First Record of the Blow Fly *Calliphora grahami* from Mexico

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First Record of the Blow Fly *Calliphora grahami*[1] from Mexico

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Abstract. This is the first record of *Calliphora grahami* (Aldrich 1930) in Mexico since it was first reported in the United States of America in 1929. Specimens were collected in spring 2008 and 2009 from carcasses of pigs, *Sus scrofa* L., in a semi-desert area in Saltillo, Coahuila, Mexico.

Resumen. Este es el primer registro de *Calliphora grahami* (Aldrich 1930) en México desde su primer reporte en los Estados Unidos de América en 1929. Los especímenes fueron colectados de cadáveres de cerdos, *Sus* scrofa L., durante la primavera de 2008 y 2009 en un área semidesértica de Saltillo, Coahuila, México.

Blow flies belonging to the genus *Calliphora* (Diptera: Calliphoridae) are known as blue bottle flies. They are distributed worldwide but are best represented in the Holarctic and Australian regions (Rognes 1991). The genus includes 13 Nearctic species, and Rognes (1991) suggested *Acronesia*, *Acrophaga*, *Aldrichina*, and *Eucalliphora* are synonyms. *Calliphora* species are important because of their impact on human and animal health. Species belonging to this genus often colonize remains early in the decomposition process but are also known to cause myiasis in humans (James 1955, Kurahasi 1971, Pratt et al. 1975, Gennard 2007). Because of these attributes, the flies are important in forensic entomology (Smith 1986, Gennard 2007).

Calliphora grahami (Aldrich 1930) (=*Aldrichina grahami*) has been collected from various decomposing materials, such as pig carrion and human feces (Kurahashi 1971, Sukontason 2004). *C. grahami* has been reported in cold climates and on remains in fresh stages of decomposition in Pakistan (Ali Shah and Sakhawat 2004). Consequently, this fly is of forensic importance because the presence of this species is indicative of a minimum time of death and that colonization occurred during cool weather. This information can prove to be vital when determining the period of insect activity on skeletal remains not harboring other potential clues to the time of death. *C. grahami* is indigenous to the east Palearctic and oriental regions and has been introduced to Hawaii and the western United States including Alaska, California, Colorado, and New Mexico (Joyce 1962; Stone et al. 1965; Verves 2002; Whitworth 2006, 2009). The first report of this species in the U.S. was in California on 10 June 1929 (Aldrich 1930).

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We used a sweep net to collect adult blow flies from four decomposing pig carcasses (approximately 19 kg, never frozen) at the "Universidad Autónoma Agraria Antonio Narro" (25°21'30.30"N and 101°2'10.60"O at 1744 m). The university is in Buenavista, Saltillo, Coahuila, in northern Mexico in a semi-desert. Flies were collected daily at 0900 and 1600 hours, from March to April 2008 and 2009. The mean temperature during the observation period was 17.3°C in 2008 and 16.8°C in 2009. Weather data were provided by the university weather station approximately 50 m from the experiment site. Adult flies were placed in glass vials containing 70% ethanol. All containers were labeled. Only two of approximately 1,000 Calliphoridae flies collected were *C. grahami,* and both were males. The samples of *C. grahami* were collected on the fourth day with the initiation of the bloat stage in 2008 and the tenth day in 2009 when the carcasses were in the putrefaction stage. Our collection of *C. grahami* represents the first record of this species in Mexico.

Aldrich (1930) and Whitworth (2006, 2009) reviewed the taxonomic characters of *C. grahami*. *C. grahami* is similar in appearance to *Calliphora vomitoria* L.; however, like *Cynomya*, adult *C. grahami* do not possess an inner presutural intraalar bristle. *C. grahami* can be distinguished from *Cynomya* by the presence of orange setae on the anterior thoracic spiracle. *C. grahami* also possesses wholly black genae, gray microtomentum on a dull thorax, and an abdomen blue or dark green with white microtomentum. Males differ in having the front about three times as wide (0.14 of head width below front ocellus) and the genitalia greatly enlarged and of unique form. The abdomen of the male is short and broad and the shinning black genital segments are large. Male epandria are large with the cerci curving sharply under the abdomen with a horn-like prominence at each base. Wings are subhyaline, the basicosta is black, and the subcostal sclerite is yellow. Hind calypters are brown with a white rim (Aldrich 1930, Whitworth 2006, 2009). Adults are 8-11 mm long (Kurahashi 1971).

Because *C. grahami* colonizes decomposing materials and is synanthrophropic, it can transmit human and animal pathogens from decomposing animals to individuals living in the surrounding area. One pathogen transmitted by this specie is the avian influenza virus (H5N1) (Tsuda et al. 2009, Sawabe et al. 2006). Other bacteria such as *Staphylococci, Staphylococcus aureus*, *Streptococci*, *Escherichia coli*, and *Salmonella* and some fungi such as *Aspergillus fumigatus* and *Mucor sp.* are transmitted by closely related species of blow flies (Förster et al. 2007). Thus, it would not be surprising to record *C. grahami* serving the same role.

This study demonstrates the presence of *C. grahami* in northern Mexico. While it seems scarce in comparison with other blow flies, the presence of adults is important because larvae must also be present. Analysis of entomological evidence related to forensic entomology is dependent on proper identification of adult and larval specimens collected from human remains. Currently, a key for identification of larvae of the species are not available. Consequently, the risk of identifying *C. grahami* larvae as other *Calliphora* species is possible. False identification could lead to improper estimation of the development time and period of insect activity because development is unique for each species. For example, *Calliphora vomitoria* needs 528.0 hours from the time an egg hatches until an adult emerges at 23°C (Greenberg and Tantawi 1993) and *Calliphora vicina* needs 454.0 to 499.0 hours from hatching until adult emergence at 23.3°C (Anderson 2000). Because of the repercussions for incorrectly identifying blow fly larvae and using that information in forensic investigations, proper taxonomic keys for the larvae in association with development data are needed.

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