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First observations on the survival strategies of terricolous arthropods in the northern Pantanal wetland of Brazil

Abstract

Terricolous arthropods (fire ants, leaf cutting ants, millipedes) make vertical migrations to temporarily pass the aquatic phase in northern Pantanal wetlands at non-flooded sites like grass stems and tree trunks.

Resumo

Primeiras observações sobre as estratégias de sobrevivência em artrópodos terrícolas das áreas alagáveis no Pantanal do Norte do Brasil

Os artrópodos terrícolas (formigas de fogo, saúvas, diplópodos) fazem migrações verticais para passar a fase aquática nas áreas alagáveis do Pantanal do Norte temporariamente em lugares não inundados como gramíneas e troncos de árvores.

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Key words

migration, inundation, floodplains, Formicidae, Diplopoda

1. Introduction

One of the largest wetlands of the world, the Pantanal of Mato Grosso, is situated in the center of South America, 15 - 20° south of the equator. It is formed by the upper section of the Paraguay River and its tributaries in a large depression. Flood levels vary from few centimeters to several meters. Flood periods range from 2 - 5 months (JUNK et al. in press). To inhabit the floodplain forests and open grasslands of this environment, terricolous arthropods have to adapt to the unfavorable external conditions to enhance their ability of survival. First observations, still preliminary, of these "survival strategies" can be given for some ant and millipede species.

2. Material and Methods

The study area was located in the northern Pantanal of Mato Grosso at Fazenda Retiro Novo, Pantanal of Poconé, in the district of Pirizal (16°15'12"S, 56°22'12"W). This region is sub-

jected to a rainy season from October to April and to annual flooding of 0.6-1.5 m height, generally between December and March (aquatic phase). Field observations were realized in February/March 2000 in two floodplain forests (locally called Landi and Cambarazal) and their adjacent open grasslands, when most of the study area was flooded.

3. Results and Discussion

In the flooded open grassland area, the soil inhabiting fire ant *Solenopsis saevissima* (Myrmicinae) aggregated on grass stems of *Setaria geniculata* (Gramineae) above the water-level (Plate 1a). Animals moved between grass stems in forming living carpets or "rafts" (see also HÖLLDOBLER & WILSON 1990) on the water surface (Plate 1b). Those reaching the floodplain forest temporarily climbed tree trunks. This survival strategy has previously been observed in white-water river-floodplains of central Amazonia where *S. saevissima* sometimes forms "rotating balls" which are carried downriver (ADIS, 2000). A second ant species, *Dorymyrmex* aff. *pyramicus* (Dolichoderinae), was found to aggregate more towards the top of the grass stems (Plate 2 a). However, dislocation on the water surface has not been observed.

In the floodplain forests, two terricolous millipede species were found to pass the aquatic phase on tree trunks. Advanced immatures of *Plusioporus salvadorii* (Spirostreptidae) were located up to 1 m above the water-level on the bark of *Vochysia divergens* (Vochysiaceae) (Plate 1c). This tree species dominates the Cambarazal floodplain forest where all developmental stages of the spirostreptidan millipede inhabit the forest floor during the terrestrial phase. A second species, *Pantanalodesmus marinezae* (Chelodesmidae), was located near the base of leaf axils of *Scheelea phalerata* (Arecaceae). During the terrestrial phase the polydesmidan millipede lives and reproduces beneath decomposing leaves of this palm tree on and in the soil. Vertical migration in response to the flood pulse was previously found in millipedes inhabiting inundation forests of river-floodplains in central Amazonia (ADIS 1997).

The leaf cutting ant *Acromyrmex lundi carli* (Myrmicinae) was twice observed to move its subterranean nest located at the bottom of tree trunks to non-flooded tree axes (Plate 2 b) prior to inundation. After

the new nest above ground had been established and was supplied with fresh leaf material for the fungus culture (Plate 2 c) the old nest was still being cleaned by workers for a possible re-use during the next terrestrial phase, if not completely destroyed by the flood. Temporary nests of *A. lundi carli* were not located in the upper canopy as reported from whitewater river-floodplains of Central Amazonia where this species uses hollow boughs and dead tree trunks as a refuge (ADIS 1982).

In conclusion, the survival strategy hitherto observed in terricolous ants and millipedes inhabiting northern Pantanal wetlands represents a temporal vertical migration to non-flooded sites. This is the most common response of terricolous arthropods to the flood pulse in river-floodplains of Central Amazonia (ADIS 1997).

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5. Literature

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Plate 1. a) Aggregation of the fire ant *Solenopsis saevissima* (Myrmicinae) on grass stems of *Setaria geniculata* (Gramineae) shortly above the water surface during flooding. b) Living carpets of the fire ant *Solenopsis saevissima* (Myrmicinae) on the water surface during flooding. c) Advanced immatures of the millipede *Plusioporos salvadorii* (Spirostreptidae) passing the flood period on a tree trunk of *Vochysia divergens* (Vochysiaceae).



Plate 2. a) Aggregation of the ant species *Dorymyrmex* nr. *pyramicus* (Dolichoderinae) at the top of grass stems of *Setaria geniculata* (Gramineae) during flooding.

b) Abandoned subterranean nest of the leaf cutting ant *Acromyrmex lundii carli* (Myrmicinae) at tree base and new established arboreal nest prior to flooding (about 1.80 m above ground) in a tree axis of *Licania parvifolia* (Chrysobalanaceae).

c) Transport of fresh leaf material by the leaf cutting ant *Acromyrmex lundii carli* (Myrmicinae) to the arboreal nest established prior to flooding in a tree axis of *Licania parvifolia* (Chrysobalanaceae).

