

CASE REPORT

PATHOLOGY/BIOLOGY

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The “Coffin Fly” *Conicera tibialis* (Diptera: Phoridae) Breeding on Buried Human Remains After a Postmortem Interval of 18 Years*

ABSTRACT: The “coffin fly,” *Conicera tibialis* Schmitz (Order: Diptera, Family: Phoridae), is well known for its frequent occurrence on buried corpses, in some cases after postmortem intervals of even 3–5 years. The present report describes the presence of a large amount of individuals of *C. tibialis* inside the coffin of a buried human corpse exhumed 18 years after death in central Spain. Adults, some of them newly emerged, and empty puparia were found in connection with the remains. Such postmortem interval is significantly longer than previously known for this species and raises the question on the current state of knowledge about the use of insects for estimating the postmortem interval in old, buried remains.

KEYWORDS: forensic science, forensic entomology, burial, exhumation, postmortem interval, *Conicera tibialis*, Phoridae

The occurrence of insects and their remnants in exhumed cadavers can provide useful information for the clarification of forensic cases (1). Among the species frequently found on buried corpses, the infamous “coffin fly,” *Conicera tibialis* Schmitz (Order: Diptera, Family: Phoridae), is notable for its typical association with cadavers in coffins and confined spaces, in some cases even after postmortem intervals of 3–5 years (1). The following case reports on the occurrence of *C. tibialis* breeding on a buried human corpse exhumed 18 years after death, a significantly longer postmortem interval than previously known for this species.

Case History

On April 9, 2010, within the collaboration agreement framework between the Department of Zoology and Physical Anthropology of the University of Alcalá (UAH) and Guadalajara Town Hall (Castilla La Mancha Region, center of Spain), a human remains recovery campaign was made at the Guadalajara cemetery, with the objective to improve the osteological collection of the mentioned department. The human remains donated to the University of Alcalá belong to cadavers that have not been claimed by their relatives within the established legal time. Therefore, Guadalajara Town Hall can donate the corpses for scientific purposes in accordance with the provisions and circumstances provided under the current legislation.

Several human bodies were exhumed, and while wrapping the remains for their subsequent transport to the laboratory, a large amount of small flies was found in one of the bodies; both the

skull and one arm of that body were carried to the laboratory in a plastic zip bag inside a cardboard box. The particular remains where entomological evidence appeared were found in an open grave (from which sand had been removed the day before), and in a zinc coffin, inside a plastic zip bag, both of them closed until the recovering process (Figs. 1 and 2). The corpse was partially saponified (Fig. 3) and corresponded to a 48-year-old man, buried at a depth of c. 2 m in 1992.

On April 12, 2010, the skull and arm were examined in the laboratory of the Department of Zoology and Physical Anthropology of the University of Alcalá, to search for insect evidence. Adults and empty puparia were collected and identified later as *Conicera tibialis* Schmitz with the keys of Disney (2). No larvae or unenclosed pupae were found in connection with the remains. Among the adults, some of them were newly emerged, and both males and



FIG. 1—Close-up of the skull in the plastic zip bag inside the zinc coffin.

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*Funded by the Spanish Ministerio de Ciencia y Tecnología (Research Project BOS2003-00400) and the University of Alcalá (Research Project PI2003/016).

Received 2 July 2010; and in revised form 16 Sep. 2010; accepted 3 Oct. 2010.



FIG. 2—Grave containing the zinc coffin with the plastic zip bag after the body removal.



FIG. 3—Close-up of the saponified hand.

females (Fig. 4) were present. Teneral individuals of *C. tibialis* can be easily distinguished by their unexpanded wings and bodies and their pale gray color (Fig. 4), with the pigmentation developing 48 h after emergence (3).

Discussion

The forensic importance of *C. tibialis* is because of its regular occurrence on buried bodies (1), which explains the several records from this species associated with exhumations in the last century (4). Moreover, it has been suggested that the records of phorids in coffins published before the original description of *C. tibialis* (5) also referred to this species (4,6). On the other hand, it has been recorded worldwide, being possibly carried by man (7), which makes *C. tibialis* a forensic indicator with universal application. Despite all the previous literature, this is the first Spanish forensic case reporting the occurrence of *C. tibialis* associated with human remains, although actually, there are still few published forensic entomology cases from Spain (8).

Several authors have emphasized the usually extremely high numbers in which live immatures and adults of *C. tibialis* (1,4,6),

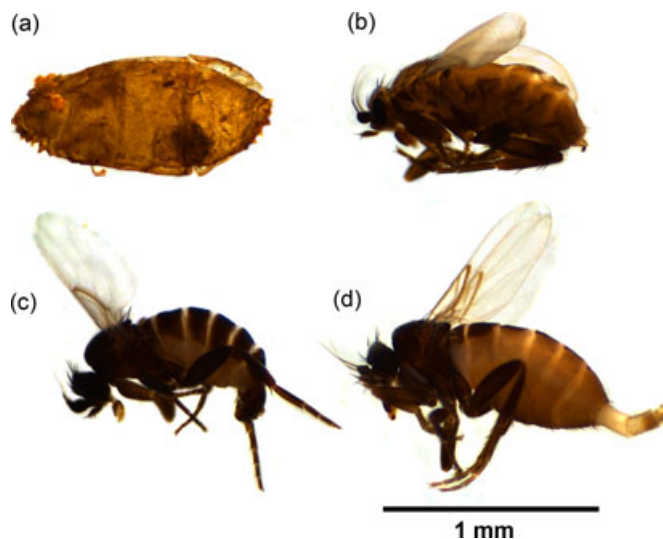


FIG. 4—*Conicera tibialis* collected on the buried remains. (a) Puparium, (b) newly emerged female, (c) male, (d) female.

as well as its empty puparia (9,10), occur on buried corpses. In the present case, the vast number of adults was underlined by the person who recovered the human remains and was also observed later in the laboratory, where some specimens were collected and examined. Despite the evidence and laboratory experiments suggesting that a sequence of generations can be produced inside a coffin (3,4), it is not possible to know when the insects arrived and if more than one generation had been produced in the present case, although newly emerged individuals and empty puparia were found (Fig. 4).

Gravid females of *C. tibialis* can reach buried corpses by burrowing down through the soil to oviposit (4), being able to move to a depth of 2 m (11), coinciding to that in which the body of the present case was buried. Larvae, pupae, and emerging adults of *C. tibialis* have been usually reared and observed from buried corpses after long postmortem intervals (1,4). The longest observed postmortem intervals for the development of the species were about 3–5 years up until now (3,12,13), but it had never been reported breeding on a corpse buried 18 years before. Such period of time is unusually long to make the cadaver suitable for the development of a necrophagous insect species, but probably the partial saponification observed (Fig. 3) could have favored the breeding of *C. tibialis*. Insect access in buried remains is as decisive a factor in influencing decomposition rate and pattern as it is in surface remains; therefore, it should be taken into account for postmortem interval estimation (14). However, estimating the duration of the burial seems to be very difficult when considering species typically associated with buried bodies only (1). The present case reports on *C. tibialis* breeding on a corpse after a postmortem interval four times longer than previously known for the species, which raises the question on the current state of knowledge about the use of insects for estimating the postmortem interval in old, buried remains.

Acknowledgements

We are grateful to Dr. Virginia Galera, who recovered the human remains where *C. tibialis* were collected and provided us the images from the exhumation, and to Marco Antonio Nieto, who alerted us to the presence of the flies and together with V.

Galera provided us valuable information about the case history. We are also grateful to Dr. Luisa M. Díaz-Aranda and two anonymous reviewers for their comments and suggestions to improve the manuscript.

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