

Systematics, Morphology and Biogeography

Checklist of Ephemeroptera (Insecta) from São Mateus River Basin, Espírito Santo, Brazil



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ABSTRACT

In order to expand the knowledge on the composition of Ephemeroptera from large rivers, we present, herein, the first survey of mayflies from the São Mateus River Basin, Espírito Santo State. Adults were collected biannually in 2012 and 2013 with the aid of Pennsylvania light trap in eleven points distributed in the main river of the river basin, São Mateus River and its two main tributaries, Cotaxé River (Braço Norte) and Cricaré River (Braço Sul). Thirty-three species were identified (22 nominal and 11 morphospecies) in 24 genera and five families. One genus and one species are reported for the first time from Brazil, three species from Southeastern Region of Brazil, and two species from the state. Five species and one genus not previously described were also found. Moreover, around 20% of the known species of mayfly registered from the state were found. This work reinforces the need to give more attention to research on large rivers due to the high potential for diversity, not only for Ephemeroptera, but also for other aquatic insects.

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Introduction

The knowledge concerning mayflies (Ephemeroptera: Insecta) in Brazil has increased considerably in recent years. With the increase of taxonomic papers and published geographical distribution, the number of species reported from the country almost doubled in two decades (Da-Silva and Salles, 2012). Not long ago the state of Espírito Santo was considered understudied with respect to the order in the country. However, after the publication of the first survey of Ephemeroptera (Salles et al., 2010), and a series of taxonomic papers based on material from the state (Salles, 2010; De-Souza et al., 2011; Massariol and Salles, 2011; Salles and Lima, 2011), this situation has drastically changed. The number of mayfly species reported from the state in 2006 was eight, and now more than 80 species have been recorded and/or described.

Nevertheless, as in most studies conducted in Brazil, the vast majority of these records were achieved based on material collected in streams. Medium to large rivers in Brazil, as a general rule, are neglected when it comes to the study of the aquatic insects community. This situation not only hampers any attempts to uncover the

diversity of the aquatic biota, but also prevents directly applicable studies, such as biomonitoring for example.

Among the main rivers in the state of Espírito Santo, the São Mateus River is located in the north of the state and has a maximum width of approximately 310 meters (SEAMA/IEMA, 2015). The São Mateus River Basin is part of the Eastern Atlantic Hydrographic Region (MMA, 2003) and is completely inserted into the Aquatic Ecoregion of the Atlantic Forest (MMA, 2006). It is the main water supply to several towns and cities, and has been providing water to several irrigation projects, and has also been used as recipient of domestic and industrial effluents and these other places. The remaining forests that protect soil and water resources have been cut or burned over the entire basin (ANA, 2015).

Aiming to expand the knowledge on mayflies, as well as to increase the information about this group in the state of Espírito Santo, the aim of this work is to provide the first inventory of species of Ephemeroptera in the São Mateus River Basin.

Material and methods

Study area

The state of Espírito Santo is located in the Southeast Region of Brazil; it has about 46,000 km² and consists of 78 municipalities and 12 River Basin (Feitoza et al., 2001). The São Mateus River Basin

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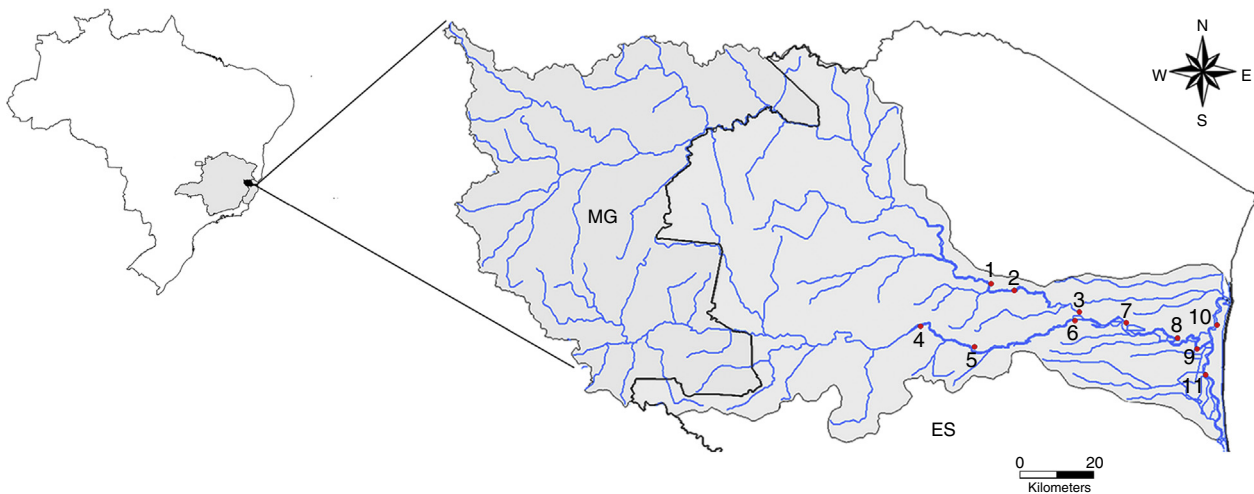


Fig. 1. Sampling points in the São Mateus River Basin, state of Espírito Santo.

(Fig. 1) has an area of approximately 13,482 km², with 5806 km² in the state of Minas Gerais, covering 12 municipalities and 7676 km² in the state of Espírito Santo, which passes through 11 municipalities (SEAMA/IEMA, 2015).

The São Mateus River is formed by two main tributaries: the Cotaxé and Cricaré rivers, with 244 km and 188 km length, respectively. (SEAMA/IEMA, 2015). From the springheads in state of Minas Gerais to the towns of Nova Venécia and Boa Esperança, both these watercourses as its tributaries have many rapids and small waterfalls. The lower course of the São Mateus River consists mainly of flooded piemontes and a small strip of coastal plain, having soft and wavy relief, which in addition to easy access allows the use of motomechanization in many stretches. Probably, these are some reasons for indiscriminate process of deforestation in this area along the last fifty years. Today the entire region is almost devoid of native vegetation and features many erosional areas. Moreover, the river is also receptor of domestic and industrial effluents from several cities through which it passes (ANA, 2015).

Collection, identification and deposition

Samples were collected at the main river of São Mateus River Basin, in 11 sites distributed as follows: three in the Cricaré River, three in the Cotaxé River, four in the São Mateus River and one in the Mariricu River (Fig. 1). Samples were collected in four campaigns, between 2012 and 2013. Figs. 2–5 correspond to images of some of the collection points. In Table 1 these points are presented with their respective geographic coordinates. Samples were gathered through a Pennsylvania light trap (Frost, 1957), equipped with a 12 Volts inspection lamp and a plastic container completely filled with alcohol 92.6%. The traps were placed in trees along the riverbank, and the lamp was lit no later than five o'clock, staying on until dawn of the next day.

For the identification of the material, a series of books, theses and papers have been consulted, among them: Molineri (1999), Domínguez et al. (2006), Salles (2006), Molineri (2010), Gonçalves et al. (2011), Nascimento et al. (2011), Lima et al. (2012), Cruz et al. (2014). The specimens are deposited at Coleção Zoológica Norte Capixaba (CZNC) of Universidade Federal do Espírito Santo, stored at around –20 °C in 80% ethanol.

Material examined and geographical distribution

The geographical distribution presented for the taxa was extracted from Domínguez et al. (2006) and Salles et al. (2015).

The examined material is organized so that PT refers to the collection point (Table 1), in brackets is the number of individuals, and then the date of collection. New records of the species are marked with an asterisk (*).

Results

Altogether 33 species are listed, with 23 nominal and 10 morphospecies, 24 genera and five families. Figures 6–9 represent some of the collected species. The species and morphospecies found in the São Mateus River Basin are listed below.

For each species, their geographical distribution is presented as well as the points at which it was collected (more information about the collection points are presented in Table 1). Comments are addressed when pertinent.

Baetidae

Americabaetis alphas Lugo-Ortiz and McCafferty, 1996

Geographical distribution: Argentina, Bolívia, Chile, Paraguai and Brazil: Alagoas, Amazonas, Bahia, Ceará, Espírito Santo (Alto Caparaó, Ibitirama, Santa Teresa, São Mateus* and Nova Venécia*), Goiás, Mato Grosso, Minas Gerais, Paraná, Pernambuco, Piauí, Rio de Janeiro, Rio Grande do Sul, Roraima, Santa Catarina, São Paulo and Sergipe.

Comments: Previously recorded for the state of Espírito Santo (Salles et al., 2010), but for the first time in the municipalities of São Mateus and Nova Venécia.

Material examined: PT01: (1) 16–17/iv/2012; PT01: (1) 20–21/xi/2012; PT02: (1) 23–24/v/2012; PT02: (1) 22–23/xi/2012; PT03: (1) 26–27/vii/2012; PT03: (1) 20–21/xi/2012; PT04: (1) 21–22/xi/2012; PT05: (1) 21–22/xi/2012.

Aturbina beatrixae Gillies, 2001

Geographical distribution: Argentina, Uruguai and Brazil: Bahia, Espírito Santo (Município Alto Caparaó, São Mateus), Mato Grosso, Minas Gerais, Paraná, Pernambuco, Santa Catarina, São Paulo.

Comments: Previously recorded for the state of Espírito Santo (Salles et al., 2010), but for the first time in the municipality of Nova Venécia.

Material examined: PT03: (2) 20–21/xi/2012; PT04: (10) 21–22/xi/2012.

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