

Libellulidae (Insecta: Odonata) from Itapiracó reserve, Maranhão, Brazil: new records and species distribution information

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ABSTRACT

In this work, I apply a simple protocol to species occurrence inventory of Odonata in a region of Maranhão state which has very few distributional records. Some relations between species occurrence and environmental characteristics are discussed, mainly in relation to the high occurrence of *Erythemis*. Eighteen new records are presented discussing the role of this approach to generate useful information for conservation purposes.

KEYWORDS: Rapid Assessment protocol, Biodiversity, Odonata, Environmental Impact, Conservation.

Libellulidae (Insecta: Odonata) da Reserva Itapiracó, Maranhão, Brasil: novos registros e informações sobre distribuição de espécies

RESUMO

Nesse trabalho eu aplico um protocolo simples para o levantamento da ocorrência de espécies de Libellulidae em uma região no estado do Maranhão, que possui pouquíssimas informações. Algumas relações entre ocorrências de certas espécies e características do ambiente além de padrões de co-ocorrência são discutidas, principalmente em relação à elevada ocorrência do gênero *Erythemis*. Dezoito ocorrências novas são listadas e é discutido o papel desse tipo de abordagem para gerar informações de interesse para conservação de espécies.

PALAVRAS-CHAVE: Levantamento rápido de espécies, Biodiversidade, Odonata, impacto ambiental, Conservação.

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In this paper I present the results of a survey in an area at Itapiracó, Maranhão, Brazil, that was a reserve invaded by homeless people. This survey was made mainly to acquire biogeographic data in an area with very few studies in Odonata and with great possible relevance to conservation. In a recent revision, De Marco & Vianna (2005) showed that the state of Maranhão has very scarce distributional information about its odonate fauna. However, a very rich fauna is expected in this region due to its biogeographical affinity both to Brazilian northeastern fauna in arid climates as well as to its Amazonian components.

The Itapiracó state reserve area (-2.524218 S, -44.206094 W, location in decimal degree format) is located on the São Luís island with a tropical warm semi-humid climate and an annual precipitation close to 1800mm (Nimer, 1989). The vegetation of the area includes a variety of palm tree formations mainly dominated by buriti (*Mauritia vinifera*) and juçara (*Euterpe oleracea*) near rivers, bordered by cerrado and restinga systems (Rebêlo & Silva, 1999).

Four main systems were observed at Itapiracó which helps understand the alterations of the odonate community: natural regeneration areas, temporary pools, lakes/impoundments, and streams. Regeneration areas (RA) surrounded almost all the forested areas of the reserve and are characterized by the presence of *Vismia* spp. In most of the area, the *Vismia* individuals do not surpass 1-1.5m in height, but it is difficult to establish whether this is a result of a recent regeneration event or the poor condition of the sand soil. Temporary pools (TP) should be easy to find in the entire area in August, soon after the dry season ("Estiagem") begins. This area had intense direct human use and the passage of people and coachbuses which usually leave deep furrows in the soil, that appear to increase with heavy rains and become pools for a relative long time. I observed many temporary pools in the regeneration areas. A dammed stream (DAM), nearly 10x15m, is one of most important habitats for the odonate there, at least based on their abundance. This small impoundment was densely occupied by *Nymphaea* aff. *ampla* and was surrounded by gramineae on one side and by secondary vegetation on the other. Besides this dam, I once visited a lake (L) with little aquatic vegetation surrounded by grass. Streams with wetlands (WET) are normally densely occupied by Jussara (*Euterpe oleracea*), Babaçú (*Orbygnia* spp) e Carnaúba (*Copernicia prunifera*) in the region. These areas are usually shaded and bordered by complex vegetation. Macrophytes may be present, but in general they are of minor importance compared to grass. The streams studied were one shaded by forest (SF) and another used by the local community as a swimming pool (SS).

For two days in August 2000, I made an Odonata inventory at those areas described above from 10:00 to

12:00 hr. This inventory was made with the aid of 12 local community members with capture effort limited to the use of one insect-net (i.e. only one collector in the field at a time), totalling 4 collector-hours. Time was divided among habitats in direct relation to the abundance of new records. When no new species was observed at a site we would move to another place. Some species were not captured but were recorded only if the identification was unequivocal (e.g. *Brachymesia herbida* Gundlach, 1889). In these cases it was marked as an observation in the result section.

The identification of species was made by comparing them with specimens in the collection deposited at the Laboratório de Ecologia Teórica e Síntese (LETS/UFG) and with the use of keys at the generic level and descriptions (Montgomery, 1940; Borror, 1942; Borror, 1945; Garrison, 1990; Carvalho & Calil, 2000; Costa *et al.*, 2002). All Odonata scientific names used are based on the synonymic list of Garrison (1991).

The observations and captures were made with emphasis on Libellulidae, as many of the other families can pass easily unnoticed in the vegetation (e.g. Coenagrionidae) or may not have been active from 10:00 to 12:00 hr (e.g. some Aeshnidae and Gomphidae). Although other species are cited here, this methodology is primary efficient for the analysis of patterns in the community of Libellulidae present:

Brachymesia herbida: A single immature individual observed at RA and a mature observed at DAM.

Diastatops obscura (Fabricius, 1775): Occurred in DAM and WET.

Erythemis plebeja (Burmeister, 1839): common in DAM not observed in other sites; many males defending territories.

Erythemis carmelita (Williamson, 1923): common in DAM, observed mainly perched in the higher vegetation 2-5m above the water. At least two individuals observed with this behaviour.

Erythemis peruviana (Rambur, 1842): common in DAM, some males defending territories.

Erythemis vesiculosa (Fabricius, 1775): Common in RA, feeding or patrolling very near the soil over the vegetation (maximum 1m above soil).

Erythrodiplax basalis (Kirby, 1897): Very frequent in WET, rare in DAM and SW. Many males were observed perched on vegetation and few possible females observed in the RA.

Erythrodiplax fusca (Rambur, 1842): single individual captured at DAM.

Erythrodiplax media Borror, 1942: several individuals defending territories in DAM and L.

Erythrodiplax paraguayensis (Förster, 1905): observed perched at lake margin (L) and DAM.

Miathyria marcella (Selys in Sagra 1857): Many small aggregation of 10 to 20 individuals observed at RA.

Micrathyria ocellata dentiens Calvert, 1909: Defending territory in DAM.

Micrathyria pseudeximia Westfall, 1992: defending territory in DAM and L.

Nephelptia phryne (Perty, 1834): a single individual was captured inside the Forest near a trail. Apparent a near-mature male foraging.

Orthemia ambinigra Calvert, 1909: Frequent in TP and WET. Rarer than *O. discolor* in RA and DAM.

Orthemis discolor (Burmeister, 1839): Often observed at trails and RA, TP. In WET it was observed defending territory. Also observed near DAM and L. This species was frequently observed defending territory against *O. ambinigra*.

Perithemis lais (Perty, 1834): Frequent in DAM and L. Male defending territory and many copulation events observed.

Zenithoptera anceps Pujol-Luz, 1993: Common in WET but also occurred at DAM.

Species of Zygoptera, not properly sampled by my sampling methods were:

Neoneura (Protoneuridae): Found perched in lower stems at the margin of SF. Very common.

Hetaerina sanguinea Selys, 1853 (Calopterygidae): Found in higher stems of grass at SW.

Ischnura fluviatilis Selys, 1876 (Coenagrionidae): Found in L, DAM and rare at WET.

An analysis of conservation value is mostly based on distributional records of faunal elements, with well determined geographic locations (Humphries *et al.*, 1995; Winston & Angermeier, 1995). However, De Marco & Vianna (2005) observed that there are many distributional records with information as imprecise as “Brazil”, or “Maranhão” or “Amazon”. These broad geographical units do not properly describe the distribution for a conservation biogeography approach, however, it provides some information that could

be useful in some other analysis. Here I apply the restrictive criteria which considers only distributional records by which we could determine the geographical (latitude/longitude) position directly from the bibliographic or collection information, or indirectly by georeferencing the information about collection locality. This is the same criteria used on a recent literature compilation of odonate distribution by De Marco & Vianna (2005) which recorded the presence of eight species in Maranhão (Table 1). We increased this list in 17 species, with samples from just one locality. This is an important picture of the present knowledge of Brazilian biodiversity and the obvious need for biodiversity inventories with focus on “white-spots” (areas with low amount of information on biodiversity).

The first aspect of this assemblage of odonate species that must be noted is the richness of *Erythemis* species. From the total of eighth species registered in Brazil (De Marco & Vianna, 2005) four were observed in a single lentic water body. This poses an interesting question about the possible coexistence of those species in respect to the current niche theory (Vandermeer, 1972; Alley, 1982). One possibility is that these species present a resource partition on ecological space that can allow its coexistence. They are similar in size; and general behavioural observations of *E. plebeja* (De Marco *et al.*, 2002) or *E. peruviana* (De Marco *et al.*, 2005) do not suggest any clear distinction of areas for male territorial defence. Another possibility, perhaps more reasonable, is that this is a non-equilibrium system strongly affected by dispersal-colonization effects. All these species had larger biogeographical distributions and appear to have high dispersal capabilities. A more detailed study is necessary to reveal whether those species have persistent populations here or are affected by some process similar to the ecological drift conceptualized by Hubbell (2001).

In some other libellulid genera, it is common to find co-occurring species as *Erythrodiplax* and *Micrathyria* (De Marco & Latini, 1998; Ferreira-Peruquetti & De Marco, 2002; De Marco *et al.*, 2005). These genera are important

Table 1 - Records of Odonata species in Maranhão state that present geographic position information based on a literature review of 217 published articles.

Species	Municipality	Latitude	Longitude	Literature reference
<i>Diastatops obscura</i>	São Luís do Maranhão	-2,583	-44,283	Montgomery (1940)
<i>Micrathyria ocellata</i>	Gonçalves Dias	-3,667	-45,783	Santos (1949)
<i>Micrathyria pseudeximia</i>	Timon	-5,094	-42,836	Costa <i>et al.</i> (2002)
<i>Uracis fastigiata</i>	Rosário	-2,934	-44,235	Costa & Santos (1997)
<i>Uracis imbuta</i>	Imperatriz	-5,516	-47,45	Costa & Santos (1997)
<i>Uracis imbuta</i>	Rosário	-2,934	-44,235	Costa & Santos (1997)
<i>Uracis siemensii</i>	Santa Luzia	-2,583	-44,283	Costa & Santos (1997)
<i>Zenithoptera anceps</i>	Santa Luzia	-2,583	-44,283	Pujol-Luz & Fonseca (1997)
<i>Zenithoptera anceps</i>	Imperatriz	-5,516	-47,450	Pujol-Luz & Fonseca (1997)
<i>Zenithoptera lanei</i>	São Luís do Maranhão	-2,583	-44,283	Pujol-Luz & Fonseca (1997)

components of tropical lentic waters but some of its species are also observed in lentic portions of streams (*E. fusca* and *E. media*).

The Libellulidae assemblage present here is also characterized by species with large biogeographic distribution (the *Erythemis* species, *E. media*, *E. fusca*, *M. marcella*, *B. herbida*, *P. lais*, *D. obscura*, *O. discolor*), a biomic trait which is possibly associated with the ability to successfully colonize in disturbed open habitats (De Marco, 1998) similar to the Itaipiracó mosaic system. However, some remarkable absences are noted: *Pantala flavescens* (Fabricius, 1798) and *Erythrodiplax umbrata* (Linnaeus, 1758) which are present in almost every site with temporary ponds in Brazil. This is possibly a sampling error due to random factors or because individuals of this species may still be in the larval stage during sampling. Even assuming these possible underestimates of odonate species composition, the use of a simple methodology as presented in this paper may help accelerate the accumulation of biogeographical information in Brazil. This effort should be directed towards areas about which biodiversity inventories are nearly absent, as shown by De Marco & Vianna (2005), and is the case of most of Maranhão.

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