NEW DISTRIBUTION AND SPECIES RECORDS O
FROM SOUTHERN AND SOUTHEASTERN

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Abstract

We provide here a list of new species records of Trichoptera (Insecta) collected in Southern and Southeastern Brazil. We report 21 new distribution records for the country of Brazil. We also provide new distribution records for 92 species of Trichoptera for the states of Minas Gerais, São Paulo, Rio de Janeiro, Paraná and Santa Catarina.

Key words: *Trichoptera, Caddisflies, Checklist, Aquatic Insects, Neotropical, Brazil, Distribution, New records*

Resumo

Apresenta-se aqui uma lista de novos registros de Trichoptera (Insecta) para estados do Sul e Sudeste do Brasil. O número de novos registros de espécies de Trichoptera apresentados aqui é de 92, sendo que 21 são novos registros também para país.

Palavras-chave:*Trichoptera, Fauna, Lista de espécies, Brasil, Insetos aquáticos, Distribuição*

Introduction

The diversity and distribution of Trichoptera from the Neotropical region is still very incompletely known; many new species remain to be discovered and described and most described species are known only from fragmentary distribution records. Although several regions in the Neotropics have been reasonably well surveyed (e.g., the Caribbean, Costa Rica, Chile), most distribution records of species of Trichoptera outside these regions are still represented by incidental collections. Many species are still only known from the site from which the species was originally described. The accompanying list was compiled from recent collections made during a United States National Science Foundation funded project, conducted in coordination with the Museu de Zoologia, Universidade de São Paulo, to inventory and describe the Trichoptera diversity of southeastern Brazil. It represents new distribution records of Trichoptera by state for the collection survey area. To date, however, no collecting has been done in the state of Espírito Santo. Records from the states of Santa Catarina and Paraná in southern Brazil resulted from collecting done by Ralph Holzenthal during a sabbatical prior to the initiation of the research project. For a complete list of the taxa currently known from Brazil, including state records, the reader is referred to the accompanying article by Paprocki et al. (2004). In addition to these records of previously described species, many species (about half of the total collected) represent new and undescribed species. Taxonomic and systematic work on these are in progress and descriptions will be reported in subsequent papers. The primary purpose of this paper is to list new species and distribution records by state from the inventory survey project. Although, the primary value of the list is to add to the knowledge of the Trichoptera fauna of southern and southeastern Brazil itself, the list has the further value of helping to fill continent-wide gaps in our knowledge of Trichoptera distribution in South America.

Collecting Methods

Collections of insects result from the juxtaposition of three elements: time, place, and opportunity. In order for a species of insect to be collected, a collector must be in the right place, at the right time, and s/he must also have or take the opportunity to collect. Needless to say, the inventory discussed here and in the accompanying article by Paprocki et al. (2004) allowed for the juxtaposition of these elements for only some fraction of the Trichoptera fauna actually present in southern and southeastern Brazil. Undoubtedly, many additional species remain to be collected**.** The following description of collecting methods is given both to record the methods used during the inventory and as an aid to students interesting in documenting the fauna.

A standard method of collecting Trichoptera is the use of a blacklight (ultra-violet light) and bed sheet erected near a stream. Primary flight time of caddisflies begins about sunset and continues for several hours after dark, but rapidly tapers off in the later evening. A second flight period occurs near dawn for some species. A 12 volt automobile battery, which can be recharged as necessary, provides enough energy to run a blacklight for several nights. However, use of a portable generator allows the possibility of also running a mercury vapor light, which gives off a much brighter light. Simultaneous use of both a mercury vapor light and blacklight maximizes their effectiveness. A tarp suspended over the sheet will provide essential protection from rain and keep the sheet dry. With such a precaution, flight of caddisflies to the sheet will continue during mild or even moderate rainfall, and it is possible to continue collecting. The best and most effective way to collect caddisflies is directly from the sheet with use of cyanide jars. If tissue paper is placed in the bottom of the jar and the jar is not allowed to become too full of insects, the hairs on the wings of the specimens, which are easily removed using general collection techniques or by rough or careless handling, will be retained. The hairs on the wings, much like the scales on the wings of Lepidoptera, are very useful diagnostic characters (Holzenthal and Blahnik 1995). Because the specimens are fragile and desiccate quickly, it is important that they be pinned promptly. Usually all of the specimens collected during a single night can be easily pinned the following morning, using stainless steel pins or minutens. Fortunately, it is not necessary to spread the wings of Trichoptera. While requiring extra effort in the field compared to collecting specimens in ethanol, specimens collected this way are also the most valuable for systematic work. When it is considered that some percentage of specimens collected will likely also constitute type series, the value of carefully pinning them should be evident.

It is also valuable to augment collecting at a sheet with other collecting techniques, including ethanol pan traps, malaise traps suspended across a stream, and day collecting by net. The method we use for ethanol pan traps is simply to place a blacklight horizontally over a shallow white pan, with a small amount of ethanol in the bottom. The trap can be run for several hours after sunset, or all night if conservation of battery power is not an issue. It must be admitted that collecting specimens in ethanol is the preferred method by some (perhaps most) Trichoptera taxonomists. However, while it is possible to do systematic work on specimens stored in ethanol, and even some advantages (more pliability, less shrinkage), they lose their color more rapidly than specimens on pins and their overall condition in ethanol deteriorates over time. Ideally, both methods of preservation should be used. Use of ethanol collecting as

an adjunct method is especially important for species in the family Hydroptilidae (the so-called microcaddisflies), especially at a site where they are very abundant. This is because "micros" usually appear at a sheet in a pulse shortly after sunset and time limits the number of specimens that can be manually collected at a sheet. Use of an ethanol pan trap guarantees that species that may have been missed at the sheet are still collected. Also, if the traps are run all night they may collect species with unusual flight periods. Although it is necessary to collect hydroptilids in ethanol to capture total diversity, every effort should still be made to collect and pin as many specimens as possible. Malaise traps and day collecting (sweeping) with a net, are useful adjunct collecting methods, especially for collecting day-active species and those not readily attracted to lights. Some day-active species may be common, but are only rarely or incidentally (or never) collected at lights.

It is important also to collect larval specimens from a site for eventual association with adult material. This is especially true if species-level identifications of larvae are ever to be used for biomonitoring purposes. A traditional method for associating larval and adult material is by use of a "metamorphotype" (Vorhies 1909, Ross 1934, Milne 1938, Ross 1944, Wiggins 1996). It requires the fortuitous collection of a mature pupa, or pharate adult, in which the genitalic characters are already formed. Larval sclerites for most species are retained within the pupal case and form the basis for making associations. Rearing of larvae is also useful, but usually requires controlled laboratory conditions. DNA sequencing techniques also hold the promise of being useful for associating larvae and adults, but limited use of the method has been made so far in Trichoptera. Specimens that are either pinned or collected in ethanol can be directly used for DNA sequencing, but efforts should also be made to collect specimens in fluids especially designed for their suitability for preserving DNA, if the eventual goal is to use the material for this purpose. Whatever method is used to associate larvae and adults, once the identity of a larva is determined, it is likely that morphological characters will continue to be important for making species identifications and constructing keys. Taxonomic progress on larvae will inevitably lag behind that of adults, on which species taxonomy is based.

Results and Discussion

Twenty-one records are of species previously unreported from Brazil. These are indicated in Table 1 by an asterisk. As might be anticipated, of the 92 species for which new state distribution records are given, the majority were either already known from nearby states in Brazil, or from the neighboring countries of Uruguay, Paraguay, or Argentina. Others, however, were previously only reported from countries distant from the collection area or from very distant areas of Brazil, as for example *Oxyethira espinada* Holzenthal and Harris and *Polyplectropus alleni* (Yamamoto), previously only known from Costa Rica, *Smicridea palifera* Flint, previously only recorded from Venezuela, and *Chimarra adamsae* Blahnik, previously only known from southern Peru and the Rio Xingu region of Brazil. Previous distribution records would have inferred these species to be restricted and endemic in distribution, but obviously this is not the case. Undoubtedly, many species of Trichoptera *will* prove to be regionally restricted and endemic, but it is still premature to make these kinds of assessments at this time.

Despite the fact that the region of southern and southeastern Brazil has a long history of occupation and includes the largest cities, universities, and museums in the country, the Trichoptera of the area have remained very poorly known and incompletely documented. Fritz Müller, was one early worker on Trichoptera of the region (with publications during 1879-1921), but there has been no recent tradition of Trichoptera research. This absence of workers largely explains why such a large percentage of the fauna has remained unknown. However, a number of Brazilian students have recently become interested in Trichoptera, in part because of the value of studying the fauna in order to do water quality assessment. They are beginning a new tradition in systematic work on Trichoptera within Brazil and it is anticipated that the fauna will soon be much better known.

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	Taxon	New state records					
	Ecnomidae						
*	*Austrotinodes uruguayensis* Angrisano 1994				PR		
	Glossossomatidae						
	Mexitrichia albolineata (Ulmer) 1907		SP				
	Mexitrichia teutona Mosely 1939			RJ			
*	*Protoptila cora* Flint 1983	MG					
	Helicopsychidae						
	Helicopsyche (*Cochliopsyche*) *clara* (Ulmer) 1905	MG					
	Helicopsyche (*Cochliopsyche*) *opalescens* Flint 1972	MG	SP				
*	*Helicopsyche (Cochliopsyche) lobata* Flint 1983	MG				SC	
	Helicopsyche (*Feropsyche*) *monda* Flint 1983	MG	SP		PR		
	Hydrobiosidae						
	Atopsyche (*Atopsaura*) *acahuana* Schmid 1989	MG		RJ			
	Atopsyche (*Atopsaura*) *huanapu* Schmid 1989			RJ			
	Atopsyche (*Atopsaura*) *huarcu* Schmid 1989		SP				
	Atopsyche (*Atopsaura*) *plancki* Marlier 1964	MG		RJ			
	Atopsyche (*Atopsaura*) *sanctipauli* Flint 1983	MG		RJ	PR	SC	
	Atopsyche (*Atopsaura*) *zernyi* Flint 1974	MG		RJ		SC	
*	*Atopsyche* (*Atopsyche*) *chirihuana* Schmid 1989	MG					
*	*Atopsyche* (*Atopsyche*) *erigia* Ross 1947	MG					
	Hydropsychidae						
	Blepharopus diaphanus Kolenati 1859	MG					
	Centromacronema obscurum (Ulmer) 1905	MG				SC	
	Leptonema bifurcatum Flint et al. 1987	MG					
	Leptonema sparsum (Ulmer) 1905	MG					
	Leptonema tridens Mosely 1933	MG	SP				
	Leptonema trispicatum Flint et al. 1987		SP		PR		
	Leptonema viridianum Navás 1916		SP				
	Macronema hageni Banks 1924	MG					
	Macrostemum ulmeri (Banks) 1913	MG					
	Smicridea (*Rhyacophylax*) *appendiculata* Flint 1972	MG					
*	*Smicridea* (*Rhyacophylax*) *dentifera*Flint 1983a		SP				
	Smicridea (*Rhyacophylax*) *discalis* Flint 1972	MG					
*	*Smicridea* (*Rhyacophylax*) *forcipata* Flint 1983					SC	
	Smicridea (*Rhyacophylax*) *iguazu* Flint 1983	MG					
	Smicridea (*Rhyacophylax*) *piraya* Flint 1983	MG					
*	*Smicridea* (*Rhyacophylax*) *radula* Flint 1974	MG	SP	RJ	PR		
	Smicridea (*Rhyacophylax*) *scutellaris* Flint 1974	MG					
	Smicridea (*Rhyacophylax*) *spinulosa* Flint 1972		SP			SC	
	Smicridea (*Rhyacophylax*) *unguiculata* Flint 1983	MG					
	Smicridea (*Rhyacophylax*) *vermiculata* Flint 1978	MG					
	Smicridea (*Smicridea*) *albosignata* Ulmer 1907	MG		RJ			
	Smicridea (*Smicridea*) *bivittata* (Hagen) 1861	MG					
*	*Smicridea* (*Smicridea*) *palifera* Flint 1981			RJ			
	Smicridea (*Smicridea*) *paranensis* Flint 1983	MG		RJ			
	Synoestroposis grisoli Navás 1924	MG					
	Synoestroposis pedicillata Ulmer 1905	MG					
	Hydroptilidae						
	Abtrichia antennata Mosely 1939	MG					
	Abtrichia squamosa Mosely 1939	MG		RJ			
	Anchitrichia duplifurcata Flint 1983	MG					
	Byrsopteryx abrelata Harris and Holzenthal 1994				PR		

	Hydroptila argentinica Flint 1983				PR		
*	*Neotrichia filifera* Flint 1983a	MG					
*	*Oxyethira espinada* Holzenthal and Harris 1992	MG					
*	*Oxyethira parce* (Edwards and Arnold) 1961	MG					
	Oxyethira tica Holzenthal and Harris 1992	MG					
	Oxyethira zilaba (Mosely) 1939	MG	SP		PR		
	Leptoceridae						
	Achoropsyche duodecimpunctata (Navás) 1916	MG	SP				
	Grumichella aequiunguis Flint 1983	MG			PR		
	Grumichella rostrata Thienemann 1905						
	Nectopsyche aureovittata Flint 1983	MG	SP				
*	*Nectopsyche acutiloba* Flint 1974	MG					
	Nectopsyche bruchi (Navás) 1920	MG			PR		
*	*Nectopsyche brunneofascia* Flint 1983a		SP			SC	
	Nectopsyche flavofasciata (Ulmer) 1907	MG	SP				
	Nectopsyche fuscomaculata Flint 1983	MG	SP				
	Nectopsyche muhni (Navás) 1916	MG					
*	*Nectopsyche navasi* Holzenthal 1999					SC	
	Nectopsyche ortizi Holzenthal 1995	MG	SP	RJ			
	Nectopsyche pantosticta Flint 1983			RJ			
	Nectopsyche punctata (Ulmer) 1905	MG	SP				
	Nectopsyche separata (Banks) 1920	MG	SP				
*	*Oecetis inconspicua* (Walker) 1852	MG			PR		
	Oecetis iguazu Flint 1983	MG	SP				
*	*Triplectides neotropicus* Holzenthal 1988	MG					
*	*Triplectides misionensis* Holzenthal 1988		SP	RJ	PR	SC	
	Odontoceridae						
*	*Marilia elongata* Martynov 1912	MG					
	Marilia major Müller 1880	MG			PR		
	Marilia minor Müller 1880	MG		RJ			
*	*Marilia truncata* Flint 1983a	MG					
	Philopotamidae						
	Chimarra (*Chimarra*) *adamsae* Blahnik 1998	MG	SP		PR		
	Chimarra (*Chimarrita*) *camella* Blahnik 1997		SP	RJ			
	Chimarra (*Chimarrita*) *camura* Blahnik 1997		SP				
	Chimarra (*Curgia*) *conica* Flint 1983			RJ			
	Chimarra (*Curgia*) *froehlichi* Flint 1998	MG					
	Chimarra (*Chimarrita*) *kontilos* Blahnik 1997	MG	SP				
	Chimarra (*Chimarrita*) *majuscula* Blahnik 1997		SP				
	Chimarra (*Curgia*) *teresae* Flint 1998	MG	SP	RJ			
	Chimarra (*Chimarra*) *uara* Flint 1971	MG					
	Polycentropodidae						
	Cernotina cacha Flint 1971	MG					
	Cernotina perpendicularis Flint 1971	MG					
	Cyrnellus fraternus (Banks) 1905	MG			PR	SC	
	Cyrnellus mammillatus Flint 1971	MG	SP		PR		
	Cyrnellus risi (Ulmer) 1907	MG					
	Nyctiophylax neotropicalis Flint 1971	MG		RJ	PR		
*	*Polyplectropus alleni* (Yamamoto) 1967	MG					
	Sericostomatidae						
	Grumicha grumicha (Vallot) 1855		SP				
	Total	**69**	**29**	**19**	**17**	**10**	

Table 1: New records of Trichoptera Species for the Brazilian States of Minas Gerais, São Paulo, Rio de Janeiro, Paraná and Santa Catarina.

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