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Identification key for the genera of Syrphidae (Diptera) from the Brazilian Amazon and new taxon records

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ABSTRACT

Identification keys are essential to properly recognize taxa, and a photographic key not only addresses that issue but can also attract the interest of the general public if designed correctly. Syrphidae is one of the largest families of Diptera, and the Brazilian Amazon holds more taxon records from this family than currently reported. The aim of the current study was to provide an updated photographic identification key, of easy use and access, to the genera of Syrphidae (Diptera) from the Brazilian Amazon region, and identify previously unrecorded taxa. Through a literature review and study of collection material from several institutions, I found 36 new taxon records for the Brazilian Amazon (15 are first records for Brazil) and provided a list of references with identification keys to species from each genus. The online version of this manuscript has a photographic identification key, with diagnostic pages for each genus, as supplementary material.

KEYWORDS: Flower fly; live pictures; Neotropical; online; taxonomy

Chave de identificação para os gêneros de Syrphidae (Diptera) da Amazônia brasileira e novos registros

RESUMO

Chaves de identificação são essenciais para reconhecer táxons, e uma chave pictórica atende a essa demanda e também desperta o interesse do público em geral, se for desenhada apropriadamente. Syrphidae é uma das maiores famílias de Diptera, e a Amazônia brasileira possui mais táxons dessa família do que registrado atualmente. O objetivo deste estudo foi prover uma chave de identificação pictórica atualizada, de fácil uso e acesso, para os gêneros de Syrphidae (Diptera) da Amazônia brasileira, e identificar táxons ainda não registrados. Através de uma revisão da literatura e estudo de material de diversas coleções, eu encontrei 36 novas ocorrências de táxons para a Amazônia brasileira (15 sendo primeiros registros para o Brasil) e disponibilizei uma lista de referências com chaves de identificação para as espécies de cada gênero. A versão online desse manuscrito possui uma chave de identificação pictórica como material suplementar.

PALAVRAS-CHAVE: Fotos; mosca das flores; Neotropical; online; taxonomia

INTRODUCTION

The general public wants to know more about natural environments and the organisms that live there (Quaresma 2003). Biodiversity professionals need to identify the groups that occur in the different biomes. An identification key that is updated and easy to use meets the demands of both the general and scientific audiences.

The Amazonian region holds a highly diverse fauna and flora (Hoorn and Wesselingh 2010). Large animals such as mammals (Sigrist 2012) and more conspicuous plants such as orchids (Luz and Oliveira 2012) are usually highlighted in Amazonian literature. Insects are mostly seen as a nuisance and/or risk (e.g. mosquitoes), with most people unaware of their great diversity (Rafael *et al*. 2009).

Syrphids, also known as flower/hover flies (Diptera: Syrphidae), are an example of poorly studied fauna in the Brazilian Amazon. The diversity of syrphid forms reaches extremes where they can be mistaken for wasps and bees (Hymenoptera) (Thompson *et al*. 2010). Most adults feed on nectar and pollen, with the larvae having habits and habitats much more diverse than the adults (Rotheray and Gilbert 1999; Pérez-Lachaud *et al*. 2014). The family is currently divided into four subfamilies: Eristalinae (mainly saprophagous larvae), Microdontinae (larvae that scavenge in ant nests), Pipizinae and Syrphinae (mainly predaceous larvae) (Thompson *et al*. 2010; Mengual *et al*. 2015). In Europe there is a long tradition in the study of syrphids, not only in academia (Bartsch 2009a; 2009b), but also with many amateurs/enthusiasts providing useful information on these flies (e.g. Owen 2010; Ball and Morris 2013). This encourages 'citizen-scientists' to develop an interest in the biodiversity around them, which can also aid on gathering data for ecological studies (Dickinson *et al*. 2010). The Amazon syrphid fauna could be explored in the same way as was done in Europe and in the Nearctic (Miranda *et al.* 2013). Thus, the objective of the current study is to develop a photographic identification key, as supplementary material, to the genera of Syrphidae from the Brazilian Amazon and present new records of distribution.

MATERIALS AND METHODS

Specimens and area studied

Material studied came from the following Brazilian institutions: Coleção de Invertebrados from the Instituto Nacional de Pesquisas da Amazônia (INPA)-Manaus/AM, Coleção Zoológica do Maranhão (CZMA)-Caxias/MA, Museu Nacional da Universidade Federal do Rio de Janeiro (MNRJ)-Rio de Janeiro/RJ and Museu Paraense Emílio Goeldi (MPEG)-Belém/PA. All voucher material remained at the institutions mentioned above. Terminology followed Thompson (1999) and Cumming and Wood (2009), with some terms simplified to ease understanding by the user (e.g. 'antennal base' instead of 'frontal prominence' or 'antennifer'). Some common terms for structures on syrphids (e.g. venation) and notes on orientation (e.g. anterior x posterior) can be found only in the supplementary material online.

The genera presented in this key were taken from the literature (Thompson *et al*. 1976; Thompson 1999; Reemer and Ståhls 2013a, 2013b) and later supplemented with new taxon records found in the material studied. Generic classification followed updated Neotropical Syrphidae literature (e.g. Miranda 2011; Reemer e Ståhls 2013a; 2013b; Miranda *et al*. 2014). Species lists were based in the literature (Thompson *et al.* 1976; Rotheray *et al.* 2000; Blatch *et al.* 2003; Borges and Pamplona 2003; Rotheray *et al.* 2007; Thompson 2007a, b; Mengual and Thompson 2008; Borges and Couri 2009; Mengual *et al.* 2009; Morales and Marinoni 2009; Reemer 2010; Thompson 2010; Miranda 2011; Montoya *et al.* 2012; Reemer 2012; Ricarte *et al.* 2012; Reemer and Ståhls 2013a; Miranda 2014; Miranda *et al*. 2014; Reemer 2014).

The study area was limited to the Brazilian Amazon, but took into consideration records for the Amazon of neighbouring countries (Bolivia, Colombia, French Guyana, Guyana, Peru, Surinam and Venezuela) since the taxa could occur in the Brazilian side as well. The 'Brazilian Amazon' considered in this study represents the 'Amazônia legal' (see figure 1 in Fearnside 2014), but limited to the rainforest areas (Acre, Amazonas, Amapá, western Maranhão, northern Mato Grosso, Pará, Rondônia, Roraima and northern Tocantins).

For records that indicated only Maranhão, Mato Grosso or Tocantins, without indicating where in those states, they were only considered part of the Brazilian Amazon if they had records in other Amazonian areas (e.g.: for a record indicating 'Mato Grosso, Venezuela' it was assumed that the species was part of the Amazonian part of Mato Grosso). Species records from the literature that indicated only 'Brazil' were not considered.

For cases where the species was assumed to occur in the Brazilian Amazon, the species name was followed by an asterisk (*) and either a neighbouring country name or 'Amazon'. A country name was used when the record was in an Amazonian region in that neighbouring country. 'Amazon' was used when the record in the literature only mentioned 'Amazon' or 'Amazon valley'.

New records found in the material studied were indicated after the species name by '**n. rec.**' followed by '**BR**', if they were new records for Brazil, and/or the acronym for the state (in bold) if it was a new record for that state, i.e.: **AC**-Acre, **AM**-Amazonas, **AP**-Amapá, **MA**-Maranhão, **MT**-Mato Grosso, **PA**-Pará, **RO**-Rondônia, **RR**-Roraima, and **TO**-Tocantins.

Images and key development

Most images were obtained by the author using a camera set on a stereomicroscope (M205, Leica, Wetzlar, Germany), and the software Leica Application Suite (v.3.6, Leica, Wetzlar, Germany), in the Laboratório de Entomologia Sistemática, Urbana e Forense (LESUF/CBio/INPA), or in the field with a DSLR camera (D3100, Nikon, Tokio, Japan) and macro lens (Macro 105mm/f2.8, Nikon, Tokio, Japan). Some images were obtained from other sources, which were indicated in the corner of the images. Images were edited in the Adobe Photoshop software (CS4, Adobe, San Jose, USA).

The steps of the key were made in the Adobe Illustrator software (CS4, Adobe, San Jose, USA) and exported as hypertext pages (HTML). The format of the key followed Miranda *et al.* (2013), with steps leading to a diagnostic taxon page or to another step. There are two types of steps: (1) Multi-optional, where the user is shown several options of different character combinations that represent a group of taxa or a specific taxon; and (2) dichotomous, where there are only two options, of character combinations, to choose from. There may be links to species lists and additional images in the diagnostic taxon pages. Some taxa occurred more than once in the key due to the diversity of forms and intermediate cases that they possess.

Some images in the key had highlighted structures, that appeared in either of two ways: (1) a red frame highlighting the position of the structure on the specimen followed by another image on the side with the structure magnified and with a red border; or (2) an orange frame, highlighting the position of the structure on the specimen, which can be clicked to reveal a magnified view of the structure.

The PDF version was assembled from the individual HTML files through the 'Create PDF' (File/Create PDF/From Web Page…) tool from the Adobe Acrobat software (9 Pro, Adobe, San Jose, USA) by selecting the first step of the key and adjusting the 'Capture multiple levels' settings to 'Get the entire site'.

RESULTS

This study reports 64 taxa (61 genera and three subgenera) for the Brazilian Amazon region, and 36 were new records for Brazil and/or the Brazilian Amazon region (Table 1 and Appendix 1).

The most recent keys for identification of species, updated from Thompson (1999), are listed on Tables 2, 3 and 4. The key (online version and a "supplementary material" PDF version), instructions about orientation, and basic terminology can be accessed through the website http://keys.inpa.gov.br/?idkey=syrphidae.

The study of Reemer (2010) found a specimen of *Paragus* (*Pandasyophthalmus*) cf. *haemorrhous* in Surinam. The genus is present in North America, extending south at most into Costa

Table 1. New records of Syrphidae (Diptera) from the Brazilian Amazon. AC: Acre; AM: Amazonas; MA: Maranhão; PA: Pará; RR: Roraima.

Species	New Brazilian record	New state record
Eristalinae		
Cepa margarita (Thompson, 1999)	✓	AM
Mallota sp.	✓	AM
Meromacrus milesia Hull, 1942	✓	AM
M. pachypus (Wiedemann, 1830)		AM
Nausigaster bonariensis Lynch-Arribalzaga, 1892		PA
Orthonevra sp.		AM, MA
Palpada aemula (Williston, 1891)	✓	PA
P. agrorum (Fabricius, 1787)		AM
P. fasciata (Wiedemann, 1819)	✓	AM, PA
Polybiomyia bigotii (Williston, 1888)		RR
Quichuana longicauda Ricarte & Hancock, 2012	✓	AM
Microdontinae		
Aristosyrphus (*Aristosyrphus*) sp.		AM
Carreramyia sp.	✓	AM
Ceratophya carinifacies (Curran, 1934)		MA
Domodon zodiacus Reemer, 2013	✓	AM
Hypselosyrphus trigonus Hull, 1937		AM
Masarygus planifrons Brèthes, 1908		PA
Menidon falcatus (Williston, 1887)		AM
Microdon macquartii Lynch-Arribalzaga, 1891	✓	AM
Pseudomicrodon polistoides Reemer, 2013	✓	AM
P. smiti Reemer, 2013	✓	AM
Schizoceratomyia barretoi Carrera, Lopes & Lane, 1947		PA
Stipomorpha apicula (Curran, 1930)	✓	AM
S. goettei (Shannon, 1927)		AM
S. guianica (Curran, 1925)		AM
S. mackiei (Shannon, 1927)		AM
Surimyia minutula (Doesburg, 1966)	✓	AM
Pipizinae		
Trichopsomyia polita Williston, 1888		RR
Syrphinae		
Calostigma elnora Shannon, 1927	✓	AM
Eosalpingogaster cochenillivora (Guérin-Méneville, 1848)		PA
Hybobathus placivus (Williston, 1888)		PA
Ocyptamus icarus Reemer, 2010	✓	AC
O. obliquus (Curran, 1941)		AM
O. prenes (Curran, 1930)		AM
Pelecinobaccha pandora (Hull, 1941)		AC
Xanthandrus plaumanni Fluke, 1937		AM, RR
Total: 36 taxa		

Table 2. Available references with species keys for Eristalinae (Syrphidae) with records for the Brazilian Amazon.

Genus	Reference
Eristalinae	
Alipumilio	Vockeroth (1964)
Cepa	Thompson (2007a)
Chalcosyrphus (*Neplas*)	Curran (1941) (as *Planes*) and Thompson (1981)
Copestylum	Curran (1939, 1953) (as *Volucella*), Fluke (1951) and Thompson (1981)
Habromyia	Curran (1934)
Lepidomyia	Hull (1946) (as *Lepidostola*)
Lycastrirhyncha	Doesburg (1963)
Mallota	Single species is illustrated in this study
Meromacrus	Hull (1942), Thompson (1981) and Blatch *et al*. (2003)
Monoceromyia	Curran (1941) and Thompson (1981) (as *Ceriana*)
Myolepta	Thompson (1968)
Nausigaster	Curran (1941) and Carrera *et al*. (1947) (species published post Curran (1941))
Ornidia	Carvalho-Filho and Esposito (2009)
Orthonevra	Single species is illustrated in this study
Palpada	Lagrange (1992), Mengual and Thompson (2008) and Morales and Marinoni (2009)
Polybiomyia	Curran (1941)
Quichuana	Ricarte *et al*. (2012)
Rhingia	Fluke (1943)
Senogaster	Single species is illustrated in this study
Sphiximorpha	Curran (1941)
Sterphus (*Ceriogaster*)	Hippa and Thompson (1994) and Zumbado and Thompson (1997)
Sterphus (*Crepidomyia*)	Hippa and Thompson (1994) and Zumbado and Thompson (1997)

Table 3. Available references with species keys for Microdontinae (Syrphidae) with records for the Brazilian Amazon.

Genus	Reference
Microdontinae	
Aristosyrphus (*Aristosyrphus*)	No available species key
Aristosyrphus (*Eurypterosyrphus*)	No available species key
Carreramyia	Reemer (2013)
Ceratophya	Reemer (2013)
Ceriomicrodon	Miranda (2014)
Chrysidimyia	Reemer and Ståhls (2013a)
Domodon	Reemer and Ståhls (2013a) and Reemer (2014) (no key, only original descriptions)
Hypselosyrphus	Reemer (2013)
Laetodon	Doesburg (1966) (as *Microdon geijskesi*)
Masarygus	Reemer and Ståhls (2013a) (see discussion about the genus and the description of *M. palmipalpus*)
Menidon	Thompson (2007b) and Reemer and Ståhls (2013a)
Microdon (*Chymophila*)	Curran (1941)
Microdon (*Microdon*)	Curran (1941)
Mixogaster	Carrera and Lenko (1958)
Peradon	Curran (1941) (as *Microdon*)
Piruwa	Reemer and Ståhls (2013a)
Pseudomicrodon	Curran (1941) (as *Microdon*)
Rhoga	Reemer (2012)
Rhopalosyrphus	Thompson (2012)
Schizoceratomyia	Papavero (1962) (as *Masarygus*)
Stipomorpha	Reemer (2013)
Surimyia	Reemer (2008)
Ubristes	Reemer (2013)

Rica in Central America. Due to the single record in Reemer (2010), and the absence of specimens in the collections studied, this genus is not considered to be established in the Amazonian region and was not included in the key. *Microdon* (*Syrphipogon*) was not included in the key due to lack of conclusive evidences that its distribution could range into the Amazonian region (records only for Costa Rica, Panama and one record in the state of Paraná, Brazil).

A specimen of *Polybiomyia*, with a complete post-metacoxal bridge, was identified as *Cerioides bigotii* (Williston, 1888) in Curran (1941) key. Thompson (2010) recognizes it as *Sphiximorpha bigotii* (Williston, 1888), but the condition of the post-metacoxal bridge does not agree with *Sphiximorpha* (where it should be incomplete), so it is here placed in *Polybiomyia*.

Table 4. Available references with species keys for Pipizinae and Syrphinae (Syrphidae) with records for the Brazilian Amazon.

Genus	Reference
Pipizinae	
Trichopsomyia	Fluke (1937)
Syrphinae	
Allograpta	Fluke (1942) and Thompson (1981)
Argentinomyia	Fluke (1945) (as *Rhysops*)
Atylobaccha	Miranda *et al.* (2014)
Calostigma	Hull (1949)
Eosalpingogaster	Mengual and Thompson (2011)
Fazia	Fluke (1942) (as *Epistrophe*)
Hermesomyia	Vockeroth (1969) and Rotheray *et al.* (2000)
Hybobathus	Hull (1949) (as *Baccha*) and Reemer (2010) (as *Ocyptamus*)
Leucopodella	Thompson (1981) and Carvalho (2011)
Mimocalla	Thompson and Zumbado (2000)
Ocyptamus	Hull (1949) (as *Baccha*), Thompson (1981) and Reemer (2010)
Orphnabaccha	There are no appropriate current keys that cover the region
Pelecinobaccha	Miranda *et al*. (2014)
Pseudodoros	Kassebeer (2000)
Relictanum	Miranda *et al*. (2014)
Salpingogaster	Curran (1941) and Thompson (1981)
Toxomerus	Thompson (1981), Borges and Couri (2009) and Mengual (2011)
Xanthandrus	Borges and Pamplona (2003)

DISCUSSION

This study discovered new taxon records for the Brazilian fauna of Syrphidae (Table 1), which reflects how much the fauna of this country, and specially the Amazonian region, is still underestimated. As an example, *Mallota* was only known from high altitude rain forests in South America, but this study found specimens in one of the few high altitude spots in the Brazilian Amazon. Another example was *Carreramyia*, unknown for Brazil but found in two different localities of the Amazonian lowlands (North and South of the Amazonas river), being captured only in canopy traps. These previously unknown taxa found in the Brazilian Amazon demonstrate the need to further study and definitely preserve this region and its still unknown biodiversity.

The key presented here will ease identification of syrphid genera in the Brazilian Amazon, allowing for a quicker assessment of new generic records, and also serving as an initial framework for regional taxonomic revisions and ecological studies. The compilation of references (Tables 2, 3 and 4) will direct the user to the most current species keys, and allied to the updated species lists in each taxon page, will also aid in identifying undescribed species or new records for the Brazilian Amazon.

CONCLUSIONS

Thirty-six new records of species and genera of Syrphidae are found, demonstrating the still unknown biodiversity present in the Brazilian Amazon. Furthermore, this study provides an updated identification key, and list of references to species keys, providing an initial study framework that will aid in future ecological studies and taxonomical revisions.

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Appendix 1. Transcription of locality labels from the specimens representing new records of Syrphidae. 'GFGM' are codes from the author's personal database; '/' represents a new line in the locality label.

Aristosyrphus (Aristosyrphus) sp.

1 female, "BRASIL, Amazonas, / Borba, Rio Abacaxis / 05°15'09"S - 58°41'52"W" "35m. 27-29.v.2008. J.A. / Rafael e equipe. Malaise" "INPA-DIP0000036" (INPA)

1 female, "BRA, Amazonas, Reserva / Florestal Adolpho Ducke / Igarapé Uberê. Malaise / xii.2002" "J.M.F.Ribeiro, Jo. Vidal & Ja / Vidal" "INPA-DIP0000068" (INPA)

1 female, "BRA, Amazonas, Reserva / Florestal Adolpho Ducke / 23.ix.1986 / L. Ulysses" "INPA-DIP000065" (INPA)

Calostigma elnora Shannon, 1927

1 female, "BRASIL, AM, Maués, Rio / Abacaxis, Campina / Pacamiri, 04°35'49"S-" "58°13'14"W, 30-31.v.2008 / J.A.Rafael e equipe, arm / susp dossel mata" "INPA-DIP000173" (INPA)

Carreramyia sp.

1 female, "BRA, Amazonas, Manaus / Reserva Adolpho Ducke, / 2°55'29"S 59°59'19"W. / 30.iii-04.iv.2012. / Malaise suspensa""PPGEnt-INPA. 2012." "INPA-DIP000001" (INPA)

1 female, "BRASIL: Amazonas / 26km NE Manaus / Reserva Ducke / 7-xii-1988" "J.A.Rafael / Arm. Suspensa / 20 metros" "0019493" (INPA)

1 female, "BRA, Amazonas, Novo / Aripuana, Guariuba, Rio / Aripuana. Armadilha suspensa / 15m em terra firme. 18- / 24.viii.1999. / J.F.Vidal & A.L.Henriques" "INPA-DIP000002" (INPA)

Cepa margarita (Thompson, 1999)

1 female, "BRA, Amazonas, Fazenda / Esteio, Km41 (Res.1501). / 02°25'S-59°52'W. Suspensa 6. / 15-25.x.1995" "Projeto Dinâmica Biológica de Fragmentos Florestais" "INPA-DIP00000067" (INPA)

Ceratophya carinifacies (Curran, 1934)

1 female, "Brasil (MA),C.N.Maranhão / REBIO - Res. Biol. Gurupi / 03°14'05"S / 46°41'83"W" "Armadilha suspensa / 01-06.iii.2011, F.Limeira-de- / Oliveira & D.W.A.Marques" "GFGM-CZMA0003" (CZMA)

Domodon zodiacus Reemer, 2013

1 male, "BRASIL, Amazonas / S. Gabriel Cachoeira / Morro 6 lagos / 28.ix-6.x.199" "300m / Arm. Malaise / J.A. Rejael / J. Vidal" "INPA-DIP0000035" (INPA)

Eosalpingogaster cochenillivora (Guérin-Méneville, 1848)

1 male, "Brasil Pará / Serra Norte / N1.C rupestre / 20.vi.1985" "Brasil Pará / M.F. Torres" "MPEG-DIP12170472" (MPEG)

Hybobathus placivus (Williston, 1888)

1 male, "Brasil Pará / Benevides Faz. / Morelandia / 6.VII.1988" "Brasil Pará / J. Dias" "GFGM-MPEG0006" (MPEG)

Hypselosyrphus trigonus Hull, 1937

1 female, "BRASIL. AM, Barcelos, Rio / Aracá, boca rio Curuduri / 00°05'50.2"N 63°17'22.3"W / 15-19.vi.2010, suspensa / dossel, 35m, E. Alvim, J.A. / Rafael, R. Freitas Silva""INPA-DIP0000007" (INPA)

Mallota sp.

2 females, "Brasil, Amazonas / S. Gabriel da Cachoeira / Serra da Neblina / Lajero. 1780m / -65.982/0,808 / 24.viii.2005 R.L. Dias" "INPA-DIP0000760 & ...761" (INPA)

Masarygus planifrons Brèthes, 1908

1 male, "Brasil Pará / Benevides Faz. / Morelandia / 29.VI.1988" "Brasil Pará / F.F. Ramos" "GFGM-MPEG0005" (MPEG)

Menidon falcatus (Williston, 1887)

1 female, "BRASIL, AM, Resex Unini / Rio Unini, lago 03 bocas / 01°34'13"S, 62°58'54"W / 14-28.vii.2004" "Arm. Suspensa 25m / M.L.Oliveira, A. Silva F. / L. Aquino leg." "INPA-DIP0000046" (INPA)

Meromacrus milesia Hull, 1942

1 female, "TEFÉ / Amazonas, Brasil / VIII.1959 / R. Carvalho" (MNRJ)

1 female, "TEFÉ / Amazonas, Brasil / XI.1959 / R. Carvalho" (MNRJ)

M. pachypus (Wiedemann, 1830)

1 female, "TEFÉ / Amazonas, Brasil / XII.1959 / R. Carvalho" (MNRJ)

Microdon (Microdon) macquartii Lynch-Arribalzaga, 1891

1 female, "BRA, Amazonas / Manaus, Res. Ducke / Igarapé Tinga / Arm. Suspensa 20m" "6-16.xii.2004 / Henriques, A. Leg." "INPA-DIP000754" (INPA)

Nausigaster bonariensis Lynch-Arribalzaga, 1892

1 female, "Brasil, Pará Monte Alegre / 16 a 20.I. 1992 / A. L. Henriques" "Armadilha / Cerrado / Malayse" "Brasil, Pará / O.T. Silveira" "GFGM-MPEG 0010" (MPEG)

Ocyptamus icarus Reemer, 2010

1 male, "Brasil, AC - Rio Branco / 25.X a 8.XI-91 / F.Ramos / A. Henriques / I. Gorayeb / N. Bittencourt" "Mata / Terra Firme" "GFGM-MPEG0003" (MPEG)

O. obliquus (Curran, 1941)

1 female, "BRASIL, Amazonas / Barcelos, viii.2008 / Bacuquara / 0°09'09"N; 63°10'38"W" "Coleta Manual / A. Silva & R. Machado" "INPA-DIP0000248" (INPA)

3 males, "BRASIL, Amazonas / Barcelos, viii.2008 / Bacuquara / 0°09'09"N; 63°10'38"W" "Coleta Manual / A. Silva & R. Machado" (INPA)

1 female, "BRA, Amazonas, Manaus, Rio / Solimões S 01°30'205" / W 061°31'975". Tenda do / barco, 8:45h. L. Salvatierra" "INPA-DIP0000251" (INPA)

O. prenes (Curran, 1930)

1 male, "BRASIL, Amazonas, Manaus, / Estação de Horticultura do INPA / 02°59'46.2" S e 60°01'24.7"W 18.ii.2007 - Colleto- / Silva,A. catação / coletado no camu-camu" "INPA-DIP0000246" (INPA)

1 female, "BRASIL, Amazonas, Manaus, / Estação de Horticultura do INPA / 02°59'46.2" S e 60°01'24.7"W / 29.x.2005 - Colleto-Silva,A. / catação no camu-camu" (INPA)

Orthonevra sp.

1 female, "BRA, Amazonas, Novo / Aripuana, Res. Soka. Malaise. / seca. 05°15'53"S-60°07'08"W. / 17-25.viii.1999 / J. Vidal & A.L. Henriques""INPA-DIP0000185" (INPA)

2 females, "Brasil(MA), São P. Água / Branca, Faz. Esplanada, / Arm. Malaise, 10-16.ix. / 2001, F. Limeira-de-Oli- / veira& J.T. Câmara" (CZMA)

Palpada aemula (Williston, 1891)

1 female, "BRASIL, Pará, Rio / Nhamundá, / 01°35'11" S - 57°37'32"W" "25m. 17-20.v.2008. J.A. / Rafael e equipe. Malaise" (INPA)

P. agrorum (Fabricius, 1787)

1 male and 1 female, "BRASIL, AM, Rio Solimões, Lago do José, / Prox. Manaus. 09.viii" "1979. J Adis e equipe. Fumigação (fogging)" (INPA)

1 male, "BRASIL, Amazonas / Manaus / Tarumã baixa / 3°00'17" 60°02'20" "25.Fev.1982 / B.W.Nelson & / G.T. Prance leg. / Rhabdodendrum macrophylum" (INPA)

1 female, "BRASIL AM, Benjamin / Constant, Ig. Crajarizinho / 042635S-695958W / 08-10.ix.2005, Malaise, / J.A.Rafael & F.F.Xavier Fo" (INPA)

1 female, "BRASIL. Amazonas / Serra do Aracá 1073 m.a. / 00°53'44.2"N / 63°26'15.9"W / 02-08.viii.2007. coleta manual / M.L.Oliveira & A.S.Filho leg" (INPA)

1 female, "BRASIL Amazonas / Barcelos, vii.2007 / Serra do Aracá, 1.100m / 0°54'35"N; 63°26'01"W" "Na luz / A. Filho leg." (INPA)

P. fasciata (Wiedemann, 1819)

1 male, "BRASIL. Amazonas / Serra do Aracá 1073 m.a. / 00°53'44.2"N / 63°26'15.9"W / 02-08.viii.2007. coleta manual / M.L.Oliveira & A.S.Filho leg" (INPA)

1 female, "BRASIL Amazonas / Barcelos, vii.2007 / Serra do Aracá, 1.100m / 0°54'35"N; 63°26'01"W" "Na luz / A. Filho leg." (INPA)

1 female, "BRA, Amazonas, Novo / Aripuanã, lago Xadá / 05°15'39"S 60°42'32"W / iv.2005" "Armadilha Malaise / F. Xavier, F. Godoi / & A. Lourido leg." (INPA)

1 female, "BRASIL, Amazonas, Manaus / Estação Exper. Silvicultura / Tropical, BR-174, km43 / 24.iv.2003" "Rede entomológica / Floresta / Galinkin J." (INPA)

1 female, "BRASIL. Pará, Anapú, / Rod. Transamazônica rio / São José, 50 m" "03°24'18"S-51°16'37"W / 06.iv.2008, arm. Luz / J.A.Rafael, F.F.Xavier Fo" (INPA)

Pelecinobaccha pandora (Hull, 1941)

1 female, "Brasil AC - Rio Branco / 25 - X a 8 - XI - 91 / F. Ramos / A. Henriques / I. Gorayeb / N. Bittencourt" "Armadilha / Malayse / T. Firme" "GFGM-MPEG0001" (MPEG)

Polybiomyia bigotii (Williston, 1888)

1 male, "BRASIL, RR, Amajari, Serra / Tepequém 03°44" 35.5"N - / 61°43'39"W, 10-12.vii.2010 / J.A.Rafael varredura" "INPA-DIP0000175" (INPA)

Pseudomicrodon polistoides Reemer, 2013

1 female, "BRASIL, Amazonas / Carauari, 5°05'31"S / 67°10'03". Vii.2005 / Luz mista/mercúrio" "A. Henriques & Xavier-Filho leg." "INPA-DIP0000075" (INPA)

P. smiti Reemer, 2013

1 female, "BRA, Amazonas, Manaus, / Campus Universitário-UFAM / Malaise, 19.v.1979 / J.A.Rafael" "INPA-DIP0000073" (INPA)

1 male, "BRASIL, AM, Resex Unini / Rio Unini, lago 03 bocas / 01°34'13"S, 62°58'54"W / 14-28.vii.2004" "Arm. Suspensa lâmina / d'água, M.L.Oliveira, / A. Silva F. L. Aquino leg." "INPA-DIP0000075" (INPA)

Quichuana longicauda Ricarte & Hancock, 2012

1 female, "BRASIL, AM, Borba, Rio / Abacaxis, Paxiúba / 04°28'48"S-59°29'34"W" "02-04.vi.2008, J.A.Rafael / e equipe, arm. Suspensa / 30mts." (INPA)

Schizoceratomyia barretoi Carrera, Lopes & Lane, 1947

1 male, "Caimbé Vigia / 24.II.1968" "Brasil PA / J. Barata" (MPEG)

1 male, "Caimbé Vigia / 24.II.1968" "Brasil PA / T. Pimentel" (MPEG)

1 female, "Caimbé Vigia / 24.II.1968" "Brasil PA / T. Pimentel" "GFM-MPEG0008" (MPEG)

Stipomorpha apicula (Curran, 1930)

4 males and 6 females, "BRA, Amazonas, Manaus, / Campus Universitário-UFAM/ [several dates] / J.A.Rafael" "INPA-DIP0000015-24" (INPA)

S. goettei (Shannon, 1927)

1 male, "BRASIL, AM, Ipixuna, Rio / Liberdade, Estirão da Preta / 07°21'46.7"S - 71°52'07.1"W / 11-15.v.2011. Arm. Malaise" "J.A.Rafael, J.T.Câmara, R.F. / Silva, A. Somavilla, C. / Gonçalves, leg." "INPA-DIP0000011" (INPA)

S. guianica (Curran, 1925)

1 female, "BRASIL, AM, Resex Unini / Rio Unini, lago 03 bocas / 01°34'13"S, 62°58'54"W / 14-28.vii.2004" "Arm. Suspensa em Igarapé / M.L.Oliveira, A. Silva F. / L. Aquino leg." "INPA-DIP0000012" (INPA)

S. mackiei (Shannon, 1927)

1 male, "BRASIL, AM, Resex Unini / Rio Unini, lago 03 bocas / 01°34'13"S, 62°58'54"W / 14-28.vii.2004" "Arm. Suspensa lâmina / d'água, M.L.Oliveira, / A. Silva F. L. Aquino leg." "INPA-DIP0000025" (INPA)

Surimyia minutula (Doesburg, 1966)

1 male, "BRA, Amazonas, Parque / Nacional do Jaú, Seringalzinho / (Nazaré), right margin rio Jaú, / 37m. Asl PNJ018. 01°54'45"S- / 61°35'25"W. 30.vi-06.vii.2003." "Malaise trap (N) / Campina D.M. Takiya" "INPA-DIP0000088" (INPA)

Trichopsomyia polita Williston, 1888

1 female, "BRA, Roraima, Uiramutá / Rio Wailá. 04°37'50"S, / 60°09'46"W, 19- / 22.iii.2007. Xavier Fo, F.F. / Arm. Malaise" "INPA-DIP0000166" (INPA)

Xanthandrus plaumanni Fluke, 1937

1 female, "BRASIL, Amazonas / Barcelos, Rio Demeni / Jalauaca, viii.2008 / 0°16'15"S, 62°44'49"W" "Armadilha suspensa 25m / Terra firme, floresta / A. Silva & R. Machado" "INPA-DIP000165" (INPA)

1 male, "BRASIL, RR, Amajari, Serra / Tepequém 03°44" 35.5"N - / 61°43'39"W, 10-12.vii.2010 / J.A.Rafael varredura" "INPA-DIP0000138" (INPA)

Supplementary material

Supplementary material 1 - Photographic identification key to the genera of Syrphidae from the Brazilian Amazon (key.pdf)

Available at: http://keys.inpa.gov.br/?idkey=syrphidae

Supplementary material 2 – Glossary of common terms (Glossary.jpeg)

Available at: http://keys.inpa.gov.br/?idkey=syrphidae

Supplementary material 3 – Orientation of specimens (Orientation.jpeg)

Available at: http://keys.inpa.gov.br/?idkey=syrphidae