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TAXONOMIC REVISION OF THE ASSASSIN-FLY GENUS *ACRONYCHES* WILLISTON, 1908 (DIPTERA: ASILIDAE: LEPTOGASTRINAE)

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Abstract.—The genus *Acronyches* Williston, 1908 (Diptera: Asilidae: Leptogastrinae) is revised. Currently, 10 species are known from Central and South America, i.e., *Acronyches alexanderi* Papavero, 1971 from Brazil, *Acronyches fenestratulus* Hermann, 1921 from Argentina, Brazil, and Paraguay, *Acronyches geosarginus* Papavero, 1971 from Suriname, *Acronyches imitator* Hermann, 1921 from Brazil and Paraguay, *Acronyches maya* Martin, 1968 from Mexico, *Acronyches meruuna* Papavero, 1971 from Brazil, *Acronyches plutactites* Papavero, 1971 from Costa Rica, *Acronyches rarus* Martin, 1968 from Mexico, *Acronyches westcotti* Martin, 1968 from Mexico, and *Acronyches willistoni* Hermann, 1921 from Guyana (not Suriname). One new synonymy is proposed: *Acronyches geosarginus* Papavero, 1971 is a new junior synonym of *Acronyches imitator* Hermann, 1921. Four new species, ***Acronyches fisheri*, new species** from Guatemala and Costa Rica, ***Acronyches gephyrus*, new species** from Colombia and Ecuador, ***Acronyches mathisi*, new species** from Brazil, and ***Acronyches kelispteron*, new species** from Ecuador and Peru are described. From a syntype series of two specimens, a lectotype is designated for *A. imitator* deposited in the Senckenberg Deutsches Entomologisches Institut.

Distribution, biodiversity hotspots sensu Conservation International, endemism, seasonal imago flight activity, and biology are discussed. Descriptions/redescriptions, photographs, illustrations, specimen occurrence data, and an identification key are provided and the data are made openly accessible in data repositories to support and accelerate future studies of the included taxa.

Key Words: robber flies, Neotropical, cybertaxonomy, open-access, species discovery

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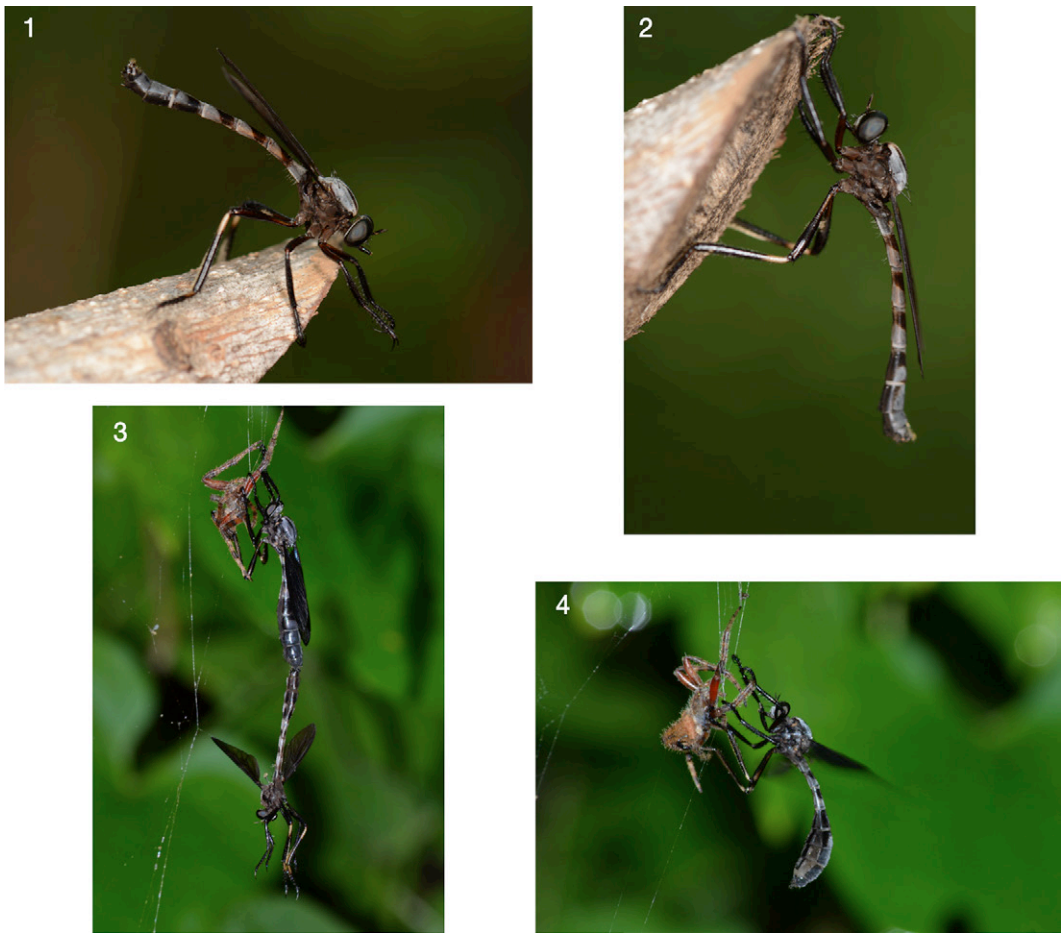
ZooBank F29DFBBD-6FCA-43C3-984E-E9CCC4C9A356

The Neotropical Leptogastrinae (Diptera: Asilidae) fauna is quite diverse in number of genera (10), but understudied at the species level with 90 species recognized (Dikow unpublished, but see Papavero 2009). The genus *Acronyches* Williston, 1908 is a distinct component of the Neotropical Leptogastrinae fauna, because the largest species belong to it (Figs. 1–4). *Acronyches* is also widespread in the Neotropical Region, ranging from Mexico to northern Argentina and southern Paraguay (Fig. 5). The genus has not always been included in the Leptogastrinae (see details below) but received attention through three studies describing the currently known ten species (Hermann 1921, Martin 1968a, Papavero 1971). The world-wide generic study of Asilidae by Hull (1962) also included *Acronyches* and the morphologically similar genus *Megonyx* Hull, 1962.

The taxonomic history of *Acronyches* can be summarized as follows: Williston (1908, p. 388), in the appendix to his Manual of North American Diptera, illustrated a female of a new species of assassin fly along with details of the tip of the tarsus (shape of claws and lack of pulvilli and empodium) and postpedicel, but did not provide a description. The few words he added, however, can be used as a diagnosis: "The distinction between the Leptogastrinae and Dasypogoninae is apparently bridged over by a new genus from



Figs. 1–4. Photographs of *Acronyches westcotti* in nature: 1–2, ♂ photographed at Mexico: Jalisco: Estación de Biología Chamela by Enrique Ramirez (2015-08-18). 3, ♀ and ♂ in copula in tail-to-tail position (♂ below) photographed at Mexico: La Cruz de Huanacaxtle by Luis Daniel Santana-Moreno (2020-08-21, iNaturalist 57296428). 4, ♀ with spider prey (same as in 3).

Fig. 5. Distribution map of all *Acronyches* species and biodiversity hotspots *sensu* Conservation International in gray. Blue circle = specimen; blue circle with white outline = type locality; blue circle with yellow outline = iNaturalist observation.

Brazil, represented by a specimen in my cabinet, of which a figure is here given. The form is quite intermediate between *Leptogaster* and *Plesiomma*. I am unable to make out the structure of the palpi." Within this illustration, he added a hand-written label that reads "*Acronyches* sp. Brazil" (see remarks under *A. meruuna* Papavero, 1971).

Hermann (1921) formally described the genus based on Williston's illustration, including the description of three species – *Acronyches willistoni* Hermann, 1921 from Guyana as type species, *A. imitator* Hermann, 1921 from Paraguay, and *A. fenestratulus* Hermann, 1921 also from Paraguay. None of the newly described species represent the taxon illustrated by Williston (1908).

Hull (1962) described the genus *Megonyx* Hull, 1962 with the single species *Megonyx giganteus* Hull, 1962 from the Amazon of Brazil, highlighting the morphological similarity to *Acronyches*. He placed both *Megonyx*

and *Acronyches* in Leptogastrinae and provided a key to the genera of that subfamily (Hull 1962, p. 296).

Martin (1968a) described three new species of *Acronyches* from Mexico – *Acronyches maya* Martin, 1968 from the Yucatan peninsula, *Acronyches rarus* Martin, 1968 from Morelos in south-central Mexico, and *Acronyches westcotti* Martin, 1968 from Nayarit in western Mexico. He furthermore elaborated on the placement of this genus in Dasypogoninae and not in Leptogastrinae, which he had studied in great detail and elevated to family rank (Martin 1968b) without including *Acronyches* in that study.

Papavero (1971) reviewed the genus in Central and South America and described four new species – *Acronyches alexanderi* Papavero, 1971 from São Paulo, Brazil, *Acronyches geosarginus* Papavero, 1971 from Suriname, *Acronyches meruuna* Papavero, 1971 from Espirito Santo, Brazil, and *Acronyches plutactites* Papavero, 1971 from Costa Rica. He synonymized *Megonyx* with *Acronyches* and *Megonyx giganteus* with *Acronyches fenestratulus*. A key to the species of the genus, except the three Mexican species described previously by Martin (1968a) and *A. willistoni*, which was not available for study, was provided. Papavero (1973) included *Acronyches* in his generic classification of Asilidae and placed it within Stenopogoninae.

Fisher (1984) published a list of 97 Asilidae species recorded from the Tambopata Reserve, Madre de Dios, Peru. He recorded *A. fenestratulus* for the first time from Peru and also recorded an undescribed species with a unique wing color pattern (see *A. kelispteron,* new species, below).

Artigas and Papavero (1991) studied the Asilidae genera occurring in North, Central, and South America and established a new, monotypic tribe, Acronychini, placing *Acronyches* within the Stenopogoninae sensu Papavero (1973).

Dikow (2009) postulated a morphology-based phylogenetic hypothesis of Asilidae, including specimens of *Acronyches maya,* and placed *Acronyches* in Leptogastrinae in the tribe Acronychini as sister-group to the Leptogastrini (the remaining 16 genera). Two autapomorphies provide morphological evidence for the hypothesis that *Acronyches* be placed within Leptogastrinae, (1) abdominal tergite 2 is more than twice as long as wide and (2) abdominal sternite 2 is divided medially into two equal halves, which are separated by fenestra. Several additional apomorphic character states (see Dikow 2009, p. 107) also support the placement of *Acronyches* in Leptogastrinae. The genus has not been included in any phylogenetic study utilizing molecular/genomic data to date, but is included in a phylogenetic study using ultra-conserved elements (UCEs) focusing on Asiloidea relationships (A. Cabrero et al., in prep).

At the commencement of this study, there were 10 valid species: *Acronyches alexanderi*, *Acronyches fenestratulus*, *Acronyches geosarginus*, *Acronyches imitator*, *Acronyches maya*, *Acronyches meruuna*, *Acronyches plutactites*, *Acronyches rarus*, *Acronyches westcotti*, and *Acronyches willistoni*.

Studying the primary type specimens of the three initial *Acronyches* species described by Hermann (1921) is very complex. Hermann (1921) prefaced his study on the Asilidae and Mydidae from Paraguay based on specimens collected by L. Zürcher by saying that he received this collection of specimens from the "Deutschen Entomologischem Museum" (now Senckenberg Deutsches Entomologisches Institut in Müncheberg, Germany, SDEI). Following the list of species identified, he states that the 'Typen' (= primary types such as holotypes) and 'Co-Typen' (= secondary types such as paratypes) of the new species are deposited in the SDEI. However, when describing the new species of *Acronyches*, Hermann includes specimens from his personal collection, which is now deposited in the Zoologische Staatssammlung München, Germany (SNSB-ZSM). Martin (1968a) stated that he had seen the type specimens of *A. willistoni* and

A. imitator when visiting the SNSB-ZSM collection in Munich, whereas he had not been able to locate the type of *A. fenestratulus* there. Hermann (1921) had indicated that the primary type specimen of *A. fenestratulus* was deposited in the SDEI and not in Munich. For *A. imitator*, Hermann (1921) only lists the male 'Co-type' in the list of new species, which was deposited in the SDEI, but did not include any specimen information in the actual species description further down in the article.

This taxonomic revision was instigated based on specimens located in several natural history collections, of which some had been identified to represent new species by F.M. Hull and E.M. Fisher (see *Acronyches fisheri* sp. n. below). The project was part of an undergraduate summer research project at the USNM by the 1st author conducted in 2014. The revision is based on the study of 116 specimens from 27 natural history collections and, fortunately, also several iNaturalist observations (Figs. 6–8).

Materials and Methods

Morphological features were examined using Zeiss SteREO Discovery.V8 and V12 stereo microscopes. Wing length is measured from the tegula to the distal tip of the wing. The female and male terminalia were first excised and macerated in 10% potassium hydroxide (KOH) at 55°C followed by neutralization in acetic acid (glacial, CH_3COOH) and rinsing in distilled water (H_2O). They were temporarily stored in 75% ethanol (C_2H_5OH) for examination and illustration and eventually sealed in polyethylene vials containing 100% glycerine (C_3H_8O) and attached to the specimen's pin. The analysis and graphs of specimen occurrence data (Figs. 6-8) and seasonal imago flight activity (Tables 1–2) were conducted and produced using the Python tool SpOccSum (Trizna and Dikow 2019).

Terminology

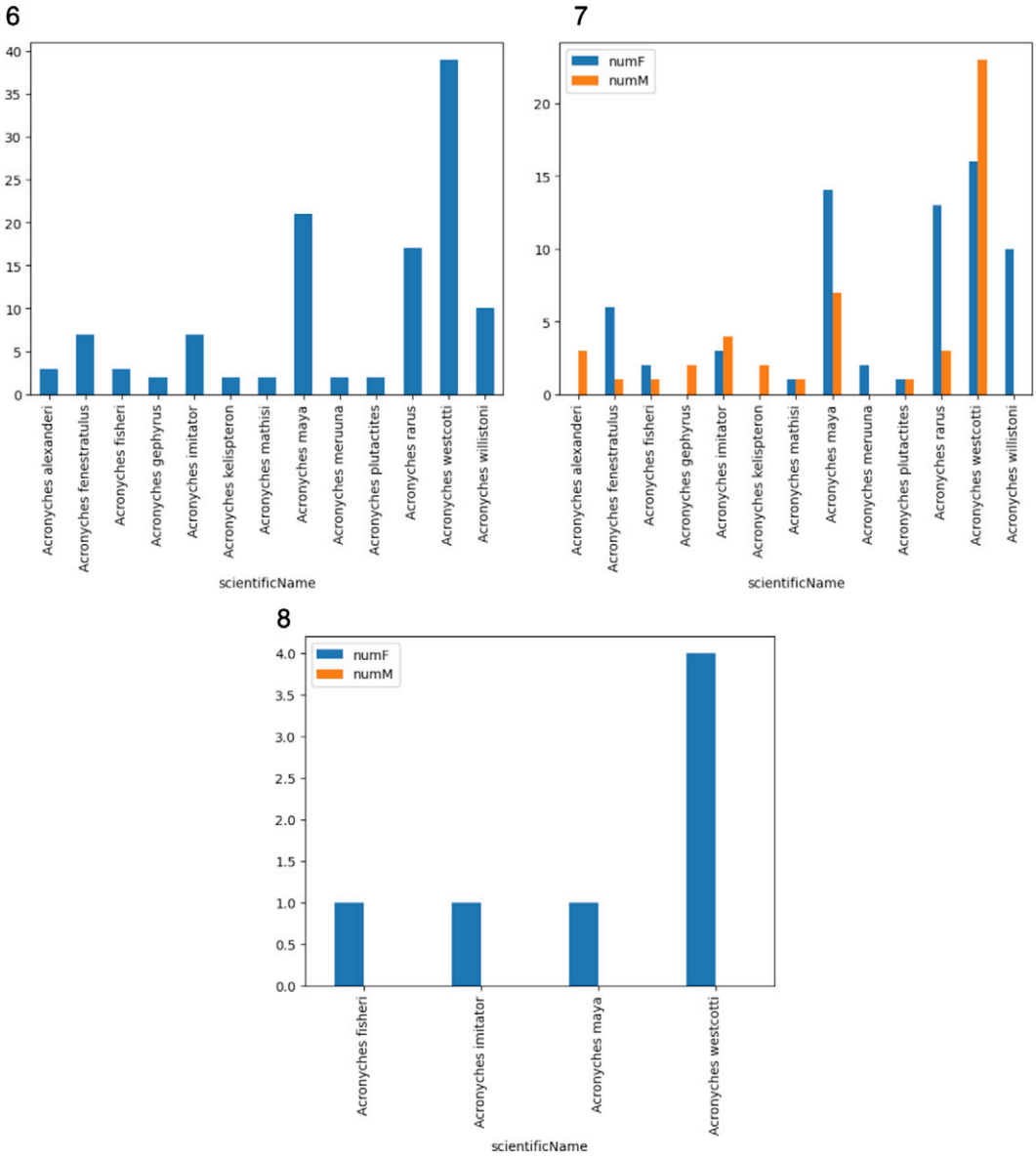
Terminology follows Dikow (2009), Cumming and Wood (2017), and Londt and Dikow (2017) (general morphology and abbreviations for setae), Stuckenberg (1999) (antennae), and Wootton and Ennos (1989) (wing venation). In the descriptions abdominal tergites are abbreviated with 'T', and sternites with 'S'. The terms prothoracic, mesothoracic, and metathoracic are abbreviated 'pro', 'mes', and 'met', respectively. The term pubescence (adjective pubescent) refers to the short, fine microtrichia densely covering certain body parts. Other generalized terms follow the Torre-Bueno Glossary of Entomology (Nichols 1989).

Species Descriptions and Re-descriptions

Species descriptions are based on composites of all specimens and not exclusively on the holotype and are compiled from a character matrix of 142 features and 476 character states assembled with Lucid Builder (version 4) and eventually exported as natural-language descriptions. These species descriptions have been deposited in the Zenodo data depository and can be accessed in XML-format following the SDD (Structure of Descriptive Data) standard. The structure of terminalia is only described once for the genus and additional species-specific features should be interpreted from the provided illustrations. All taxon names have been registered in ZooBank (Pyle and Michel 2008).

Specimen Occurrence Data

The following data on species occurrences are given (where available): country, state/province, county or municipality, locality, geographic co-ordinates (those in square brackets '[]' estimated by the authors), elevation (in meters), date of collection (format: yyyy-mm-dd), habitat information, sampling protocol (if other than hand netting), collector, catalog number (a unique specimen number and any other identifying number), depository (institution and collection code), number of specimens, sex, name of person who identified the specimen, and any other previous identifications. Each specimen is listed with a unique specimen number (either an institutional



Figs. 6–8. Graphs summarizing number of specimens and iNaturalist observations for each *Acronyches* species. 6, Total number of specimens per species. 7, Number of ♀ (numF, blue) and ♂ (numM, orange) per species. 8, Number of iNaturalist observations (all females).

catalog number or an AAM-XXXXXX number used by the 2nd author) that will allow the re-investigation as well as provide a unique Life Science Identifier (LSID). The distributions of all species are illustrated in maps plotted with Mapbox Studio (https://www.mapbox.com/mapbox-studio) indicating all of the localities for which co-ordinates are available or could be approximated from online gazetteers or Google Earth. Type localities are plotted with a white outline and iNaturalist observations are plotted with a yellow outline. The distribution maps include Biodiversity Hotspots sensu Conservation International

Table 1. Collecting event summary of *Acronyches* species (lost holotype of *A. plutactites* included; first specimen studied by Williston prior to 1908 not included/unavailable; iNaturalist with most recent observation year; * = includes specimen of undetermined sex).

species	number	# iNaturalist Observations	♀/♂	events	first collection	most recent collection
A. alexanderi	3	0	0 / 3	3	1939	1968
A. fenestratulus	7	0	6 / 1	6	1914	2003
A. fisheri	3	1 (2022)	2 / 1	3	1944	1977
A. gephyrus	2	0	0 / 2	2	1978	1984
A. imitator	7	1 (2021)	3 / 4	7	1913	2009
A. kelispteron	2	0	0 / 2	2	1990	2012
A. mathisi	2	0	1 / 1	2	1991	2008
A. maya	21	1 (2019)	14 / 7	16	1963	2000
A. meruuna	2	0	2 / 0	2	1962	1962
A. plutactites	2	0	1 / 1	2	1944	1983
A. rarus	17*	0	13 / 3	12	1968	1997
A. westcotti	39	4 (2024)	16 / 23	15	1934	1999
A. willistoni	10	0	10 / 0	8	1949	1998
summary	116	7	70/46	78	1913	2012

Table 2. Seasonal imago flight activity of *Acronyches* species through number of specimens collected (and/or iNaturalist observations) and unique collecting events in each month (data given as # specimens / observations / # collecting events). Months abbreviated starting with January; * = includes iNaturalist observation; lost holotype of *A. plutactites* included.

species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A. alexanderi	1/1	-	1/1	-	-	-	-	-	-	-	-	1/1
A. fenestratulus	-	1/1	1/1	1/1	1/1	-	1/1	-	-	1/1	-	-
A. fisheri	-	-	1/1*	-	1/1	1/1	1/1	-	-	-	-	-
A. gephyrus	-	-	-	-	-	-	-	-	1/1	1/1	-	-
A. imitator	-	-	-	1/1	-	1/1	-	-	1/1	2/2	1/1	1/1*
A. kelispteron	-	-	-	-	-	-	-	-	-	1/1	2/2	-
A. mathisi	-	-	-	-	-	-	-	-	-	1/1	1/1	-
A. maya	-	-	-	1/1	-	6/4*	6/4	4/4	2/2	-	1/1	1/1
A. meruuna	-	-	-	-	-	-	-	-	-	-	2/2	-
A. plutactites	-	-	1/1	1/1	-	-	-	-	-	-	-	-
A. rarus	-	-	-	-	-	1/1	6/5	7/3	1/1	2/2	-	-
A. westcotti	-	-	-	3/2	-	1/1	21/6	9/4*	6/1	3/3*	-	-
A. willistoni	1/1	-	1/1	-	-	1/1	3/3	1/1	1/1	-	-	-
total	2/2	1/1	5/5*	7/6	2/2	11/ 9*	38/ 20	21/12*	12/7	11/ 11*	7/7	3/3*

(Mittermeier et al., 1998; Myers et al., 2000; Mittermeier et al., 2005, Noss et al. 2015). The specimen occurrence data are deposited as a Darwin Core Archive (DwC-A) in the Global Biodiversity Information Facility (GBIF) uploaded using the Integrated Publishing Toolkit (IPT) at the NMNH.

Photographs and Illustrations

Whole habitus photographs of pinned specimens were taken with a Visionary Digital Passport II system (base and StackShot only) with two different cameras: an Olympus E-30 Four-Thirds camera with a 50 mm macro lens (equivalent to 100 mm focal length in 35 mm photography) and an Olympus OM-D E-M1 Mark III Micro Four-Thirds camera with a 60 mm f/2.8 macro lens (equivalent to 120 mm focal length in 35 mm photography). The specimens were illuminated by a Falcon FLDM- i200 LED dome-light for even and soft light. Individual RAW-format

images were stacked using HeliconFocus Pro (versions 6.7 and 8.+) and exported in Adobe DNG-format. All photographs have been deposited in FigShare for download in full-resolution. Morphological features were illustrated using a 10x10 ocular grid on the Zeiss SteREO Discovery.V12 microscope and later digitally converted to vector graphics using Adobe Illustrator and Affinity Designer software. The illustrations of male and female terminalia have been deposited in digital format (svg-format) in FigShare.

Key

The dichotomous, interactive key has been built with Lucid Builder (version 4.+) and can be accessed on Lucidcentral and the 2nd author's research web-site.

Institutions Providing Specimens

Institutions providing specimens are listed below, together with the abbreviations used in the text when citing depositories (institutionCode), a link to the record in the Global Registry of Scientific Collections (GRSciColl), and the people who kindly assisted: AMNH - American Museum of Natural History, New York City, New York, USA (D. Grimaldi); CAS - California Academy of Sciences, San Francisco, California, USA; CNC - Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, Ontario, Canada (B. Sinclair, O. Lonsdale); CNIN - Colección Nacional de Insectos, Universidad Nacional Autónoma de México, Mexico City, México (A. Estrada); CZMA - Coleção Zoológica do Maranhão, Universidade Estadual do Maranhão, Caxias, Maranhão, Brazil (F. Limeira-de-Oliveira, R. Vieira); EBCC - Universidad Nacional Autónoma de México, Estación de Biología "Chamela", San Patricio, Jalisco, México (A. Estrada); EMEC - Essig Museum of Entomology, University of California, Berkeley, CA, USA (P. Oboyski); FIOCRUZ - Entomological Collection, Fundação Oswaldo Cruz, Rio de Janeiro, Brazil (R. Vieira); FMNH - Field Museum of Natural History, Chicago, Illinois, USA (M. Turcatel); FSCA - Florida State Collection of Arthropods, University of Florida, Gainesville, Florida, USA (G. Steck); IMLA - Fundación e Instituto Miguel Lillo, Universidad Nacional de Tucumán, Tucumán, Argentina (E. Constanza Perez); INBIO - Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica (M. Zumbado; specimens now at Museo Nacional de Costa Rica - MNCR); INPA - Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas, Brazil (R. Vieira); LACM - Natural History Museum of Los Angeles County, Los Angeles, California, USA (B. Brown); MFN - Museum für Naturkunde, Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Berlin, Germany (J. Pohl, S. Marotzke); MHNSM - Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru (P. Sanchez); MNRJ - Museu Nacional, Universidade do Rio Janeiro, São Cristovão, Rio de Janeiro, Brazil (R. Vieira); MZUSP - Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil (C. Lamas); NHMUK - The Natural History Museum, London, UK (E. McAlister); NHMW - Naturhistorisches Museum, Wien, Austria (P. Sehnal); RMNH - National Museum of Natural History, Naturalis, Leiden, The Netherlands (M. Guimarães Cruz); SDEI - Senckenberg Deutsches Entomologisches Institut, Müncheberg, Brandenburg, Germany (F. Menzel); SEMC - Snow Entomological Museum Collection, Biodiversity Institute and Natural History Museum, University of Kansas, Lawrence, Kansas, USA (Z. Falin); SNSB-ZSM - Zoologische Staatssammlung, München, Bayern, Germany (M. Kotrba); TAMU - Texas A&M University Insect Collection, College Station, Texas, USA (E. Riley); UCD - Bohart Entomological Museum, University of California Davis, Davis, California, USA (L. Kimsey); USNM - United States National Museum, Smithsonian

Institution, Washington, DC, USA. Several specimens originated from the personal collection of Eric Fisher (El Dorado Hills, California, USA) and have been donated to the USNM where they are now deposited.

Data Resources

GBIF: specimen occurrence data-set – e54c0882-109f-4f71-82c7-d24306f3f2db – DOI 10.15468/xyrnxf.

Lucid Builder: illustrated, dichotomous identification key – https://keys.lucidcentral.org/keys/v4/acronyches_dichotomous/ (archived in XML SDD format – DOI 10.5281/zenodo.17261013).

FigShare: full-resolution specimen photographs and terminalia illustrations – DOI 10.25573/data.c.8030239.

Zenodo: natural-language species descriptions from Lucid Builder in SDD format – DOI 10.5281/zenodo.17260968.

ZooBank new nomenclatorial acts: F29DFBBD-6FCA-43C3-984E-E9CCC4C9A356.

Taxonomy

Acronyches Williston, 1908

ZooBank EFD960B4-2DF7-4D8D-AB6D-BA8A1ADE5CB8

Original description online biodiversitylibrary.org/page/1316572 (see also Hermann 1921 biodiversitylibrary.org/page/45494270)

GBIF gbif.org/species/11271775

iNaturalist inaturalist.org/taxa/248217-Acronyches

Acronyches Williston, 1908: 388. Type-species: *Acronyches willistoni* Hermann, 1921, by subsequent designation.

Megonyx Hull, 1962 junior synonym by Papavero 1971: 146, ZooBank 2E43B51D-45C4-4FA1-9C7F-440B3FBFBCC2, Original description online biodiversitylibrary.org/page/7872644.

Diagnosis.—The genus is distinguished from other Leptogastrinae genera by the large size (wing length 11–22 mm), the triangular shape of the face (narrow dorsally, wide ventrally), the postpronotal lobes extending medially, but not also anteriorly, the elongated postpedicel, the large metakatepisternum, which is visible between the mesothoracic and metathoracic coxae, and the entirely reduced or absent empodium.

Description of ♂ *terminalia* (Figs. 15–23, 36–44, 57–61, 69–77, labeled in Figs. 57–61).—abdominal segments T1–T8 and S1–S8 entire (without modifications); hypopygium black or brown; epandrium divided medially into 2 halves, either joined medially or far apart medially; surstylus absent; hypandrium fused to gonocoxite forming a gonocoxite-hypandrial complex, gonocoxite-hypandrial complex well-developed, rectangular to square, approximating epandrium, but not fused to it proximally; gonocoxite-hypandrial complex entirely free from epandrium; gonostylus present, positioned distally on gonocoxite; subepandrial sclerite asetose, distal margin simple, straight margin; phallus with 1 functional prong, dorsal phallic sheath long, sperm sac entirely covered, lateral process of dorsal phallic sheath absent (gonopore marks tip); lateral ejaculatory process present, large cylindrical sclerite; ejaculatory apodeme single plate of varying diameter and shape (two lateral surfaces only).

Description of ♀ *terminalia* (for *Acronyches maya*, Fig. 62).—S8 plate-like, slightly emarginate medio-distally, T10 divided into 2 lightly sclerotized sclerites, T9 and T10 entirely fused, sclerites not distinguishable; 3 spermathecae; *bursa copulatrix* cylindrical, expanded and angled 180 degrees medially; spermathecae all equally large, occupying at most distal-most segment; common spermathecal duct long, extending beyond tip of furca, individual spermathecal duct long; spermathecae formed by expanded reservoirs, weakly sclerotized; S9 (furca) consists of 2 anteriorly and posteriorly separated sclerites.

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—A widespread genus known from

Mexico in the north to northern Argentina and southern Paraguay in the south (Fig. 5). A rarely collected genus known only from 116 specimens in museum collections from 67 collecting events between 1913–2012 (Table 1). The genus is known to occur in the Atlantic Forest, Cerrado, Madrean Pine-Oak Woodlands, Mesoamerica, and Tropical Andes biodiversity hotspots *sensu* Conservation International. The genus also occurs outside of biodiversity hotspots and is not endemic to any particular hotspot. Based on the wide distribution, adult flies are active year-round with species-specific differences in seasonal imago flight activity (Table 2). iNaturalist observations (Figs. 1–4) add to the understanding of the biology. Several observations feature adult flies feeding on spiders that were captured in their webs and mating behavior with a tail-to-tail position and the male hanging from the female during copulation.

Acronyches alexanderi Papavero, 1971
ZooBank DCA36DF3-FFEB-4648-8976-5F3487F3E2B5
GBIF gbif.org/species/1664464
Figs. 9–11, 15–17, 84

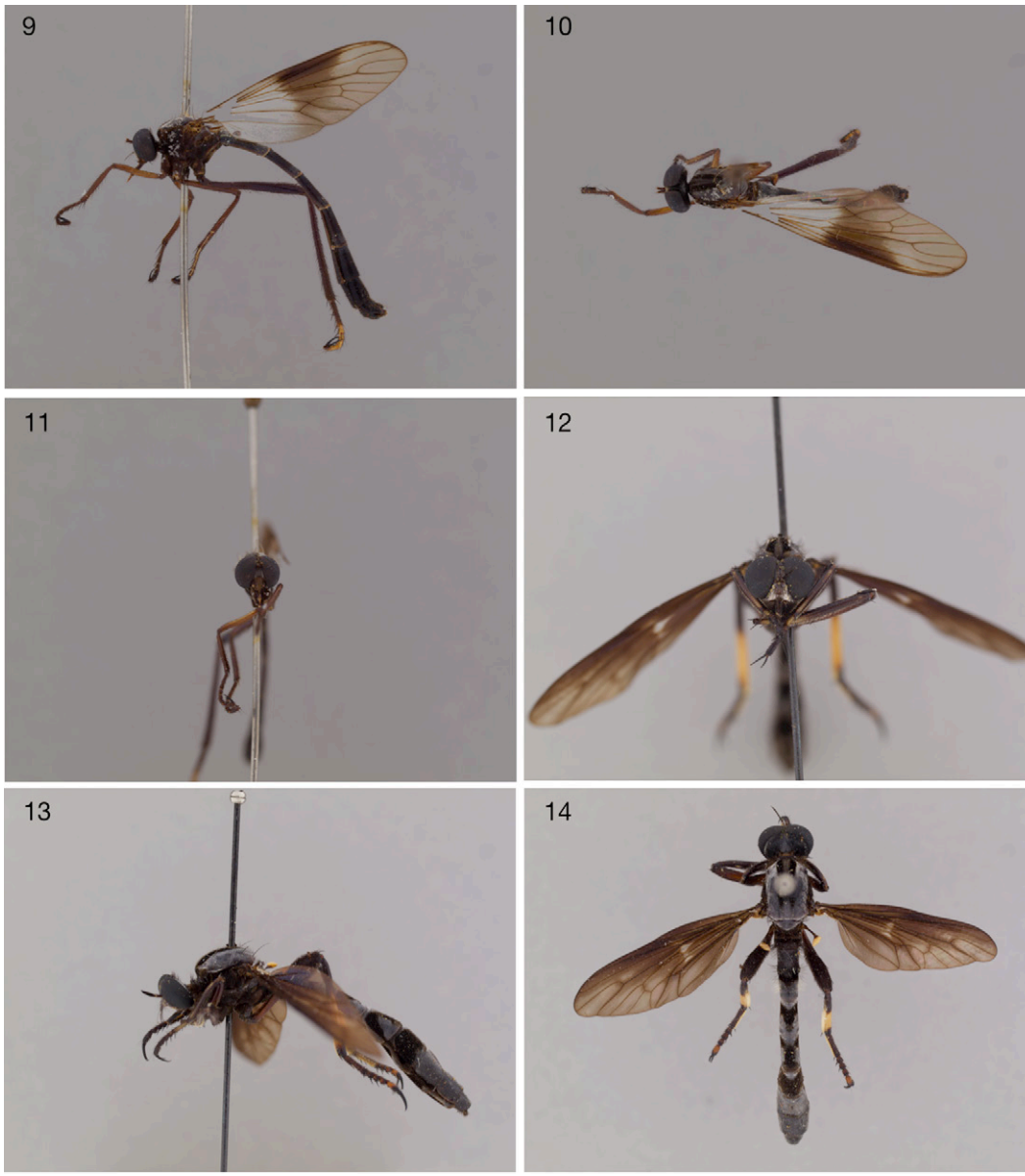
Diagnosis.—The species is distinguished from congeners by the hyaline proximal ⅓ of the wing, the entirely brown tibiae, the yellow metathoracic tarsomeres 2–5, and the overall brown coloration. It is restricted to the Atlantic Forest of Rio de Janeiro and São Paulo states in Brazil.

Description.—*Head:* black, face triangular (narrow dorsally, wide ventrally), wide, wider than width of adjacent ommatidium at narrowest point; face light gray pubescent, facial swelling in lateral view indistinct, not discernible in lateral view; mystax black, macrosetose on lower facial margin, setose laterally and dorsally, center of face asetose, 7 macrosetae; vertex between compound eyes sharply depressed, same width as ocellar triangle (ocellar triangle and compound eyes almost touching); ocellar triangle (in dorsal view) elliptical, not visible (in lateral view) above eye margin, gray pubescent; occiput gray pubescent, ocp setae black; pocl macrosetae black. Proboscis dark brown, brown setose; maxillary palpus dark brown, brown setose.

Antenna: scape black, black setose ventrally, gray pubescent; pedicel black, black setose dorsally and ventrally, gray pubescent; postpedicel long, 2x as long as scape and pedicel combined, dark brown, gray pubescent, asetose; stylus composed of 1 element, stylus shorter than postpedicel, brown, apical seta-like sensory element brown.

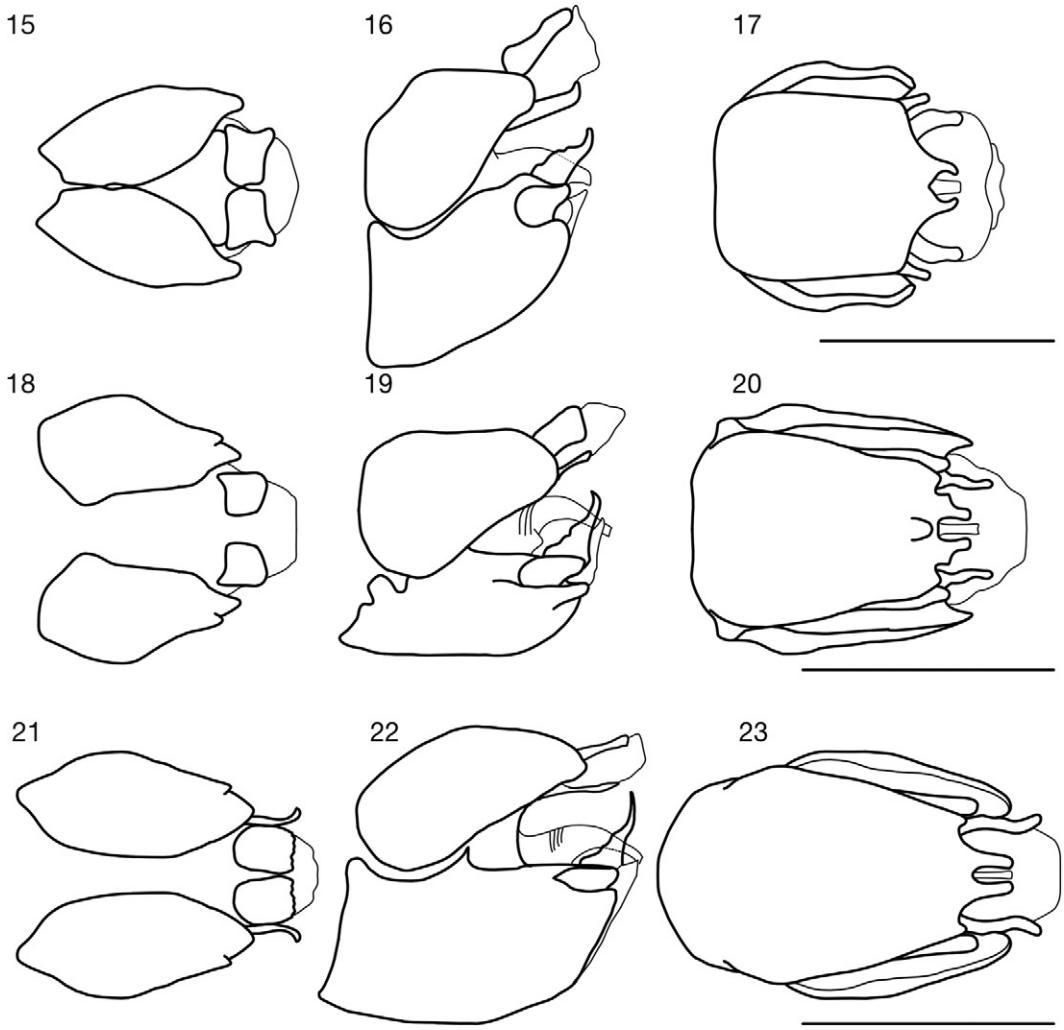
Thorax: black, predominantly gray pubescent, predominantly black setose; postpronotal peg absent; postpronotal lobe brown, brown pubescent, laterally setose, medially asetose, lateral postpronotum with with many (>8) erect setae; scutum dark gray, predominantly light gray pubescent, medially with gray pubescent stripe terminating at transverse suture, paramedially with broad dark gray pubescent stripes terminating at posterior margin of scutum, surface entirely smooth, black setose; acr setae present, dc setae pre- and postsuturally brown, npl seta 1, spal seta 1, pal seta 1; proepisternum, antepronotum, and postpronotum brown pubescent; antepronotum with macrosetae, prosternum asetose, prosternum and proepisternum separated by membrane; pleura dark brown; anterior proepimeron black setose; anepisternum black setose, supero-posterior anepimeron long brown setose; mesopostnotum, anatergite, and katatergite dark brown pubescent, katatergite long black setose; scutellum gray pubescent, posterior margin dark gray, contrasting with anterior scutellar surface, ap sctl setae short, black, ds sctl setae absent.

Leg: in general brown, predominantly brown setose; pro coxa brown pubescent, brown setose, mes coxa brown pubescent, brown setose, met coxa brown pubescent, asetose; pro and mes femur brown, brown setose; met femur predominantly brown, ± cylindrical only slightly wider than pro and mes femur,



Figs. 9–14. *Acronyches alexanderi* and *A. fenestratulus*: 9–11, ♂ of *A. alexanderi* (MZSP-MZ001261, holotype, images at FigShare https://doi.org/10.25573/data.30108925). 9, Lateral. 10, Dorsal, 11 head anterior; 12–14 ♀ of *A. fenestratulus* (MFN-URI-638279, FigShare https://doi.org/10.25573/data.30108976). 12, Head anterior. 13, lateral. 14, dorsal.

brown setose on all surfaces, postero-median 'hair brush' absent; pro and mes tibia brown, met tibia dark brown, anterior tibial stripe absent, pro, mes, and met tibia brown setose; pro and mes tarsomere dark brown, met tarsomere 1 dark brown, fading to light brown distally, tarsomere 2–5 light brown, pro, mes, and met tarsomere 1–5 with long antero-ventral and postero-ventral black macrosetae, pro and mes tarsomere 1 approx. as long as

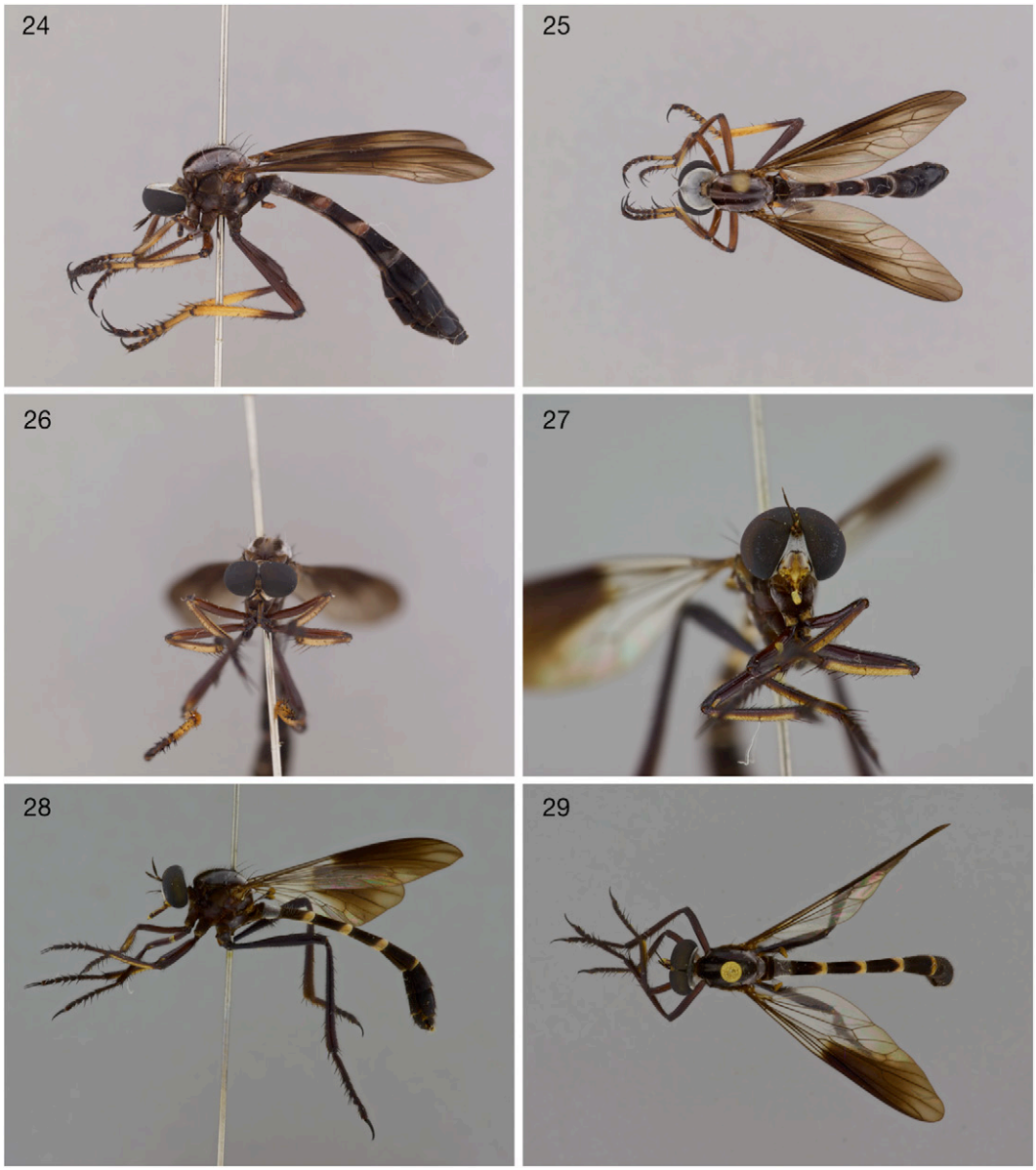


Figs. 15–23. Male terminalia of *Acronyches alexanderi*, *A. fisheri*, and *A. gephyrus*: 15–17, *A. alexanderi* (MZSP-MZ001261, holotype, illustrations at FigShare https://doi.org/10.25573/data.30108925). 15, Dorsal. 16, Lateral. 17, Ventral. 18–20, *A. fisheri* (AAM-010665, paratype, illustration at FigShare https://doi.org/10.25573/data.30246274). 18, Dorsal. 19, Lateral. 20, Ventral. 21–23, *A. gephyrus* (NHMUK013623769, paratype, illustration at FigShare https://doi.org/10.25573/data.30246370). 21, Dorsal, 22, Lateral. 23, Ventral. Scale lines = 1 mm.

tarsomere 2–5, met tarsomere 1 approx. as long as tarsomere 2–4, met tarsomere 5 cylindrical; empodium minute.

Wing: length = 11 mm; proximal part of wing hyaline, center dark brown fading into lighter brown distally, wing pattern: proximal part of wing hyaline, middle region dark brown fading into light brown distally; veins brown; microtrichia densely covering wing, cell bm without or only few microtrichia, cell d densely covered by microtrichia; cell d terminates in M_1, M_2, and M_3; r-m positioned in center of cell d; CuA and CuP present, cell cua open; haltere entirely dark brown.

Abdomen: dark brown, gray pubescent, surface smooth, setae with small sockets only; T1 asetose, brown, brown pubescent; T2–8 predominantly long light brown setose,

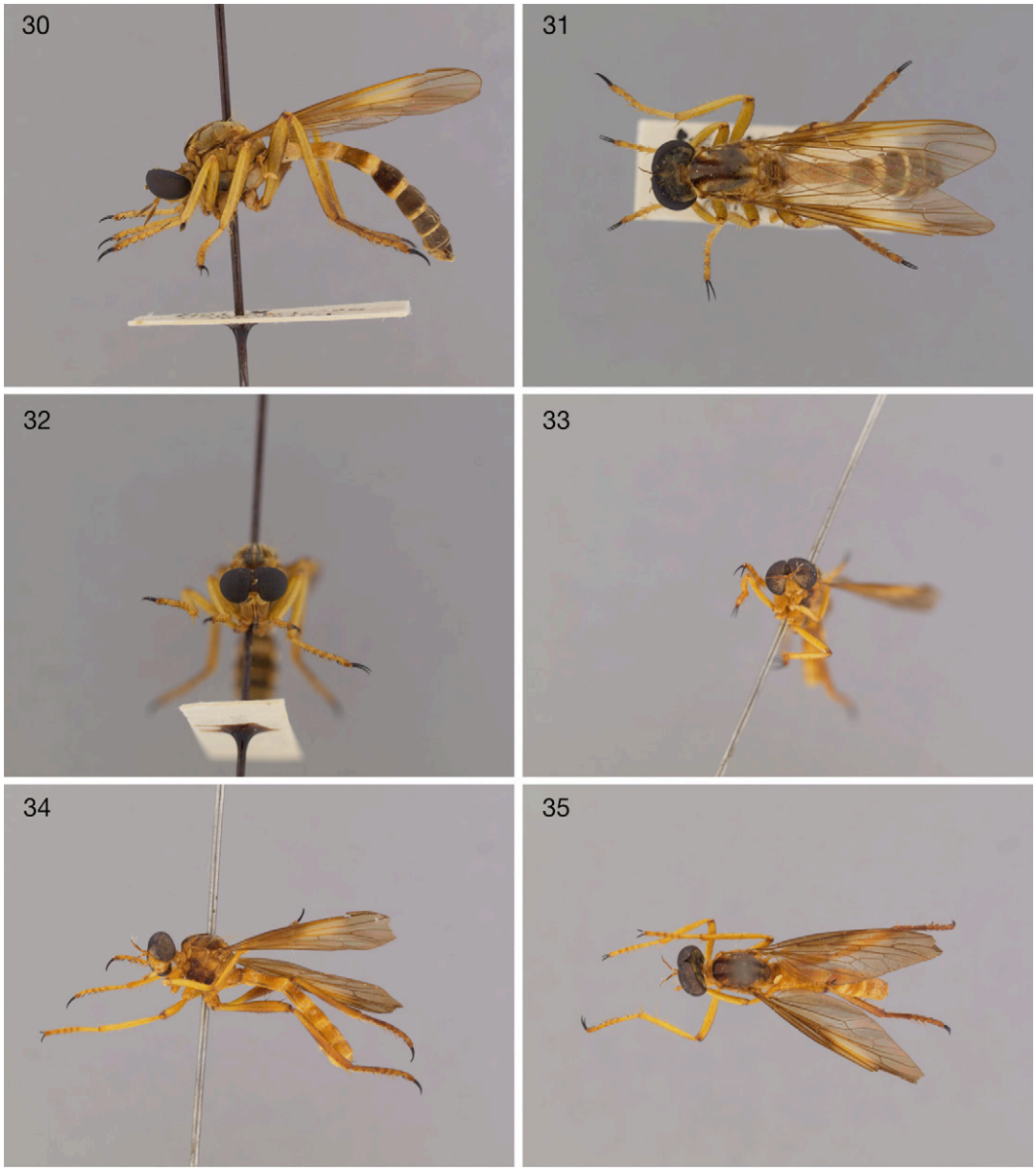


Figs. 24–29. *Acronyches fisheri* and *A. gephyrus*. 24–26, ♂ of *A. fisheri* (USNMENT00972464, holotype, images at FigShare https://doi.org/10.25573/data.30109159). 24, Lateral. 25, Dorsal. 26, Head anterior; 27–29 ♂ of *A. gephyrus* (NHMUK013623770, holotype, FigShare https://doi.org/10.25573/data.30141979). 27, Head anterior. 28, Lateral. 29, Dorsal.

brown, light brown border distally, gray pubescent; S1–7 asetose, brown, entirely gray pubescent.

Type locality.—Brazil: São Paulo: Mogi das Cruzes (23°31'29"S 046°11'13"W, -23.52472 -46.18694).

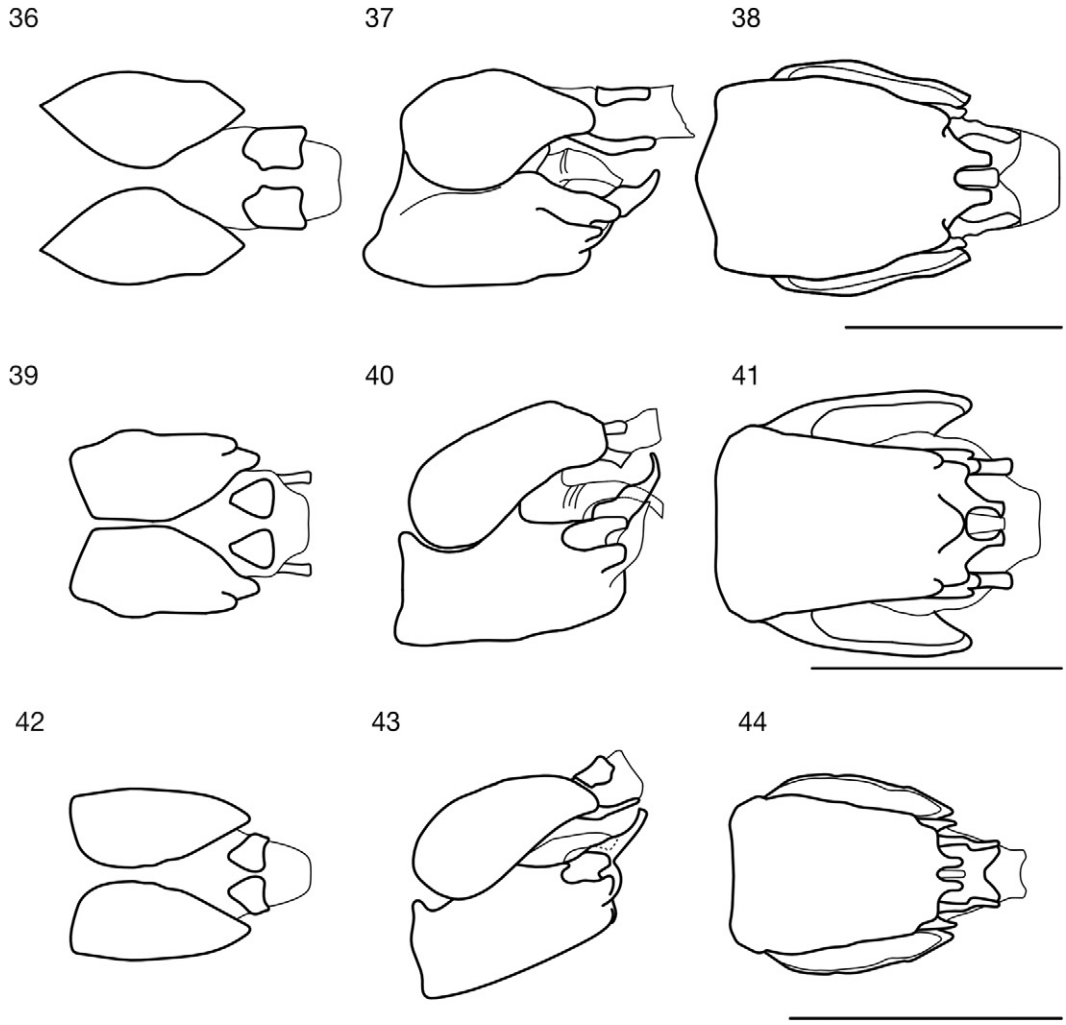
Material examined.—Brazil: São Paulo: 1♂ Mogi das Cruzes, 23°31'29"S 046°11'13"W, 1939-01-00, Carrera, M. (MZSP-MZ001261, Holotype, MZSP); Rio de Janeiro: 1♂ Reprêsa Rio Grande, Jacarepaguá, 22°57' 01"S043°20'59"W,1968-03-00,Alvarenga,M.



Figs. 30–35. *Acronyches imitator*. 30–32, ♂ (lectotype). 30, Lateral (images at FigShare https://doi.org/10.25573/data.30141952). 31, Dorsal. 32, Head anterior. 33–35, ♂ (holotype of *A. geosarginus*, MZSP-MZ001262, FigShare https://doi.org/10.25573/data.30141934). 33, Head anterior. 34, Lateral. 35, Dorsal.

(AAM-006807, Paratype, MNRJ); 1♂ Reprêsa do Rio Grande, Jacarepaguá, Guanabara, 22°58'12"S 043°23'23"W, 1967-12-00, Alvarenga, M. (Paratype, FIOCRUZ).

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—Known only from two localities in southern Brazil (Fig. 84). A rarely collected species known only from three ♂ specimens from three collecting events in 1939, 1967, and 1968 (Table 1). The species is endemic to the Atlantic Forest biodiversity hotspot. Adult flies are active in December, January, and March in summer and early fall in the Southern Hemisphere (Table 2). Nothing is known of the biology.

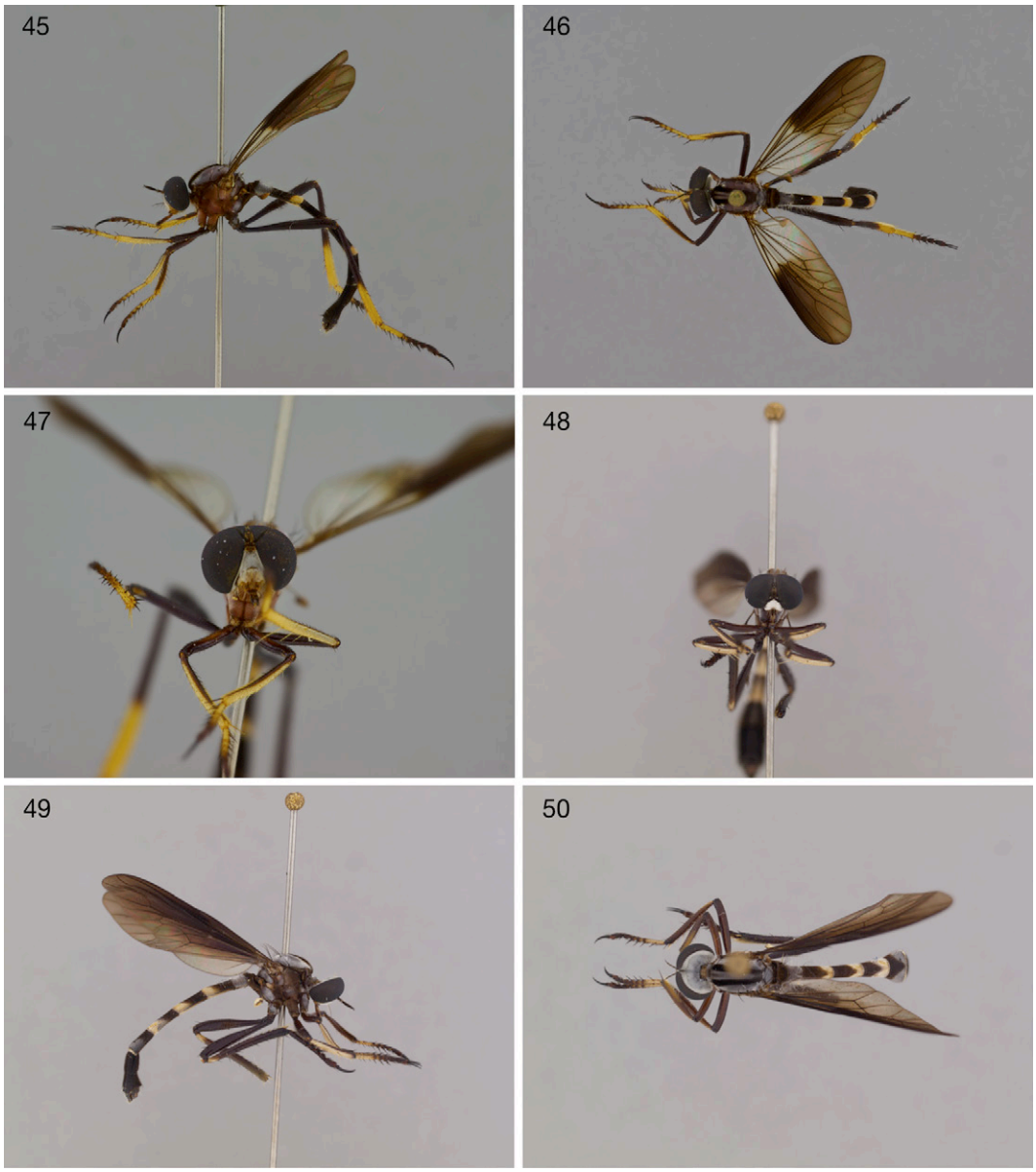


Figs. 36–44. Male terminalia of *Acronyches imitator*, *A. kelispteron*, and *A. mathisi*. 36–38, *A. imitator* (lectotype, images at FigShare https://doi.org/10.25573/data.30141952). 36, Dorsal. 37, Lateral. 38, ventral. 39–41, *A. kelispteron* (AAM-003766, paratype, illustration at FigShare https://doi.org/10.25573/data.30246406). 39, Dorsal. 40, Lateral. 41, Ventral. 42–44, *A. mathisi* (USNMENT00972474, holotype, illustration at FigShare https://doi.org/10.25573/data.30141982). 42, Dorsal. 43, Lateral. 44, Ventral. Scale lines = 1 mm.

Acronyches fenestratulus Hermann, 1921
ZooBank A3AB7670-7EFA-43FC-827D-E39F557F7F25
Original description online biodiversitylibrary.org/page/45494272
GBIF gbif.org/species/1664462
Figs. 12–14, 84

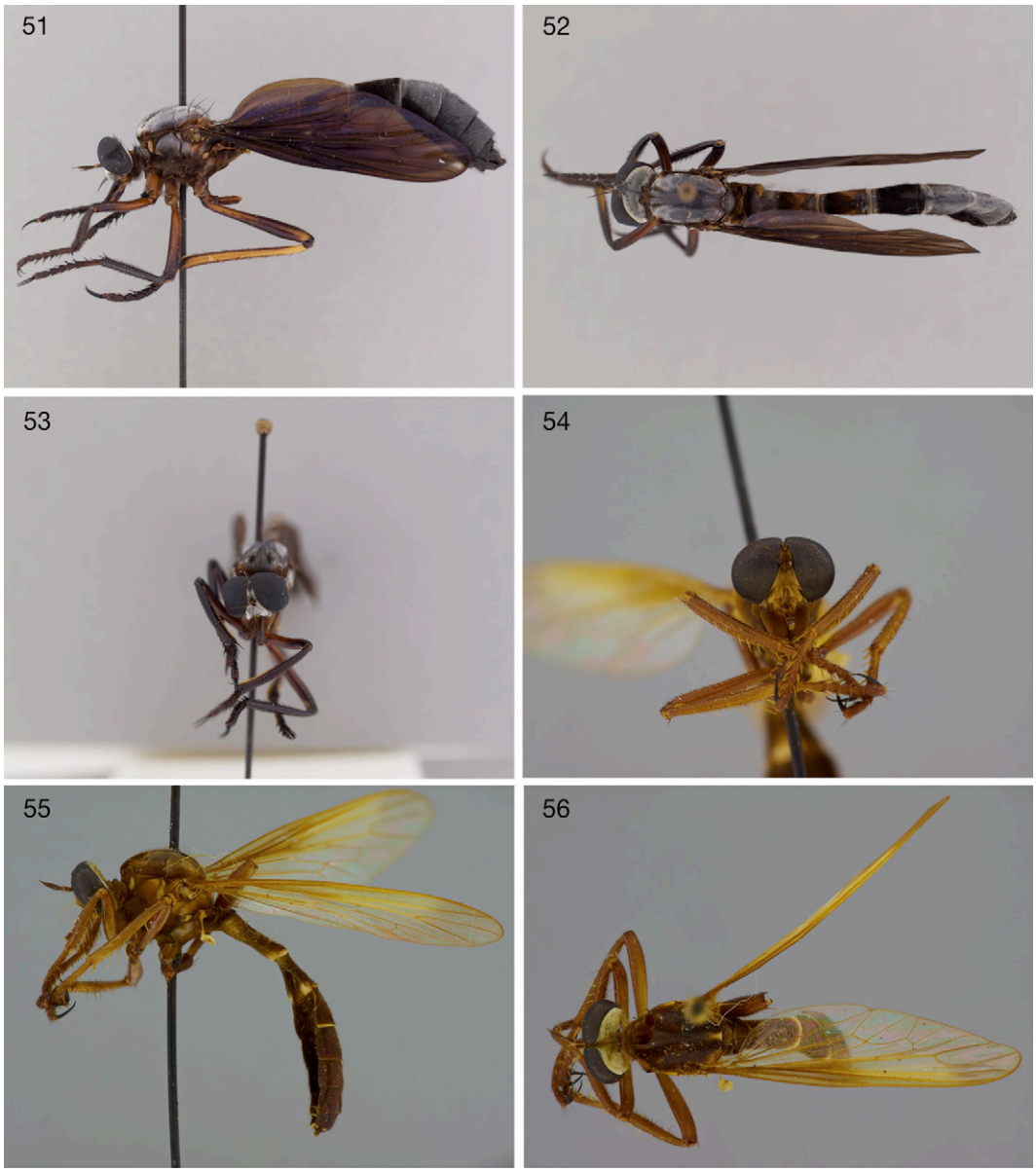
Megonyx giganteus Hull, 1962, junior synonym by Papavero 1971: 148.
ZooBank 5E0B10FC-3E2C-4B85-9E38-D547C26E912F.
Original description online biodiversitylibrary.org/page/7872645.

Diagnosis.—The species is distinguished from congeners by the well-developed facial swelling, the mystax occupying the entire face, the almost entirely brown stained wings, and the yellow coloration of the distal ½ of the metathoracic tibiae.



Figs. 45–50. *Acronyches kelispteron* and *A. mathisi*. 45–47, ♂ of *A. kelispteron* (NHMUK013623771, holotype, images at FigShare https://doi.org/10.25573/data.30141970). 45, Lateral. 46, Dorsal. 47. Head anterior; 48–50 ♂ of *A. mathisi* (USNMENT00972474, holotype, FigShare https://doi.org/10.25573/data.30141982). 48, Head anterior. 49, lateral. 50, dorsal.

Description.—*Head:* dark brown, face triangular (narrow dorsally, wide ventrally), wide, wider than width of adjacent ommatidium at narrowest point; face gray pubescent, facial swelling in lateral view distinct, well-developed and protruding distinctly; mystax black, restricted to lower facial margin, 15–25 macrosetae; vertex between compound eyes sharply depressed, same width as ocellar triangle (ocellar triangle and

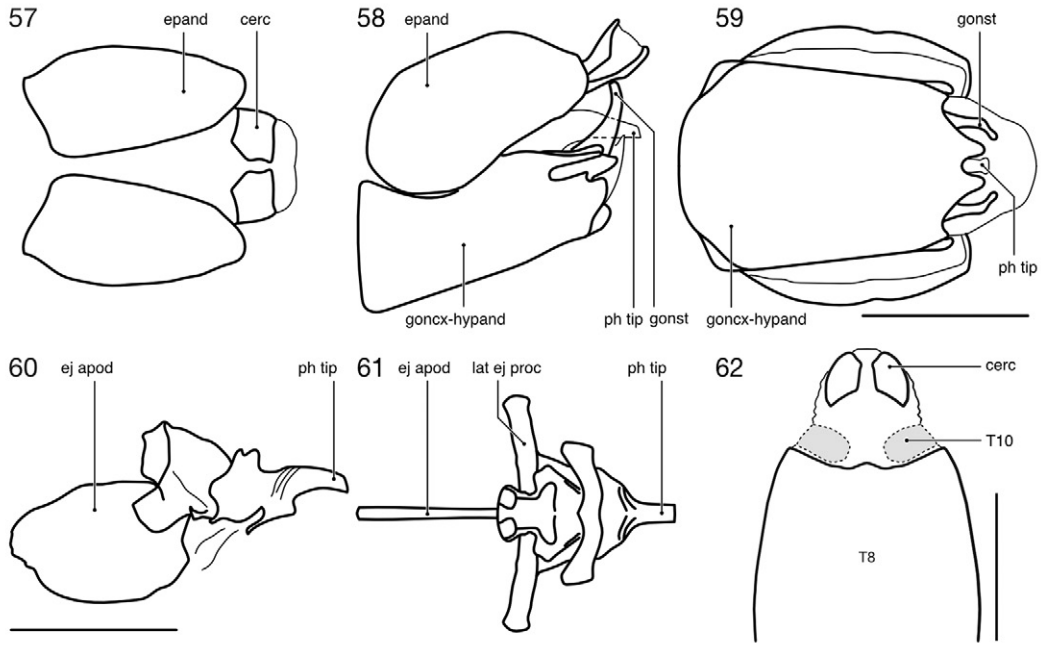


Figs. 51–56. *Acronyches maya* and *A. meruuna.* 51–53, ♂ of *A. maya* (USNMENT00972471, images at FigShare https://doi.org/10.25573/data.30142006). 51, Lateral. 52, Dorsal, 53, Head anterior; 54–56 ♂ of *A. meruuna* (AMNH_IZC-00446550, FigShare https://doi.org/10.25573/data.30142009). 54, Head anterior. 55, lateral. 56, dorsal.

compound eyes almost touching); ocellar triangle (in dorsal view) elliptical, anteriorly protruding dorsally, posteriorly below eye margin, apubescent; occiput gray pubescent, dorso-medially brown pubescent, ocp setae black; pocl macrosetae black.

Proboscis and maxillary palpus: proboscis black, black setose; maxillary palpus brown, black setose.

Antenna: scape brown, black setose ventrally, white pubescent; pedicel brown, black setose dorsally and ventrally, gray pubescent;



Figs. 57–62. Male and female terminalia of *Acronyches maya.* 57–59, Hypopygium (USNMENT00972466, illustrations at FigShare https://doi.org/10.25573/data.30246583). 57, Dorsal. 58, Lateral. 59, Ventral. 60–61, Phallus (USNMENT00972467, illustration at FigShare https://doi.org/10.25573/data.30246628). 60, Lateral. 61, Dorsal. 62, Female abdomen tip (USNMENT00972468, illustration at FigShare https://doi.org/10.25573/data.30246655). Scale lines = 1 mm. cerc = cerci, ej apod = ejaculatory apodeme, epand = epandrium, goncx-hypand = gonocoxite-hypandrial complex, gonst = gonostylus, lat ej proc = lateral ejacutalory process, ph tip = phallus tip.

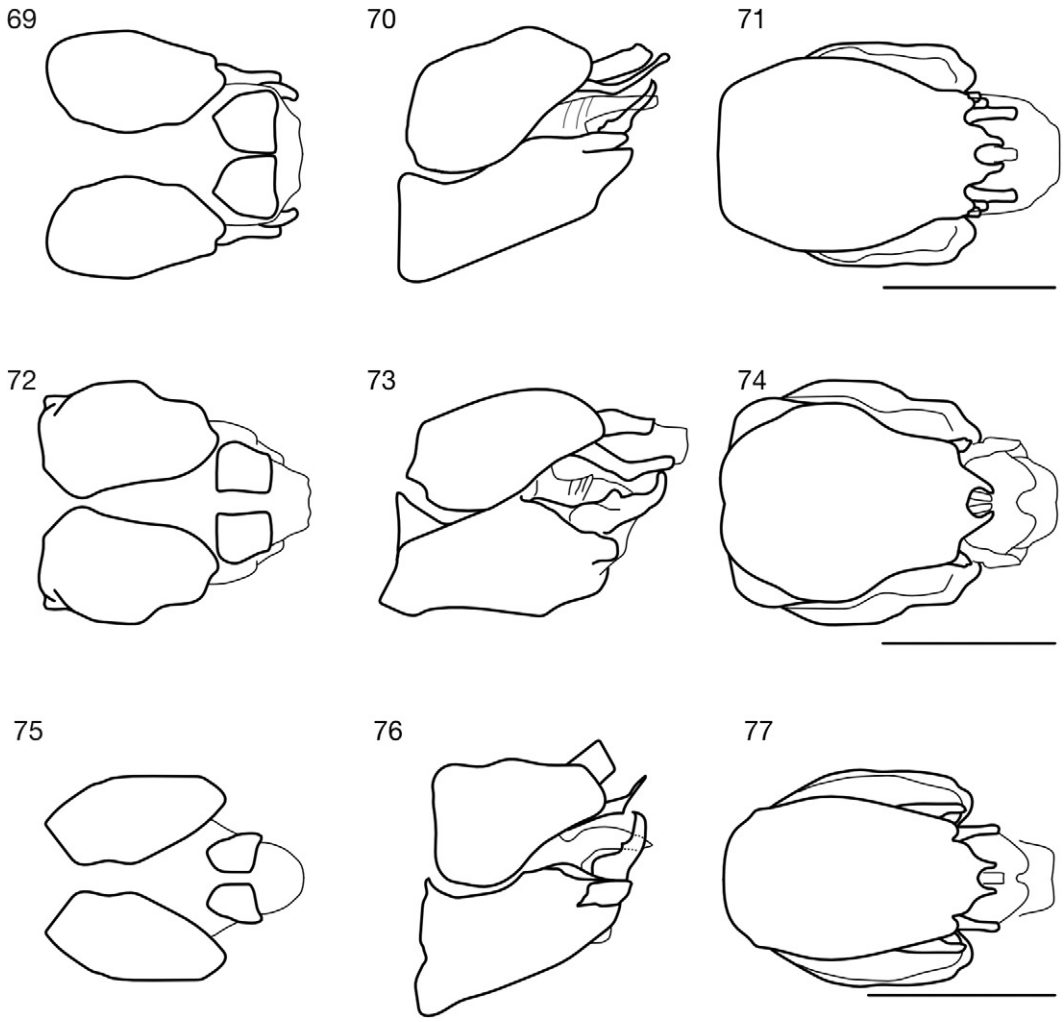
postpedicel long, 2x as long as scape and pedicel combined, brown, gray pubescent, asetose; stylus composed of 1 element, stylus shorter than postpedicel, brown, apical seta-like sensory element hyaline.

Thorax: dark brown, predominantly gray pubescent, predominantly brown setose; postpronotal peg absent; postpronotal lobe brown, gray pubescent, laterally long setose, medially asetose, lateral postpronotum with with many (>8) erect setae; scutum dark gray, predominantly light gray pubescent, medially with broad dark gray pubescent stripe terminating anterior to wing base, paramedially with broad gray pubescent stripes terminating between spa and pal seta, surface entirely smooth, brown and white setose; acr setae present, dc setae pre- and postsuturally black, npl seta 2, spal seta 1, pal seta 1; proepisternum, antepronotum, and postpronotum dark brown; antepronotum with macrosetae, prosternum setose, prosternum and proepisternum separated by membrane; pleura dark brown; anterior proepimeron brown setose; anepisternum long brown setose, setae anteriorly directing, supero-posterior anepimeron asetose; mesopostnotum, anatergite, and katatergite gray pubescent, katatergite long brown setose; scutellum gray pubescent, posterior margin same coloration as anterior scutellar surfaces, ap sctl setae absent, ds sctl setae short, brown.

Leg: in general dark brown or yellow, black, yellow and white setose; pro coxa gray pubescent, black setose, mes coxa gray pubescent, black setose, met coxa gray pubescent, black setose; pro and mes femur dark brown, black setose; met femur dark brown, clubbed in distal ¾, black setose, club more densely setose, postero-median 'hair brush' present,

Figs. 63–68. *Acronyches plutactites* and *A. rarus*. 63–65, ♂ of *A. plutactites* (USNMENT00972472, images at FigShare https://doi.org/10.25573/data.30142027). 63, Lateral. 64, Dorsal. 65, Head anterior. 66–68, ♂ of *A. rarus* (USNMENT00972462, FigShare https://doi.org/10.25573/data.30142051). 66, Head anterior. 67, lateral. 68, dorsal.

black setae; pro and mes tibia predominantly dark brown (may fade into light brown distally), met tibia black proximally (approx. ⅓) and distally, remaining parts yellow, anterior tibial stripe brown, present on pro and mes tibia, pro and mes tibia predominantly white setose (some brown setae), some large black macrosetae, small yellow setae on met tibia; pro and mes tarsomere 1 yellow dorsally, brown ventrally, remaining tarsomere black, pro and mes tarsomere 1–5 with large black macrosetae, met tarsomere 1 with yellow setae, pro and mes tarsomere 1 longer than tarsomere 2–3 combined, but less than 2–4,

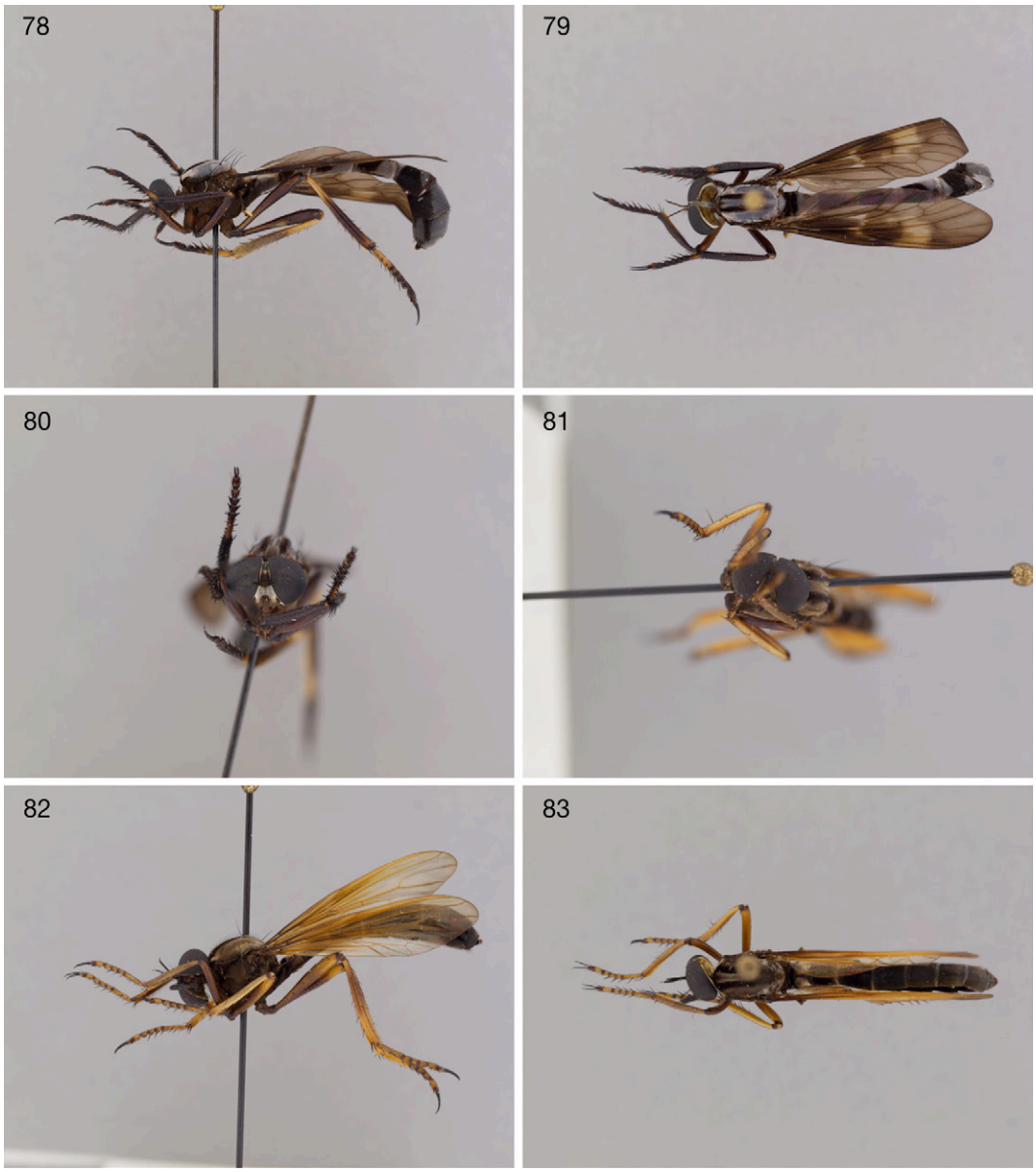


Figs. 69–77. Male terminalia of *Acronyches plutactites*, *A. rarus*, and *A. westcotti*. 69–71, *A. plutactites* (USNMENT00972472, illustrations at FigShare https://doi.org/10.25573/data.30142027). 69, Dorsal. 70, Lateral. 71, Ventral. 72–74 *A. rarus* (AAM-006554, holotype, illustration at FigShare https://doi.org/10.25573/data.30246733). 72, Dorsal. 73, Lateral. 74, Ventral. 75–77, *A. westcotti* (USNMENT00972478, illustration at FigShare https://doi.org/10.25573/data.30246748). 75, Dorsal. 76, Lateral, 77, Ventral. Scale lines = 1 mm.

met tarsomere 1 as long as tarsomere 2–3, but less than 2–4, met tarsomere 5 cylindrical; empodium minute.

Wing: length = 16–19 mm; brown stained throughout, some areas darker than others, with hyaline spots, wing pattern: prominently stained brown with hyaline spots in br and bm cells; veins brown; microtrichia densely covering wing, cell bm densely covered by microtrichia, cell d densely covered by microtrichia; cell d terminates in M_1, M_2, and M_3; r-m positioned in center of cell d; CuA and CuP present, cell cua closed; haltere stalk brown, knob light brown.

Abdomen: dark brown, gray and black pubescent, surface smooth, setae with small sockets only; T1 black setose, dark brown, dark gray pubescent; T2–8 predominantly black setose, T1–3 with some white, long black and white setae laterally, T2 predominantly



Figs. 78–83. *Acronyches westcotti* and *A. willistoni*. 78–80 ♀ of *A. westcotti* (USNMENT02102053, images at FigShare https://doi.org/10.25573/data.30142084). 78, Lateral. 79, Dorsal. 80, Head anterior. 81–83, ♂ of *A. willistoni* (USNMENT00972463, FigShare https://doi.org/10.25573/data.30142105). 81, Head anterior. 82, lateral. 83, dorsal.

light gray with medial transverse dark gray band, light gray triangles distally, T3–7 predominantly dark gray, light gray triangles laterally, dark and light gray pubescent; predominantly dark brown to black setose, some white setae, predominantly dark gray, with some light gray triangular pattern laterally, predominantly dark gray, with some light gray triangular pattern laterally.

Type locality.—Paraguay: Itapua: Santa Trinidad (27°07’54”S 055°42’13”W, -27.13167 -55.70361).

Fig. 84. Distribution map of *Acronyches* species and biodiversity hotspots *sensu* Conservation International in gray. *A. alexanderi* light blue; *A. fenestratulus* = blue; *A. fisheri* = red; *A. gephyrus* = yellow; *A. westcotti* = dark purple. Circle with white outline = type locality; circle with yellow outline = iNaturalist observation.

Material examined.—Argentina: Jujuy: 1♀ Calilegua, 23°46’26”S 064°46’13”W, 1950-02-13, Willink, Monros (AAM-006806, MZUSP); Brazil: Amazonas: 1♀ Manaus, 03°07’25”S 060°02’16”W, 49 m, 1945-10-00, Praetorius, W. (AMNH_IZC-00446540, Holotype *Megonix giganteus* Hull, 1962, AMNH); Paraguay: Itapua: 1♀ Santa Trinidad, 27°07’54”S 055°42’13”W, 1914-03-00 (Holotype, SDEI); Cordillera: 1♀ San Bernardino, 25°18’38”S 057°17’46”W, Fiebrig, K. (MFN-URI-638279, MFN); Peru: Loreto: 1♂ Explorama Lodge, 80 km NE Iquitos, 03°26’36”S 072°51’05”W, 1990-07-19, Dunkle, S. (AAM-009506, FSCA); Madre de Dios: 1♀ Sachavacayoc Cocha, SW Puerto Maldon- ado, 12°51’22”S 069°21’43”W, 2003-04-30, Smit, J. (RMNH.INS.1675935, RMNH); 1♀ Rio Tambopata Reserve, 30 km (air) SW Puerto Maldonado, 12°50’00”S

069°20'00"W, 290 m, 1984-05-15, Pulawski, W. (CASENT8602996, CASC).

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—Known only from six localities in the Southern Hemisphere (Fig. 84). A rarely collected species known only from seven specimens (6 ♀, 1 ♂) from six collecting events between 1914–2003 (Table 1). The species occurs primarily outside of biodiversity hotspots, while the type locality is within the Atlantic Forest biodiversity hotspot. Adult flies are active in February to May, July, and October in late summer, fall, winter, and early spring in the Southern Hemisphere (Table 2). Nothing is known of the biology.

Remarks.—Hermann (1921) listed the sex of the holotype from Santa Trinidad, Paraguay, to be male, but it is a female. Interestingly, K. Fiebrig also collected a specimen of this species at San Bernardino, Paraguay (see specimen MFN-URI-638279), deposited in the MFN, and therefore it was not available for study by F. Hermann. There are two localities in Paraguay, Santa Trinidad and San Bernardino, where both *A. fenestratulus* and *A. imitator* were collected, possibly by the same collector (both are deposited in the same collection, although the labels do not contain detailed collector information).

Acronyches fisheri, new species

Zoobank: CD3421A8-0175-4A34-819E-8B45A4FDA7E5

Figs. 18–20, 24–26, 84

Etymology.—The species is named in honor of Dr. Eric M. Fisher (El Dorado Hills, CA, USA), who collected the holotype and discovered this species as new in 1977. His outstanding knowledge of Neotropical Asilidae and support of the assassin fly community with material and encouragement warrant naming a species of this interesting genus in his honor.

Diagnosis.—The species is distinguished from congeners by the yellow coloration of the distal ⅔ of the metathoracic tibiae, and the brown-stained anterior edge of the wings. It has been collected only in Mexico, Guatemala and Costa Rica.

Description.—*Head:* light brown, face triangular (narrow dorsally, wide ventrally), wide, wider than width of adjacent ommatidium at narrowest point; face white pubescent, facial swelling in lateral view distinct, well-developed and discernible; mystax black, macrosetose on lower facial margin, very sparsely setose laterally and dorsally, center of face asetose, 8 macrosetae; vertex between compound eyes sharply depressed, same width as ocellar triangle (ocellar triangle and compound eyes almost touching); ocellar triangle (in dorsal view) elliptical, anteriorly protruding dorsally, posteriorly below eye margin, gray pubescent; occiput light gray to white pubescent, ocp setae white; pocl macrosetae white.

Proboscis and maxillary palpus: proboscis dark brown, brown setose; maxillary palpus brown, brown setose.

Antenna: scape brown, black setose ventrally, white pubescent; pedicel brown, black setose dorsally and ventrally, white pubescent; postpedicel long, 2x as long as scape and pedicel combined, dark brown, white pubescent throughout, asetose; stylus composed of 1 element, stylus shorter than postpedicel, brown, apical seta-like sensory element hyaline.

Thorax: brown, predominantly brown pubescent, scutum and scutellum gray pubescent, predominantly black setose; postpronotal peg absent; postpronotal lobe brown, yellow pubescent, laterally setose, medially asetose, lateral postpronotum with with 1–2 wavy, erect setae; scutum gray, predominantly light gray pubescent, medially with broad light gray pubescent stripe terminating between spa and pal seta, paramedially with broad dark brown pubescent stripes fused at posterior margin of scutum, surface entirely smooth, black setose; acr setae present, dc setae pre- and postsuturally black, npl seta 1, spal seta 1, pal seta 1; proepisternum, antepronotum, and postpronotum light gray

pubescent; antepronotum with macrosetae, prosternum asetose, prosternum and proepisternum separated by membrane; pleura brown; anterior proepimeron white setose; anepisternum brown setose, supero-posterior anepimeron asetose; mesopostnotum, anatergite, and katatergite gray pubescent, katatergite long brown setose; scutellum gray pubescent, posterior margin dark gray, contrasting with anterior scutellar surface, ap sctl setae short, black, ds sctl setae short, black.

Leg: in general brown and light yellow, predominantly dark brown setose, some yellow and white setae; coxae gray pubescent, brown setose; pro and mes femur brown, brown setose; met femur brown, clubbed in distal ¾, brown setose on all surfaces, postero-median 'hair brush' present, brown setae; pro and mes tibia light brown, with brown anterior stripe, met tibia predominantly yellow, with proximal ⅓ end of tibia brown, anterior tibial stripe brown, present on pro and mes tibia, pro, mes, and met tibia predominantly brown setose, some yellow setae, macrosetae dark and light brown; tarsomere light brown, dark brown band distally, predominantly brown setose, some yellow setae, macrosetae black, pro and mes tarsomere 1 approx. as long as tarsomere 2–4, usually longer, met tarsomere 1 longer than tarsomere 2–4, met tarsomere 5 cylindrical; empodium minute.

Wing: length = 15 mm; entirely hyaline through microtrichia, wing pattern: predominantly brown, darker areas between C, SC and r-m veins, medial edge more opaque; veins brown; microtrichia predominantly covering wing, cell bm proximal ½ densely covered by microtrichia, distal ½ becomes less dense, cell d densely covered by microtrichia; cell d terminates in M_1, M_2, and M_3; r-m positioned in proximal ½ of cell d; CuA and CuP present, cell cua open; haltere stalk brown, knob light brown.

Abdomen: dark gray, dark gray pubescent, surface smooth, setae with small sockets only; T1 black setose, brown, brown pubescent; T2–8 predominantly black setose, T1 long black macrosetose, T2–3 long white setose, predominantly dark gray, T2–4 with light gray triangles laterally, dark and light gray pubescent; predominantly black setose, some white setae, predominantly dark gray, entirely gray pubescent.

Type Locality.—Guatemala: Petén: Ruinas Tikal (17°13'20''N 089°37'25''W, 17.22222 -89.62361)

Material Examined.—Costa Rica: Cartago: 1♂ Turrialba, 09°54'04''N 083°41'00''W, 1944-05-23, Schrader, F. (AAM-010665, Paratype, MZUSP); Guatemala: Petén: 1♀ Ruinas Tikal, 17°13'20''N 089°37'25''W, 245 m, 1977-07-07–1977-07-10, Fisher, E., Fisher, J. (USNMENT00972464, Holotype, USNM); Mexico: Veracruz: 1♀ Catemaco, 18°25'24''N 095°06'44''W, 335 m, 1969-06-16–1969-06-18, Mason, W. (CNCDiptera198141, Paratype, CNC).

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—Known only from three localities in the Northern Hemisphere (southern Mexico to Costa Rica, Fig. 84). A rarely collected species known only from three specimens (2♀, 1♂) from three collecting events between 1944–1977 with one iNaturalist observation (112332422) in 2022 (Table 1). The species is endemic to the Mesoamerica biodiversity hotspot. Adult flies are active in March and May–July in the early spring and summer in the Northern Hemisphere (Table 2). Nothing is known of the biology.

Remarks.—The paratype specimen from Turrialba, Costa Rica (AAM-010665) was labeled as a new species by F.M. Hull with the unpublished name *Acronyches stygius*.

Acronyches gephyrus, new species

Zoobank: 3EA688DD-F67E-46DA-B1BA-D6D5FCB39281

Figs. 21–23, 27–29, 84

Etymology.—From Greek gephyria = bridge, referring to bridging the distribution of the genus through the occurrence in western Colombia and Ecuador.

Diagnosis.—The species is distinguished from congeners by the hyaline proximal ⅓ of the wing, the entirely dark brown to black metathoracic tibiae and tarsi, the open cell cu*a*, and the limited occurrence in Colombia and Ecuador.

Description.—*Head:* brown, face triangular (narrow dorsally, wide ventrally), wide, wider than width of adjacent ommatidium at narrowest point; face white pubescent, facial swelling in lateral view indistinct, not discernible in lateral view; mystax black, macrosetose on lower facial margin, very sparsely setose laterally and dorsally, center of face asetose, 10–13 macrosetae; vertex between compound eyes sharply depressed, same width as ocellar triangle (ocellar triangle and compound eyes almost touching); ocellar triangle (in dorsal view) elliptical, visible (in lateral view) above eye margin, brown pubescent; occiput gray pubescent or silver pubescent, ocp setae black or white; pocl macrosetae black.

Proboscis and maxillary palpus: proboscis brown or dark brown, brown setose or light yellow; maxillary palpus brown, brown setose or light yellow.

Antenna: scape black, black setose dorsally and ventrally, brown pubescent; pedicel brown, black setose dorsally and ventrally, brown pubescent; postpedicel long, 2x as long as scape and pedicel combined, dark brown, brown pubescent, asetose; stylus composed of 1 element, stylus shorter than postpedicel, brown, apical seta-like sensory element brown.

Thorax: dark brown, predominantly gray pubescent, predominantly black setose; postpronotal lobe dark brown, dark brown pubescent, laterally setose, medially asetose, lateral postpronotum with with many (>8) wavy, erect setae; scutum dark gray, predominantly gray pubescent, medially with dark gray pubescent stripe, paramedially with 2 dark gray pubescent stripes terminating in V-like shape at posterior margin of scutum, surface entirely smooth, black setose; acr setae present, dc setae pre- and postsuturally black, npl seta 1, spal seta 1, pal seta 1; proepisternum, antepronotum, and postpronotum brown pubescent; antepronotum with macrosetae, prosternum asetose, prosternum and proepisternum separated by membrane; pleura brown; anterior proepimeron asetose; anepisternum black setose, supero-posterior anepimeron asetose; mesopostnotum, anatergite, and katatergite gray pubescent, katatergite long brown setose; scutellum gray pubescent, posterior margin dark gray, contrasting with anterior scutellar surface, ap sctl setae short, black, ds sctl setae short, black.

Leg: in general black or brown and yellow, predominantly brown setose; coxae brown, gray pubescent, sparse dark brown and black setae; pro and mes femur brown, black setose; met femur black, clubbed in distal ½, brown setose on all surfaces, postero-median 'hair brush' absent; pro and mes tibia dark brown with brown stripe anteriorly, met tibia black, anterior tibial stripe brown, present on pro and mes tibia, pro, mes, and met tibia brown setose or pro, mes, and met tibia yellow, brown and black setose, pro tibia with dense brush of yellow setae anteriorly; tarsomeres dark brown to black, predominantly dark brown setose, some brown setae, macrosetae black, pro and mes tarsomere 1 approx. as long as tarsomere 2–4, usually longer, met tarsomere 1 approx. as long as tarsomere 2–4, met tarsomere 5 cylindrical; empodium minute.

Wing: length = 12 mm; proximal part of wing hyaline, center dark brown fading into lighter brown distally, wing pattern: proximal part of wing hyaline, mid anterior region dark brown fading into light brown distally and posteriorly; veins brown; microtrichia densely covering wing, cell bm without or only few microtrichia, cell d densely covered by microtrichia; cell d terminates in M_1, M_2, and M_3; r-m positioned in center of cell d; CuA and CuP present, cell cua open; haltere stalk brown, knob light brown.

Abdomen: dark gray, gray and brown pubescent, surface smooth, setae with small

sockets only; T1 black setose or brown, dark gray, brown pubescent; T2–8 T2 long white setose, T3–8 brown setose, predominantly dark brown with light yellow band distally, predominantly brown pubescent, T2 with proximal ⅓ light gray pubescent; predominantly black setose or predominantly dark brown setose, dark brown, light yellow bands distally, predominantly brown pubescent, S2 with proximal ⅓ light gray pubescent.

TypeLocality.—Colombia:Putumayo:Villa Garzon (01°01’42’’N 076°37’03’’W, 1.02833 -76.6175)

Material Examined.—Colombia: Putumayo: 1♂ Villa Garzon, 01°01’42”N 076°37’03”W, 400 m, 1984-10-12, Cooper, M. (NHMUK013623770,Holotype,NHMUK);Ecuador: Napo: 1♂ Muyuna, 5 km W Tena, 00°58’43”S 077°51’10”W, 1300 m, 1978-09-28, primary forest, Cooper, M. (NHMUK013623769, Paratype, NHMUK).

Fig. 85. Distribution map of *Acronyches* species and biodiversity hotspots *sensu* Conservation International in gray. *A. imitator* blue; *A. kelispteron* = light blue (included locality at Tambopata Reserve, Peru); *A. mathisi* = dark purple; *A. maya* = red. Circle with white outline = type locality; circle with yellow outline = iNaturalist observation.

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—Known only from two localities just north of the equator in Colombia and Ecuador (Fig. 84). A rarely collected species known only from two specimens from two collecting events between 1978–1984 (Table 1). The species occurs in the Tropical Andes biodiversity hotspot, but also outside of this hotspot. Adult flies are active in September–October in the early fall in the Northern Hemisphere (Table 2). Nothing is known of the biology.

Acronyches imitator Hermann, 1921
ZooBank 1821A76A-F375-4B76-A1EA-BE4AF602BCFD
Original description online biodiversitylibrary.org/page/45494272
GBIF gbif.org/species/1664456
iNaturalist: 1631778-Acronyches-imitator
Figs. 30–38, 85

Acronyches geosarginus Papavero, 1971 **new synonym**.
ZooBank 3D6BC16F-72AA-4A87-8888-3CCBA89F7473.

Diagnosis.—The species is distinguished from congeners by the overall light brown coloration, the entirely yellow to light brown legs and tarsi, and the somewhat distinct wasp-waist in abdominal tergites 2–3.

Description.—*Head:* brown, face triangular (narrow dorsally, wide ventrally), wide, wider than width of adjacent ommatidium at narrowest point; face gray pubescent or light yellow pubescent, facial swelling in lateral view distinct, well-developed and discernible; mystax yellow, macrosetose on lower facial margin, very sparsely setose laterally and dorsally, center of face asetose, 6 macrosetae; vertex between compound eyes sharply depressed, same width as ocellar triangle (ocellar triangle and compound eyes almost touching); ocellar triangle (in dorsal view) elliptical, visible (in lateral view) above eye margin, brown pubescent; occiput gray pubescent, dorso-medially brown pubescent, ocp setae light brown or yellow; pocl macrosetae yellow.

Proboscis and maxillary palpus: proboscis brown, light brown setose; maxillary palpus light brown, light brown.

Antenna: scape light brown, brown setose ventrally, yellow pubescent; pedicel light brown, brown setose dorsally and ventrally, yellow pubescent; postpedicel long, 2x as long as scape and pedicel combined, brown, gray pubescent, asetose; stylus composed of 1 element, stylus shorter than postpedicel, brown or orange, apical seta-like sensory element hyaline.

Thorax: dark brown, predominantly yellow pubescent, predominantly yellow setose; postpronotal peg absent; postpronotal lobe light brown, yellow pubescent, laterally setose, medially asetose, lateral postpronotum with with 1–2 wavy, erect setae; scutum brown, predominantly light gray pubescent, medially with gray pubescent stripe terminating at transverse suture, paramedially with broad dark gray pubescent stripes terminating at posterior margin of scutum, surface entirely smooth, white setose; acr setae present, dc setae pre- and postsuturally white, npl seta 1, spal seta 1, pal seta 1; proepisternum, antepronotum, and postpronotum yellow pubescent; antepronotum with macrosetae, prosternum asetose, prosternum and proepisternum separated by membrane; pleura light brown; anterior proepimeron white setose; anepisternum white setose, supero-posterior anepimeron asetose; mesopostnotum, anatergite, and katatergite yellow pubescent, katatergite long yellow setose; scutellum yellow pubescent, posterior margin dark brown, contrasting with anterior scutellar surface, ap sctl setae absent, ds sctl setae short, brown.

Leg: in general light brown, predominantly brown setose; coxae light brown, gray pubescent, short white setose; pro and mes femur light brown, yellow setose; met femur light brown, clubbed in distal ⅔, light brown setose, postero-median 'hair brush' present, brown setae; pro, mes, and met tibia light

yellow to light brown, anterior tibial stripe absent, pro, mes, and met tibia predominantly yellow setose, some white setae, some brown or yellow macrosetae; tarsomere light brown, predominantly light brown setose, pro and mes tarsomere 1 approx. as long as tarsomere 2–4, met tarsomere 1 approx. as long as tarsomere 2–4, met tarsomere 5 cylindrical; empodium minute.

Wing: length = 13 mm; entirely hyaline through microtrichia, wing pattern: no pattern; veins light yellow; microtrichia densely covering wing, cell bm densely covered by microtrichia, cell d densely covered by microtrichia; cell d terminates in M_1, M_2, and M_3; r-m positioned in center of cell d; CuA and CuP present, cell cua closed or open; haltere entirely light yellow.

Abdomen: dark brown, gray pubescent, surface smooth, setae with small sockets only; T1 black setose, yellow to light brown, yellow pubescent; T2–8 predominantly dark brown setose, T1–2 long white setose, predominantly dark brown with light brown band distally, predominantly yellow pubescent; predominantly dark brown setose, predominantly dark brown, light brown bands distally, entirely gray pubescent.

Type locality.—Paraguay: Cordillera: San Bernardino (25°18’38”S 057°17’46”W, -25.31056 -57.29611).

Material examined.—Argentina: Misiones: 1♀ Parque Nacional Iguazú, 25°41’17”S 054°27’39”W, 1980-11-24, Willink, A., Fidalgo, Claps, Dominguez (IMLA-DIP4166, IMLA); Brazil: Amazonas: Manaus, Reserva Silvicultura, BR 174, km 43, Campina, 02° 36’02”S 060°03’36”W, 2009-09-09–2009-09-24, Malaise trap, Freitas-Silva, R., Monte, G., Vidal, J. (AAM-006548, INPA); Mato Grosso do Sul: 1♂ Dourados, 18°06’00”S 057° 29’00”W, 1937-04-00 (AAM-006805, MZUSP); Goiás: 1♀ Parque Nacional das Emas, 18°10’00”S 052°45’00”W, 1980-10-10–1980-10-24, on tree (arvore), Kent (AAM-006804, MZUSP); Paraguay: Cordillera: 1♀ San Bernardino, 25°18’38”S 057°17’46”W, Fiebrig, K. (Paralectotype, SNSB-ZSM); Itapua: 1♂ Santa Trinidad, 27°07’54”S 055°42’13”W, 1913- 10-00 (Lectotype, SDEI); Suriname: Paramaribo: 1♂ Paramaribo, 05°49’23”N 055°10’03”W, 1960-06-15, Doesburg (MZSP-MZ001262, Holotype *Acronyches geosarginus*, MZUSP).

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—Known only from seven localities spanning the equator from Suriname in the north to southern Paraguay in the south (Fig. 85). A rarely collected species known only from seven specimens (4♀, 3♂) from seven collecting events between 1913–2009 with a single iNaturalist observation (103540572) in 2021 (Table 1). The species occurs primarily outside biodiversity hotspots but also within the Atlantic Forest and Cerrado biodiversity hotspots. Adult flies are active in April, June, and September–December (Table 2). Hermann (1921) mentioned that this species closely resembles *Blepharepium coarctatum* Perty, 1833 (now listed as a subspecies of *B. cajennense* (Fabricius, 1787), 9320175, Dasypogoninae) in habitus and coloration. Nothing else is known of the biology.

Remarks.—Hermann (1921, p. 118) lists a single male” “Cotype” from Santa Trinidad collected in October 1914 (the label indicates the year as 1913), but two syntypes exist. The Santa Trinidad specimen is in the Senckenberg Deutsches Entomologisches Institut (SDEI, referenced as “Deutschem Entom. Museum, Berlin-Dahlem” by Hermann) and labelled as “Cotype”. Another female specimen, from San Bernardino, Paraguay, is in the Zoologische Staatssammlung München (SNSB-ZSM) and bears a red label stating “Type von *Acronyches imitator* Hermann 1921”. The SNSB-ZSM is the collection that houses F. Hermann’s extensive and well-curated Diptera collection, including many primary type specimens of species he described.

Although the San Bernardino specimen is not mentioned in the original description, it appears to have been studied by Hermann at

the time and considered the type. Following the list of species of Asilidae and Mydidae from Paraguay, Hermann identified material collected by L. Zürcher for the SDEI (see title of Hermann's publication), he remarks: "Dieser Aufzählung füge ich nun die Beschreibungen jener paraguayischen Asiliden an, deren Typen, resp.[ektive] Cotypen, in der vorstehenden Sammlung vorhanden sind." Hermann (1921, p. 118) states that he will only reference the primary type specimens and secondary type specimens (his "Cotypes") in the new species descriptions, which have been made available to him by and are now deposited in the SDEI. We regard both, the Santa Trinidad and San Bernardino specimens, as syntypes because of the unusual circumstance that only one, but not the other, specimen is mentioned in the original species description. To preserve taxonomic stability, make more universal the use of this specific name, and to refer to only published specimens, the male specimen from Santa Trinidad in the SDEI is here designated as the lectotype, making the female specimen from San Bernardino in the SNSB-ZSM a paralectotype.

Papavero (1971) described *A. geosarginus* from Suriname and commented on its similarity to *A. imitator.* We regard these differences as insufficient to treat the Suriname specimen as a distinct species. We provide photographs of both the lectotype of *A. imitator* and the holotype of *A. geosarginus* for reference (Figs. 30–35).

***Acronyches kelispteron*, new species**

Zoobank: 5EC25294-7CF2-4909-8491-3B4DD56C87EC

Figs. 39–41, 45–47, 85

Etymology.—From Greek kelis/celis = stain, spot and pteron = wing, referring to the distinctive coloration and staining of the wings.

Diagnosis.—The species is distinguished from congeners by the hyaline proximal ⅓ of the wing, the yellow distal ½ of the metathoracic tibiae, yellow metathoracic tarsomere 1, the open cell cu*a*, and the limited occurrence in Ecuador and Peru.

Description.—*Head:* brown, face triangular (narrow dorsally, wide ventrally), wide, wider than width of adjacent ommatidium at narrowest point; face white pubescent, facial swelling in lateral view distinct, well-developed and discernible; mystax black, macrosetose on lower facial margin, very sparsely setose laterally and dorsally, center of face asetose, 7–9 macrosetae; vertex between compound eyes sharply depressed, same width as ocellar triangle (ocellar triangle and compound eyes almost touching); ocellar triangle (in dorsal view) elliptical, visible (in lateral view) above eye margin, brown pubescent; occiput gray pubescent or silver pubescent, ocp setae white; pocl macrosetae yellow.

Proboscis and maxillary palpus: proboscis dark brown or light brown, light yellow or white setose; maxillary palpus brown, light yellow or white setose.

Antenna: scape brown, brown setose dorsally and ventrally, white pubescent; pedicel brown, black setose dorsally and ventrally, gray pubescent; postpedicel long, 2x as long as scape and pedicel combined, brown, brown pubescent, asetose; stylus composed of 1 element, stylus shorter than postpedicel, brown, apical seta-like sensory element brown.

Thorax: dark brown or light brown, predominantly light gray pubescent, predominantly black setose; postpronotal lobe brown, yellow pubescent, laterally setose, medially asetose, lateral postpronotum with asetose; scutum dark gray, predominantly gray pubescent, medially with dark gray pubescent stripe, paramedially with 2 dark gray pubescent stripes terminating in V-like shape at posterior margin of scutum, 2 light gray pubescent spots latero-medially, surface entirely smooth, black setose; acr setae present, dc setae pre- and postsuturally black, npl seta 1, spal seta 1, pal seta 1; proepisternum, antepronotum, and postpronotum brown pubescent; antepronotum with macrosetae,

prosternum asetose, prosternum and proepisternum separated by membrane; pleura light brown; anterior proepimeron asetose; anepisternum black setose, supero-posterior anepimeron asetose; mesopostnotum, anatergite, and katatergite gray pubescent, katatergite long brown setose; scutellum gray pubescent, posterior margin dark gray, contrasting with anterior scutellar surface, ap sctl setae short, black, ds sctl setae long, brown.

Leg: in general brown and light yellow, predominantly dark brown setose, some yellow and white setae; coxae brown, gray pubescent, sparse dark brown and black setae; pro and mes femur dark brown, light brown stripe along dorsal–anterior side of pro femur, black setose; met femur dark brown, clubbed in distal ½, brown setose on all surfaces, postero-median 'hair brush' present, brown setae; pro and mes tibia light yellowish brown, with brown stripe anteriorly, met tibia dark brown proximally, distally fading from light brown to yellow, anterior tibial stripe brown, present on pro and mes tibia, pro, mes, and met tibia yellow, brown and black setose, pro tibia with dense brush of yellow setae anteriorly; pro and mes tarsomere 1–3 yellowish brown, fading to dark brown in tarsomere 4–5, met tarsomere 1 yellowish brown fading to dark brown distally, tarsomere 2–5 dark brown, predominantly brown setose, some yellow setae, macrosetae black, pro and mes tarsomere 1 approx. as long as tarsomere 2–4, usually longer, met tarsomere 1 approx. as long as tarsomere 2–4, met tarsomere 5 cylindrical; empodium minute.

Wing: length = 12 mm; proximal part of wing hyaline, center dark brown fading into lighter brown distally, wing pattern: proximal part of wing hyaline, mid anterior region dark brown fading into light brown distally and posteriorly; veins brown; microtrichia densely covering wing, cell bm sparsely covered by microtrichia, cell d densely covered by microtrichia; cell d terminates in M_1, M_2, and M_3; r-m positioned in center of cell d; CuA and CuP present, cell cua open; haltere stalk yellow, knob brown.

Abdomen: dark gray, gray pubescent, surface smooth, setae with small sockets only; T1 black setose or brown, dark brown, brown pubescent; T2–8 T2 long white setose, T3–8 white setose, predominantly dark brown with light yellow band distally, predominantly brown pubescent, T2 with proximal ⅓ light gray pubescent; S2 long white setose, S3–8 white setose, S6–8 brown setose, dark brown, light yellow bands distally, predominantly brown pubescent, S2 with proximal ⅓ light gray pubescent.

Type Locality.—Ecuador: Morona Santiago: Macas (02°18'28''S 078°07'13''W, -2.30778 -78.12028).

Material Examined.—Ecuador: Morona Santiago: 1♂ Macas, 02°18'28"S 078°07' 13"W, 1300 m, 1990-11-24, Cooper, M. (NHMUK013623771, Holotype, NHMUK); Peru: Ucayali: 1♂ Coronel Portillo, Masisea, 08°19'53"S 073°41'41"W, 211 m, 2012-10-10–2012-10-27, Sanchez, P. (AAM-003766, Paratype, MHNSM).

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—Known only from two localities south of the equator from Ecuador and Peru (Fig. 85). A rarely collected species known only from two specimens (2♂) from two collecting events in 1990 and 2012 (Table 1). The species occurs in the Tropical Andes biodiversity hotspot but also outside of it. Adult flies are active in October–November (Table 2). Nothing is known of the biology.

Remarks.—Fisher (1984) records a specimen of an unidentified species of *Acronyches* from Tambopata Reserve, Madre Dios, Peru, and his short diagnosis matches *A. kelispteron* very well. We have not been able to locate this specimen in the collections mentioned in the publication (CASC and Frost Entomological Museum, at the Pennsylvania State University) to verify our hypothesis. The specimen from Tambopata Reserve in Madre Dios state would extend the species's

distribution substantially further south and is plotted in Fig. 85).

Acronyches mathisi, new species

Zoobank:
321D11A5-968A-4F70-835E-FC15563F9530
Figs. 42–44, 48–50, 85

Etymology.—The species is named after Wayne N. Mathis in celebration of his career with the present *Festschrift*. Wayne Mathis is a dipterist and biodiversity discoverer with an exceptional knowledge of acalyptrate taxa who published broadly but with a particular emphasis on shore flies (Ephydridae).

Diagnosis.—The species is distinguished from congeners by the almost entirely brown stained wing, the entirely brown metathoracic tibiae and tarsi, and the absence of macrosetae on the antepronotum. It is known only from Brazil.

Description.—*Head:* brown, face triangular (narrow dorsally, wide ventrally), wide, wider than width of adjacent ommatidium at narrowest point; face light gray pubescent, facial swelling in lateral view distinct, well-developed and discernible; mystax yellow, macrosetose on lower facial margin, very sparsely setose laterally and dorsally, center of face asetose, 5 macrosetae; vertex between compound eyes sharply depressed, same width as ocellar triangle (ocellar triangle and compound eyes almost touching); ocellar triangle (in dorsal view) elliptical, anteriorly protruding dorsally, posteriorly below eye margin, gray pubescent; occiput gray pubescent, ocp setae white; pocl macrosetae white.

Proboscis and maxillary palpus: proboscis brown, light brown setose; maxillary palpus brown, light brown.

Antenna: scape brown, white setose ventrally, gray pubescent; pedicel brown, white setose dorsally and ventrally, gray pubescent; postpedicel long, 2x as long as scape and pedicel combined, brown, gray pubescent, asetose; stylus composed of 1 element, stylus shorter than postpedicel, brown, apical seta-like sensory element hyaline.

Thorax: brown, predominantly light gray pubescent, predominantly black setose; postpronotal peg absent; postpronotal lobe light brown, yellow pubescent, laterally setose, medially asetose, lateral postpronotum with asetose; scutum gray, predominantly light gray pubescent, medially with broad light gray pubescent stripe terminating between spa and pal seta, paramedially with broad dark gray pubescent stripes fused posterior margin of scutum, surface entirely smooth, black setose; acr setae present, dc setae pre- and postsuturally black, npl seta 1, spal seta 1, pal seta 1; proepisternum, antepronotum, and postpronotum light gray pubescent; antepronotum without macrosetae, prosternum asetose, prosternum and proepisternum separated by membrane; pleura brown; anterior proepimeron white setose; anepisternum white setose, supero-posterior anepimeron asetose; mesopostnotum, anatergite, and katatergite light gray pubescent, katatergite long white setose; scutellum light gray pubescent, posterior margin dark gray, contrasting with anterior scutellar surface, ap sctl setae short, black, ds sctl setae short, black.

Leg: in general black, predominantly dark brown setose, some yellow and white setae; pro coxa gray pubescent, brown setose, mes coxa gray pubescent, black setose, met coxa predominantly light gray pubescent, black setose; pro and mes femur dark brown, black setose, some white setae; met femur dark brown, clubbed in distal ¾, black setose, some white setae, postero-median 'hair brush' present, short yellow setae; pro and mes tibia predominantly light yellow, brown stripe anteriorly, black band distally, met tibia dark brown, yellow proximally, anterior tibial stripe brown, present on pro and mes tibia, pro, mes, and met tibia predominantly yellow setose, some white setae, some brown or yellow macrosetae; pro and mes tarsomere 1 light yellow, 2–4 transitioning to dark brown, met tarsomere dark brown, predominantly brown setose, some yellow setae, macrosetae black, pro and mes tarsomere 1 approx. as long as

tarsomere 2–4, met tarsomere 1 approx. as long as tarsomere 2–4, met tarsomere 5 cylindrical; empodium minute.

Wing: length = 13 mm; entirely brown stained, wing pattern: predominantly brown, darker areas between C, SC and r-m veins, medial edge more opaque; veins brown; microtrichia predominantly covering wing, cell bm sparsely covered by microtrichia, cell d densely covered by microtrichia; cell d terminates in M_1, M_2, and M_3; r-m positioned in distal ½ of cell d; CuA and CuP present, cell cua closed; haltere stalk brown, knob yellow.

Abdomen: brown, gray pubescent, surface smooth, setae with small sockets only; T1 black setose, dark brown, brown pubescent; T2–8 predominantly black and white setose, T1 with large black macrosetae, T2–5 long white setose, predominantly dark gray, T3–6 with light brown triangles laterally, T7 with light gray triangle, gray pubescent; predominantly black setose, some white setae, S1–4 light yellow, S5–7 dark gray, S1–5 light gray pubescent, S6–7 dark gray pubescent.

Type Locality.—Brazil: Rondônia: Fazenda Rancho Grande (10°19’12’’S 062°28’48’’W, -10.32 -62.48).

Material Examined.—Brazil: Rondônia: 1♂ Fazenda Rancho Grande, 62 km S Ariquemes, 10°19’12’’S 062°28’48’’W, 165 m, 1991-11-12–1991-11-22, Fisher, E. (USNMENT 00972474, Holotype, USNM); Maranhão: 1♀ Carolina, Pov. Campo Grande, Balneário Upupuxete, 07°23’54’’S 047°15’00’’W, 2008-10-28–2008-10-31, Armadilha Malaise, Limeira-de-Oliveira, F., Moraes, P. (CZMA).

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—Known only from two localities south of the equator in Brazil (Fig. 85). A rarely collected species known only from two specimens (1♀, 1♂) from two collecting events in 1991 and 2008 (Table 1). The species occurs in the Cerrado biodiversity hotspot but also outside of it. Adult flies are active in October–November (Table 2). Nothing is known of the biology.

Acronyches maya Martin, 1968
ZooBank 8F1BDBDF-D94E-4889-AB96-C752170AB88B
Original description online biodiversitylibrary.org/page/53666720
GBIF gbif.org/species/1664461
Type record online gbif.org/occurrence/1142509010
iNaturalist: 294875-Acronyches-maya
Figs. 51–53, 57–62, 85

Diagnosis.—The species is distinguished from congeners by the large size (wing length 19–22 mm), the entirely brown stained wings, the well-developed facial swelling, and the limited occurrence in Central America.

Description.—*Head:* black, face triangular (narrow dorsally, wide ventrally), wide, wider than width of adjacent ommatidium at narrowest point; face light gray pubescent, facial swelling in lateral view distinct, well-developed and protruding distinctly; mystax black, macrosetose on lower facial margin, very sparsely setose laterally and dorsally, center of face asetose, (6–)8–9(–10) macrosetae; vertex between compound eyes sharply depressed, same width as ocellar triangle (ocellar triangle and compound eyes almost touching); ocellar triangle (in dorsal view) elliptical, visible (in lateral view) above eye margin, gray pubescent; occiput gray pubescent, ocp setae black; pocl macrosetae black.

Proboscis and maxillary palpus: proboscis brown or dark brown, black setose; maxillary palpus dark brown, black setose.

Antenna: scape brown, black setose ventrally, gray pubescent; pedicel light brown, black setose dorsally and ventrally, yellow pubescent; postpedicel long, 2x as long as scape and pedicel combined, brown, yellow pubescent, asetose; stylus composed of 1 element, stylus shorter than postpedicel, brown, apical seta-like sensory element hyaline.

Thorax: black, predominantly dark gray pubescent, predominantly black setose; postpronotal peg absent; postpronotal lobe brown, yellow pubescent, laterally setose, medially

asetose, lateral postpronotum with with many (>8) wavy, erect setae or with many (>8) erect setae; scutum dark gray, predominantly gray pubescent, with broad dark gray pubescent stripes along dc setae, surface entirely smooth, black setose; acr setae present, dc setae pre- and postsuturally black, npl seta 1(–2), spal seta 1(–4), pal seta 1; proepisternum, antepronotum, and postpronotum gray pubescent; antepronotum with macrosetae, prosternum setose, prosternum and proepisternum separated by membrane; pleura dark brown; anterior proepimeron black setose; anepisternum black setose, supero-posterior anepimeron asetose; mesopostnotum, anatergite, and katatergite gray pubescent, katatergite long black setose; scutellum gray pubescent, posterior margin dark gray, contrasting with anterior scutellar surface, ap sctl setae short, black, ds sctl setae short, black.

Leg: in general dark brown, predominantly dark brown setose, some yellow and white setae; pro coxa gray pubescent, black setose, mes coxa gray pubescent, black setose, met coxa gray pubescent, black setose; pro and mes femur dark brown, brown setose; met femur predominantly dark brown, lighter brown proximally and distally, clubbed in distal ¾, brown setose on all surfaces, posteromedian 'hair brush' present, brown setae; pro and mes tibia dark brown, met tibia light brown with dark brown stripe dorsally and ventrally, anterior tibial stripe absent, pro, mes, and met tibia predominantly dark brown setose, black macrosetae, pro and met tibia with yellow setae distally; pro and mes tarsomere dark brown, met tarsomere 1 brown to light brown with dark brown stripe dorsally and ventrally, darker brown in tarsomere 2–4, predominantly brown setose, some yellow setae, macrosetae black, pro and mes tarsomere 1 approx. as long as tarsomere 2–4, met tarsomere 1 approx. as long as tarsomere 2–4, met tarsomere 5 cylindrical; empodium minute.

Wing: length = 19–22 mm; entirely dark brown stained, wing pattern: predominantly dark brown, with light opaque areas found within cells; veins brown; microtrichia densely covering wing, cell bm densely covered by microtrichia, cell d densely covered by microtrichia; cell d terminates in M_1, M_2, and M_3; r-m positioned in center of cell d; CuA and CuP present, cell cua closed; haltere entirely brown or stalk brown, knob light brown.

Abdomen: dark gray, dark gray pubescent, surface smooth, setae with small sockets only; T1 black setose, dark brown, brown pubescent; T2–8 predominantly black setose, T2–T3 long black setose, predominantly dark gray, T3–5 with light brown triangles laterally, T6 predominantly light gray with dark gray triangles laterally, dark and light gray pubescent; predominantly black setose, predominantly dark gray, S1–3 light gray pubescent, S4–7 dark gray pubescent.

Female terminalia: see generic diagnosis and description.

Type locality.—Mexico: Yucatan: Chichen Itza (20°40'57''N 088°34'07''W, 20.6825 -88.56861).

Material examined.—Costa Rica: Guanacaste: 1♂ Bagaces, Parque Nacional Palo Verde, sector Palo Verde, 1 km radio de Estancia, 10°22'00''N 085°22'59''W, 0–50 m, 2000-06-08–2000-06-17, Jimenez, I. (INBIO-0003132966, INBIO); 1♀ Cañas, 14 km S, 10°19'17''N 085°02'49''W, 1990-07-15–1990-07-25, Parker, F. (LACMENT329885, LACM); 1♀ Cerro El Hacha, 12 km SE La Cruz, 10°58'59''N 085°32'28''W, 300 m, 1991-09-00, Lopez, E., Espinoza, R. (INBIO-000379031, INBIO); 1♀ Estación Murcielago, 8 km S.O. de Cuajiniquil, 10°54'07''N 085° 43'52''W, 100 m, 1993-04-16–1993-07-04, Quesada, F. (INBIO-001724351, INBIO); 1♀ Nicoya, Estación Barra Honda, 10°10' 11''N 085°22'45''W, 100 m, 2000-09-08–2000-09-10, Cardenas, Y., Porras, W. (INBIO-0003330366, INBIO); 1♂ OTS Palo Verde Station, 10°21'00''N 085°21'00''W, 1976-06-00–1976-07-00, Fisher, E. (USNMENT 00972466, USNM); 1♂ OTS Palo Verde

Station, 10°21’00’’N 085°21’00’’W, 1976-07-07–1976-07-09, Fisher, E. (USNMENT 00972471, USNM); 1♀ OTS Palo Verde Station, 10°21’00’’N 085°21’00’’W, 1976-07-01–1976-07-03, Fisher, E. (USNMENT 00972469, USNM); 1♂ OTS Palo Verde Station, 10°21’00’’N 085°21’00’’W, 1976-06-00–1976-07-00, Fisher, E. (USNMENT 00972467, USNM); 1♀ OTS Palo Verde Station, 10°21’00’’N 085°21’00’’W, 1976-06-00–1976-07-00, Fisher, E. (USNMENT 00972468, USNM); 1♀ OTS Palo Verde Station, 10°21’00’’N 085°21’00’’W, 1976-07-01–1976-07-03, Fisher, E. (USNMENT00972470, USNM); 1♀ Reserva Natural Cabo Blanco, Estación San Miguel, Cobano, 09°34’52’’N 085°08’12’’W, 0 m, 1993-11-00, Ramirez, M. (INBIO-001726092, INBIO); 1♀ Rio Naranjo, 3 km SE, 10°39’28’’N 085°05’30’’W, 1993-07-11, Parker, F. (LACMENT329887, LACM); 1♂ Rio Naranjo, 3 km SE, 10°39’28’’N 085° 05’30’’W, 1991-12-00, Parker, F. (LACMENT 329886, LACM); 1♀ Santa Rosa National Park, 10°55’00’’N 085°40’00’’W, 300 m, 1983-08-01–1983-08-28, Janzen, D., Hallwachs, W. (AMNH_IZC-00446530, AMNH); 1♀ Santa Rosa National Park, 10°55’00’’N 085°40’ 00’’W, 300 m, 1982-07-15–1982-07-31, Janzen, D., Hallwachs, W. (AMNH_IZC-00446549, AMNH); 1♀ Santa Rosa National Park, Cerro El Hacha, 11°00’00’’N 085°33’00’’W, 300 m, 1985-08-03–1985-08-24, Malaise trap, Janzen, D. (AMNH_IZC-00446529, AMNH); Mexico: Yucatan: 1♂ Chichen Itza, 20°40’57’’N 088°34’07’’W, 0000-00-00, Thompson, E. (FMNHINS3130454, Holotype, FMNH); 1♀ Piste, near Chichen Itza, 20°41’55’’N 088°35’21’’W, 1967-08-06, Welling, E. (USNMENT00972473, USNM); 1♀ X-Can, 20°51’30’’N 087°40’08’’W, 1963-06-27, - (USNMENT00972465, USNM); Puebla: 1♂ Rio Naxapa, 3 km N Izucar de Matamoros, 18°37’34’’N 098°28’09’’W, 1330 m, 1969-08-18, Byers, G. (AAM-009504, SEMC).

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—Known from several localities in the Northern Hemisphere in Puebla, Mexico, in the north and Costa Rica in the south (Fig. 85). A somewhat commonly collected species known from 21 specimens (14♀, 7♂) from 16 collecting events between 1963–2000 with a single iNaturalist observation (97618714) in 2019 (Table 1). The species occurs in and is endemic to the Mesoamerica biodiversity hotspot. Adult flies are active in April, June–September, and November–December (Table 2). Nothing is known of the biology.

Remarks.—Specimens of this species have been collected in Costa Rica and Mexico while an iNaturalist observation also records this species from El Salvador.

Acronyches meruuna Papavero, 1971
ZooBank BEF54478-83CD-4CED-A016-D632877680A0
GBIF gbif.org/species/1664457
Figs. 54–56, 86

Diagnosis.—The species is distinguished from congeners by the yellow to light-brown notopleural, supra-alar, and postalar macrosetae, the lightly brown stained wings, the brown metathoracic tibiae and tarsi, the entirely brown abdomen, and the restricted occurrence in Bahia and Rio de Janeiro states in Brazil.

Description.—*Head:* brown, face triangular (narrow dorsally, wide ventrally), wide, wider than width of adjacent ommatidium at narrowest point; face gray pubescent, facial swelling in lateral view distinct, well-developed and discernible; mystax light brown, macrosetose on lower facial margin, setose laterally and dorsally, center of face asetose, 6–7 macrosetae; vertex between compound eyes sharply depressed, same width as ocellar triangle (ocellar triangle and compound eyes almost touching); ocellar triangle (in dorsal view) elliptical, not visible (in lateral view) above eye margin, gray pubescent; occiput brown pubescent, ocp setae light brown; pocl macrosetae yellow.

Fig. 86. Distribution map of *Acronyches* species and biodiversity hotspots sensu Conservation International in gray. *A. meruuna* light blue; *A. plutactites* = dark purple; *A. rarus* = blue; *A. willistoni* = red. Circle with white outline = type locality; circle with yellow outline = iNaturalist observation; the type locality of *A. plutactites* is not plotted as no specimens were studied.

Proboscis and maxillary palpus: proboscis dark brown, light brown setose; maxillary palpus brown, light brown.

Antenna: scape brown, brown setose ventrally, gray pubescent; pedicel brown, brown setose dorsally and ventrally, gray pubescent; postpedicel long, 2x as long as scape and pedicel combined, brown, gray pubescent, asetose; stylus composed of 1 element, stylus shorter than postpedicel, brown, apical seta-like sensory element hyaline.

Thorax: brown, predominantly gray pubescent, predominantly brown setose; postpronotal peg absent; postpronotal lobe brown, gray pubescent, laterally setose, medially asetose, lateral postpronotum with with 1–2

wavy, erect setae; scutum gray, predominantly brown pubescent, medially with dark brown pubescent stripe, paramedially with 2 gray pubescent stripes terminating in V-like shape at posterior margin of scutum, surface entirely smooth, black setose; acr setae present, dc setae pre- and postsuturally light brown, npl seta 1, spal seta 1, pal seta 1; proepisternum, antepronotum, and postpronotum gray pubescent; antepronotum with macrosetae, prosternum asetose, prosternum and proepisternum separated by membrane; pleura light brown or brown; anterior proepimeron asetose; anepisternum asetose, supero-posterior anepimeron asetose; mesopostnotum, anatergite, and katatergite yellow pubescent, katatergite long black setose; scutellum gray pubescent, posterior margin same coloration as anterior scutellar surfaces, ap sctl setae short, black, ds sctl setae absent.

Leg: in general brown, dark and light brown setose; coxae gray pubescent, brown setose; pro and mes femur dark brown, brown setose; met femur dark brown, clubbed in distal ⅔, brown setose on all surfaces, postero-median 'hair brush' present, brown setae; pro, mes, and met tibia dark brown, anterior tibial stripe absent, pro, mes, and met tibia brown setose; tarsomere brown, short dark brown setose, long light brown setose, pro and mes tarsomere 1 approx. as long as tarsomere 2–4, met tarsomere 1 approx. as long as tarsomere 2–5, met tarsomere 5 cylindrical; empodium minute.

Wing: length = 14 mm; entirely hyaline, wing pattern: no pattern; veins light brown; microtrichia predominantly covering wing, cell bm densely covered by microtrichia, cell d without or only few microtrichia; cell d terminates in M_1, M_2, and M_3; r-m positioned in center of cell d; CuA and CuP present, cell cua open; haltere entirely light brown.

Abdomen: dark brown, gray pubescent, surface smooth, setae with small sockets only; T1 asetose, brown, brown pubescent; T2–8 T2 long brown setose, T3–7 dark brown setose, predominantly light yellow, medially light brown, gray pubescent; predominantly dark brown setose, dark brown, light brown distally, entirely gray pubescent.

Type locality.—Brazil: Espírito Santo: Parque Sooretama (= Reserva Biológica de Sooretama)

(19°00'59"S 040°05'38"W, -19.01639 -40.09389).

Material examined.—Brazil: Espírito Santo: 1♀ Linhares, Parque Sooretama (= Reserva Biológica de Sooretama), 19°00'59"S 040°05'38"W, 1962-11-00, Oliveira, F. (MZSP-MZ001263, Holotype, MZSP); Rio de Janeiro: 1♀ Rio de Janeiro, 22°53'00''S 043° 13'00''W, 0000-11-00 (AMNH_IZC-0044 6550, AMNH).

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—Known only from two localities south of the equator in Brazil (Fig. 86). A rarely collected species known only from two specimens, both females, from two collecting events in 1962 (one specimen without collecting date, Table 1). The species occurs within and is endemic to the Atlantic Forest biodiversity hotspot. Adult flies are active in November (Table 2). Nothing is known of the biology.

Remarks.—The AMNH specimen from Rio de Janeiro (AMNH_IZC-00446550) bears a label stating "S.W. Williston Collection". It was studied by F.M. Hull and labelled as *Acronyches* sp. This specimen does not match the illustration by Williston (1908) (compare www.biodiversitylibrary.org/page/1316572 and Fig. 55) at least not at first look and only if one assumes that the position of legs and wings has been altered in the drawing published by Williston (1908) to show the structures in more detail. However, similarities are: female specimen with the abdomen arching somewhat ventrally (arching more pronounced in specimen), one met femur pointing dorsally (and not ventrally; right met leg in specimen, left met leg in illustration), angle of wing and visibility of wing venation (right wing in specimen, left wing

in illustration), and the angle of head (same in both). This AMNH specimen is the only specimen that can be attributed to Williston and is from Brazil, so it may have served as a 'model' for the illustration that initiated the discovery of this genus by Williston (1908).

Acronyches plutactites Papavero, 1971
ZooBank E0F6B11C-6350-4A27-A16F-00957D87C6DD
GBIF gbif.org/species/1664463
Figs. 63–65, 69–71, 86

Diagnosis.—The species is distinguished from congeners by the distinctly clubbed metathoracic femora, the yellow mystax, the large size (wing length 17 mm), and the restricted distribution in Costa Rica.

Description.—*Head:* light brown, face triangular (narrow dorsally, wide ventrally), wide, wider than width of adjacent ommatidium at narrowest point; face gray pubescent, facial swelling in lateral view distinct, well-developed and discernible; mystax yellow, macrosetose on lower facial margin, very sparsely setose laterally and dorsally, center of face asetose, 10 macrosetae; vertex between compound eyes sharply depressed, same width as ocellar triangle (ocellar triangle and compound eyes almost touching); ocellar triangle (in dorsal view) elliptical, visible (in lateral view) above eye margin, apubescent; occiput silver pubescent, ocp setae brown; pocl macrosetae white.

Proboscis and maxillary palpus: proboscis brown, white setose; maxillary palpus brown, white setose.

Antenna: scape brown, white setose ventrally, white pubescent; pedicel light brown, white setose dorsally and ventrally, white pubescent; postpedicel long, 2x as long as scape and pedicel combined, brown, gray pubescent, asetose; stylus composed of 1 element, stylus shorter than postpedicel, brown, apical seta-like sensory element hyaline.

Thorax: brown, predominantly gray pubescent, white setose; postpronotal peg absent; postpronotal lobe brown, brown pubescent, laterally long setose, medially asetose, lateral postpronotum with with many (>8) wavy, erect setae; scutum gray, predominantly gray pubescent, medially with 3 light gray pubescent stripes from postpronotal lobes to posterior margin of scutum, paramedially 2 dark gray pubescent strips terminating at posterior margin of scutum, surface entirely smooth, white setose; acr setae present, dc setae pre- and postsuturally white, npl seta 2, spal seta 1, pal seta 1; proepisternum, antepronotum, and postpronotum gray pubescent; antepronotum with macrosetae, prosternum setose, prosternum and proepisternum separated by membrane; pleura dark brown; anterior proepimeron white setose; anepisternum white setose, supero-posterior anepimeron asetose; mesopostnotum, anatergite, and katatergite gray pubescent, katatergite long white setose; scutellum gray pubescent, posterior margin same coloration as anterior scutellar surfaces, ap sctl setae absent, ds sctl setae short, hyaline.

Leg: in general brown and light yellow, black macrosetae, yellow setose; pro coxa gray pubescent, black setose, mes coxa gray pubescent, black setose, met coxa predominantly light gray pubescent, proximal anteriorly brown pubescent, black setose; pro and mes femur light yellow dorsally, brown ventrally, black band apically, black setose or yellow setose; met femur predominantly light yellow, brown stripe ventrally, club brown dorsally, black band distally, clubbed in distal ⅔, black setose on all surfaces, club more densely setose, 2 black thick macrosetae distally, postero-median 'hair brush' present, black setae; pro, mes, and met tibia predominantly light yellow, brown stripe anteriorly, black band distally, anterior tibial stripe brown stripe present on all tibia, pro and mes tibia black thick macrosetose, met tibia black macrosetose, small yellow setae antero-ventrally on pro and met tibia; tarsomere predominantly yellow, dark brown bands distally, pro, mes, and met tarsomere 1–5 with long antero-ventral and postero-ventral black

macrosetae, pro and mes tarsomere 1 longer than tarsomere 2–3 combined, but less than 2–4, met tarsomere 1 as long as tarsomere 2–3, but less than 2–4, met tarsomere 5 cylindrical; empodium minute.

Wing: length = 17 mm; slightly brown stained throughout, wing pattern: predominantly brown near proximal side of wing, lighter brown towards distal end, br and bm brown with opaque areas within center of cell, junction of r2+r3 darker then surrounding area; veins brown; microtrichia densely covering wing, cell bm densely covered by microtrichia, cell d densely covered by microtrichia; cell d terminates in M_1, M_2, and M_3; r-m positioned in center of cell d; CuA and CuP present, cell cua open; haltere entirely brown.

Abdomen: brown, gray pubescent, surface smooth, setae with small sockets only; T1 black setose, brown, brown pubescent; T2–8 predominantly long black setose, T6–7 with some long white setae, T1 gray, T2 light gray, T3 light yellow, T4 dark gray with light brown band distally, T5–7 gray with light band distally, dark and light gray pubescent; predominantly long black setose, S1–2 sparsely setose, S5–7 with some long white setae, S1–2 light yellow, S3–4 dark brown with light brown bands distally, S5–7 gray with light brown bands distally, S1–2 light yellow pubescent, S2 light gray pubescent stripe laterally, S3–4 predominantly dark brown pubescent, some light brown pubescence medially, S5–S7 gray pubescent with some light brown pubescence medially.

Type locality.—Costa Rica: Cartago: Turrialba (09°54'04"N 083°41'00"W).

Material examined.—Costa Rica: Heredia: 1♂ La Selva, 3 km S Puerto Viejo, 10°26'00''N 084°01'00''W, 1983-03-23, Hespenheide, H. (USNMENT00972472, USNM).

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—Known only from two localities in the Northern Hemisphere in Costa Rica (Fig. 86). A rarely collected species known only from two specimens (1♀, 1♂) from two collecting events in 1944 and 1983 (Table 1). The species occurs within and is endemic to the Mesoamerica biodiversity hotspot. Adult flies are active in March–April (Table 2). Nothing is known of the biology.

Remarks.—The unique female holotype from Turrialba, Costa Rica, collected in April 1944 by F. Schrader, could not be located at the Museum of Comparative Zoology (MCZ) at Harvard University as indicated as the depository by Papavero (1971). The 2nd author has visited the MZSP and did not locate the holotype there either (should it not have been returned to the MCZ). Therefore, the holotype has to be regarded as lost. With the present study re-describing this distinct species and providing high-resolution photographs, a neotype designation is in our view unnecessary. See the Discussion on specimens collected at Turrialba – the only locality where three species of *Acronyches* have been collected to date.

Acronyches rarus Martin, 1968
ZooBank 105D983E-18F0-47B3-AA24-2E417FF5FD08
Original description online biodiversitylibrary.org/page/53666721
GBIF gbif.org/species/1664458
Figs. 66–68, 72–74, 86

Diagnosis.—The species is distinguished from congeners by the numerous wavy, erect setae on the lateral postpronotum, the overall light brown coloration, the lightly brown stained wings, and the limited occurrence in Mexico.

Description.—*Head:* light brown, face triangular (narrow dorsally, wide ventrally), wide, wider than width of adjacent ommatidium at narrowest point; face gray pubescent, facial swelling in lateral view distinct, well-developed and discernible; mystax light brown, macrosetose on lower facial margin, setose laterally and dorsally, center of face asetose, 8–12 macrosetae; vertex between compound eyes sharply depressed, same

width as ocellar triangle (ocellar triangle and compound eyes almost touching); ocellar triangle (in dorsal view) elliptical, anteriorly protruding dorsally, posteriorly below eye margin, brown pubescent; occiput yellow pubescent, gray pubescent along medial line, ocp setae brown, yellow or dark brown dorsally transitioning to black ventrally; pocl macrosetae yellow.

Proboscis and maxillary palpus: proboscis light brown, brown setose or light brown setose; maxillary palpus light brown, brown setose or light brown.

Antenna: scape yellow, brown setose ventrally or light brown setose ventrally, yellow pubescent; pedicel yellow, brown setose dorsally and ventrally or yellow setose dorsally and ventrally, yellow pubescent; postpedicel long, 2x as long as scape and pedicel combined, light yellow, yellow pubescent, asetose; stylus composed of 1 element, stylus shorter than postpedicel, orange, apical seta-like sensory element hyaline.

Thorax: light yellow, predominantly light gray pubescent, predominantly yellow setose; postpronotal peg absent; postpronotal lobe light brown, yellow pubescent, laterally long setose, medially asetose, lateral postpronotum with with many (>8) wavy, erect setae; scutum light brown, predominantly light gray pubescent, medially with faint light brown pubescent stripe terminating at transverse suture, paramedially with broad light brown pubescent stripes on entire length of scutum, surface entirely smooth, predominantly yellow setose; acr setae present, dc setae pre- and postsuturally light brown, npl seta 1, spal seta 1, pal seta 1; proepisternum, antepronotum, and postpronotum yellow pubescent; antepronotum with macrosetae, prosternum setose, prosternum and proepisternum separated by membrane; pleura light brown; anterior proepimeron white setose; anepisternum long brown setose, supero-posterior anepimeron asetose; mesopostnotum, anatergite, and katatergite yellow pubescent, katatergite long brown setose; scutellum gray pubescent, posterior margin light brown, contrasting with anterior scutellar surface, ap sctl setae short, brown, ds sctl setae short, white.

Leg: in general yellow, predominantly yellow setose, some black setae; coxae yellow, gray pubescent, short black setose; pro and mes femur light brown, brown band apically, yellow setose; met femur predominantly yellow, light brown anteriorly, brown band distally, clubbed in distal ⅔, predominantly yellow setose on all surfaces, postero-median 'hair brush' present, brown setae; pro, mes, and met tibia light yellow, rarely pro, mes, and met tibia light brown to brown, anterior tibial stripe absent, pro, mes, and met tibia predominantly yellow setose, some yellow or black macrosetae; tarsomere yellow to light yellow, light brown band distally, pro, mes and met tarsomere 1–5 with long antero-ventral and postero-ventral yellow and/or black macrosetae, pro and mes tarsomere 1 approx. as long as tarsomere 2–4, usually longer, met tarsomere 1 longer than tarsomere 2–4, met tarsomere 5 cylindrical; empodium minute.

Wing: length = 14–18 mm; light brown stained throughout, some areas lighter than others, wing pattern: predominantly light brown, darker areas between C and Sc veins, opaque blotches crossing r, br, bm cells, large opaque blotch between r_5, r3, r_1 cells of varying size; veins light yellow; microtrichia densely covering wing, cell bm densely covered by microtrichia, cell d densely covered by microtrichia; cell d terminates in M_1, M_2, and M_3; r-m positioned in distal ½ of cell d; CuA and CuP present, cell cua closed or open; haltere entirely light brown.

Abdomen: yellow, yellow and light gray pubescent, surface indented, setae with large sockets; T1 brown, yellow to light brown, brown pubescent; T2–8 predominantly yellow setose, T1 with some long white setae, T1–7 light brown, light brown pubescent; predominantly light brown to yellow setose, with some white setae, yellow, predominantly yellow to light brown pubescent, some light gray

pubescence, S2–4 with light yellow pubescent triangles laterally.

Type locality.—Mexico: Morelos: Yautepec (18°53’35”N 099°04’35”W, 18.89306 -99.07639).

Material examined.—Mexico: Guerrero: 2♀ Iguala, 18 km N, 18°27’10”N 099° 31’50”W, 1311 m, 1987-07-05, Wharton, Robert (TAMU-ENTO-X1031108, TAMU); Jalisco: 1♀ El Grullo, 10 km NE, 19°50’27”N 104°07’21”W, 1991-08-8, Noguera, F. (EBCC1164, EBCC); 1♀ San Buenaventura, 19°45’03”N 104°03’33”W, 840 m, 1997-07-1, Noguera, F. (EBCC2635, EBCC); 1♀ San Buenaventura, 19°45’03”N 104°03’33”W, 840 m, 1997-07-1, Ayala, R. (EBCC2636, EBCC); 1♀ San Buenaventura, 19°45’03”N 104°03’33”W, 840 m, 1997-08-3, Ramírez, E. (EBCC2637, EBCC); 1♀ San Buenaventura, 19°45’03”N 104°03’33”W, 840 m, 1997-08-3, Rodríguez A. (EBCC2638, EBCC); 1♀ San Buenaventura, 19°45’03”N 104°03’33”W, 840 m, 1997-08-4, Ramírez, E. (EBCC2639, EBCC); 1♀ San Buenaventura, 19°48’25”N 104°01’52”W, 900 m, 1997-08-5, Noguera, F. (EBCC2640, EBCC); 1♀ San Buenaventura, 19°45’03”N 104°03’33”W, 840 m, 1997-09-3, Rodríguez A. (EBCC2641, EBCC); Morelos: 1♀ Ajuchitlán, 2.5 km O, 18°28’04”N 098°59’32”W, 950 m, 1996-07-31, Morales, M. (EBCC1166, EBCC); 1?*Ajuchitlán, 2.5 km O, 18°28’04”N 098°59’32”W, 950 m, 1996-10-9, Noguera, F. (EBCC2144, EBCC); 1♀ Huautla Estación CEAMISH, 2.5 km N and 4 km O, 18°27’40”N 099°02’28”W, 940 m, 1996-08-9, Guardado, M. (EBCC1165, EBCC); 1♀ Huautla Estación CEAMISH, 2.5 km N and 4 km O, 18°27’40”N 099°02’28”W, 940 m, 1996-10-9, Ayala, R. (EBCC2018, EBCC); 1♂ Huautla Estación CEAMISH, 2.5 km N and 4 km O, 18°27’40”N 099°02’28”W, 940 m, 1996-08-5–1996-08-10, Malaise Trap 1, Noguera, F., Morales, M., Uribe, C., González, E., Rodríguez, A., Zaragoza, S., Rodríguez, B., Guardado, M., Pérez, A. (EBCC2498, EBCC); 1♂ Yautepec, 18°53’35”N 099°04’35”W, 1968-07-13–0000–00, Parker, F., Stange, L. (AAM-006554, Holotype, UCD); Mexico: 1♂ Colorines, 19°10’60”N 100°13’00”W, 1974-06-17–1974-06-21, Porter, C., Calmbacher, C. (AAM-006542, FSCA); Oaxaca: 1♀ Puente los Pilletes, 3.4 km SE, 16°24’11”N 095°47’13”W, 671 m, 1968-07-07–1974-06-21, McFadden, M. (USNMENT00972462, USNM);

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—Known from several localities in the Northern Hemisphere in southern Mexico (Fig. 86). A somewhat commonly collected species known from 16 specimens (13♀, 3♂) from 12 collecting events between 1968–1997 (Table 1). The species occurs in and is endemic to the Mesoamerica biodiversity hotspot. Adult flies are active in June–October (Table 2). Nothing is known of the biology.

Remarks.—*Acronyches rarus* occurs sympatrically with *A. westcotti* at San Bernardino, Mexico (see Discussion). The species inhabits tropical deciduous forests (A. Estrada, pers. comm.).

Acronyches westcotti Martin, 1968
ZooBank DC306509-5855-4E3D-B823-DB0EC4220001
Original description online biodiversitylibrary.org/page/53666722
GBIF gbif.org/species/1664465
iNaturalist: 259982-Acronyches-westcotti
Figs. 75–80, 84

Diagnosis.—The species is distinguished from congeners by the overall brown to black coloration, the 2–3 black lateral macrosetae on the antepronotum, the lightly yellow proximal 1/5 on the metathoracic tibiae, the brown stained wings with whitish spots speckled in, and the limited occurrence in Mexico.

Description.—*Head:* brown, face triangular (narrow dorsally, wide ventrally), wide, wider than width of adjacent ommatidium at narrowest point; face white pubescent, facial swelling in lateral view distinct, well-developed and discernible; mystax black, macrosetose on lower facial margin, setose laterally and dorsally, center of face asetose, (6–)7–9 macrosetae; vertex between compound eyes sharply depressed, same width as ocellar

triangle (ocellar triangle and compound eyes almost touching); ocellar triangle (in dorsal view) elliptical, anteriorly protruding dorsally, posteriorly below eye margin, brown pubescent; occiput yellow pubescent, gray pubescent along medial line, ocp setae black; pocl macrosetae brown.

Proboscis and maxillary palpus: proboscis dark brown, black setose; maxillary palpus brown, black setose.

Antenna: scape brown, black setose ventrally, white pubescent; pedicel brown, black setose dorsally and ventrally, white pubescent; postpedicel long, 2x as long as scape and pedicel combined, dark brown, white pubescent throughout, asetose; stylus composed of 1 element, stylus shorter than postpedicel, brown, apical seta-like sensory element hyaline.

Thorax: brown, predominantly gray pubescent, predominantly black setose; postpronotal peg absent; postpronotal lobe brown, brown pubescent, laterally setose, medially asetose, lateral postpronotum with with many (>8) wavy, erect setae; scutum gray, predominantly light gray pubescent, medially with faint black pubescent stripe to transverse suture, paramedially with broad black pubescent stripes along dc setae to posterior margin of scutum, surface entirely smooth, black setose; acr setae present, dc setae pre- and postsuturally black, npl seta 1, spal seta 1(–3), pal seta 1; proepisternum, antepronotum, and postpronotum brown pubescent; antepronotum with macrosetae, prosternum setose, prosternum and proepisternum separated by membrane; pleura brown; anterior proepimeron brown setose; anepisternum black setose, supero-posterior anepimeron asetose; mesopostnotum, anatergite, and katatergite brown pubescent, katatergite long black setose; scutellum light gray pubescent, posterior margin dark gray, contrasting with anterior scutellar surface, ap sctl setae short, black, ds sctl setae short, black.

Leg: in general brown and yellow, predominantly dark brown setose, some yellow and white setae; coxae gray pubescent, brown setose; pro and mes femur dark brown, brown setose; met femur predominantly dark brown, lighter brown proximally, clubbed in distal ¾, brown setose on all surfaces, postero-median 'hair brush' present, short yellow setae; pro and mes tibia dark brown, met tibia dark brown yellow to light brown proximally, anterior tibial stripe absent, pro, mes, and met tibia predominantly dark brown setose, black macrosetae, pro and met tibia with yellow setae distally or pro, mes, and met tibia predominantly dark brown setose, black macrosetae, yellow setae distally; pro and mes tarsomere dark brown, met tarsomere 1 brown to light brown with dark brown stripe dorsally and ventrally, darker brown in tarsomere 2–4, predominantly brown setose, some yellow setae, macrosetae black, pro and mes tarsomere 1 approx. as long as tarsomere 2–4, met tarsomere 1 approx. as long as tarsomere 2–4, met tarsomere 5 cylindrical; empodium minute.

Wing: length = 12.5–17 mm; slightly brown stained throughout, wing pattern: predominantly light brown, darker areas between C and Sc veins, opaque blotches crossing r, br, bm cells, large opaque blotch between r_5, r3, r_1 cells of varying size; veins brown; microtrichia densely covering wing, cell bm densely covered by microtrichia, cell d densely covered by microtrichia; cell d terminates in M_1, M_2, and M_3; r-m positioned in distal ½ of cell d; CuA and CuP present, cell cua closed; haltere entirely brown or stalk brown, knob light brown.

Abdomen: dark gray, dark gray pubescent, surface smooth, setae with small sockets only; T1 black setose, dark brown, dark gray pubescent; T2–8 predominantly black setose, T1 long black macrosetose, T2–3 long white setose, predominantly dark gray, T3–5 with light gray triangles laterally, dark and light gray pubescent; predominantly black setose, predominantly dark gray, predominantly dark gray, S2–4 with light gray lateral edges.

Type locality.—Mexico: Nayarit: Ixtlán del Río, 32 km SE (20°59'06"N 104°06'11"W, 20.985 -104.10306).

Material examined.—Mexico: Colima: 1♀ Minatitlán, 22 km E, 19°22’05’’N 103°56’22’’W, 1993-04-19, Rodríguez A. (EBCC1167, EBCC); 1♂ Minatitlán, 22 km E, 19°22’05’’N 103°56’22’’W, 1993-04-19, Rodríguez A. (EBCC1168, EBCC); Guerrero: 1♀ Acahuizotla, 17°21’37’’N 099°28’02’’W, 827 m, 1983-06-27, Garcia, M. (AAM-003103, CNIN); Jalisco: 1♀ El Tuito, 16 km NW, 20°23’17’’N 105°26’20’’W, 305 m, 1990-07-25, Westcott, R. (USNMENT00972460, USNM); Jalisco: 1♂ Estación de Biología Chamela, 19°36’27’’N 105°03’05’’W, 1990-07-27–1990-07-29, Westcott, R. (USNMENT00972478, USNM); 1♂ Estación de Biología Chamela, 19°36’27’’N 105°03’05’’W, 1981-07-13–1981-07-14, prey of *Ospriocerus diversus*, Pinto, J., Fisher, E., LaSalle, J. (USNMENT00972461, USNM); 1♀ Estación de Biología Chamela, 19°36’27’’N 105°03’05’’W, 1990-07-27–1990-07-29, Westcott, R. (USNMENT00972479, USNM); 1♂ Estación de Biología Chamela, 19°36’27’’N 105°03’05’’W, 1990-07-23–1990-07-31, Chemsak, J. (EMEC255230, EMEC); 1♀ Estación de Biología Chamela, 19°36’ 27’’N 105°03’05’’W, 1990-07-23–1990-07-31, Chemsak, J. (EMEC255229, EMEC); 1♀ Estación de Biología Chamela, 19°36’27’’ N 105°03’05’’W, 1993-07-19–1993-07-22, Westcott, R. (USNMENT02102053, USNM); 1♀ Estación de Biología Chamela, 19°36’ 27’’N 105°03’05’’W, 1990-08-25, Mayorga, C., Cadena, A., Martínez, J. (CNIN); 1♀ La Huerta, Estación de Biología Chamela, 19°30’00’’N 105°00’00’’W, 1990-07-07, Ramírez, E. (EBCC1152, EBCC); 1♀ La Huerta, Estación de Biología Chamela, 19°30’00’’N 105°00’00’’W, 1982-07-27, Bullock, S. (EBCC1153, EBCC); 1♀ La Huerta, Estación de Biología Chamela, 19°30’00’’N 105°00’00’’W, 1982-09-12, Bullock, S. (EBCC1154, EBCC); 1♀ La Huerta, Estación de Biología Chamela, 19°30’00’’N 105°00’00’’W, 1986-07-24, Malaise Trap, Usela, E. (EBCC1155, EBCC); 1♂ La Huerta, Estación de Biología Chamela, 19°30’ 00’’N 105°00’00’’W, 1988-08-15, Ramírez, E. (EBCC1156, EBCC); 1♂ La Huerta, Estación de Biología Chamela, 19°30’ 00’’N 105°00’00’’W, 1990-09-19, Ramírez, E. (EBCC1157, EBCC); 1♂ La Huerta, Estación de Biología Chamela, 19°30’ 00’’N 105°00’00’’W, 1990-09-19, Ramírez, E. (EBCC1158, EBCC); 1♂ La Huerta, Estación de Biología Chamela, 19°30’ 00’’N 105°00’00’’W, 1990-09-19, Ramírez, E. (EBCC1159, EBCC); 1♀ La Huerta, Estación de Biología Chamela, 19°30’ 00’’N 105°00’00’’W, 1990-09-19, Ramírez, E. (EBCC1160, EBCC); 1♂ La Huerta, Estación de Biología Chamela, 19°30’ 00’’N 105°00’00’’W, 1990-09-19, Ramírez, E. (EBCC1161, EBCC); 1♀ La Huerta, Estación de Biología Chamela, 19°30’ 00’’N 105°00’00’’W, 1999-07-07–1999-07-11, Sarmiento, M. (EBCC2558, EBCC); 1♂ La Huerta, Estación de Biología Chamela, vereda Búho, 19°30’00’’N 105°00’00’’W, 1994-07-16–1994-07-22, Malaise Trap, Mercado, I. (EBCC1162, EBCC); 1♂ La Huerta, Estación de Biología Chamela, vereda Tejón, 19°30’00’’N 105°00’00’’W, 200 m, 1994-08-02–1994-08-06, Malaise Trap, Mercado, I. (EBCC1163, EBCC); 1♀ San Buenaventura, 19°47’36’’N 104°03’19’’W, 720 m, 1997-10-04, Guardado, M. (EBCC2336, EBCC); 1♂ San Buenaventura, 19°47’36’’N 104°03’19’’W, 720 m, 1997-07-02, Toledo, V. (EBCC2627, EBCC); 1♂ San Buenaventura, 19°47’36’’N 104°03’19’’W, 720 m, 1997-07-02, Noguera, F. (EBCC2628, EBCC); 1♂ San Buenaventura, 19°47’36’’N 104°03’19’’W, 720 m, 1997-07-02, Ramírez, E. (EBCC2629, EBCC); 1♂ San Buenaventura, 19°47’36’’N 104°03’19’’W, 720 m, 1997-07-04, Guardado, M. (EBCC2630, EBCC); 1♂ San Buenaventura, 19°47’36’’N 104°03’19’’W, 720 m, 1997-07-05, Ramírez, E. (EBCC2631, EBCC); 1♂ San Buenaventura, 19°48’25’’N 104°01’52’’W, 900 m, 1997-08-05, González, E. (EBCC2632, EBCC); 1♀ San Buenaventura, 19°48’25’’N 104°01’52’’W, 900 m, 1997-08-05, González, E. (EBCC2633, EBCC); 1♂ San Buenaventura, 19°47’36’’N 104°03’19’’W, 720 m, 1997-08-06, Noguera, F.

(EBCC2634, EBCC); Nayarit: 1♂ Acaponeta, 55 km SSE, km 82, 22°01'46''N 105°13' 05''W, 1971-08-08, Fisher, E. (USNMENT009 72455, USNM); 1♀ Compostela, vicinity of, 21°14'09''N 104°54'01''W, 1934-04-00, - (USNMENT00779797, USNM); 1♂ Ixtlán del Río, 32 km SE, 20°59'06''N 104°06'11''W, 1963-07-22, Westcott, R. (CASENT12464, Holotype, CASC); 1♂ Punta de Mita, 7 km E and 5 km S, 20°45'00''N 105°25' 00''W, 1990-07-22–1990-07-26, Westcott, R. (USNMENT00972475, USNM); 1♂ Punta de Mita, 7 km E and 5 km S, 20°45'00''N 105°25'00''W, 1990-07-22–1990-07-26, Westcott, R. (USNMENT00972476, USNM); 1♂ Punta de Mita, 7 km E and 5 km S, 20°45' 00''N 105°25'00''W, 1990-07-22–1990-07-26, Westcott, R. (USNMENT00972477, USNM).

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—Known from several localities in the Northern Hemisphere in western Mexico (Fig. 84). A commonly collected species known from 39 specimens (16♀, 23♂) from 15 collecting events between 1934–1999 with five iNaturalist observations between 2017–2024 (Table 1). The species is endemic to two biodiversity hotspots and occurs primarily in the Mesoamerica biodiversity hotspot and in the higher elevation Madrean Pine-Oak Woodland biodiversity hotspot. Adult flies are active in April and June–October (Table 2). The iNaturalist observations provide a glimpse into the biology. Three of the five observations feature adult flies feeding on spiders in their orbweb.

Remarks.—*Acronyches westcotti* occurs sympatrically with *A. rarus* at San Bernardino, Mexico (see Discussion). The species inhabits tropical deciduous forests (A. Estrada, pers. comm.).

Acronyches willistoni Hermann, 1921
ZooBank F9662821-CD40-
4E80-895C-B71C151E4FF7
Original description online biodiversitylibrary.
org/page/45494271
GBIF gbif.org/species/1664460
Figs. 81–83, 86

Diagnosis.—The species is distinguished from congeners by the overall light brown to brown coloration, slightly yellow to light brown stained in anterior ½ of the wing, the densely microtrichose wings, and the limited occurrence from Costa Rica to Ecuador and Guyana.

Description.—*Head:* light brown, face triangular (narrow dorsally, wide ventrally), wide, wider than width of adjacent ommatidium at narrowest point; face yellow pubescent, facial swelling in lateral view distinct, well-developed and discernible; mystax black, macrosetose on lower facial margin, very sparsely setose laterally and dorsally, center of face asetose, 10 macrosetae; vertex between compound eyes ± horizontally straight, medially only slightly below dorsal eye margin or sharply depressed, same width as ocellar triangle (ocellar triangle and compound eyes almost touching); ocellar triangle (in dorsal view) elliptical, visible (in lateral view) above eye margin, silver pubescent; occiput yellow pubescent, ocp setae brown; pocl macrosetae black.

Proboscis and maxillary palpus: proboscis dark brown, light brown setose; maxillary palpus brown, light brown.

Antenna: scape brown, brown setose ventrally, yellow pubescent; pedicel brown, brown setose dorsally and ventrally, yellow pubescent; postpedicel long, 2x as long as scape and pedicel combined, brown.

Thorax: brown, predominantly brown pubescent, predominantly brown setose; postpronotal peg absent; postpronotal lobe brown, brown pubescent, laterally setose, medially asetose, lateral postpronotum with with 1–2 wavy, erect setae or asetose; scutum brown, predominantly brown pubescent, surface entirely smooth, black setose; acr setae present, dc setae pre- and postsuturally black, npl seta 1, spal seta 1, pal seta 1; proepisternum, antepronotum, and postpronotum brown pubescent; antepronotum with macrosetae, prosternum setose, prosternum and proepisternum separated by membrane; pleura dark brown; anterior proepimeron asetose;

anepisternum long brown setose, supero-posterior anepimeron asetose; mesopostnotum, anatergite, and katatergite brown pubescent, katatergite long black setose; scutellum gray pubescent, posterior margin light brown, contrasting with anterior scutellar surface, ap sctl setae short, brown, ds sctl setae short, brown.

Leg: dark and light brown setose; coxae brown pubescent, brown setose; pro and mes femur brown, brown setose; met femur dark brown, clubbed in distal ⅓, predominantly brown setose, some light brown setae, postero-median 'hair brush' present, brown setae; pro, mes, and met tibia brown, anterior tibial stripe absent, pro, mes, and met tibia predominantly dark brown setose, black macrosetae, yellow setae distally; tarsomere light brown, predominantly brown setose, some yellow setae, macrosetae black, met tarsomere 1 approx. as long as tarsomere 2–4, met tarsomere 5 cylindrical; empodium absent or not discernible.

Wing: length = 14 mm; hyaline with some light brown areas, wing pattern: hyaline along medial cells, light brown strain around costal and radial cells; veins light yellow; microtrichia densely covering wing, cell bm densely covered by microtrichia, cell d densely covered by microtrichia; cell d terminates in M_1, M_2, and M_3; r-m positioned in center of cell d; CuA and CuP present, cell cua open; haltere entirely brown.

Abdomen: brown, gray and brown pubescent, surface smooth, setae with small sockets only; T1 black setose, dark brown, dark gray pubescent; T2–8 T2 long brown setose, T3–7 dark brown setose, brown, light brown border distally, brown with some gray pubescent; predominantly dark brown setose, S1–2 light brown proximally, distal ½ light brown, S3–7 dark brown, light brown distally, dark brown pubescent with light gray areas.

Type locality.—Guyana (not Suriname).

Material examined.—Colombia: Amazonas: 1♀ Leticia, 04°12'27''S 069°56'21''W, 1974-08-16, Cooper, M. (NHMUK013740893, NHMUK); Arauca: 1♀ Puerto Miranda, N Tame, 06°39'03''N 071°39'41''W, 1976-07-17–1976-07-18, Cooper, M. (NHMUK013740895, NHMUK); 1♀ Tame, 06°27'29''N 071°44'05''W, 1976-07-01–1976-07-07, Cooper, M. (NHMUK013740894, NHMUK); Putumayo: 1♀ La Hormiga, near Puerto Assis, 00°25'24''N 076°54'18''W, 1978-09-07, Cooper, M. (NHMUK013740891, NHMUK); Costa Rica: Cartago: 1♀ Tuis, 09°51'22''N 083°33'56''W, 1000 m, 0000-00-00, Fassl (AAM-002848, NHMW); 1♀ Turrialba, 09°54'04''N 083°41'00''W, 1949-01-28, - (AAM-006808, MZUSP); Ecuador: Morona Santiago: 1♀ Macas, 02°18'28''S 078°07'13''W, 1300 m, 1996-06-01, Cooper, M. (NHMUK013740890, NHMUK); Napo: 1♀ Panacocha, 00°25'30''S 076°06'09''W, 1998-03-13, Cooper, M. (NHMUK013740892, NHMUK); Guyana: 1♀ Guyama [sic], 04°44'28''N 058°54'21''W, (Holotype, SNSB-ZSM); Panama: Panamá Oeste: 1♀ Barro Colorado Island, 09°09'25''N 079°50'54''W, 1979-07-07, Shelly, T. (USNMENT00972463, USNM).

Distribution, biodiversity hotspots, endemism, seasonal imago flight activity, and biology.—Known from a few localities from primarily north of the equator from Costa Rica in the north to the southern-most tip of Colombia in the south, and east to Guyana (Fig. 86). A somewhat commonly collected species known from 10 specimens, all females, from eight collecting events between 1949–1998 (holotype without collecting date, Table 1). The species occurs within the Mesoamerica and Tropical Andes biodiversity hotspots, but also outside of them. Adult flies are active in January, March, and June–September (Table 2). Nothing is known of the biology.

Remarks.—The holotype was collected in Guyana and not in Suriname as Hermann mentions in the original description. The specimen from Turrialba, Costa Rica (AAM-006808), was labeled as a new species by F.M. Hull with the unpublished name *A. flavipennis*. See the Discussion on specimens collected at Turrialba – the only locality where three species of *Acronyches* have been collected to date. The species was previously regarded to be very rare. Papavero (1971) had apparently

not studied any specimen and therefore excluded *A. willistoni* from his identification key. A single collector, M. Cooper (specimens in the NHMUK), was able to collect six specimens during six different collecting events. He also collected material of the new species *A. gephyrus* and *A. kelispteron*.

Key to *Acronyches* Species

An online, illustrated version of this key is available at keys.lucidcentral.org/keys/v4/acronyches_dichotomous.

1. Proximal 1/3 of wing at least in part yellow or brown stained (especially anterior wing cells) and with dense microtrichia 4
— Proximal 1/3 of wing entirely hyaline (no staining) and with very few microtrichia 2
2. Metathoracic tarsomeres 2–5 yellow, tarsomere 1 brown; center of wing brown stained, distal 1/3 of wing only lightly brown stained ..... *A. alexanderi*
— Metathoracic tarsomeres 2–5 brown, tarsomere 1 yellow or brown; center and distal 1/3 of wing brown stained 3
3. Distal 1/3 of metathoracic tibia yellow, proximal 2/3 brown; metathoracic tarsomere 1 yellow ..... *A. kelispteron*
— Entire metathoracic tibia brown; metathoracic tarsomere 1 brown ..... *A. gephyrus*
4. Notopleural, supra-alar, and postalar macrosetae dark brown to black 7
— Notopleural, supra-alar, and postalar macrosetae yellow to light brown 5
5. Lateral postpronotum with many (>8) wavy, erect setae; antepronotum with 2–3 (rarely only 1) distinct macrosetae laterally; occurrence limited to Mexico ..... *A. rarus*
— Lateral postpronotum with 1-2 wavy, erect setae; antepronotum with 1 distinct macroseta laterally; Suriname, Argentina, Brazil, Paraguay 6
6. Katatergal setae yellow; tergite 2 yellow to light brown, much lighter than tergite 5 ..... *A. imitator*
— Katatergal setae light brown to brown; tergite 2 brown, same color as tergite 5 ..... *A. meruuna*
7. Antepronotum with short yellowish setae (no macrosetae); lateral postpronotum asetose; occurrence limited to Brazil .... *A. mathisi*
— Antepronotum with brown to black setae including at least 1 lateral macroseta; lateral postpronotum with at least 1 wavy, erect seta (usually many); Mexico to Argentina 8
8. Mystax occupying entire face, setae in center of face almost as long as mystacal setae at fronto-clypeal suture .... *A. fenestratulus*
— Mystax confined to fronto-clypeal suture, face either asetose or with only a few short setae (no macrosetae) medially and laterally 9
9. Lateral postpronotum with many (>8) wavy, erect setae 11
— Lateral postpronotum with only 1-2 wavy, erect setae 10
10. Metathoracic tibia brown (sometimes light brown) throughout; wing membrane slightly yellow to light brown stained in anterior 1/2; Costa Rica to Ecuador and Guyana ..... *A. willistoni*
— Metathoracic tibia yellow in distal 2/3, brown in proximal 1/3; wing membrane distinctly brown stained in anterior 1/2; Mexico to Costa Rica ..... *A. fisheri*
11. Facial swelling well-developed, fronto-clypeal suture distinctly protruding in lateral view; wing dark brown stained throughout ..... *A. maya*
— Facial swelling indistinct, fronto-clypeal suture only slightly protruding in lateral view; wing predominantly brown stained, with distinctly light brown to yellow transverse bands/areas 12
12. Metathoracic femur distinctly clubbed on distal 1/2; mystax yellow; occiput gray pubescent; occurrence limited to Costa Rica ..... *A. plutactites*
— Metathoracic femur only slightly enlarged on distal 1/3; mystax brown; occiput

brown pubescent with median, vertical gray pubescent stripe; occurrence limited to Mexico ..... *A. westcotti*

Discussion

Localities with Two or More Species

There are six localities at which more than one *Acronyches* species has been recorded. *Acronyches fisheri* (1944-05-23, F. Schrader, MZSP), *A. plutactites* (1944-04, F. Schrader, specimen lost), and *A. willistoni* (1949-01-28, no collector, MZSP) have been collected at Turrialba, Costa Rica (09°54'04''N 083°41'00''W). This locality is in central Costa Rica east of the capital San José in the Mesoamerica biodiversity hotspot. It is possible that all three specimens were collected by the same collector, F. Schrader, in the 1940s, although collector data are missing for one specimen.

Acronyches fenestratulus (1945-10, W. Preatorius) and *A. imitator* (2009-09-09, R. Freitas-Silva *et al.*) have been collected in or near Manaus, Brazil (03°07'25''S 060°02'16''W). This locality is in the vast Amazonian lowland rainforest.

Acronyches fenestratulus (no date, K. Fiebrig, MFN) and *A. imitator* (no date, K. Fiebrig, SNSB-ZSM) have been collected at San Bernardino, Paraguay (25°18'38''S 057°17'46''W) before 1921. This locality is in southern Paraguay near the capital Ascunción. Although the same collector, K. Fiebrig, collected these specimens, they are deposited in different museums. While the *A. imitator* specimen was studied by Hermann in the SNSB-ZSM, the *A. fenestratulus* specimen was not seen by him at the time when he described that species.

The same set of species, *A. fenestratulus* (1914-03, no collector, SDEI) and *A. imitator* (1913-10, no collector, SDEI), have been collected at Santa Trinidad, Paraguay (27°07'54''S 055°42'13''W). This locality is in south-easternmost Paraguay near the border with Argentina and is situated in the Atlantic Forest biodiversity hotspot. These two specimens represent the holotype and lectotype, respectively, and were likely collected by the same collector in 1913–1914.

Acronyches rarus (7 specimens, 1997-07-01–1997-09-03, several collectors) and *A. westcotti* (9 specimens, 1997-07-02–1997-08-06, several collectors) have been collected in and around San Buenaventura, Mexico (19°47'36''N 104°03'19''W). This locality is in central-western Mexico in the state of Jalisco in the Mesoamerica biodiversity hotspot. These more recently collected specimens have very precise geographic co-ordinates on the labels. There are three places around San Buenaventura at which the 16 specimens have been collected, but only once, on 1997-08-05, have both species been collected at the same site (19°48'25''N 104°01'52''W) by two different collectors and can therefore be regarded as sympatric.

Acronyches kelispteron (1990-11-24, M. Cooper) and *A. willistoni* (1996-06-01, M. Cooper) have been collected at Macas, Ecuador (02°18'28''S 078°07'13''W). This locality is in central-eastern Ecuador in the foothills of the Andes at 1300 m elevation. Both specimens were collected by the same collector, but in different months and years.

iNaturalist Records

Four of the 13 *Acronyches* species have been observed on iNaturalist to date. The permanent links to these observations are listed under each species, *i.e.*, *A. fisheri* (1), *A. imitator* (1), *A. maya* (1), and *A. westcotti* (4). Interestingly, almost all observations are based on female specimens and one includes a mating pair. The iNaturalist observations also allow us to extend the distribution of *A. maya* into El Salvador, from where no specimens were observed in natural history collections.

Biology

None of the 116 specimens included in this study contained information on their prey so no information as to their biology is available. However, three of the seven iNaturalist observations show interactions with prey and all of

them are with spiders in orbwebs. This suggests that *Acronyches* species prey on resting prey and may, at least partially, specialize on spiders.

Seasonal Imago Flight Activity

The distribution of *Acronyches* species spans the equator and extends from central Mexico in the north to southern Paraguay and northern Argentina in the south. Comparisons of seasonal imago flight activity are therefore somewhat difficult to make. There is at least one species active as an adult in each month of the year (Table 2). Widespread species such as *A. fenestratulus* or *A. imitator*, each known from seven adult specimens (Table 1) and occurring primarily south of the equator (Figs. 84–85), have been recorded in six different months spanning a period of nine months (Table 2). More geographically restricted species such as *A. maya* (21 adult specimens, Fig. 85) or *A. willistoni* (10 adult specimens, Fig. 86) have been recorded in seven and six months, respectively, spanning a period of nine months. One of the most restricted species geographically, *A. westcotti* (39 adult specimens, Fig. 84), has been recorded in six months spanning a period of seven months (Table 2). The activity from April–October coincides with spring to autumn in the Northern Hemisphere.

Biodiversity Hotspots

All *Acronyches* species occur within at least one biodiversity hotspot *sensu* Conservation International, *i.e.*, Atlantic Forest, Cerrado, Madrean Pine-Oak Woodlands, Mesoamerica, or Tropical Andes. The following species are endemic to a specific hotspot or a set of hotspots: Atlantic Forest = *A. alexanderi*, *A. meruuna*; Mesoamerica = *A. fisheri*, *A. maya*, *A. plutactites*, and *A. rarus*; Mesoamerica + Madrean Pine-Oak Woodlands = *A. westcotti*.

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It is our pleasure to contribute an article and a new species of Asilidae to honor Wayne Mathis in this *Festschrift*. See the introductory article (Norrbom et al., this issue) for a personal note.

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