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Blood sucking Diptera (*Culicidae, Psychodidae, Simuliidae*) in forest fragment under impact of dam in the borderland of Rio Grande do Sul and Santa Catarina states, Brazil

Dípteros hematófagos (*Culicidae, Psychodidae, Simuliidae*) em fragmento de floresta sob impacto de barragem na fronteira dos estados do Rio Grande do Sul e Santa Catarina, Brasil

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– NOTE –

ABSTRACT

*The study of **Diptera** of medical importance in areas affected by dam constructions is very important due to the possibility of the occurrence of diseases transmitted by these species. Collections were performed during 2010 and 2011 in an area under impact of a dam on the Uruguai River in the borderland of Rio Grande do Sul and Santa Catarina states. Insects were collected using suction tubes and Shannon trap, also immature live forms were obtained by manual collect. Eight-hundred sixty-one **Diptera** insects were captured, including **Haemagogus leucocelaenus** (**Culicidae**), **Aedes albopictus** (**Culicidae**), three species of **Anopheles** spp. (**Culicidae**), two of **Plebotominae** and three distinct **Simuliidae** species. The **Diptera** fauna in the area is diversified and species with medical importance were identified before and after reservoir filling.*

Key words: *dams, **Diptera**, environmental impact, vectors.*

RESUMO

*O estudo de dípteros de importância médica em áreas afetadas pelas construções de barragens é muito importante, devido à possibilidade de ocorrência de doenças transmitidas por essas espécies. As coletas foram realizadas entre 2010 e 2011 em uma área sob o impacto de uma barragem no Rio Uruguai, na fronteira entre os estados do Rio Grande do Sul e Santa Catarina. Os insetos foram coletados através de tubos de sucção e armadilha Shannon, também foram coletadas manualmente formas aquáticas de imaturos. Oitocentos e sessenta e um dípteros foram capturados, incluindo **Haemagogus leucocelaenus** (**Culicidae**), **Aedes albopictus** (**Culicidae**), três espécies de **Anopheles** spp. (**Culicidae**), duas espécies de **Plebotominae** e três espécies de **Simuliidae**. A fauna de dípteros na área é diversificada e foram identificadas espécies com importância médica antes e após o enchimento do reservatório.*

Palavras-chave: *represas, **Diptera**, impacto ambiental, vetores.*

The construction of hydroelectric plants causes relevant impact in the environment, mostly due to the modification of river hydrology, resulting in lakes covering extensive land areas. These modifications may alter communities composition and population dynamics of several organisms, including ***Diptera*** related to transmission of human diseases, like ***Culicidae*** (PAULA & GOMES, 2007), Psychodidae (***Phlebotominae***) (REZENDE et al., 2009) and ***Simuliidae*** (ROSENBERG et al., 1997). In the last decade, many dams were erased along the Uruguai river, however very few data about the ***Diptera*** fauna with medical importance as vector-borne disease in this region are available. Therefore, the objective of this work was to survey ***Culicidae***, ***Psychodidae*** (***Phlebotominae***) and ***Simullidae*** fauna as potential vectors of human infectious disease in the region of Foz do Chapecó Hydroelectric Station before and after the dam reservoir filling. This enterprise is located on Uruguai River in the borderland of Santa Catarina (municipality of Águas de Chapecó) and Rio Grande do Sul (municipality of Alpestre) Brazilian southern states with reservoir area of 79.2 Km^2 (27°05'46.04''S, 53°01'05.66''W).

Four collections were developed in eight Atlantic forest (Mixed ombrophilous) fragments (upper to 2.0 km^2) allocate on the edge of the reservoir located in rural areas impacted by the dam reservoir. The collections were performed twice before reservoir filling in 2010 between March 20th - 23th

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and July 2nd - 4th and two times in 2011 after reservoir filling were completed (January 15th - 17th and July 15th - 17th). Adult insects of ***Culicidae***, ***Psychodidae*** (***Phlebotominae***) were collected during two distinct periods of the day, with the same effort, using suction tubes and lethal tubes (from 9 a.m. to 4 p.m) and using Shannon trap (from 6 p.m. to 8 p.m). Furthermore, immature live forms of ***Simuliidae*** were collected in small creeks using tweezers and pipettes in the same period of the day (MARCONDES, 2011). ***Diptera*** were identified by keys according to MARCONDES (2011), checking original and complementary descriptions of species.

Four-hundred eighty-one specimens of ***Culicidae*** belonging to 12 genera were collected, 222 (46.1%) before and 259 (53.9%) after reservoir filling. ***Ochlerotatus scapularis*** (11.9%), *O.* ***serratus*** s.l. (6.5%) and ***Anopheles galvaoi*** (4.6%) were the most abundant species in the area (Table 1). The presence of ***Haemagogus leucocelaenus*** and ***Aedes albopictus*** in the area is epidemiologically very relevant. ***H. leucocelaenus*** is involved in sylvatic cycle of yellow fever in Brazilian state of Rio Grande do Sul (VASCONCELOS et al., 2003) and ***A. albopictus*** has been reported as a vector of several arboviruses (GRATZ, 2004). Since the impacted area by Foz do Chapecó Hydroelectric Station is situated in a transition area of yellow fever (YF) (VASCONCELOS et al., 2004), ***A. albopictus*** may be involved in the transition from sylvatic cycle of YF transmission to urban one (VASCONCELOS, 2002).

Although no human malaria has been reported in the area of this study, the presence of secondary vectors as ***A. evansae***, ***A. galvaoi*** and ***A. strode*** (CONSOLI & LOURENÇO-DE-OLIVEIRA, 1994) should be emphasized. These ***Anopheles***

Table 1 - Diptera collected before and after reservoir filling of Foz do Chapecó Hydroelectric Station, Santa Catarina and Rio Grande do Sul, Brazil.

Diptera	Before N (%)	After N (%)	Total N (%)
Culicidae			
Aedes albopictus	3 (0.4)	1 (0.1)	4 (0.5)
Anopheles argyritarsis	3 (0.4)	1 (0.1)	4 (0.5)
A. evansae	0 (0.0)	4 (0.5)	4 (0.5)
A. galvaoi	20 (2.3)	20 (2.3)	40 (4.6)
A. strodei	10 (1.2)	12 (1.4)	22 (2.6)
Coquillettidia shannoni	4 (0.5)	0 (0.0)	4 (0.5)
***Culex* (*Culex*)** spp.	15 (1.8)	1 (0.1)	16 (1.9)
***C.* (*Melanoconion*)** spp.	69 (8.0)	5 (0.6)	74 (8.6)
Haemagogus leucocelaenus	0 (0.0)	8 (0.9)	8 (0.9)
Limatus durhamii	12 (1.4)	26 (3.0)	38 (4.4)
Mansonia humeralis	3 (0.4)	0 (0.0)	3 (0.4)
M. wilsoni	0 (0.0)	4 (0.5)	4 (0.5)
Ochlerotatus crinifer	5 (0.6)	11 (1.3)	16 (1.9)
O. fluviatilis	2 (0.2)	2 (0.2)	4 (0.5)
O. scapularis	55 (6.4)	47 (5.5)	102 (11.9)
O. serratus s.l.	2 (0.2)	54 (6.3)	56 (6.5)
Psorophora ferox	3 (0.4)	6 (0.6)	9 (1.0)
Sabethes purpureus	1 (0.1)	1 (0.1)	2 (0.2)
Trichoprosopon pallidiventer	1 (0.1)	2 (0.2)	3 (0.4)
Uranotaenia apicalis	1 (0.1)	0 (0.0)	1 (0.1)
***Wyeomyia* (*Wyeomyia*)** spp.	13 (1.5)	54 (6.3)	67 (7.8)
Psychodidae (Phlebotominae)			
Nyssomyia neivai	1 (0.1)	5 (0.6)	6 (0.7)
Pintomyia pessoai	10 (1.2)	21 (2.4)	31 (3.6)
Simullidae			
Simulium mariavulcanoae	31 (3.6)	0 (0.0)	31 (3.6)
S. nogueirai	0 (0.0)	21 (2.4)	21 (2.4)
S. pertinax	0 (0.0)	288 (33.5)	288 (33.5)
S. subnigrum	0 (0.0)	3 (0.4)	3 (0.4)
Total	264 (30.7)	597 (69.3)	861 (100.0)

species, previously reported from Santa Catarina and Rio Grande do Sul, were considered responsible for autochthonous cases of malaria in some municipalities in Goiás state (MANOEL et al., 2010). Although ***Uranotaenia apicalis*** have been reported in the Brazilian state of São Paulo (DIBO et al., 2011), this is the first report of this specie in the South region of Brazil, regardless this specie is unrelated with vector-borne diseases.

Thirty-seven specimens of ***Phlebotominae*** (***Nyssomyia neivai*** – 0.7% – and ***Pintomyia pessoai*** – 3.6%) were collected in the crepuscule or night period (Table 1). One specimen of ***N. neivai*** and ten of ***P. pessoai*** were collected before reservoir filling, however the highest amount of these ***Phlebotominae*** specimens were collected after reservoir filling, representing five of ***N. neivai*** and 21 of ***P. pessoai***. Both species have been reported as ***Leishmania braziliensis*** vectors and are found in both forest and human-modified environments (ANDRADE FILHO et al., 2007).

Three-hundred and forty-three immature specimens of ***Simullidae*** were collected from riverbeds in small creeks, 31 specimens (3.6%) of ***Simulium mariavulcanoae***, 21 (2.4%) of ***S. nogueirai***, 288 (33.5%) of ***S. pertinax*** and three (0.4%) of ***S. subnigrum*** were collected (Table 1). These species had already been reported in both Brazilian southern states. Interesting that only ***S. mariavulcanoae*** was collected before the reservoir filling and the other three species of ***Simulium*** were found only after reservoir filling. Although these species have not been incriminated in transmission of ***Onchocerca volvulus***, the high density of the population and their severe biting cause negative impact on human population (allergy) and on cattle (loss of weight and/or reduction of milk production) (MARCONDES, 2011).

Due to the small amount of sampling before and after reservoir filling, it was not possible to infer the modifications on ***Diptera*** fauna in the impacted area. However, this study shows an interesting ***Diptera*** fauna before and after reservoir filling, especially the potential vectors of human diseases, like ***A. albopictus***, ***H. leucocelaenus***, ***N. neivai*** and ***P. pessoai***. It indicates the need of continuous surveillance of ***Diptera*** populations in order to avoid the emergence of important tropical diseases in the area impacted by the reservoir of this hydroelectric.

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