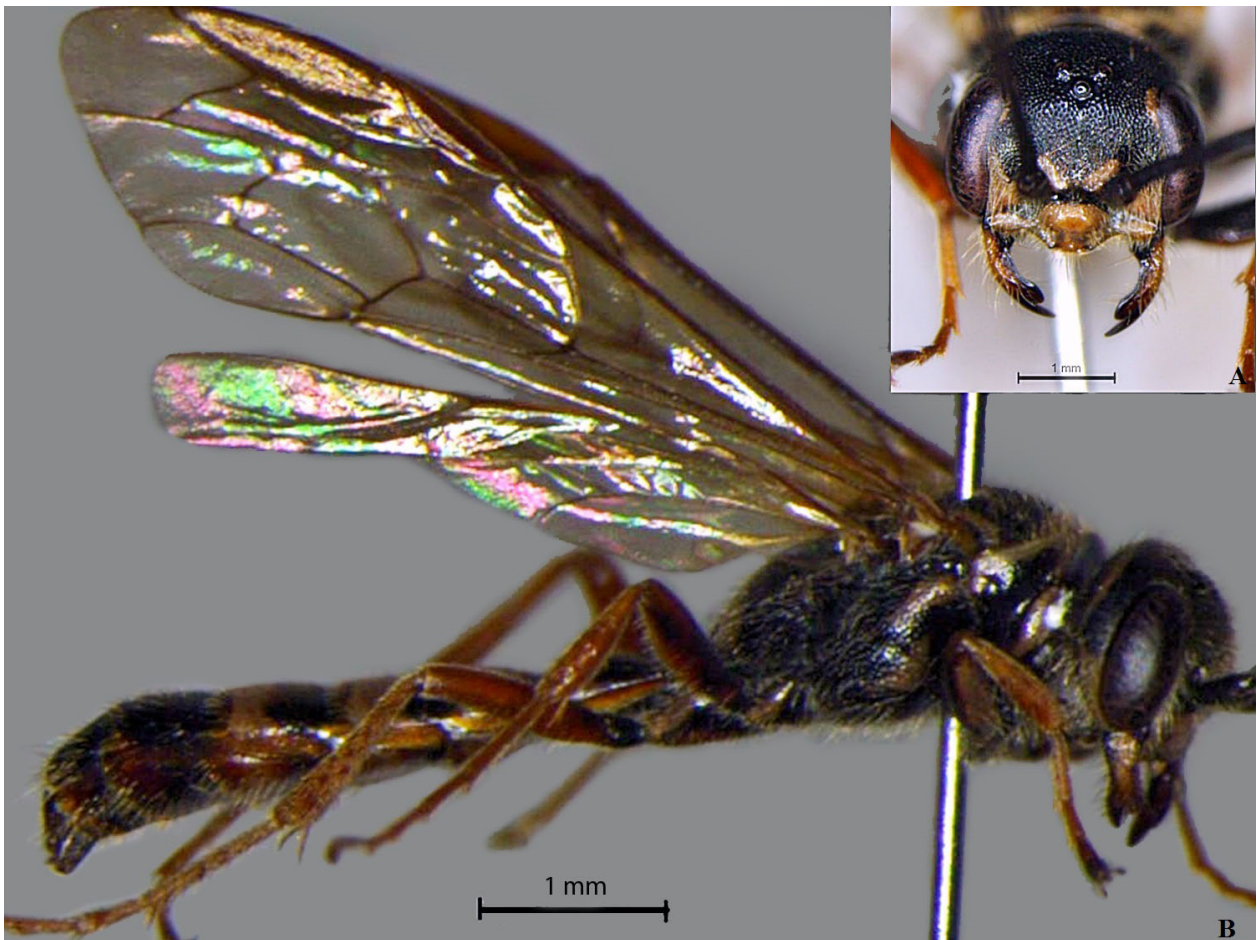


FIGURE 4. *Upa porteri* Kimsey. A Face. B Lateral habitus.

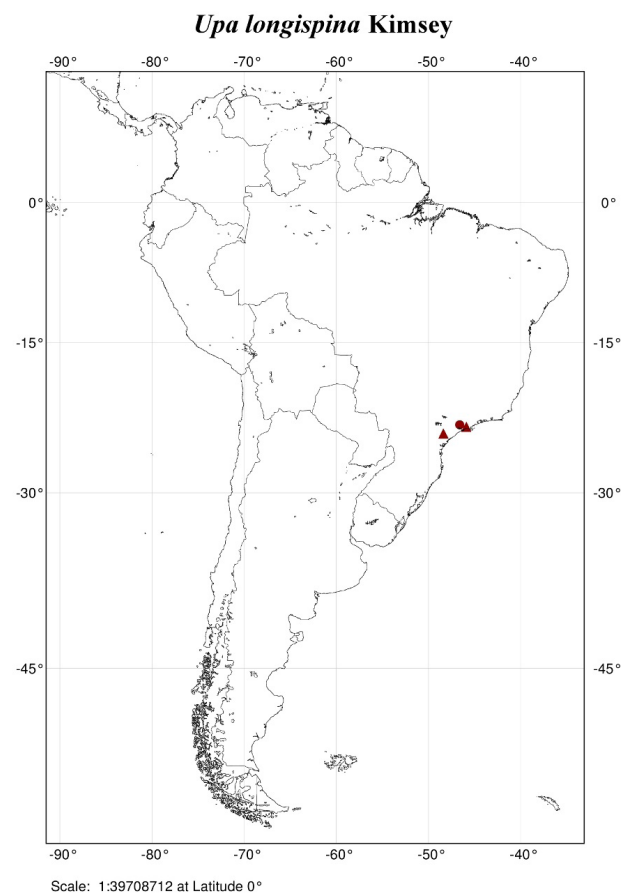
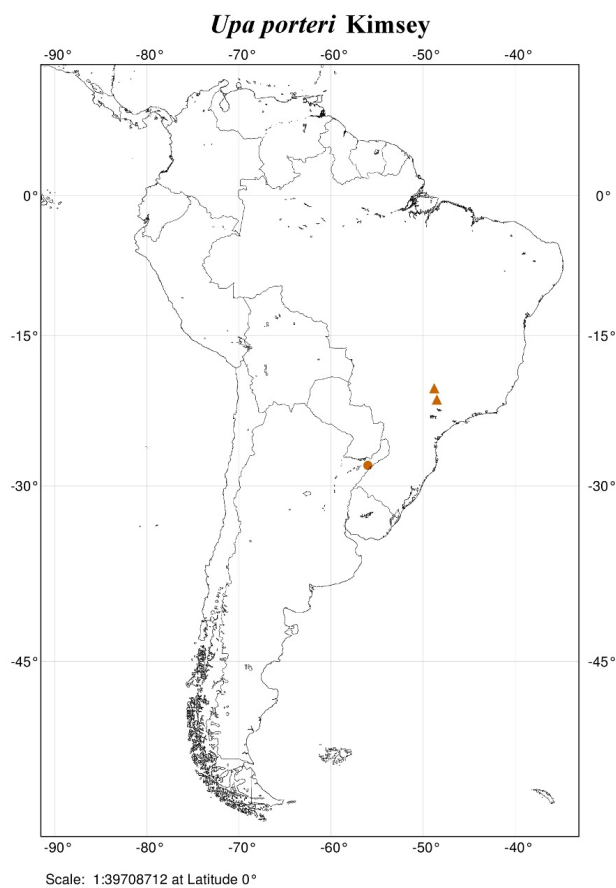
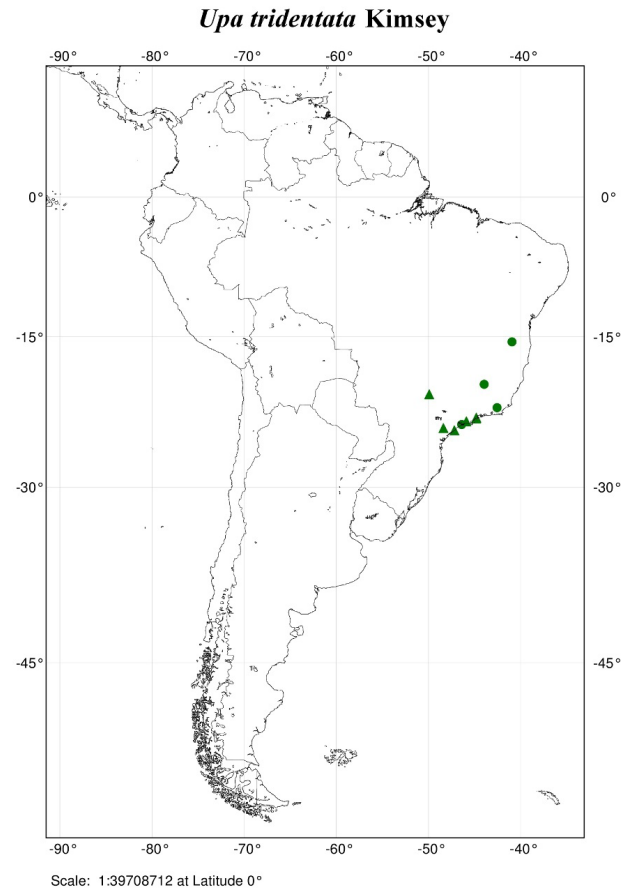
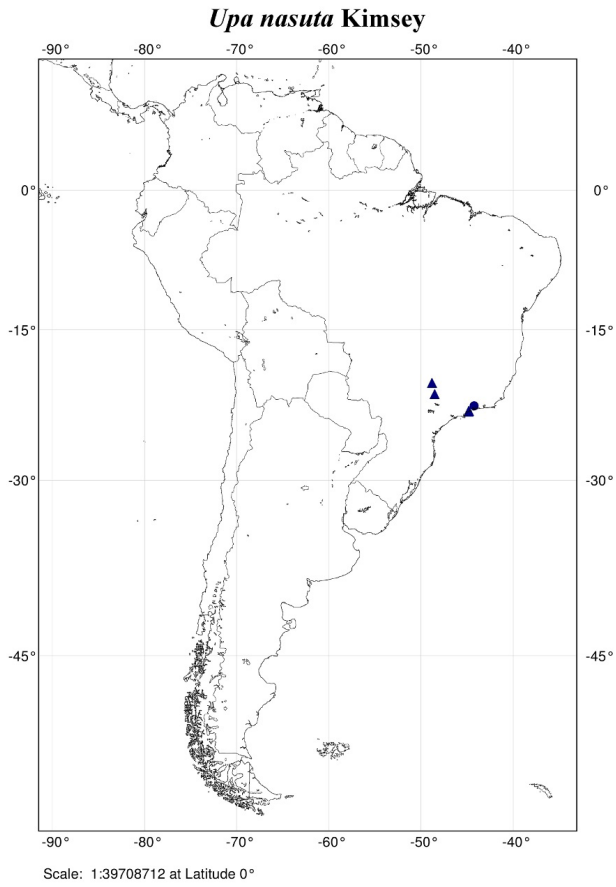


FIGURE 5. Distribution map of four species of *Upa* Kimsey (Hymenoptera: Thynninae). Circles indicate old records and triangles new records.

ACKNOWLEDGMENTS: We are grateful to Dr. Carlos Roberto Ferreira Brandão, curator of the MZUSP's Hymenoptera collection. This study was supported by São Paulo Research Foundation (Fapesp) and National Counsel of Technological and Scientific Development (CNPq).

LITERATURE CITED

- Costa, L.P. 2003. The Historical Bridge Between the Amazon and the Atlantic Forest of Brazil: a Study of Molecular Phylogeography with Small Mammals. *Journal of Biogeography* 30: 71-86.
- Diepenbroek, M., Grobe, H. and Sieger, R. 2000. PanMap. <http://www.pangaea.de/Software/PanMap>
- Genise, J. and Kimsey, L. 1991. New Genera of South American Thynninae (Tiphidae, Hymenoptera). *Psyche* 98: 57-69.
- Kimsey, L. 1991. Revision of the South American wasp genus *Aelurus* (Hymenoptera: Tiphidae: Thynninae). *Systematic Entomology* 16: 223 - 237.
- Kimsey, L. 1992. Phylogenetic relationships among the South American thynninae tiphidae wasps (Hymenoptera). *Systematic Entomology* 17: 133-144.
- Kimsey, L. 1996. Revision of the South American Thynnine Genus *Upa* (Hymenoptera:Tiphidae). *Proceedings of the Entomological Society of Washington* 98(1): 55-63.
- Kimsey, L. 2004. Illustrated keys to genera of the male wasps in the subfamily Thynninae (Hymenoptera: Tiphidae). *Proceedings of the Entomological Society of Washington* 106: 571-585.
- Morellato, L.P.C. and Haddad, C.F.B. 2000. Introduction: The Brazilian Atlantic Forest. *Biotropica* 32: 786-792.
- Morrone, J.J. 2006. Biogeographic Areas and Transition Zones of Latin America and the Caribbean Islands Based on Panbiogeographic and Cladistic Analyses of the Entomofauna. *Annual Review of Entomology* 51: 467-494.
- Morrone, J.J. and Lopretto, E.C. 1994. Distributional Patterns of freshwater Decapoda (Crustacea: Malacostraca) in Southern South America: A Panbiogeographic Approach. *Journal of Biogeography* 21: 97-109.
- Roig-Alsina, A. 1989. La Posición Sistemática de los Grupos Hasta Ahora Incluidos en *Chirodamus* Haliday *sensu lato* y Revisión de *Pompilocalus* Gen. Nov. (Hymenoptera, Pompilidae). *Revista de la Sociedad Entomológica Argentina* 47: 3-73.
- Santos, E.F. and Noll, F.B. 2010. Additions to the known distribution of *Epipompilus aztecus* (Cresson, 1869) and *E. excelsus* (Bradley, 1944) (Hymenoptera: Pompilidae). *Psyche: A Journal of Entomology* 2010: 1-4.
- Sigrist, M.S. and Carvalho, C.J.B. 2009. Historical relationships among areas of endemism in the tropical South America using Brooks Parsimony Analysis (BPA). *Biota Neotropica* 9: 79-90.
- Vanin, A.S. 1976. Taxonomic Revision of the South American Belidae (Coleoptera). *Arquivos de Zoologia* 28: 1-75.

RECEIVED: August 2013

ACCEPTED: September 2013

PUBLISHED ONLINE: October 2013

EDITORIAL RESPONSIBILITY: Matthew Smart