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New records of mosquito species (Diptera: Culicidae) for Santa Catarina and Paraná (Brazil)

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Abstract: We provide eight new mosquito species records for Santa Catarina (*Limatus flavisetosus* Oliveira Castro 1935, *Mansonia flaveola* (Coquillett 1906), *Ma. titillans* (Walker 1848), *Psorophora forceps* Cerqueira 1939, *Sabethes xyphydes* Harbach 1994, *Toxorhynchites bambusicolus* (Lutz & Neiva 1913), *Tx. theobaldi* (Dyar & Knab 1906) and *Wyeomyia lassalli* Bonne-Wepster & Bonne 1921) and three for Paraná (*Ochlerotatus argyrothorax* Bonne-Wepster & Bonne 1920, *Uranotaenia pallidoventer* Theobald 1903 and *Wyeomyia pilicauda* Root 1928). Additionally, we list all species in these eight genera recorded previously in the two states. The known distribution and possible epidemiological implications of the new species records are discussed.

Keywords: *Ochlerotatus*, *Psorophora*, *Sabethes*, *Toxorhynchites*, *Wyeomyia*, *Mansonia*.

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Resumo: Relatamos o primeiro encontro de oito espécies de mosquitos para Santa Catarina (*Limatus flavisetosus* Oliveira Castro 1935, *Mansonia flaveola* (Coquillett 1906), *Ma. titillans* (Walker 1848), *Psorophora forceps* Cerqueira 1939, *Sabethes xyphydes* Harbach 1994, *Toxorhynchites bambusicolus* (Lutz & Neiva 1913), *Tx. theobaldi* (Dyar & Knab 1906) e *Wyeomyia lassalli* Bonne-Wepster & Bonne 1921) e três para o Paraná (*Ochlerotatus argyrothorax* Bonne-Wepster & Bonne 1920, *Uranotaenia pallidoventer* Theobald 1903 e *Wyeomyia pilicauda* Root 1928). Adicionalmente, apresentamos lista de todas as espécies destes oito gêneros com registro nos dois estados. A distribuição conhecida das espécies e sua possível importância epidemiológica são discutidas.

Palavras-chave: *Ochlerotatus*, *Psorophora*, *Sabethes*, *Toxorhynchites*, *Wyeomyia*, *Mansonia*.

Introduction

The dipteran family Culicidae includes several epidemiologically important insects, mostly related to the transmission of arboviruses and malaria parasites, but also to the annoyance caused by their bites (Consoli & Oliveira 1994). The Brazilian southern states of Santa Catarina and Paraná are included in the geographical distribution of several arboviruses (Forattini 2002), but information on the mosquito fauna is mostly restricted to those species related to malaria transmission, such as *Anopheles (Kerteszia)* spp. in Santa Catarina (e.g. Rachou & Ferraz 1951, Ferreira 1965) and *Anopheles (Nyssorhynchus)* spp. in Paraná (e.g. Guimarães et al. 1997). Knowledge of the distribution of mosquito species is essential for understanding the risks to human and animal health and the development of future control measures. The objective of the present paper is to present new records of several mosquito species of eight genera and list species in these genera previously recorded for Paraná and Santa Catarina states.

Methods

Mosquitoes were collected in nine different localities of Santa Catarina and Paraná States between 1999 and 2008 (Table 1). All localities belong to the Atlantic Forest biome, and are constituted by dense ombrophilous forest. The climate is tropical, with high temperatures (means higher than 22 °C) and high rain precipitation, well distributed thorough the year (Veloso et al. 1991). Except for Unidade de Conservação Ambiental Desterro (Florianópolis, SC), Floresta Nacional (Ibirama, SC) and Floresta do Palmito (Paranaguá, PR), all the studied localities are constituted by forest fragments smaller than 10 ha, highly influenced by human activities, either by agriculture or by the proximity of urban areas. All the forest fragments had several breeding places for mosquitoes, mostly phytotelmata (e.g. bromeliads), shallow pools on rocks and, in Ascurra, Indaial and Ibirama, marshes with aquatic plants.

Five different methodologies were utilized for the daylight collections: Shannon trap without light, CDC-like trap baited by a hen, artificially drilled bamboo internodes, attracted by humans and collected by suction tubes and aspiration from the vegetation. Mosquitoes were identified using descriptions and keys of Lane (1953a, b), Correa & Ramalho (1956), Consoli & Oliveira (1994) and Forattini (2002). When necessary, specimens were compared with those of the Faculdade de Saúde Pública da Universidade de São Paulo (São Paulo, Brazil). All specimens were glued to card triangles on entomological pins and are located in the Departamento de Microbiologia e Parasitologia da Universidade Federal de Santa Catarina and in the Entomological Collection Padre Jesus Santiago Moure, Departamento

de Zoologia, Universidade Federal do Paraná (DZUP). Genera and subgenera of Culicidae are abbreviated according to Reinert (1975), and *Ochlerotatus* was considered a valid genus (Reinert 2000), as recommended by Marcondes (2007). The subgenus *Ochlerotatus* is abbreviated as *Och.* according to Reinert et al. (2004).

Results and Discussion

Eleven species were recorded for the first time for the states of Santa Catarina and Paraná (Table 2). These new records are distributed in eight genera. A review of the literature indicated that 89 species included in these eight genera have been previously recorded in Paraná and Santa Catarina states (Table 3).

Mansonia includes two subgenera: *Mansonia*, not recorded in the Neotropical Region, and *Mansonioides*, which had 15 species recorded from this region (Barbosa et al. 2007). From these, *Ma. titillans* (Walker, 1848) and *Ma. flaveola* (Coquillett, 1906) are widely distributed, from southern United States (Florida and Texas) to extreme south of Brazil, Argentina and Uruguay (Heinemann & Belkin 1977, Cardoso et al. 2005). *Mansonia titillans* (Walker 1848) was previously reported as vector of Venezuelan Encephalitis Virus (Méndez et al. 2001).

Ochlerotatus includes 58 species in Central and South America (Reinert et al. 2005). The larvae of *Oc. argyrorhox* Bonnewepster & Bonne 1920 develop in tree holes and shallow ponds on rocks (Pereira et al. 2005). *Psorophora ferox* Cerqueira, 1939 had been recorded in Mato Grosso do Sul, Espírito Santo and Rio de Janeiro states (Guedes et al. 1965). The present report from Santa Catarina considerably extends its known distribution. *Uranotaenia pallidiventer* Theobald, 1903 was reported in Amazonian Forest (Hutchings et al. 2005). It should be emphasized the absence of previous reports of *Uranotaenia* from Santa Catarina (Table 3).

Among species developing in phytotelmata, *Sa. xhyphides* Harbach, 1994 had been reported for two municipalities of Rio Grande do Sul, the most southern state of Brazil (Cardoso et al. 2005). Since the mosquitoes referred by Prado (1935) in bamboos at São Paulo state as *Sa. intermedius* (Lutz, 1904) were considered as *Sa. xhyphides* (Harbach 1994), Santa Catarina would be the third state to have this species reported.

The distribution of *Toxorhynchites (Lynchiella)* includes, besides tropical regions, also other subtropical and temperate ones, differently from the other two subgenera (Collins & Blackwell 2000). *Toxorhynchites theobaldi* (Dyar & Knab 1906), besides occurring in bamboo internodes, can also be found in tree holes (Silva & Lozovei 1999).

The present report adds to the recent reports by Paterno & Marcondes (2004), Marcondes et al. (2003, 2006) and Müller &

Table 1. Localities of Santa Catarina and Paraná states where mosquitoes were collected.

Tabela 1. Localidades dos Estados de Santa Catarina e Paraná onde os mosquitos foram coletados.

Locality	Coordinate	Altitude (a.s.l.)
Ascurra, SC	26° 57' 07" S and 49° 22' 14" W	86 m
Floresta Nacional, Ibirama, SC	27° 02' 23" S and 49° 27' 29" W	330 m
Floresta do Palmito, Paranaguá, PR	25° 31' 13" S and 48° 30' 34" W	2 m
Governador Celso Ramos, SC	27° 18' 53" S and 48° 33' 33" W	40 m
Guabiruba, SC	27° 05' 09" S and 48° 58' 52" W	60 m
Indaial, SC	26° 53' 39" S and 49° 13' 34" W	82 m
Nova Trento, SC	27° 15' 49" S and 48° 55' 22" W	379 m
Unidade de Conservação Ambiental Desterro, Florianópolis, SC	27° 31' 51" S and 48° 30' 44" W	50-150 m

Mosquitos of Santa Catarina and Paraná

Table 2. New records of Culicidae species from the Brazilian southern states of Santa Catarina and Paraná.**Tabela 2.** Novos registros de espécies de Culicidae para os Estados do sul brasileiro de Santa Catarina e Paraná.

Species	Locality	Quantity/sex	Date
Aedini			
<i>Ochlerotatus argyrorhox</i>	Paranaguá, PR, (FEP)	1 ♀	29.VI.2005
Bonne-Wepster & Bonne, 1920			
<i>Psorophora forceps</i> Cerqueira, 1939	Guabiruba, SC	1 ♀	13.X.1998
Mansoniini			
<i>Mansonia flaveola</i> (Coquillett, 1906)	Ascurra, SC	1 ♀	14.XI.1999
<i>Ma. titillans</i> (Walker, 1848)	Indaial, SC	3 ♀	10.V.1999
	Rio do Sul, SC	2 ♀	20.X.1999
Sabethini			
<i>Limatus flavisetosus</i> Oliveira Castro, 1935	Ibirama, SC, (FLONA)	1 ♀	02.IV.2008
<i>Sabethes xyphydes</i> Harbach, 1994	Florianópolis, SC, (UCAD)	1 ♂, from immature forms	22.V.2005
<i>Wyeomyia lassalli</i>	Florianópolis, SC, (UCAD)	1 ♀	12.IV.2007
Bonne-Wepster & Bonne, 1921			
<i>Wyeomyia pilicauda</i> (Root, 1928)	Paranaguá, PR, (FEP)	17 ♀	26.I.2005
		90 ♀	16.II.2005
		13 ♀	30.III.2005
		2 ♀	27.IV.2005
		2 ♀	23.V.2005
		2 ♀	24.VIII.2005
		2 ♀	23.IX.2005
		5 ♀	31.X.2005
		2 ♀	23.XI.2005
		12 ♀	29.XII.2005
Uranotaeniini			
<i>Uranotaenia pallidoventer</i> Theobald, 1903	Paranaguá, PR, (FEP)	3 ♀	30.X.2005
		1 ♀	23.XI.2005
Toxorhynchitini			
<i>Toxorhynchites bambusicolus</i>	Florianópolis, SC, (UCAD)	2 ♂, from immature forms	25.II.2006
(Lutz & Neiva, 1913)			
<i>Tx. theobaldi</i> (Dyar & Knab, 1906)	Florianópolis, SC, (UCAD)	1 ♂, from immature forms	14.II.2006

Table 3. Species of *Ochlerotatus*, *Psorophora*, *Mansonia*, *Limatus*, *Sabethes*, *Wyeomyia*, *Uranotaenia* and *Toxorhynchites* reported in Santa Catarina and/or Paraná states.**Tabela 3.** Espécies de *Ochlerotatus*, *Psorophora*, *Mansonia*, *Limatus*, *Sabethes*, *Wyeomyia*, *Uranotaenia* e *Toxorhynchites* registrados para os Estados de Santa Catarina e/ou Paraná.

Species	Santa Catarina	Paraná	References
Aedini			
<i>Ochlerotatus (Ochlerotatus) albifasciatus</i> (Macquart 1838)	x		marcondes et al. (2003)
<i>Oc. (Och.) crinifer</i> (Theobald 1903)		x	Barbosa et al. (2003), Consolim et al. (1993), Lopes & Lozovei (1995), Lopes (2002a), Tissot & Silva (2008)
<i>Oc. (Och.) fluviatilis</i> (Lutz 1904)	x	x	Barbosa et al. (1993), Bona & Navarro-Silva (2008), Consolim et al. (1993), Guimarães et al. (2003), Lopes et al. (1993, 1995b), Lopes & Lozovei (1996), Lopes (1997b, c, 2002a, b), Marcondes et al. (2006), Silva (2002), Tissot & Silva (2008)
<i>Oc. (Och.) fulvus</i> (Wiedemann 1828)	x	x	Consolim et al. (1993), Guimarães et al. (2003), Marcondes et al. (2003), Tissot & Silva (2008)
<i>Oc. (Och.) hastatus</i> Dyar 1922		x	Tissot & Silva (2008)
<i>Oc. (Och.) hortator</i> (Dyar & Knab 1907)		x	Bona & Navarro-Silva (2008)
<i>Oc. (Och.) nubilus</i> Theobald 1903		x	Tissot & Silva (2008)
<i>Oc. (Och.) oligopistus</i> Dyar 1918		x	Tissot & Silva (2008)
<i>Oc. (Och.) pennai</i> (Antunes & Lane 1938)		x	Guimarães et al. (2003)
<i>Oc. (Och.) rhyacophilus</i> Costa Lima 1933	x	x	Marcondes et al. (2003), Santos-Neto & Lozovei (2008), Tissot & Silva (2008)
<i>Oc. (Och.) scapularis</i> (Rondani 1848)	x	x	Barbosa et al. (2003), Bona & Navarro-Silva (2008), Guimarães et al. (2003), Lopes et al. (1995b), Lopes & Lozovei (1996), Marcondes & Paterno (2005), Paterno & Marcondes (2004), Sant'Ana & Lozovei (2001), Silva & Menezes (1996), Silva (2002), Tissot & Navarro-Silva (2004)

Table 3. Continued...

Species	Santa Catarina	Paraná	References
<i>Oc. (Och.) serratus</i> (Theobald 1901)	x	x	Barbosa et al. (1993, 2003), Bona & Navarro-Silva (2008), Consolim et al. (1993), Guimarães et al. (2003), Marcondes et al. (2006), Paterno & Marcondes (2004), Santos-Neto & Lozovei (2008), Tissot & Navarro-Silva (2004)
<i>Oc. (Och.) stigmaticus</i> (Edwards 1922)		x	Barbosa et al. (1993)
<i>Oc. (Och.) terreus</i> (Walker 1856)	x	x	Barbosa et al. (1993), Consolim et al. (1993), Guimarães et al. (2003), Lopes (1997a, 2002a, b), Lopes et al. (2002), Marcondes et al. (2003), Santos-Neto & Lozovei (2008), Silva & Lozovei (1999), Tissot & Silva (2008)
<i>Psorophora (Grabhamia) cingulata</i> (Fabricius 1805)		x	Barbosa et al. (1993), Consolim et al. (1993), Lopes et al. (1993), Lopes & Lozovei (1996), Lopes (1997b, c, 2002a), Santos-Neto & Lozovei (2008), Tissot & Silva (2008)
<i>Ps. (Gra.) confinnis</i> (Fabricius 1805)		x	Consolim et al. (1993), Lopes & Lozovei (1996), Lopes (2002a), Silva (2002), Tissot & Silva (2008)
<i>Ps. (Janthinosoma) albipes</i> (Theobald 1907)		x	Bona & Navarro-Silva (2008), Guimarães et al. (2003), Tissot & Silva (2008)
<i>Ps. (Jan.) albigenu</i> (Lutz 1908)		x	Consolim et al. (1993)
<i>Ps. (Jan.) circumflava</i> Cerqueira 1943		x	Lopes (2002a)
<i>Ps. (Jan.) discrucians</i> (Walker 1956)	x	x	Consolim et al. (1993), Lopes & Lozovei (1996), Lopes (2002a), Marcondes et al. (2006)
<i>Ps. (Jan.) ferox</i> (Humboldt 1819)	x	x	Barbosa et al. (1993, 2003), Bona & Navarro-Silva (2008), Consolim et al. (1993), Guimarães et al. (2003), Marcondes et al. (2006), Paterno & Marcondes (2004), Tissot & Navarro-Silva (2004), Tissot & Silva (2008)
<i>Ps. (Jan.) johnstonii</i> (Grabham 1905)		x	Consolim et al. (1993)
<i>Ps. (Jan.) lanei</i> Shannon & Cerqueira 1943	x	x	Consolim et al. (1993), Marcondes et al. (2006)
<i>Ps. (Jan.) lutzii</i> (Theobald 1901)	x	x	Marcondes et al. (2003), Tissot & Silva (2008)
<i>Ps. (Jan.) pseudomelanota</i> Barata & Cotrim 1971		x	Santos-Neto & Lozovei (2008)
<i>Ps. (Jan.) varipes</i> (Coquillett 1904)		x	Barbosa et al. (1993), Guimarães et al. (2003)
<i>Ps. (Psorophora) ciliata</i> (Fabricius 1794)	x	x	Consolim et al. (1993), Marcondes et al. (2006), Tissot & Silva (2008)
<i>Ps. (Ps.) saeva</i> Dyar & Knab 1906		x	Lopes (2002a)
<i>Mansoniini</i>			
<i>Mansonia (Mansonia) amazonensis</i> (Theobald 1901)		x	Lopes (2002a), Teodoro et al. (1995)
<i>Ma. (Man.) cerqueirai</i> (Barreto & Coutinho 1932)		x	Tissot & Silva (2008)
<i>Ma. (Man.) flaveola</i> (Coquillett 1906)		x	Teodoro et al. (1995)
<i>Ma. (Man.) fonsecai</i> (Pinto 1932)		x	Bona & Navarro-Silva (2008), Tissot & Navarro-Silva (2004), Tissot & Silva (2008)
<i>Ma. (Man.) humeralis</i> Dyar & Knab 1916		x	consolim et al. (1993), Lopes (2002a), Teodoro et al. (1995)
<i>Ma. (Man.) iguassuensis</i> Barbosa, Navarro-Silva & Sallum 2007		x	Tissot & Silva (2008)
<i>Ma. (Man.) indubitans</i> Dyar & Shannon 1925		x	Barbosa et al. (2003), Consolim et al. (1993), Lopes (2002a), Teodoro et al. (1995)
<i>Ma. (Man.) pessoai</i> (Barreto & Coutinho 1944)		x	Barbosa et al. (2003), Tissot & Navarro-Silva (2004), Tissot & Silva (2008)
<i>Ma. (Man.) pseudotitillans</i> (Theobald 1901)		x	Consolim et al. (1993), Lopes (2002a), Teodoro et al. (1995)
<i>Ma. (Man.) titillans</i> (Walker 1848)		x	barbosa et al. (2003), Consolim et al. (1993), Guimarães et al. (2003), Lopes et al. (1995b, c), Lopes & Lozovei (1996), Lopes (2002a), Teodoro et al. (1995), Tissot & Navarro-Silva (2004)
<i>Ma. (Man.) wilsoni</i> (Barreto & Coutinho 1944)	x	x	Barbosa et al. (2003), Lopes (2002a), Marcondes et al. (2006), Teodoro et al. (1995), Tissot & Navarro-Silva (2004)
<i>Sabethini</i>			

Mosquitos of Santa Catarina and Paraná

Table 3. Continued...

Species	Santa Catarina	Paraná	References
<i>Limatus durhamii</i> Theobald 1901	x	x	Consolim et al. (1993), Guimarães et al. (2003), Lopes et al. (1987, 1993, 1995a), Lopes (1997a, b, c, 1999, 2002a), Marcondes et al. (2006), Paterno & Marcondes (2004), Silva (2002), Tissot & Navarro-Silva (2004), Tissot & Silva (2008)
<i>Li. flavisetosus</i> Oliveira Castro 1935		x	Tissot & Silva (2008)
<i>Sabethes (Peytonulus) aurescens</i> (Lutz 1905)	x	x	Lozovei (1998, 2001), Marcondes & Mafra (2003), Marcondes et al. (2006), Paterno & Marcondes (2004), Tissot & Silva (2008), Zequi & Lopes (2001)
<i>Sa. (Pey.) undosus</i> (Coquillett 1906)		x	Tissot & Silva (2008)
<i>Sa. (Sabethes) albiprivus</i> Lutz 1903	x	x	Guimarães et al. (2003), Paterno & Marcondes (2004)
<i>Sa. (Sab.) batesi</i> Lane & Cerqueira 1942		x	Lozovei (1998, 2001)
<i>Sa. (Sab.) belisarioi</i> Neiva 1908	x	x	Consolim et al. (1993), Marcondes et al. (2006)
<i>Sa. (Sab.) purpureus</i> (Theobald 1907)		x	Barbosa et al. (2003), Guimarães et al. (2003), Tissot & Silva (2008)
<i>Sa. (Sabethoides) chloropterus</i> (Humboldt 1820)		x	Guimarães et al. (2003)
<i>Sa. (Sabethinus) identicus</i> Dyar & Knab 1907	x	x	Guimarães et al. (2003), Lopes (2002a), Marcondes et al. (2006), Zequi & Lopes (2001)
<i>Sa. (Sbn) indigenes</i> (Harbach 1994)		x	Lopes (2002a)
<i>Sa. (Sbn) intermedius</i> (Lutz 1904)		x	Tissot & Silva (2008)
<i>Sa. (Sbn) melanonymphe</i> (Dyar 1924)	x	x	Lozovei (1998, 2001), Lopes (2002a), Marcondes et al. (2003, 2006), Zequi & Lopes (2001)
<i>Sa. (Sbn) xhyphydes</i> Harbach 1994		x	Tissot & Silva (2008)
<i>Wyeomyia (Dendromyia) personata</i> (Lutz 1904)		x	Lozovei (1998, 2001)
<i>Wy. (Exallomyia) tarsata</i> Lane & Cerqueira 1942	x		marcondes et al. (2003)
<i>Wy. (Phoniomyia) antunesi</i> Lane & Guimarães 1937		x	Tissot & Silva (2008)
<i>Wy. (Pho.) bourrouli</i> Lutz 1905	x		marcondes et al. (2003), Paterno & Marcondes (2004)
<i>Wy. (Pho.) davisii</i> (Lane & Cerqueira 1942)	x	x	Bona & Navarro-Silva (2008), Muller & Marcondes (2006), Paterno & Marcondes (2004)
<i>Wy. (Pho.) edwardsii</i> Lane & Cerqueira 1942	x	x	Marcondes et al. (2003), Muller & Marcondes (2006), Tissot & Silva (2008)
<i>Wy. (Pho.) fuscipes</i> Edwards 1922	x		paterno & Marcondes (2004)
<i>Wy. (Pho.) galvaoi</i> (Correa & Ramalho 1956)	x	x	Bona & Navarro-Silva (2008), Paterno & Marcondes (2004), Tissot & Silva (2008)
<i>Wy. (Pho.) incaudata</i> Root 1928	x	x	Bona & Navarro-Silva (2008), Marcondes & Paterno (2005), Muller & Marcondes (2006), Paterno & Marcondes (2004)
<i>Wy. (Pho.) lopesi</i> (Correa & Ramalho 1956)		x	Bona & Navarro-Silva (2008)
<i>Wy. (Pho.) mystes</i> Dyar 1924	x	x	Guimarães et al. (2003), Paterno & Marcondes (2004), Tissot & Silva (2008)
<i>Wy. (Pho.) pallidiventer</i> (Theobald 1907)	x	x	Muller & Marcondes (2006); Paterno & Marcondes (2004); Tissot & Silva (2008)
<i>Wy. (Pho.) palmata</i> (Lane & Cerqueira 1942)	x		paterno & Marcondes (2004)
<i>Wy. (Pho.) pilicauda</i> (Root 1928)	x		Muller & Marcondes (2006), Paterno & Marcondes (2004)
<i>Wy. (Pho.) quasilongirostris</i> (Theobald 1907)	x	x	Barbosa et al. (2003), Guimarães et al. (2003), Marcondes et al. (2003), Tissot & Navarro-Silva (2004), Tissot & Silva (2008)
<i>Wy. (Pho.) splendida</i> Bonne-Wepster & Bonne 1919	x		paterno & Marcondes (2004)
<i>Wy. (Pho.) theobaldi</i> (Lane & Cerqueira 1942)	x	x	Bona & Navarro-Silva (2008), Paterno & Marcondes (2004)
<i>Wy. (Pho.) tripartita</i> (Bonne-Webster & Bonne 1921)	x		marcondes et al. (2003), Muller & Marcondes (2007)
<i>Wy. (Protopolepis) confusa</i> (Lutz, 1905)		x	Guimarães et al. (2003)
<i>Wy. (Wyeomyia) abebela</i> Dyar & Knab 1908		x	Bona & Navarro-Silva (2008)

Table 3. Continued...

Species	Santa Catarina	Paraná	References
Wy. (<i>Wyo</i>) <i>limai</i> Lane & Cerqueira 1942	x	x	Lozovei (1998, 2001), Lopes (2002a), Marcondes & Mafra (2003, 2006), Tissot & Silva (2008), Zequi & Lopes (2001)
Wy. (<i>Wyo</i>) <i>lutzi</i> (Costa Lima 1930)	x	x	Lozovei (1998, 2001), Marcondes et al. (2003)
Wy. <i>aporonoma</i> Dyar & Knab 1906		x	Guimarães et al. (2003)
Wy. <i>argenteorostris</i> (Bonne-Wepster & Bonne 1920)	x		marcondes et al. (2003)
Wy. <i>cesari</i> Del Ponte & Cerqueira 1938	x		marcondes et al. (2003)
Wy. <i>rooti</i> (Del Ponte 1939)		x	Lopes (2002a), Zequi & Lopes (2001)
<i>Uranotaeniini</i>			
<i>Uranotaenia</i> (<i>Uranotaenia</i>) <i>apicalis</i> Theobald 1903		x	Lopes (2002)
<i>Ur. (Ura.) calosomata</i> Dyar & Knab 1907		x	Santos-Neto & Lozovei (2008)
<i>Ur. (Ura.) geométrica</i> Lutz 1901		x	Lopes (2002a), Lopes et al. (2002)
<i>Ur. (Ura.) lowii</i> Theobald 1901		x	Silva (2002), Tissot & Silva (2008)
<i>Ur. (Ura.) nataliae</i> Lynch-Arribalzaga 1891		x	Santos-Neto & Lozovei (2008), Silva (2002);
<i>Ur. (Ura.) pulcherrima</i> Lynch-Arribalzaga 1891		x	Lopes & Lozovei (1995), Lopes (2002a)
<i>Toxorhynchitini</i>			
<i>Toxorhynchites</i> (<i>Ankylorhynchus</i>) <i>catharinensis</i> (Costa Lima, Guitton, & Ferreira 1962)	x		Marchon-Silva et al. (1996)
<i>To. (Linchiella) bambusicolus</i> (Lutz & Neiva 1913)		x	Lozovei (1998, 2001)
<i>To. (Lyn.) pusillus</i> (Costa Lima 1931)		x	Lozovei (2001)
<i>To. (Lin.) theobaldi</i> (Dyar & Knab 1906)		x	Silva & Lozovei (1996, 1999)

Marcondes (2006) eight species new for Santa Catarina, besides three others for Paraná, which has been better studied, showing that the fauna of these southern Brazilian states is diversified and poorly known. This is specially marked for *Wyeomyia* (*Phoniomyia*), since 14 of the 21 known species were already reported from Santa Catarina. This group, which had only one new species (*Wy. deanei* Lourenço de Oliveira, 1983) described since 1956, certainly deserves a more thoroughly study. For instance, Anhembi arbovirus was isolated from *Wy. pilicauda* (Root 1928) in the littoral of São Paulo state (Souza Lopes et al. 1975).

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References

- BARBOSA, O.C., TEODORO, U., LOZOVEI, A.L., SALVIA FILHO, V., SPINOSA, R.P., LIMA, E.M. & FERREIRA, M.E.M.C. 1993. Nota sobre culicídeos adultos coletados na região sul do Brasil. *Rev. Saúde Públ.*, 27(3):214-216.
- BARBOSA, A.A., SILVA, M.A.N. & CALADO, D. 2003. Atividade de Culicidae em remanescente florestal na região urbana de Curitiba (Paraná-Brasil). *Rev. Bras. Zool.*, 20(1):59-63.

- BARBOSA, A.A., NAVARRO-SILVA, M.A. & SALLUM, M.A. 2007. *Mansonia* (*Mansonia*) *iguassuensis* sp. nov. (Diptera: Culicidae) from Brasil. *Zootaxa*, 1527:1-8.
- BONA, A.C.D. & NAVARRO-SILVA, M.A. 2008. Diversidade de Culicidae durante os períodos crepusculares em bioma de Floresta Atlântica e paridade de *Anopheles cruzii* (Diptera: Culicidae). *Rev. Bras. Zool.*, 25(1):40-48.
- CARDOSO, J.C., CORSEUIL, E. & BARATA, J.M.S. 2005. Culicinae (Diptera, Culicidae) ocorrentes no Estado do Rio Grande do Sul, Brasil. *Rev. Bras. Entomol.*, 49(2):275-287.
- COLLINS, L.E. & BLACKWELL, A. 2000. The biology of *Toxorhynchites* mosquitoes and their potential as biocontrol agents. *Biocontrol*, 21(4):105-116.
- CONSOLIM, J., PELLEGRINI, N.J.M. & LUZ, E. 1993. Culicídeos (Diptera, Culicidae) do lago de Itaipu, Paraná, Brasil. *Acta Biol. Par.*, 22:83-90.
- CONSOLI, R.A.G.B. & OLIVEIRA, R.L. 1994. Principais mosquitos de importância sanitária no Brasil. Fiocruz, Rio de Janeiro.
- CORREA, R.R. & RAMALHO, G.R. 1956. Revisão de *Phoniomyia* Theobald, 1903 (Diptera, Culicidae, Sabethini). *Fol. Clin. Biol.*, 25:1-176.
- FERREIRA, E. 1965. Distribuição geográfica dos anofelinos no Brasil e sua relação com o estado atual da erradicação da malária. *Revta. Bras. Malar. Doen. Trop.*, 17:329-348.
- FORATTINI, O.P. 2002. *Culicidologia Médica*. EDSP, São Paulo.
- GUÉDES, A.S., SOUZA, M.A., MACIEL, C.S. & XAVIER, S.H. 1965. Catálogo ilustrado de mosquitos na Coleção do Instituto Nacional de Endemias Rurais. I. O gênero *Psorophora* Robineau-Desvoidy, 1827. *Revta. Bras. Malariol. Doenças Trop.*, 17:3-24.
- GUIMARÃES, A.E., MELLO, R.P., LOPES, C.M., ALENCAR, J. & GENTILE, C. 1997. Prevalência de Anofelinos (Diptera: Culicidae) no Crepúsculo Vespertino em Áreas da Usina Hidrelétrica de Itaipu, no

Mosquitos of Santa Catarina and Paraná

- Município de Guaíra, Estado do Paraná, Brasil. Mem. Inst. Oswaldo Cruz, 92:745-754.
- GUIMARÃES, A.E., LOPES, C.M., MELLO, R.P. & ALENCAR, J. 2003. Ecologia de mosquitos (Diptera, Culicidae) em áreas do Parque Nacional do Iguaçu, Brasil. I – Distribuição por hábitat. Cad. Saúde Públ., 19(4):1107-1116.
- HARBACH, R.E. 1994. The subgenus *Sabethinus* of *Sabethes*. (Diptera: Culicidae). Syst. Entomol., 19(3):207-234.
- HEINEMANN, S.J., BELKIN, J.N. 1977. Collection records of the project "Mosquitoes of Middle America". 9. Mexico (MEX, MF, MT, MX). Mosquito Syst. 9:483-535.
- HUTCHINGS, R.S.G., SALLUM, M.A.M., FERREIRA, R.L.M. & HUTCHINGS R.W. 2005. Mosquitoes of the Jaú National Park and their potential importance in Brazilian Amazonia. Med. Vet. Entomol., 19(4):428-441.
- LANE, J. 1953a. Neotropical Culicidae. Vol. 1. EDUSP, São Paulo.
- LANE, J. 1953b. Neotropical Culicidae. Vol. 2. EDUSP, São Paulo.
- LOPES, J., BORSATO, A.M. & PIRES, M.A. 1987. Entomofauna da Mata Godoy. I. Culicidae (Diptera) procriando-se em criadouros artificiais introduzido na mata. Semina Ci. Biol./Saúde, 8(2):67-69.
- LOPES, J., SILVA, M.A.N., BORSATO, A.M., OLIVEIRA, V.D.R.B. & OLIVEIRA, F.J.A. 1993. *Aedes (Stegomyia) aegypti* L. e a culicídeofauna associada em área urbana da região sul, Brasil. Rev. Saúde Públ., 27(5):326-333.
- LOPES, J. & LOZOVEI, A.L. 1995. Ecologia de mosquitos (Diptera: Culicidae) em criadouros naturais e artificiais de área rural do Norte do Estado do Paraná, Brasil. I - Coletas ao longo do leito de ribeirão. Rev. Saúde Públ., 29(3):183-191.
- LOPES, J., SILVA, M.A.N., OLIVEIRA, V.D.R.B., BORSATO, A.M. & BRAGA, M.C.P. 1995a. Ecologia de mosquitos (Diptera: Culicidae) em criadouros naturais e artificiais de área rural do Norte do Estado do Paraná, Brasil. III. Viabilização de recipientes como criadouro. Semina Ci. Biol./Saúde, 16(2):244-253.
- LOPES, J., OLIVEIRA, F.J.A., OLIVEIRA, V.D.R.B. & TONON, M.A.P. 1995b. Alterações na densidade populacional e diversidade de Culicidae (Diptera) na área urbana do município de Londrina, Estado do Paraná, Sul do Brasil em consequência de modificações ambientais. Semina Ci. Biol./Saúde, 16(2):238-243.
- LOPES, J., OLIVEIRA, V.D.R.B. & OLIVEIRA, F.J.A. 1995c. Predominância de *Mansonia titillans* (Walker, 1848) (Diptera: Culicidae) na área urbana do município de Londrina-PR, Sul do Brasil. Semina Ci. Biol./Saúde, 16(2):254-259.
- LOPES, J. & LOZOVEI, A.L. 1996. Ecologia de mosquitos (Diptera, Culicidae) em criadouros naturais e artificiais de área rural do Norte do Paraná, Brasil. II. Coletas com isca humana. Rev. Bras. Zool., 13(3):585-596.
- LOPES, J. 1997a. Ecologia de mosquitos (Diptera: Culicidae) em criadouros naturais e artificiais de área rural do Norte do Estado do Paraná, Brasil. V. Coleta de larvas em recipientes artificiais instalados em mata ciliar. Rev. Saúde Públ., 31(4):370-377.
- LOPES, J. 1997b. Ecologia de mosquitos (Diptera: Culicidae) em criadouros naturais e artificiais de área rural do Norte do Estado do Paraná, Brasil. VI. Coletas de Larvas no Peridomicílio. Rev. Bras. Zool., 14(3):571-578.
- LOPES, J. 1997c. Ecologia de mosquitos (Diptera: Culicidae) em criadouros naturais e artificiais de área rural do Norte do Estado do Paraná, Brasil. VII. Coexistência das espécies. Iheringia, Sér. Zool., 83:91-97.
- LOPES, J. 1999. Ecologia de mosquitos (Diptera, Culicidae) em criadouros naturais e artificiais de área rural do norte do Paraná, Brasil. VIII. Influência das larvas predadoras (*Toxorhynchites* sp., *Limatus durhamii* e *Culex bigoti*) sobre a população de larvas de *Culex quinquefasciatus* e *Culex eduardoi*. Rev. Bras. Zool., 16(3):821-826.
- LOPES, J. 2002a. Mosquitos (Diptera: Culicidae) da Região do Baixo Tibagi e suas adaptações a ambientes antropogênicos: causas e consequências. In A Bacia do Rio Tibagi. (M.E. Medri, E. Bianchini, O.A. Shibatta & J.A. Pimenta, eds). Londrina, p. 327-351.
- LOPES, J. 2002b. The occurrence of *Aedes (Stegomyia) aegypti* (Linnaeus) and *Aedes (Stegomyia) albopictus* (Skuse) in a rural área in Northern Paraná, Brazil and the associated Culicidae fauna. Rev. Bras. Zool., 19(4):1075-1079.
- LOPES, J., ZEQUI, J.A.C., NUNES, V., OLIVEIRA, O., NETO, O.B.P.O. & RODRIGUES, W. 2002. Immature Culicidae (Diptera) Collected from the Igapó Lake Located in the Urban area of Londrina, Paraná, Brazil. Braz. Arch. Biol. Technol., 45(4):565-471.
- LOZOVEI, A.L. 1998. Mosquitos dendrícolas (Diptera, Culicidae) em internódios de taquara da floresta atlântica, serra do mar e do primeiro planalto, Paraná, Brasil. Braz. Arch. Biol. Technol., 41(4):501-508.
- LOZOVEI, A.L. 2001. Microhabitats de mosquitos (Diptera, Culicidae) em internódios de taquara na Mata Atlântica, Paraná, Brasil. Iheringia, Sér. Zool., 90:3-13.
- MARCHON-SILVA, V., LOURENÇO-DE-OLIVEIRA, R., ALMEIDA, M.D., SILVA-VASCONCELOS, A. & COSTA, J. 1996. The Type Specimens of Mosquitoes (Diptera, Culicidae) Deposited in the Entomological Collection of the Instituto Oswaldo Cruz, Rio de Janeiro, Brazil. Mem. Inst. Oswaldo Cruz, 91(4):471-478.
- MARCONDES, C.B. & MAFRA, H. 2003. Nova técnica para o estudo da fauna de mosquitos (Diptera: Culicidae) em internódios de bambus, com resultados preliminares. Rev. Bras. Soc. Bra. Med. Trop., 36(6):763-764.
- MARCONDES, C.B., FERNANDES, A., PATERNO, U., MÜLLER, G.A., PINHO, L.C. & STRUFFALDI, D.V. 2003. New records of mosquitoes from the southern Brazilian states of Santa Catarina and Rio Grande do Sul, with 18 species new for the States (Diptera: Culicidae). Zootaxa, 347:1-6.
- MARCONDES, C.B. & PATERNO, U. 2005. Preliminary evidence of association between species of mosquitoes in Atlantic forest of Santa Catarina State, (Diptera: Culicidae). Rev. Bras. Soc. Bra. Med. Trop., 38(1):75-76.
- MARCONDES, C.B., FERNANDES, A. & MÜLLER, G.A. 2006. Mosquitoes (Diptera: Culicidae) near a reservoir in the Western part of the Brazilian State of Santa Catarina. Biota Neotrop., 6(3): <http://www.biotaneotropica.org.br/v6n3/pt/abstract?inventory+bn02606032006> (ultimo acesso em 05/05/2008).
- MARCONDES, C.B. 2007. Taxonomic changes: disprove or accept them. Trends Parasitol., 23:302-303.
- MÉNDEZ, W., LIRIA, J., NAVARRO, J.C., GARCÍA, C.Z., FREIER, J.E., SALAS, R., WEAVER, S.C. & BARRERA, R. 2001. Spatial Dispersion of Adult Mosquitoes (Diptera: Culicidae) in a Sylvatic Focus of Venezuelan Equine Encephalitis Virus. J. Med. Entomol., 38(6):813-819.
- MÜLLER, G.A. & MARCONDES, C.B. 2006. Bromeliad-associated mosquitoes from Atlantic forest in Santa Catarina Island, southern Brazil (Diptera, Culicidae), with new records for the State of Santa Catarina. Iheringia, Sér. Zool., 96:315-319.
- PATERNO, U. & MARCONDES, C.B. 2004. Mosquitos antropofílicos de atividade matutina em Mata Atlântica em Florianópolis, Santa Catarina, Brasil (Diptera, Culicidae). Rev. Saúde Públ., 38(1):133-135.
- PEREIRA, E.S., FERREIRA, R.L.M., HAMADA, N. & LICHTWARDT, R.W. 2005. Trichomycete Fungi (Zygomycota) Associated with Mosquito Larvae (Diptera: Culicidae) in Natural and Artificial Habitats in Manaus, AM Brazil. Notrop. Entomol., 34(2):325-329.
- PRADO, A. 1935. Contribuições ao conhecimento dos culicídeos de São Paulo. VI. Notas sobre os mosquitos originários das taquaras: *Sabethoides intermedius* (Lutz) e *Megarhynus bambusicola* Lutz & Neiva. Mem. Instit. Butantan, 9:195-199.
- RACHOU, R.G. & FERRAZ, D.M. 1951. Contribuição ao conhecimento da distribuição geográfica dos anofelinos no Brasil: Estado de Santa Catarina. Rev. Bras. Malariol. Doen. Trop., 3(3):540-554.
- REINERT, J.F. 1975. Mosquito generic and subgeneric abbreviations (Diptera: Culicidae). Mosquito System., 7:105-110.
- REINERT, J.F. 2000. New classification for the composite genus *Aedes* (Diptera: Culicidae: Aedini), elevation of subgenus *Ochlerotatus* to generic rank, reclassification of the other subgenera, and notes

- on certain subgenera and species. J. Am. Mosquito Control Assoc., 16(3):175-188.
- REINERT, J.F., HARBACH, R. & KITCHING, I.J. 2004. Phylogeny and classification of Aedini (Diptera: Culicidae), based on morphological characters of all life stages. Zool. J. Linn. Soc., 142:289-368.
- REINERT, J.F., HARBACH, R. & SALLUM, M.A.M. 2005. Checklist of aedine mosquito species (Diptera, Culicidae, Aedini) occurring in Middle and South America (south of the United States) reflecting current generic and subgeneric status. Rev. Bras. Entomol., 49(2):249-252.
- SANT'ANA, A.L. & LOZOVEI, A.L. 2001. Influência do ciclo lunar na captura de *Aedes scapularis* (Diptera, Culicidae) na mata Atlântica do Paraná. Iheringia, Ser. Zool., 90:175-182.
- SANTOS-NETO, L.G. & LOZOVEI, A.L. 2008. Aspectos ecológicos de *Anopheles cruzii* e *Culex ribeirensis* (Diptera, Culicidae) da Mata Atlântica de Morretes, Paraná, Brasil. Rev. Bras. Entomol., 52(1):105-111.
- SILVA, A.M. & LOZOVEI, A.L. 1996. Criadouros de imaturos de mosquitos (Diptera, Culicidae) introduzidos em mata preservada na área urbana de Curitiba, Paraná, Brasil. Revta. Bras. Zool., 13(4):1023-1042.
- SILVA, M.A.N. & LOZOVEI, A.L. 1999. Ocorrência de *Haemagogus* (*Conopostegus*) *leucocelaenus* (Dyar & Shannon) e *Toxorhynchites* (*Lynchiella*) *theobaldi* (Dyar & Knab) em ocos de árvore em capão de mata, Curitiba, Paraná, Brasil. Rev. Bras. Zool., 16 (1):257-267.
- SILVA, A.M. & MENEZES, R.M.T. 1996. Encontro de *Aedes scapularis* (Diptera: Culicidae) em criadouro artificial em localidade da região Sul do Brasil. Rev. Saúde Públ., 30(1):103-104.
- SILVA, M.A.N. & LOZOVEI, A.L. 1999. Ocorrência de *Haemagogus* (*Conopostegus*) *leucocelaenus* (Dyar & Shannon) e *Toxorhynchites* (*Lynchiella*) *theobaldi* (Dyar & Knab) em oco de árvore em capão de mata, Curitiba, Paraná, Brasil. Rev. Bras. Zool., 16(1):257-267.
- SILVA, A.M. 2002. Imaturos de mosquito (Diptera, Culicidae) de áreas urbana e rural no norte do Estado do Paraná, Brasil. Iheringia, Sér. Zool., 92(4):31-36.
- SOUZA LOPES, O., SACCHETTA, L.A., FONSECA, I.E. & LACERDA, J.P. 1975 Bertioga (Guama group) and Anhembi (Bunyamwera group), two new arboviruses isolated in São Paulo, Brazil. Am. J. Trop. Med. Hyg., 4(1):131-134.
- TEODORO, U., GUILHERME, A.L.F., LOZOVEI, V., FILHO, V.L.S., FUKUSHIGUE, Y., SPINOSA, R.P., FERREIRA, M.E.M.C., BARBOSA, O.C. & LIMA, E.M. 1995. Culicídeos do Lago de Itaipu, no Rio Paraná, Sul do Brasil. Rev. Saúde Públ., 29(1):6-14.
- TISSOT, A.C. & NAVARRO-SILVA, M.A. 2004. Preferência por hospedeiro e estratificação de Culicidae (Diptera) em área de remanescente florestal do Parque Regional do Iguaçu, Curitiba, Paraná, Brasil. Rev. Bras. Zool., 21(4):877-886.
- TISSOT, A.C. & SILVA, M.A.N. 2008. Lista das espécies de Culicidae (Diptera) depositadas na Coleção de Entomologia Pe. J. S. Moure. Rev. Bras. Entomol., 52(2):263-268.
- VELOSO, H.P., Rangel Filho, A.L. & Lima, J.C.A. 1991. Classificação da vegetação brasileira, adaptada a um sistema universal. IBGE, Rio de Janeiro.
- ZEQUI, J.A.C. & LOPES, J. 2001. Culicídeofauna (Diptera) encontrada em entrenós de taquara de uma mata residual na área urbana de Londrina, Paraná, Brasil. Rev. Bras. Zool., 18:429-438.

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