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Lists of Species

List of Odonates from Mata do Baú, Barroso, Minas Gerais, Brazil

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Abstract: A survey of odonatofauna was carried out in Mata do Baú, a predominantly forested area in Barroso, Minas Gerais, regarded as a priority area for conservation and scientific investigation, as published by Biodiversitas, a Brazilian nongovernmental institution. Sample collection was conducted over twenty-six days from November 2009 to February 2011. Fifty-seven species of Odonata were collected and grouped into 30 genera and nine families. The dominant families were Libellulidae (46.5%), Coenagrionidae (20.6%), and Megapodagrionidae (10.3%). A specimen of *Heteragrion obsoletum* (Selys, 1886) was collected, which to-date is known by a single specimen collected in 1880 and red-listed as endangered. Special attention was given to the presence of five species of the genus *Heteragrion*, strictly limited to lotic forest streams, with two new species'. This genus is especially sensitive to environmental deterioration, indicating that the forest stream's environmental conditions are beneficial to the area and create a baseline for future monitoring of similar environments.

Introduction

Taxonomic studies of regional and state fauna are considered important, not only for zoogeographic purposes, but also for defining conservation strategies and supporting the preparation of red lists. With regard to Brazilian odonates, state lists exist only for São Paulo (Costa *et al.* 2000) and Espírito Santo (Costa and Oldrini 2005). In Minas Gerais published, regional lists are scanty and exist only for Poços de Caldas (Santos 1966). Herein, we present a commented list of odonates collected in Mata do Baú, the primary forested area of Barroso, Minas Gerais. This has been regarded as a priority area for conservation and scientific research in Minas Gerais (Drummond *et al.* 2005).

Material and Methods

The study was carried out in Mata do Baú, an environment characterized by the presence of semi-deciduous Montane Forest, gallery forests along the Rio das Mortes river, and savannah (Menini-Neto *et al.* 2004). Comprising an area of 400 ha, Mata do Baú is the largest fragment of native forest in Barroso, situated in the Campos-das-Vertentes region in center-south Minas Gerais (21°11'13" S, 43°58'34" W) (Figure 1). The climate is Cwb mesotermic according to Köppen, characterized by humid summers and dry winters. The mean annual temperature is 18°C with a maximum of 24.4°C and a minimum of 13.8°C. The mean annual rainfall is 1400 mm and the altitude varies between 900 and 1200 m. Collections were made with entomologic nets in the different physiognomic regions, totaling 26 days from November 2009 to February 2011, over sixteen months of study. Specimens were killed with ethyl acetate. The authorization process number issued by IBAMA, through the SISBIO system is 21090. Specimens were deposited in the entomological collection of the Universidade Federal de Minas Gerais.

Species richness was determined from the absolute numbers of collected specimens , by Jacknife resampling, using the Estimates Software (Colwell 2009) with 1000 resamplings. Collection efficiency and the number of sampled species were based on the richness percentages estimated by the mean of three nonparametric estimators: Ace 1, Jack 1, and Chao 1 with the use of estimates. The total number of expected species was compared using the species accumulation curve (Cowell 2009), with a confidence degree of 95%, to estimate the actual number of species in the studied area.

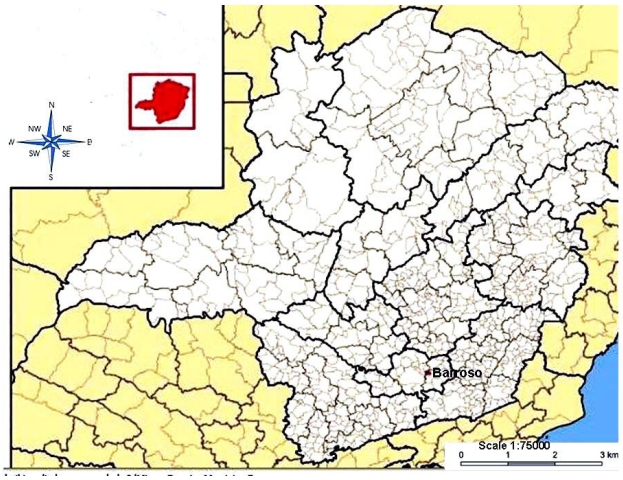

Figure 1. Geographic localition of Barroso, state of Minas Gerais, Brazil.

Results and Discussion

The list Odonata recorded from Mata do Baú is present as follows:

ZYGOPTERA

CALOPTERYGIDAE
Hetaerina longipes Hagen and Selys, 1853 - I-OD-2012-0001
Hetaerina rosea Selys, 1853 - I-OD-2012-0002
Hetaerina simplex Selys, 1853 - I-OD-2012-0003
Mnesarete pudica phryne Costa, 1986 - I-OD-2012-0004

COENAGRIONIDAE
Acanthagrion gracile Rambur, 1842 - I-OD-2012-0005
Argia croceipennis Selys, 1865 - I-OD-2012-0006
Argia lilacina Selys, 1865 - I-OD-2012-0007
Argia mollis Hagen in Selys, 1865 - I-OD-2012-0008
Argia reclusa Selys, 1865 - I-OD-2012-0009
Argia sp. - I-OD-2012-0010
Oxyagrion basale Selys, 1876 - I-OD-2012-0011
Oxyagrion terminale Selys, 1876 - I-OD-2012-0012
Oxyagrion evanescens Calvert, 1909 - I-OD-2012-0013
Telebasis gigantea Daigle, 2002 - I-OD-2012-0015
Tigriagrion aurantinigrum Calvert, 1909 - I-OD-2012-0016

DICTERIADIDAE
Heliocharis amazona Selys, 1853 - I-OD-2012-0017

LESTIDAE
Lestes auritus Hagen in Selys, 1862 - I-OD-2012-0018
Lestes bipupillatus Calvert, 1909 - I-OD-2012-0019

MEGAPODAGRIONIDAE
Allopodagrion contortum (Hagen in Selys, 1862) - I-OD-2012-0020
Heteragrion aurantiacum Selys, 1862 - I-OD-2012-0021
Heteragrion obsoletum Selys, 1886 - I-OD-2012-0022
Heteragrion tiradentense Machado and Bedé, 2006 - I-OD-2012-0023
Heteragrion n. sp. - I-OD-2012-0024
Heteragrion sp. - I-OD-2012-0025

PROTONEURIDAE
Epipleoneura venezuelensis Rácenis, 1955 - I-OD-2012-0026
Forcepsioneura sancta (Hagen in Selys, 1860) - I-OD-2012-0027

ANISOPTERA

AESHNIDAE
Castoraeschna januaria (Hagen, 1857) - I-OD-2012-0028
Rhionaeschna pauloi Machado, 1984 - I-OD-2012-0029

GOMPHIDAE
Epigomphus paludosus Hagen in Selys, 1854 - I-OD-2012-0030
Phyllocycla argentina (Hagen in Selys, 1856) - I-OD-2012-0031

LIBELLULIDAE
Brachymesia furcata (Hagen, 1861) - I-OD-2012-0032
Brechmorhoga nubecula (Rambur, 1842) - I-OD-2012-0033
Dasythemis mincki mincki (Karsch, 1890) - I-OD-2012-0034
Elasmothemis constricta (Calvert, 1898) - I-OD-2012-0035
Erythrodiplax fusca (Rambur, 1842) - I-OD-2012-0036
Erythrodiplax latimaculata Ris, 1911 - I-OD-2012-0037
Erythrodiplax media Borror, 1942 - I-OD-2012-0038
Erythrodiplax umbrata (Linnaeus, 1758) - I-OD-2012-0039
Erythrodiplax paraguayensis (Förster, 1904) - I-OD-2012-0040
Erythrodiplax juliana Ris, 1911 - I-OD-2012-0041
Erythrodiplax sp. 1 - I-OD-2012-0042
Erythrodiplax sp. 2 - I-OD-2012-0043
Erythemis peruviana Rambur, 1842 - I-OD-2012-0044
Erythemis vesiculosa (Fabricius, 1775) - I-OD-2012-0045
Macrothemis heteronycha (Calvert, 1909) - I-OD-2012-0046
Macrothemis imitans imitans Karsch, 1890 - I-OD-2012-0047
Macrothemis marmorata Hagen, 1868 - I-OD-2012-0048
Miathyria marcella (Selys, 1857) - I-OD-2012-0049
Micrathyria stawiarskii Santos, 1953 - I-OD-2012-0050
Micrathyria hesperis Ris, 1911 - I-OD-2012-0051
Micrathyria sp. - I-OD-2012-0052
Orthemis discolor (Burmeister, 1839) - I-OD-2012-0053
Pantala flavescens (Fabricius, 1798) - I-OD-2012-0054
Perithemis mooma Kirby, 1889 - I-OD-2012-0055
Perithemis icteroptera (Selys, 1857) - I-OD-2012-0056
Tramea calverti Muttkowski, 1910 - I-OD-2012-0057
Tramea cophysa Hagen, 1817 - I-OD-2012-0058

As shown in the list, 57 species belonging to 30 genera and nine families were collected in Mata do Baú. Considering the small size of the area (400 ha), the number of species is relatively large and reflects the diversity of the area, which contains both lotic and lentic water systems, as well as forested and open environments. The results of a social wasps inventory (Vespidae) also revealed a high number of species, a fact that has been correlated with the area's plant diversity (Souza and Prezoto 2006). Table 1 shows the number of species for each family.

Libellulidae was the family with most species (46.55%) followed by Coenagrionidae (20.60%) and Megapodagrionidae (10.3%), in marked contrast with the fact that in the world and in the Neotropical region, Coenagrionidae is more speciose than Libellulidae and Megapodagrionidae. On the other hand, all collected Libellulidae were common species with wide geographic ranges (although three of them – two *Erythrodiplax* and one *Micrathyria* – all represented by male individuals, not yet been identified), whereas the rarest and most important species, with regard to their conservation status, are Coenagrionidae and Megapodagrionidae.

The common species, with wide geographic ranges, predominated in the areas of open vegetation, whereas the rarest and most important for conservation predominated in the forested area, a fact that corroborates the results obtained for the odonatological fauna of the Maraca Biological Reserve in Roraima (Machado *et al.* 1991). In the Megapodagrionidae, five species of *Heteragrion* were collected, all from the gallery forest lotic streams. The presence of the species of this genus is an unusual finding.

Its species are strictly lotic with most species occurring only in lotic, streams, in areas of dense forest. Adults and larval odonates have been shown to be good indicators of water quality (Schmidt 1985; Brown Jr. 1997; Clausnitzer and Jödicke 2004) and *Heteragrion* has been shown to be especially sensitive to environmental deterioration (Machado 1988).

Thus, the presence of five species of *Heteragrion* in Mata do Baú, with a new species under description, indicates that its water systems are well preserved and present a strong argument for creating a protected area in this area. Moreover, the rich presence of *Heteragrion* is a useful tool for its future monitoring .

Of especial interst was finding a specimen of *Heteragrion obsoletum* Selys, 1886 (Figure 02), collected in a shaded area inside the forest. As reported by Machado (2008), this species was described based on a single specimen collected by the Belgian naturalist Walther de Selys-Lonchamps in December, 1872, in Caxambu, Minas Gerais, as recorded in his diary (Selys 1875). The specimen has been deposited in the Selys collection at the Institute Royal des Sciences Naturelles de Belgique in Brussels. Since then, the species has never again been collected, despite the fact that two collection trips have been made to Caxambu and neighboring Airuoca in an attempt to find it (Machado, personal communication). Its rediscovery at Mata do Baú, situated around 150 km from Caxambu, is especially important because the holotype of the single known specimen disappeared from the Selys collection as i reported by the curator Jerome Constant (in litt.). The species is regarded as threatened under the endangered category both on the National and State red lists (Machado 2008). Based on the specimen from Barroso, the species will be redescribed and a neotype designated in a separate paper. Another rare species collected at Mata do Baú is *Heteragrion tiradentense* (Machado and Bedê 2006) (Figure 3) known from a single locality at the Serra de São José Wildlife Refuge in Tiradentes, Minas Gerais.

The finding of *Heliocharis amazona* Selys, 1853 (Dicteriadidae), restricted to streams of the well-preserved stretches of gallery forests along the Rio das Mortes river, suggests that this species may also be a good indicator of the degree of conservation of the streams, as already pointed out by Ferreira-Peruquetti and Fonseca-Gessner (2003) (Figure 4).

Despite the fact that the number of species obtained was relatively high, collection efficiency by means of nonparametric estimators was 61%, indicating that collection effort was not enough to reveal the true richness of odonatofauna at Serra do Baú. Taking our knowledge about the Odonata fauna in environments similar to those of the Mata do Baú into account, we can state that further collection efforts would certainly allow other species to be found, especially in the Rio das Mortes,. in which one or two species of *Neoneura*, one species of *Elasmothemis*, and other species of *Gomphidae* possibly occur. One should also consider that, when analyzed separately, the estimator 01 Jack differs from that of the collected species curve (cole) and indicates the stability of the species collected (Figure 5).

Figure 2. *Heteragrion obsoletum* Selys, 1886

Figure 3. *Heteragrion tiradentense* (Machado and Bedê 2006)

Figure 4. *Heliocharis amazona* Selys, 1853

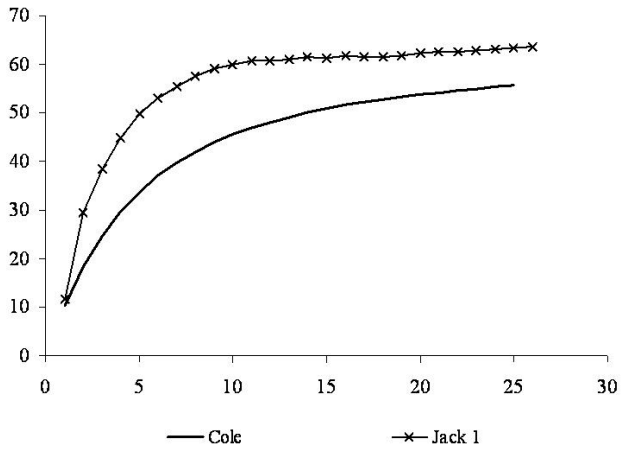

Figure 5. Number of species of Odonata collected (sobs) on 26 sampling days in relation to the number of species expected by Jacknife 01 estimator in Mata do Baú, Barroso, state of Minas Gerais, Brazil.

Table 1. Number of Odonata species per family collected in Mata do Baú.

FAMILY	No.	%
Zygoptera		
Calopterygidae	4	6.99
Coenagrionidae	11	20.60
Dicteriadidae	1	1.91
Megapodagrionidae	6	10.30
Protoneuridae	2	3.44
Lestidae	2	3.44
Anisoptera		
Aeschnidae	2	3.44
Gomphidae	2	3.44
Libellulidae	27	46.55
TOTAL	**58**	**100%**

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