

Distribution patterns of aquatic and semi aquatic Heteroptera in Retiro das Pedras, Brumadinho, Minas Gerais, Brazil

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Abstract

A list of aquatic and semi aquatic Heteroptera species from Retiro das Pedras (Brumadinho, Minas Gerais), the community distribution patterns within different habitats (3rd order stream, artificial reservoir and temporary pools) and notes on faunistic and distribution status of species are presented.

Keywords: Heteroptera, Nepomorpha, Gerromorpha, Leptopodomorpha, Retiro das Pedras, Faunistic.

Introduction

Insects are important members of aquatic environments. Among them are the aquatic and semi aquatic Heteroptera, widely distributed insects inhabiting all sort of freshwater habitats. The water bugs belonging to the sub order Heteroptera have a direct life cycle (eggs, nymphs and sexually mature adults). Owing to their peculiar morphological and behavioural features these predaceous insects, irrespective of developmental stage, are able to subjugate and consume several prey items. It confers to the group marked relevance to the trophic structure and nutrient transfer in freshwater sources as well as an eminent potential for controlling disease vector populations (Pontier & Delplanque, 1976; Cooper, 1983; Santamarina-Mijares & Gonzáles-Broche, 1985; Victor & Ugwoke, 1987; Consoli et al., 1989; Kesler & Munns, 1989; Pereira et al., 1991, 1993; Pereira & Melo, 1998).

Studies concerning aquatic and semi aquatic Heteroptera in Minas Gerais state are scarce and broadly dispersed within the literature (Nieser, 1994; Nieser & Pelli, 1994; Nieser & Melo, 1997, 1999a, b; Nieser et al., 1997, 1999; Nieser & Polhemus, 1999; Nieser & Chen, 2002). Also, studies that account for distribution and habitat preferences as well as other basic biological and ecological information on the aquatic and semi aquatic Heteroptera in the state are infrequent so that several features remain for further consideration (Vianna et al., 1999; Vianna & Melo, 2002; Goulart et al., 2002).

Problems with water quality and general degradation of aquatic habitats are an ongoing process mainly dependent on human population expansion and the frequently improper use of freshwater sources. Belo Horizonte, Minas Gerais State capital, is no exception to the rule. Human occupation and land use modifications affect the city as a whole including its boundaries where several aquatic systems that strikingly contribute to the ecological equilibrium of the region and to the city water supply are located. However, studies about invertebrate aquatic communities and attempts for the establishment and selection of conservation priorities for riverine habitats within these areas are, at least, incipient.

Aiming to contribute to the current knowledge on the aquatic and semi aquatic Heteroptera in Minas Gerais State and to aid programs of water quality as well as biodiversity conservation and management, focusing on water bodies from Belo Horizonte vicinities, an inventory of the heteropteran fauna of Retiro das Pedras and the spatial distribution between different habitats are presented.

Study area

The Retiro das Pedras (20°04'S; 44°00'W), included within Brumadinho county and situated in the "Quadrilátero Ferrífero", is a house condominium located 15 Km south far from Belo Horizonte city in the state of Minas Gerais. The region is located in an altitudinal gradient (highest altitude: ~1450m). The vegetation is known as "Campo Rupestre", formation mainly dominated by shrubs and grasses. Considering the climate, it is remarkable a well-defined dry winter season (Jun-Sep) and wet season in summer (Oct-May). This seasonal pattern influences the general environmental conditions of the water bodies of the area. So, in the rainy months several small temporary habitats are created, being dried up along the winter and are governed by these hydrological fluctuations. On the other hand, the drier months are characterized by fire events. A general characterization of sampled stations is provided below:

Station 1 (Str1): A perennial 3rd order stream draining to Retiro das Pedras river watershed that shows fast-flowing (riffle) and some stagnant (pool) areas. The stream is shallow (up to 80cm depth) and entirely exposed to sunlight, despite some areas of overhanging vegetation that serve as physical support and shade. A rocky substratum is characteristic of the habitat.

Station 2 (Art2): An artificial reservoir. This man-made habitat (0.30-1.90m depth) was constructed for the partial supply of the Retiro das Pedras water demand. The station is very influenced by the riparian canopy which provides shading and organic matter input. The circulation of water is dependent on precipitation regime. A muddy substratum is present.

Station 3 (Temp3): Temporary pools. These ephemeral habitats occur only in the rainy months. They were represented by muddy areas to shallow pools (up to 50cm depth), almost without flux, fully exposed to sun. Some floating plant debris at edges were observed.

Received 20.02.2003

Accepted 03.12.2003

Distributed 30.12.2003

Material and Methods

Samples were carried out from January 1999 through September 2002 at the mentioned sampling stations which were considered to represent possible habitats for Heteroptera and to account for the ecological diversity of the aquatic sources within Retiro das Pedras.

Heteropteran nymphs and adults were collected with entomological hand nets, sweeping the water column, edges and bottom of the water sources. The collected material was emptied into a plastic tray and the insects were sorted from organic matter, picked out and transferred to vials containing 80% ethanol. The remaining material was placed in plastic bags for further laboratory trial, performed under stereoscope microscope whenever necessary. This procedure allowed maximizing the collection of a representative spectrum of Heteroptera species from Retiro das Pedras.

The species identification was performed according to Nieser & Melo, (1997) and sampled material was deposited in the entomological collection of the Department of Parasitology from Federal University of Minas Gerais (DPIC).

Results

There were recorded 32 species distributed in 12 families. The dominance of Nepomorpha species (17) was found in all sampling stations. Veliidae and Gerridae were the commonest families of Gerromorpha, comprising together 40.6% (13) of all recorded species from Retiro das Pedras vicinities. Notonectidae was the major family of collected Nepomorpha with 5 species (15.6%) recorded in the study area. The checklist of species among the sampled habitats is shown in Tab. 1.

The station 1 (Str1) fauna comprises 18 species (56.2%). Nine of them (*Buenoa oreia*, *Neoplea maculosa*, *Tenagobia schreiberi*, *Halobatopsis chrysocastanis*, *Rhagovelia scitula*, *R. trianguloides*, *R. whitei*, *Microvelia quieta* and *Paravelia* sp.1) were not be found in any other sampled habitat.

The highest number of species (19) was recorded in station 2 (Art2), ten of which were exclusively registered at this habitat (*Buenoa mutabilis*, *Notonecta polystolisma*, *Neotrepes latus*, *Centrocorisa kollarii*, *Halobatopsis delectus*, *Brachymetra albinervis*, *B. furva*, *Limnogonus profugus*, *Platyvelia* sp. and *Mesovelia amoena*).

Among the six species collected in station 3 (Temp3), *Ochterus perbosci* and *Paravelia* sp.2 were restricted to the habitat while *Carvalhoiella beckeri* and *Rupisalda* sp. occurred also in Str1 and in Temp3.

Seven species (*Belostoma testaceopallidum*, *B. riberoi*, *Enithares braziliensis*, *Limnocoris maculiceps*, *Microvelia hinei*, *Neotrepes jaczewiskii*, *Ranatra montei* and *R. robusta*) occurred in both Str1 and Art2 (Tab. 1).

Discussion

The observed trend evidences that biotic and abiotic factors influenced population distribution and community assembly from Retiro das Pedras in different pathways. The communities of Str1 and Art2, that comprise permanent habitats in the current study, presented distinct species composition. However, attempts to analyze the species

variability on the mentioned habitats might be done carefully. What were recognizable along the period of study is that the reservoir construction and consequent hydrological and general habitat traits modifications have led to a displacement of species, favouring lentic species. Other studies like Nieser, (1975); García-Avilés et al. (1996); González Martínez & Valladares Díez, (1996) and Larsen & Olson, (1997) specifically concerning to heteropteran community structure in a wide range of habitats can not be directly compared, although they support some patterns that the present study suggests.

The small temporary pools, (Temp3), supports a community mainly formed of semi aquatic species known to tolerate a wide range of conditions and possessing good colonizer abilities that confer advantages for the exploitation of temporary or disturbed environments. A semi aquatic mode of existence and noticeable flight abilities of Temp3 community species stand out as the evolutionary path for avoiding disturbance considering the habitat harming, highly variable environmental conditions as water permanence variation and temperature fluctuation, pattern similarly observed on others temporary habitats (Smith & Pearson, 1987; Bazzanti et al., 1996; Moreno et al., 1997; Goulart et al., 2002). These habitats could also serve as a refuge for dispersal and as feeding sites for the fauna of the other permanent habitats. This stresses the neglected relevance of these habitats considering biodiversity conservation, biomonitoring and management interventions.

The current knowledge concerning the distribution status and faunistic aspects of the aquatic and semi aquatic Heteroptera in Minas Gerais is insufficient for a definitive biogeographical analysis. However, our surveys in Retiro das Pedras resulted in a great number of species that are of remarkable interest so that further comments has become necessary.

It is particularly relevant for the biological diversity conservation the first record of an undescribed species of *Rupisalda*, a genus of Saldidae (Heteroptera: Leptopodomorpha), an important semi aquatic family in North American fauna where they are found associated with saline or brackish water habitats, although few reports for the family are found for Brazil (Drake & Carvalho, 1948). In addition, new records of two undescribed species of *Paravelia* and one of *Platyvelia* for Minas Gerais were done.

A group of species recorded for Retiro das Pedras range have been recently described or reported for Minas Gerais. Included in this group are at least five species that are probably neglected or easily overlooked due to their small size or to collecting constraints, resulting in an inevitable sub estimated distribution (*Centrocorisa kollarii*, *Neotrepes latus*, *Carvalhoiella beckeri*, *Halobatopsis chrysocastanis*, *Ochterus perbosci*) and so their occurrence extent within the state are incomplete and their distribution range needs to be revised.

Other species (*Ranatra montei*, *R. robusta*, *Tenagobia schreiberi*, *Limnocoris maculiceps*, *Belostoma testaceopallidum*, *B. riberoi*, *Neotrepes jaczewiskii*, *Neoplea maculosa*, *Buenoa mutabilis*, *Buenoa oreia*, *Enithares braziliensis*, *Martarega uruguayensis*, *Rhagovelia whitei*, *R. scitula*, *R. trianguloides*, *Halobatopsis delectus*, *Brachymetra albinervis*, *B. furva*, *Mesovelia amoena* and *Microvelia hinei*) so far as the literature concern (Nieser & Melo, 1997; Nieser & Chen, 2002), are regionally important with dispersed

Table 1 – List of species and habitat distribution of aquatic and semi aquatic Heteroptera from Retiro das Pedras. (Station 1-Str1[Stream]; Station 2-Art2 [Artificial reservoir]; Station 3- Temp3([Temporary pools])

TAXONOMIC LEVEL	STR1	ART2	TEMP3
NEPOMORPHA			
Nepidae			
<i>Ranatra montei</i> De Carlo	X	X	
<i>Ranatra robusta</i> Montandon	X	X	
Belostomatidae			
<i>Belostoma testaceopallidum</i> Latreille	X	X	
<i>Belostoma ribeiroi</i> De Carlo	X	X	
Naucoridae			
<i>Limnocoris maculiceps</i> Montandon	X	X	
<i>Carvalhoiella beckeri</i> De Carlo	X		X
Notonectidae			
<i>Enithares braziliensis</i> Spinola	X	X	
<i>Martarega uruguayensis</i> (Berg)		X	X
<i>Buenoa oreia</i> Nieser et al.	X		
<i>Buenoa mutabilis</i> Truxal		X	
<i>Notonecta polystolisma</i> Fieber		X	
Helotrephidae			
<i>Neotrepes jaczewiskii</i> China	X	X	
<i>Neotrepes latus</i> Nieser & Chen		X	
Pleidae			
<i>Neoplea maculosa</i> (Berg)	X		
Corixidae			
<i>Centrocorisa kollarii</i> (Fieber)		X	
<i>Tenagobia schreiberi</i> Espínola	X		
Ochteridae			
<i>Ochterus perbosci</i> (Guérin-Méneville)			X
GERRMORPHA			
Gerridae			
<i>Halobatopsis delectus</i> Drake & Harris		X	
<i>Halobatopsis chrysocastanis</i> Nieser & Melo	X		
<i>Brachymetra albinervis</i> (Amiot & Serville)		X	
<i>Brachymetra furva</i> Drake		X	
<i>Limnogonus profugus</i> Drake & Harris		X	
Veliidae			
<i>Rhagovelia scitula</i> Bacon	X		
<i>Rhagovelia trianguloides</i> Nieser & Polhemus	X		
<i>Rhagovelia whitei</i> (Breddin)	X		
<i>Microvelia hinei</i> Drake		X	X
<i>Microvelia quieta</i> Drake & Carvalho	X		
<i>Paravelia</i> sp.1 (Undescribed species)	X		
<i>Paravelia</i> sp.2 (Undescribed species)			X
<i>Platyvelia</i> sp. (Undescribed species)		X	
Mesoveliidae			
<i>Mesovelia amoena</i> Uhler		X	
LEPTOPODOMORPHA			
Saldidae			
<i>Rupisalda</i> sp. (Undescribed species)	X		X

distributional reports in the literature but are apparently widespread in Minas Gerais state.

Despite the general environmental degradation and the lack of basic ecological information on the aquatic and semi aquatic Heteroptera communities in Minas Gerais, Retiro das Pedras still has marked relevance for biodiversity conservation expressed both by its diversity of aquatic ecosystems and by its rich aquatic and semi aquatic Heteroptera communities. Our assumption is that Retiro das Pedras could also be regarded as a reference location since it is likely to portray the ecological diversity of the aquatic sources at the south range of Belo Ho-

rizonte city boundary, threatened due to the often neglected human impacts mitigation.

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