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First report of *Typophorus florigradus* Bechyné & Špringlová, 1961 (Chrysomelidae, Eumolpinae) on *Callisthene fasciculata* (Spr.) Mart. (Vochysiaceae) in the Brazilian Pantanal

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Abstract. *Typophorus florigradus* Bechyné & Špringlová, 1961 (Chrysomelidae, Eumolpinae) has been described based on material sampled from flowers of Convolvulaceae and Commelinaceae species in Utinga, state of Pará, Brazil, in 1960. After its description, there have been no new reports about its behavior or host plants. The present note thus aims to record its abundant presence in canopies of *Callisthene fasciculata* (Spr.) Mart. (Vochysiaceae) in the northern Pantanal region of Mato Grosso, Brazil.
Keywords: Pantanal, Plant host, Seasonality

Introduction

Eumolpinae is a Chrysomelidae subfamily with over 500 genera and approximately 7,000 species with cosmopolitan distribution whose diversity has increased across the tropics (Jolivet & Verma, 2008, Jolivet et al., 2014, Elgueta et al., 2017). Adults of this subfamily feed on leaves, whereas larvae feed preferentially on the subterraneous parts of dicotyledons and, rarely, on monocotyledons and gymnosperms (Jolivet et al., 2014).

Larvae and adults feed on distinct groups of plants, although the biology of larvae is little known (Chaboo & Flowers, 2015). Many species are polyphagous, some of which show a preference for *Ipomoea* spp. and Convolvulaceae of economic importance (Jackson et al., 2003, Jolivet et al., 2014), Melastomataceae, Solanaceae and Rubiaceae (Chaboo & Flowers, 2015). Others are considered pests affecting cultivated plants belonging to the families Musaceae, Solanaceae, Fabaceae and Myrtaceae (e.g. Chaboo & Flowers, 2015). Polyphagia for species belonging to the same genus may be related to a preference of those insects for the same chemical compounds sequestered from different plant families, making them toxic and unpalatable (e.g. alkaloids, latex) (Jolivet & Verma, 2008, Jolivet et al., 2014).

Many studies about host plants of Chrysomelidae reviewed by Flowers & Janzen (1997) do not focus on the distinction between accidental or causal associations and true host associations. According to those authors, on several occasions, many chrysomelids move from their host plants to rest or defecate.

Among the Eumolpinae genera, *Typophorus* Chevrolat, 1836 (Typophorini Baly, 1865) stands out for its wide distribution, occurring from Mexico to Argentina. Approximately 30 species of the genus have been recorded in Brazil (Bechyné, 1953, 1954, 1955, Bechyné & Špringlová, 1961). *Typophorus* species have been recorded on *Conostegia xalapensis* (Bonpl.) D. Don ex DC. (Melastomataceae) and *Ipomoea pes-caprae* (L.) R. Br. (Convolvulaceae) (Flowers & Janzen, 1997). In Brazil, *Typophorus basalis* Baly, 1859, *Typophorus nigritus* (Fabricius, 1801) and *Typophorus quiquemaculatus* Erichson, 1847 have been

recorded as pests affecting sweet potato and other Convolvulaceae plants (Bondar, 1930, Costa-Lima, 1955).

The polyphagous behavior of *Typophorus nigritus* Fabricius, 1801 and its subspecies (e.g. *nigritus* (Fabricius, 1801), *viridicyaneus* (Crotch, 1873)) indicates that the species of the genus are restricted to Convolvulaceae (Bechyné, 1997, Jackson et al., 2003). However, records on other botanical families are reported due to the behavior of those insects, which have the habit of resting and defecating on large plants; e.g., those belonging to the genera *Gossypium*, *Saccharum,* etc. (Bechyné, 1997).

Typophorus florigradus Bechyné & Špringlová, 1961 (Chrysomelidae, Eumolpinae) was described based on material sampled from Convolvulaceae and Commelinaceae flowers in Utinga, state of Pará, Brazil, in 1960 (Bechyné & Špringlová 1961). After its description, there have been no new reports about its behavior or new host plants. Therefore the present study aims to record its abundant presence in canopies of Callisthene fasciculata (Spr.) Mart. (Vochysiaceae) in the northern Pantanal region of Mato Grosso, Brazil.

Methods

The study was conducted within a monodominant, seasonally flooded forest with predominance of *C. fasciculata* (Fig 1) during the high water (2010) and dry season (2011) of the northern Pantanal on the Porto Cercado road, specifically, at the Alvorada farm (16°26' 846"S and 56°24' 951"W), Poconé, Mato Grosso, Brazil. The local climate is tropical savannah, characterized by dry winters and wet summers, with temperatures ranging between 22 ºC and 32 ºC (Hasenack et al., 2003), and type AW under Köppen classification. Annual rainfall varies between 1,000 and 1,500 mm, with periods of rainfall below 10 mm occurring over several months (Radambrasil, 1982).

Sampling was performed by fogging twelve canopies of *C. fasciculata* with an insecticide (six canopies during the high-water period of 2010 and six in the dry period of 2011). The trees were sampled at random, maintaining a minimum distance of 10 m between each specimen, following the criteria proposed by Adis et al. (1998) and the methodological procedures of Battirola et al. (2004) and Yamazaki et al. (2016, 2017).

Canopy fogging was carried out for a duration of ten minutes in each tree, using 0.5% Lambdacialotrin (Icon®) synthetic pyrethroxide, diluted in two litres of diesel oil at a concentration of 1% (20 ml), combined with Synergist (DDVP) 0.1% (2 ml). The thermo-nebuliser used was the Swingfog SN50 (Battirola et al., 2004, Yamazaki et al., 2016, 2017). These procedures always occurred at approximately 06:00 am, when air circulation is less intense, allowing the insecticide cloud to rise slowly through the canopy without dispersing (Adis et al. 1998).

Callisthene fasciculata (Spr.) Mart. (Vochysiaceae) is a tree species that reaches four to 15 m in height and has a dark, thick and very rough bark (Pott & Pott, 1994). In the Northern Pantanal region of Mato Grosso, it forms monodominant densifications; i.e., forests where over 50% of the individuals correspond to the same plant species (Connell & Lowman, 1989). These densifications are locally called “carvoais”, which are susceptible to seasonal floods during the high-water periods in that region. The phenology of the species is well-adapted to the hydrological conditions of the Pantanal biome, with the flowering period occurring between September and October, from seeds dispersed in the previous year (Custódio et al., 2014). The species is characterized as deciduous, losing its leaves throughout the periods of drought and reaching loss peaks between July and August of each year until the start of the rainy season. During the high-water period, the canopy has its foliage wet and well-formed (Corsini & Guarim-Neto, 2000).

Part of the collected material is stored on 70% alcohol in the Biological Collection of Southern Amazonia (ABAM), Federal University of Mato Grosso, in Sinop - MT. Replicates of the control material were deposited in the Padre Jesus Santiago Moure Entomological Collection, at the Department of Animal Science at the Federal University of Paraná, in Curitiba - PR, Brazil.

Results and discussion

In an evaluation of the assembly of canopy coleopterans associated with *Callisthene fasciculata* (Spr.) Mart. (Vochysiaceae) during the high-water period of 2010 and the dry period of 2011 in the north region of the Pantanal biome, a total of 272 *T. florigradus* (Fig. 2) individuals were sampled, 270 during the high-water period and only two during the dry period.

The record of *T. florigradus* associated with the canopy of *C. fasciculata* raises an important discussion about studies on the association between Chrysomelidae and its host plants. Such studies are essential for understanding phylogenetic or ecological theories related to the evolution of host selection and chemical interactions between insects and plants with emphasis on chemical prospecting. Oftentimes, these studies are focused on the host plant rather than on the insects or practices of use, conservation and protection of biodiversity (Flowers & Janzen, 1997).

The great richness of Coleoptera associated with the tree canopies in monodominant forests in the Pantanal biome was recorded by Marques et al. (2006) in densifications of *Vochysia divergens* Pohl. (Vochysiaceae) and by Santos et al. (2003) and Battirola et al. (2014) in canopies of *Attalea phalerata* Mart. (Arecaceae). No record of occurrence of *T. florigradus* was made in any of those studies, indicating a closer relationship with *C. fasciculata*. Overall, canopies can be considered important habitat models (Nadkarni, 1994, Adams et

al., 2017), which are influenced by variations in the phenology of host plants, including periods of fructification, flowering and leaf turnover, thereby altering the availability of resources and niches available to the fauna (e.g. Basset et al., 2003, Castaño-Meneses, 2014).

The monodominant structure of the vegetation can affect the distribution of resources to the associated fauna, because due to the lower number of tree species in their composition, resources are distributed in a more even and less diversified manner, facilitating the access to and maintenance of species adapted to those conditions (e.g. Southwood, 1961, Root, 1973). Studies on tree canopies have reported s relationship between insects and specific plant hosts, indicating the existence of very close evolutionary relationships between plants and coleopterans which involve interactions such as pollination, herbivory, seed predation, as well as action as trophic links in food chains (Basset, 1992, Ødegaard, 2003, 2004, Novotny & Basset, 2005).

Herbivorous insects utilize the canopies of trees not only for feeding and oviposition, but also as sites of protection against abiotic variations such as humidity and temperature, or as enemy-free sites (Neves et al., 2013). Once they meet all the requirements for their survival, insects may present a restrict relationship with their host plant (Ribeiro & Borges, 2010).

Figure 1. Internal view of the monodominant forest of *Callisthene fasciculata* (Vochysiaceae) in the Northern Pantanal region of Mato Grosso.

Figure 2. Lateral view of *Typophorus florigradus* (Chrysomelidae, Eumolpinae) collected on *Callisthene fasciculata* (Vochysiaceae) in the Northern Pantanal region of Mato Grosso.

Conclusion

Thus, future studies can examine the level of association between *T. florigradus* and Vochysiaceae species and the implications of the record of great abundance of this species on *C. fasciculata* during the high-water period, which may reinforce ecological theories. These would include, for instance, the migration patterns of the described invertebrates to periodically flooded areas; and the importance of tree canopies as shelter areas for rare species and for the maintenance of diversity of herbivorous insects from the Neotropical region.

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