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Bacteria carried by *Chrysomya megacephala* (Fabricius, 1794) (Diptera: Calliphoridae) in Sinop, Mato Grosso, Brazil

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Abstract

Chrysomya megacephala (Diptera: Calliphoridae), known as blowfly, has a great capacity for dispersion and, due to factors such as food abundance and favorable climate, it colonizes Brazil completely in a short time. These insects are important because carrying microorganisms such as bacteria, viruses, protozoa and helminthes, which promote many diseases. The aim of this study was to verify the diversity of bacteria carried by this species in the Federal University of Mato Grosso – Campus of Sinop during the month of January of 2012. The flies were collected using two traps baited with 100 g of fresh sardines on each and maintained in the field for 24 hours. Twenty specimens of *C. megacephala* were placed in Petri dishes, to walk for two minutes upon Nutrient Agar (NA). After establishment of the colonies, isolation of the bacteria on the NA medium and their multiplication in test tubes containing the same culture medium was performed, and later sent to identification by gas chromatography. The bacteria encountered were *Aquaspirillum polymorphum*; *Burkholderia ambifaria*; *Burkholderia anthina*; *Burkholderia cepacia*; *Burkholderia cenocepacia*; *Burkholderia pyrrocinia*; *Burkholderia stabilis*; *Paenibacillus macerans*; *Virgibacillus pantothenicus*, *Bacillus subtilis* e *Photorhabdus luminescens luminescens*, with the last two species considered of importance in the plant protection sector.

Keywords: Microorganism, health, plant protection.

Introduction

Insects are important agents in the spread of several bacteria species (Pesquero et al., 2012), especially the Orders Blattodea (Salehzadeh et al., 2007; Lamiaa et al., 2007; Chaichanawongsaroj et al., 2004); Hymenoptera (Fontana et al., 2010; Santos et al., 2009; Rodovalho et al., 2007) and Diptera (Choo et al., 2011; Béjar et al., 2006; Mian et al., 2002; Olsen & Hammack, 2000) which showed the greatest number of reports.

Regarding dissemination, these arthropods play an important associated role, mainly related to the sectors of epidemiology, public health and forensics (Gomes et al., 2007; Guimarães et al., 1983; James, 1970) and especially due to their association with microorganisms such as bacteria, viruses, protozoa and helminthes (Thyssen et al., 2004; Paraluppi et al., 1996; Furlanetto et al., 1984), that are responsible for the spread of diseases such as dysentery, cholera, botulism, typhoid fever, brucellosis, polio, smallpox, tuberculosis, cholera, conjunctivitis, leprosy and other diseases (Vignau et al., 2003; Weigert et al., 2002; Greenberg, 1971; Azevedo, 1960).

Studies about interaction of insects with entomopathogenic bacteria have shown satisfactory results, which express the possibility of combined use of these organisms in biological control programs (Carvalho et al., 2012).

The blowfly *Chrysomya megacephala* (Fabricius, 1794) (Diptera: Calliphoridae) is considered of epidemiological importance, since it has great biotic potential, easily adapts to climatic and environmental conditions, and especially due to the fact that it can use carcasses and feces as sites for feeding and oviposition (Vianna et al., 2004; Drugueri, 2003; Von Zuben et al., 2000).

The objective of this study was to know the diversity of bacteria carried by the blowfly *C. megacephala* on the Campus of the Federal University of Mato Grosso, situated in Municipality of Sinop during the month of January, which is considered a period of high temperatures and high precipitation levels in the region,

which favors the appearance of large populations of this insect.

Methods

Sampling was performed on the Campus of Federal University of Mato Grosso (S Latitude 11° 51' 44" and Longitude W 55° 29' 44") in the city of Sinop, Mato Grosso State, Brazil. Two traps baited like that proposed by Oriet. al. (1969) and used in population dynamic studies (Pires et al., 2008) were used for collection of specimens. These traps were baited with 100g of fresh sardines and maintained in the field for 24 hours (Pires et al., 2008; Lomônaco, 1987; Baumgartner & Greenberg 1985). Collection of specimens was performed during the month of January 2012, during which the flies were captured and then 20 females of *C. megacephala* were separated, to be placed individually in Petri dishes (1.5 x 15 cm) and allowed to walk for two minutes on Nutrient Agar (NA).

After establishment of the colonies, isolation of the bacteria on the NA medium and their multiplication in test tubes containing the same culture medium was performed. These samples were subsequently sent to EMBRAPA - Environment, where they were identified by means of analyzing the fatty acid profile of the cell membrane in a gas chromatograph, using the Microbial Identification Software (MIDI, Sherlock® TSBA Library version 5.0, Microbial ID, Newark, DE, USA).

Results and discussion

The bacteria encountered were *Aquaspirillum polymorphum*; *Bacillus subtilis*, *Burkholderia ambifaria*; *Burkholderia anthina*; *Burkholderia cepacia*, *Burkholderia cenocepacia*, *Burkholderia pyrocinia*; *Burkholderia stabilis*; *Paenibacillus macerans*; *Photorhabdus luminescens* and *Virgibacillus pantothenticus*.

This study presents important results with regards to knowledge of the bacteria species encountered and conveyed for insects on the UFMT Campus -Sinop. Special attention is given to the species

Bacillus subtilis and *Photobacterium luminescens* which are entomopathogenic organisms and important to the plant protection sectors (Lanna Filho et al., 2010; Duchaud et al., 2003).

This study showed a low number of bacteria species transmitted by *C. megacephala*, and this may be due to the fact that the municipality of Sinop has no "open-air" sewage system, but instead a septic system is predominant, which reduces contact of blowflies with this type of contamination source. An important observation was the fact that two entomopathogenic bacteria associated with *C. megacephala* were encountered with potential for use in biological control programs. However, this report has not been common in studies on transmission of bacteria with muscoid flies, since most reports only associate transmission of disease causing microorganisms (Chaiwong et al., 2012; Oliveira et al., 2006; Paraluppi et al., 1996 Lima et al., 1991). On the other hand, research has shown that the species *Chrysomya albiceps* (Wiedemann, 1819) (Diptera: Calliphoridae) does not adapt to the substrate offered as a source of food and oviposition site treated with *Photobacterium luminescens* (Gulcu, et al., 2012). Thus, more studies must be performed in order to understand aspects associated with interaction among the bacteria *Photobacterium luminescens* and *Bacillus subtilis* with the blowfly *C. megacephala*.

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