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SCIENTIFIC NOTE

New Records, Threatens and Conservation Status for *Dichotomius schiffleri* Vaz-de-Mello, Louzada & Gavino (Coleoptera: Scarabaeidae): an Endangered Dung Beetle Species from Brazilian Atlantic Forest Ecosystems

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Abstract

Dichotomius schiffleri Vaz-de-Mello *et al* is often cited as endemic to the preserved coastal sandy-dune vegetation (*restinga*) of Guriri Island, Espírito Santo state, and is included in the Brazilian List of Endangered Fauna as "critically endangered" (CR). However, we recorded its occurrence in twelve additional sites along the coasts of Espírito Santo, Bahia, Sergipe and Pernambuco. The geographic distribution of *D. schiffleri* is limited to the coastal Atlantic Forest domain, mainly in preserved *restinga* patches. We recommend that *D. schiffleri* remains in the List of Endangered species, but in the "endangered" (EN) category, according to the IUCN criteria.

In recent years, several Brazilian insect species have been included in the Brazilian Red List (Machado *et al* 2005, Vaz-de-Mello & Louzada 2008). Among them, *Dichotomius schiffleri* Vaz-de-Mello et al (Coleoptera: Scarabaeidae), a dung beetle species that is restricted to Brazilian coastal ecosystems.

Dichotomius schiffleri is a medium-sized dung beetle, closely related both taxonomically and ecologically to other species in the *D. sericeus* species complex (Harold) (Vaz-de-Mello *et al* 2001). Since its first collection in 1996, *D. schiffleri* has been considered endemic to preserved coastal sandy-dune vegetation (*restinga*) in Guriri Island, within the Delta of the São Mateus River (north of Espírito Santo state, Brazil), and considered an endangered species due to its sensitivity to habitat degradation (Louzada et al 1996, Vieira *et al* 2008).

The main anthropogenic threats faced in the Guriri Island are fire, beach development and the conversion of *restinga* to pasturelands for cattle ranching. In 1998, an environmental protection zone was established in Guriri Island (APA of Conceição da Barra), but the degradation of *restinga* in the rest of the island has continued. In 2001, *D. schiffleri* was proposed and then included in the Brazilian List of Endangered Fauna as critically endangered (CR) (Machado *et al* 2005, Vaz-de-Mello & Louzada 2008).

Here we evaluated the endemism of *D. schiffleri* across selected patches of preserved *restinga* in sites along the coastline in the states of Espírito Santo and Bahia by sampling with human-dung baited pitfall traps (Larsen & Forsyth 2005). We also surveyed existing entomological collection data for most collections with important material inside and outside the country, to evaluate other possible new distributional records for this species.

The data presented are a complete description of all information regarding collection sites, vegetation types and data from entomological collections of twelve

registers recovered from museums and field trips, excluding the records for Guriri Island (Table 1). Including absence data for *D. schiffleri*, we obtained a total of 33 distribution records in vegetations from the Atlantic Forest domain, along the states of São Paulo, Espírito Santo, Bahia, Sergipe, Pernambuco and Paraíba.

After its description in 2001, *D. shiffleri* has been recorded from Mata de São João, Bahia, where it achieved a large abundance, being the dominant species in the Scarabaeinae community.

Examination of museum collections revealed a total of six records. Two records in lowland Atlantic Forest fragments, three in *restinga* forests, and one in a fragment of Atlantic rainforest domain, the latter without detailed information about vegetation physiognomy.

The first record for a lowland forest fragment was one specimen deposited in the Canadian Museum of Nature (CMN, Gâtineau, Canada), found in Linhares, Espírito Santo. This single specimen was collected along with about 700 individuals of another species of *Dichotomius*. The second lowland forest record are 10 specimens found in the zoological collection of the Universidade Federal de Mato Grosso (UFMT, Cuiabá, Brazil), collected in several dates prior to 1997 in Linhares, Espírito Santo. A third record, also found in UFMT, was in survey records from *restinga* forests in Porto Seguro, Bahia, in 2004. Another two records from preserved *restinga* forests patches are 186 individuals deposited at the Departamento de Biologia, Universidade de Pernambuco (UPE, Recife, Brazil), and 10 at the Setor de Ecologia, Universidade Federal de Lavras (UFLA, Lavras, Brazil) surveyed in Pernambuco, in 2009. The sixth record refers to five specimens collected in a fragment of Atlantic rainforest domain, in Sergipe, in 1999. Two specimens are deposited at UFMT and the other three are at the Fundação Zoobotânica do Rio Grande do Sul (FZB/RS, Porto Alegre, Brazil). Detailed information on the vegetation physiognomy was not provided by collection specimens labels, and the coordinates presented in Table 1 refer to the locality reference.

The surveys we conducted along the Brazilian coastline in 2007 add new occurrences of *D. schiffleri* in five other sites (Table 1). Four records in Bahia state and one in Espírito Santo, all of them were surveyed in preserved *restinga* forests fragments.

This expanded sampling effort clearly demonstrates that *D. schiffleri* is not exclusively endemic to Guriri Island. However, this species remains restricted to preserved habitats, such as fragments of the Atlantic forest.

Although the geographical distribution known to *D. schiffleri* was significantly increased, this species still fits IUCN criteria to be considered as an endangered species (IUCN 2001), although not critically endangered as previously reported in the Brazilian List of Endangered Fauna. The extent of occurrence (< 5000 km^2) and area of occupancy (< 500 km^2) associated with the clear recent decline in habitat availability supports the recommendation of *D. schiffleri* as an endangered (EN) species under IUCN criteria B1a, b + B2a, b.

The Brazilian Atlantic forest is one of the most threatened tropical ecosystems globally, and has suffered intense impact by human land use and forest exploitation or destruction. About five percent of Atlantic rainforests remain intact (Oliveira-Filho & Fontes 2000). Within

Table 1 New records of *Dichotomius schiffleri* in the Brazilian coastal vegetation.

Ecosystem	Locality/state	Longitude	Latitude	Conservation status
Restinga forest	Ipojuca/PE	35°01'05''W	08°31'48''S	Reserva Particular de Nossa Senhora do Outeiro de Maracaípe
Restinga forest	Ipojuca/PE	34°58'48''W	08°25'37''S	Unprotected area
Atlantic rainforest domain	Santa Luzia do Itanhy/SE	37°25'22''W	11°22'55''S	Unprotected area
Restinga forest	Mata de São João/BA	38°03'41''W	12°33'58''S	Reserva Particular de Sapiranga
Restinga forest	Porto Seguro/ BA	39°09'36''W	16°19'48''S	Reserva Florestal da Companhia Veracel Celulose
Restinga forest	Santa Cruz de Cabrália/ BA	39°01'21''W	16°19'24''S	Unprotected area
Restinga forest	Prado/BA	39°13'23''W	17°17'42''S	Unprotected area
Restinga forest	Alcobaça/BA	39°11'38''W	17°26'25''S	Unprotected area
Restinga forest	Mucuri/BA	39°31'43''W	18°03'05''S	Unprotected area
Restinga forest	Regência/ES	39°53'05''W	19°39'57''S	Reserva Biológica de Comboios
Lowland forest	Linhares/ES	39°58'43''W	19°03'50''S	Unprotected area
Lowland forest	Linhares/ES	39°54'36''W	19°05'24''S	Reserva Florestal da Companhia Vale do Rio Doce

this biome, the *restinga* formations that compose the principal habitat of *D*. *schiffleri* have been suffering intense degradation since Brazil's colonization (Lacerda *et al* 1984). Moreover, the only two *D*. *schiffleri* records in lowland rainforest were taken in large fragments (> 2,000 ha), and the species was very rare in both cases (one or two individuals per sample). All surveys from small forest fragments in the region (sizes from one to 80 ha) were negative for this species.

The replacement and/or degradation of its natural habitat are the main threats listed to *D*. *schiffleri* (Vieira *et al* 2008). These threats are often associated to several interests related to the urbanization process, residential development, burning events due to induced fire, illegal wood exploitation, natural vegetation replacement to introduced grasslands for cattle ranching and impacts associated to tourism.

The *restinga* ecosystem is narrow-range distributed and is probably one of the most extinction-prone ecosystems of Brazil. In conclusion, although our data clearly increase the known occurrence area of *D*. *schiffleri*, it is still considered an endangered species and is the most narrowly associated to *restinga* habitats.

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