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# ZOOTAXA

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## **A revision of *Metaleptobasis* Calvert (Odonata: Coenagrionidae) with seven synonymies and the description of eighteen new species from South America**

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**A revision of *Metaleptobasis* Calvert (Odonata: Coenagrionidae) with seven synonymies and the description of eighteen new species from South America**

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Cover photo: Adult male of *Metaleptobasis bovilla*, at roadside swampy ditch and pools between Beverly and Cahuita in Limón Prov., Costa Rica, photographed by William Haber on 8 iii 2006

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## Abstract

Examination of over 1,400 specimens of the neotropical genus *Metaleptobasis* Calvert, 1907, including primary types or paratypes of 18 of the 20 currently available species names and large series of specimens including pairs in tandem and copula, allowed me to unequivocally associate older names with species, distinguish between specific and intraspecific variability, associate both sexes for each species, and recognize the existence of female polymorphism. As a result, seven names are found to be junior synonyms: *Metaleptobasis mauritia* Williamson, 1915 junior synonym of *M. bicornis* (Selys, 1877), *M. manicaria* Williamson, 1915 and *M. fernandesi* Rácenis, 1955 junior synonyms of *M. dicerias* (Selys, 1877), *M. westfalli* Cumming, 1954 junior synonym of *M. foreli* Ris, 1915, and *M. tetragena* Calvert, 1947, *M. weibezahni* Rácenis, 1955, and *M. incisula* De Marmels, 1989 junior synonyms of *M. brysonima* Williamson, 1915. Lectotypes are designated for *M. amazonica* and *Leptobasis dicerias*. Eighteen new species of *Metaleptobasis* are described: *M. brevicauda* (Holotype ♂, Peru, Huánuco Dep., Shapajilla, jungle, 11 v 1939, F. Woytkowski leg., in UMMZ); *M. falcifera* (Holotype ♂, Peru, Madre De Dios Dep., Pakitza, Reserved Zone, Manu National Park, T2 to R2 to T1 to base camp, 11°55'48"S, 71°15'18"W, 250 m, 17 ix 1989, J.A. Louton leg., in USNM); *M. furcifera* (Holotype ♂, Peru, Loreto Dep., Iquitos, iii 1936, G.G. Klug leg., in BMNH); *M. gabriellae* (Holotype ♂, Peru, Loreto Dep., Tamshiyacu-Tahuayo Reserve, forest in-

terior (4°23'40"S, 73°14'56"W), 27 vii 2009, T. Faasen leg., in RMNH); *M. guillermoi* (Holotype ♂, Peru, Loreto Dep., Yarinacocha, temporary forest stream (8°17'S, 74°37'W, 145 m), 2 vi 1972, D.L. Pearson leg., in FSCA); *M. inermis* (Holotype ♂, Brazil, Pará State, Jacareacanga, vii 1969, F.R. Barbosa leg., in UMMZ); *M. leniloba* (Holotype ♂, Peru, Loreto Dep., Pacaya-Samiria National Reserve, Santa Luisa trail (5°15'S, 74°40'W), 10 vi 2008, C. Beatty, A. Cordero & J. Hoffmann leg., in FSCA); *M. longicauda* (Holotype ♂, Brazil, Mato Grosso State, C. Teles Pires, Alto Tapajós, 1–31 viii 1956, Sick leg., in MNRJ); *M. orthogonia* (Holotype ♂, Peru, Loreto Dep., San Juan, Río Amazonas, near Iquitos, viii 1939, J. Schunke leg., in FSCA); *M. paludicola* (Holotype ♂, Peru, Loreto Dep., Tamshiyacu-Tahuayo Reserve, swamp, 4°23'49"S, 73°14'57"W, 27 ii 2009, T. Faasen leg., in RMNH); *M. panguanae* (Holotype ♂, Peru, Huánuco Dep., Biological Station Panguana, E side Río Yuyapichis, 9°37'S, 74°57'W, 6–17 iv 2003, H.J. & E.-G. Burmeister leg., in ZSM); *M. peltata* (Holotype ♂, Peru Loreto Dep., Tamshiyacu-Tahuayo Reserve, 4°21'22"S, 73°11'0"W, 19 ii 2010, T. Faasen leg., in RMNH); *M. prostrata* (Holotype ♂, Peru, Junín Dep., Satipo, v 1945, P. Paprzycki leg., in UMMZ); *M. silvicola* (Holotype ♂, Peru, Madre de Dios Dep., Explorer's Inn on Río Tambopata, 30 km SW Puerto Maldonado, main trail, 1 viii 1979, M. Perkins & P. Donahue leg., in FSCA); *M. spatulata* (Holotype ♂, Peru, Huánuco Dep., 10 km N of Cucharas, confluence of Huallaga and Pacay rivers, viii 1954, F. Woytkowski leg., in UMMZ); *M. tridentigera* (Holotype ♂, Brazil, Rondônia State, Porto Velho, Area Abunan, T11 Aleatorio, 8°46'S, 63°54'W, 86 m, 16 v 2010, Nogueira & Mendes leg., in MZUSP); *M. truncata* (Holotype ♂, Brazil, Pará State, Jacareacanga, xi 1969, F.R. Barbosa leg., in UMMZ); and *M. turbinata* (Holotype ♂, Peru, Loreto Dep., Tamshiyacu-Tahuayo Reserve, forest swamp (4°24'18"S, 73°14'38"W), 25 ii 2010, T. Faasen leg., in RMNH). Illustrations, keys, diagnoses, and distribution maps for all 31 currently known species are provided. Phylogenetic relationships within the genus *Metaleptobasis* are analyzed based on 33 adult morphological characters, including the 31 currently described species of *Metaleptobasis* and eleven outgroup taxa of other Coenagrionidae of the subfamily Teinobasinae. The cladistic analysis recovered *Metaleptobasis* as monophyletic, and as sister group of *Aceratobasis* Kennedy, a teinobasine genus some of the species of which possess an articulated spur on base of male cercus. Hypothesized relationships among its species are discussed.

**Key words:** Damselfly, Neotropics, key, diagnoses, distribution maps, female polymorphism, cladistic analysis

## Resumen

Examinación de más de 1.400 ejemplares del género neotropical *Metaleptobasis* Calvert, 1907, incluyendo tipos primarios o paratipos de 18 de los 20 nombres actualmente disponibles y de series grandes de ejemplares incluyendo pares en tandem y cópula, me permitió asociar inequívocamente nombres viejos con especies, distinguir entre variabilidad específica e intraspecífica, asociar ambos sexos para cada especie, y reconocer la existencia de polimorfismo en la hembra. Como resultado, se encuentra que siete nombres son sinónimos junior: *Metaleptobasis mauritia* Williamson, 1915 sinónimo junior de *M. bicornis* (Selys, 1877), *M. manicaria* Williamson, 1915 y *M. fernandesi* Rácenis, 1955 sinónimos junior de *M. diceras* (Selys, 1877), *M. westfalli* Cumming, 1954 sinónimo junior de *M. foreli* Ris, 1915, y *M. tetragena* Calvert, 1947, *M. weibezahni* Rácenis, 1955, y *M. incisula* De Marmels, 1989 sinónimos junior de *M. brysonima* Williamson, 1915. Se designan lectotipos para *M. amazonica* y *Leptobasis diceras*. Se describen dieciocho especies nuevas de *Metaleptobasis*: *M. brevicauda* (Holotipo ♂, Perú, Dep. Huánuco, Shapajilla, selva, 11 v 1939, F. Woytkowski leg., en UMMZ); *M. falcifera* (Holotipo ♂, Perú, Dep. Madre De Dios, Pakitza, Zona de Reserva, Parque Nacional Manu, T2 a R2 a T1 a campamento base, 11°55'48"S, 71°15'18"W, 250 m, 17 ix 1989, J.A. Louton leg., en USNM); *M. furcifera* (Holotipo ♂, Perú, Dep. Loreto, Iquitos, iii 1936, G.G. Klug leg., en BMNH); *M. gabrielae* (Holotipo ♂, Perú, Dep. Loreto, Reserva Tamshiyacu-Tahuayo, interior de la selva (4°23'40"S, 73°14'56"W), 27 vii 2009, T. Faasen leg., en RMNH); *M. guillermoi* (Holotipo ♂, Perú, Dep. Loreto, Yarinacocha, arroyo temporario en la selva (8°17'S, 74°37'W, 145 m), 2 vi 1972, D.L. Pearson leg., en FSCA); *M. inermis* (Holotipo ♂, Brasil, Estado de Pará, Jacareacanga, vii 1969, F.R. Barbosa leg., en UMMZ); *M. leniloba* (Holotipo ♂, Perú, Loreto Dep., Reserva Nacional Pacaya-Samiria, trocha Santa Luisa (5°15'S, 74°40'W), 10 vi 2008, C. Beatty, A. Cordero & J. Hoffmann leg., en FSCA); *M. longicauda* (Holotipo ♂, Brasil, Estado de Mato Grosso, C. Teles Pires, Alto Tapajós, 1–31 viii 1956, leg. Sick, en MNRJ); *M. orthogonia* (Holotipo ♂, Perú, Dep. Loreto, San Juan, Río Amazonas, cerca de Iquitos, viii 1939, J. Schunke leg., en FSCA); *M. paludicola* (Holotipo ♂, Perú, Dep. Loreto, Reserva Tamshiyacu-Tahuayo, pantano, 4°23'49"S, 73°14'57"W, 27 ii 2009, T. Faasen leg., en RMNH); *M. panguanae* (Holotipo ♂, Perú, Dep. Huánuco, Estación Biológica Panguana, lado E de Río Yuyapichis, 9°37'S, 74°57'W, 6–17 iv 2003, H.J. & E.-G. Burmeister leg., en ZSM); *M. peltata* (Holotipo ♂, Perú, Dep. Loreto, Reserva Tamshiyacu-Tahuayo, 4°21'22"S, 73°11'0"W, 19 ii 2010, T. Faasen leg., en RMNH); *M. prostrata* (Holotipo ♂, Perú, Dep. Junín, Satipo, v 1945, P. Paprzycki leg., en UMMZ); *M. silvicola* (Holotipo ♂, Perú, Dep. Madre de Dios, Explorer's Inn en Río Tambopata, 30 km SW Puerto Maldonado, trocha principal, 1 viii 1979, M. Perkins & P. Donahue leg., en FSCA); *M. spatulata* (Holotipo ♂, Perú, Dep. Huánuco, 10 km N de Cucharas, confluencia de ríos Huallaga y Pacay, viii 1954, F. Woytkowski leg., en UMMZ); *M. tridentigera* (Holotipo ♂, Brasil, Estado de Rondônia, Porto Velho, Área Abunan, T11 Aleatorio, 8°46'S, 63°54'W, 86 m, 16 v 2010, Nogueira & Mendes leg., en MZUSP); *M. truncata* (Holotipo ♂, Brasil, Estado de Pará, Jac-

areacanga, xi 1969, F.R. Barbosa leg., en UMMZ); and *M. turbinata* (Holotipo ♂, Perú, Loreto Dep., Reserva Tamshiyacu-Tahuayo, pantano en la selva (4°24'18"S, 73°14'38"W), 25 ii 2010, T. Faasen leg., en RMNH). Se proveen ilustraciones, claves, diagnosis, y mapas de distribución para las 31 especies conocidas. Las relaciones filogenéticas dentro del género *Metaleptobasis* son analizadas sobre la base de 33 caracteres morfológicos de los adultos, incluyendo las 31 especies descritas de *Metaleptobasis* y otros once taxa de Coenagrionidae de la subfamilia Teinobasinae como grupo externo. El análisis cladístico recobró a *Metaleptobasis* como monofilético, y como grupo hermano de *Aceratobasis* Kennedy, un género de teinobasines algunas de cuyas especies poseen un espolón articulado en la base del cerco del macho. Se discuten las relaciones hipotetizadas entre las especies.

**Palabras clave:** Libélulas, Neotrópico, clave, diagnosis, mapas de distribución, polimorfismo de hembras, análisis cladístico

## Introduction

*Metaleptobasis* is a Neotropical genus of damselflies found in swampy areas, eutrophic oxbow lakes, and small sluggish streams within shaded tropical and subtropical forests in Central and South America. Adults are relatively easy to recognize from all other New World coenagrionids by their unique combination of characters including a pair of smooth horns on anterior portion of mesanepisterna, a pale pterothorax with a dark mid-dorsal stripe, angulate frons, vein descending from quadrangle forming an unbroken line to wing margin, postero-dorsal margin of S9 with denticles, and ovipositor surpassing posterior margin of S10 (Garrison *et al.* 2010). However, since they seldom fly and usually perch motionless on twigs and bushes on thickly vegetated areas and remain near the ground or water's surface, they are difficult to detect and are therefore relatively rare in collections, being usually represented by low numbers of specimens. The breeding habitat and larvae of all species in this genus remain currently unknown.

*Metaleptobasis* was erected by Calvert (1907) to include his new species *M. bovilla*, and also *M. diceras*, a species described by Selys (1877) under *Leptobasis*, and 'perhaps other species associated therewith by de Selys' (Calvert 1907: 386). Several additional species were later described under this genus (Williamson 1915; Ris 1918; Sjöstedt 1918; Calvert 1948; Santos 1956; Cumming 1954; Rácenis 1955; De Marmels 1989; Daigle 2000, 2003, 2004; Tennessen 2012), and 20 species names are currently included under *Metaleptobasis* (Garrison *et al.* 2010; Tennessen 2012).

Some of the oldest descriptions, e.g. *M. diceras* (Selys, 1877), *M. bicornis* (Selys, 1877), *M. quadricornis* (Selys, 1877), were brief and lacked diagnostic illustrations, and several species descriptions were based on single specimens, i.e. *M. brysonima* Williamson, 1915, including many based on single females, i.e. *M. bicornis*, *M. quadricornis*, *M. foreli* Ris, 1918, *M. tetragena* Calvert, 1948, *M. fernandesi* Rácenis, 1955, and *M. weibezaehni* Rácenis, 1955. These original descriptions focused on characters that are here found to be variable, dimorphic, or polymorphic (i.e. color of head, development and orientation of female mesanepisternal horns) or lacked diagnostic value. This, coupled with the fact that subsequent authors did not examine types of previously described species, led to misapplication of species names and mis-association of sexes of different species (Calvert 1909; Cumming 1954; Rácenis 1955), mistakes that in turn misled later authors describing additional species (De Marmels 1989).

Cumming (1954) provided a key for males of the eight species described at that time, including also two species later placed in *Aceratobasis* Kennedy, 1920, based mostly on shape of the mesanepisternal horns and caudal appendages as per illustrations of previous authors. A key to the 16 South American species of *Metaleptobasis* described up to 2008, including also a species of *Mesoleptobasis* Sjöstedt, 1918, was included in Heckman's (2008) volume. This key was built using descriptive characters taken from a compilation of original descriptions and previous works, in many instances using characters with no diagnostic value, misinterpreted from drawings, or including incorrect generalizations, and unfortunately does not allow for species recognition.

Because of all the problems enumerated above, identification of species in this genus has been extremely difficult. Many collections included numerous undescribed species from the western region of South America and from the Amazon region, in many cases recognized as possibly new by their collectors, but left undescribed pending clarification of species identities of older names.

The present study is based on examination of over 1,400 specimens, including primary types or paratypes of 18 of the 20 currently available species names, which allowed me to unequivocally associate older names with species

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