

**[Insects as forensic indicators: analysis of some cases]**

Forensic Entomology is the branch of forensic science in which information about insects is used to draw conclusions when investigating legal cases related to both human and animals. It deals mainly with It is the broad field where arthropod science and judicial system interact. It deals with the postmortem interval or changes. In this paper three cases of human corpses attacked by Dipteran insects are reported. The first case describes the putrefied corpse of a newly born child. The other two cases concern two men in their forties. One of them was apparently drunk when he died. Insects recorded are *Sarcophaga tibialis* and *Chrysomya marginalis*. The first case describes the putrefied corpse of a newly born child. The other two cases concern two men in their forties. One of them was apparently drunk when he died. Insects recorded are *Sarcophaga tibialis* and *Chrysomya marginalis*. The first case describes the putrefied corpse of a newly born child. The other two cases concern two men in their forties. One of them was apparently drunk when he died. Insects recorded are *Sarcophaga tibialis* and *Chrysomya marginalis*.

المستخلص علم الحشرات الجنائي هو فرع من العلم الجنائي حيث تستخدم معلومات عن الحشرات للوصول إلى بعض الحالات الجنائية المتعلقة بالإنسان و الحيوان أي انه العلم الذي يشير إلى تلاقح علوم مفصليات الأرجل مع النظام القضائي وهو يعنى أساسا بالفترة أو التغيرات التي تحدث عقب الوفاة. في هذه الورقة نورد ثلاث حالات تعرض فيها المتوفين أو الجثث لهجمات الحشرات ثنائية الأجنحة. الحالة الأولى تخص طفل حديث الولادة وهو في حالة تعفن. الحالتان الثانية و الثالثة تخصان رجلين في عقدهما الرابع و احدهما قد يكون مات مخمورا. تنتمي الحشرات التي تم رصدها إلى رتبة ثنائية الأجنحة وهما.

Open Access **Insects as forensic indicators: analysis of some cases**

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### Abstract:

Forensic Entomology is the branch of forensic science in which information about insects is used to draw conclusions when investigating legal cases related to both human and animals. It is the broad field where arthropod science and judicial system interact. It deals mainly with the postmortem interval or changes. In this paper three cases of human corpses attacked by Dipteran insects are reported. The first case describes the putrefied corpse of a newborn. The other two cases concern two men in their forties. One of them was apparently drunk when he died. Insects recorded are *Sarcophaga tibialis* and *Chrysomya marginalis*.

### المستخلص

علم الحشرات الجنائي هو فرع من العلم الجنائي حيث تستخدم معلومات عن الحشرات للوصول إلى بعض الحالات الجنائية المتعلقة بالإنسان و الحيوان أي انه العلم الذي يشير إلى تلاقح علوم مفصليات الأرجل مع النظام القضائي وهو يعنى أساسا بالفترة أو التغيرات التي تحدث عقب الوفاة. في هذه الورقة نورد ثلاث حالات تعرض فيها المتوفين أو الجثث لهجمات الحشرات ثنائية الأجنحة. الحالة الأولى تخص طفل حديث الولادة وهو في حالة تعفن. الحالتان الثانية و الثالثة تخصان رجلين في عقدهما الرابع و احدهما قد يكون مات مغمورا. تنتمي الحشرات التي تم رصدها إلى رتبة ثنائية الأجنحة وهما *Chrysomya marginalis* و *Sarcophaga tibialis*

**Key words:** Forensic entomology, Corpses, *Sarcophaga tibialis*, *Chrysomya marginalis*

### 1. Introduction

Forensic entomology is the branch of forensic science in which information about insects is used to draw conclusions when investigating legal cases related to both humans and animals. The term may be expanded to include other arthropods. Insects can be used in the investigation of a crime scene both on land and in water (Anderson, 1995, Erzinçlioğlu, 2000, Keiper and Gasamatta, 2001, Hobischak

and Anderson 2002, Oliveira and de Mello-Patiu, 2004) . The majority of cases where entomological evidence has been used are concerned with illegal activities which take place on land and are

discovered within a short time of being committed.

The insects that can assist in forensic entomological investigations include Blowflies (Calliphoridae), flesh flies (Sarcophagidae), cheese skippers (Piophilidae), hide and skin beetles (Dermestidae), rove beetles (Staphylinidae), and clown beetles (Histeridae). In some of these families only the juvenile stages are carrion feeders and consume a dead body. In others, both the juvenile stages and the adults will eat the body (are necrophagous). Yet, other families of insects are attracted to the body solely because they feed on the

necrophagous insects that are present (Gennard, 2007).

The examination of entomological evidence or insect infestation on human corpses/remains can provide estimates of the time of death or post-mortem interval. Forensic entomology is receiving increasing interest of investigators, forensic specialists, coroners, medical examiners, and pathologists. They focus on the criminal component of the legal system and dealing with the necrophagous, feeding insects. Insects can be of significant importance in cases of badly decomposed and unidentified remains and with an undetermined time of death (Greenberg and Kunich, 2002).

## 2. Materials and Methods

The study comprised the dead bodies brought to the mortuary of Omdurman teaching hospital and Wad Medani hospital.

Specific material evidence, in the form of the insects, maggots, pupae was collected from various parts of the body. Both dead and live insects, at all stages of development, were collected. The samples were preserved in 70% alcohol. The live samples were kept with food and air in separate containers and reared to adult.

Outside temperature was recorded by a weather station nearby.

The insect evidence collected was studied to calculate and determine the time since death.

## 3. Results

### Case 1:

The corpse of a newly born male was found in Abu Sied area (south of Omdourman) block 7 on the first of November 2010 (3:40 pm), tied in a plastic bag, naked and wrapped in a red T-shirt and newspaper (Fig. 1). The corpse was bloated and black. Larvae were collected from the sheet and the body and reared in containers covered with a piece of mosquito net and fed with small pieces of rotten meat. On 11<sup>th</sup> of November (7/am), adults emerged and were identified as *Sarcophaga tibialis* (Diptera: Sarcophagidae). In a previous study *Sarcophaga tibialis* developed to adult, within 15 days under similar temperature (34°C). This suggests a minimum postmortem interval (PMI) of 5 days, and this is consistent with forensic medicine determination is more than 3 days. (Personal communication with Dr. Jamal Yousif the Director of the mortuary of Omdurman teaching hospital.



**Figure 1** (Case no. 1) the corpse of newly born male found in Abu Sied area (south of Omdourman) block 7, on 1 November 2010. This photograph was provided by The General Directorate for Criminal Investigation –section Crime Scene and Crisis. Khartoum

### Case 2:

The corpse of approximately 43 -year-old man known as being alcoholic was found in a farm at ‘Alhosh’ area south of Wad Medani, Gezira State on 7<sup>th</sup> of November 2010. He wore a ‘Jalabia’ (Fig. 2).

Larvae were collected from his face and arm and bred in containers covered with pieces of mosquito netting and fed with small pieces of meat. On 14<sup>th</sup> of November, adults emerged and were

identified as *Chrysomya marginalis* (Diptera: Calliphoridae). In a previous study *Chrysomya marginalis* developed to adult, within 9 days under similar temperature (34°C). This suggests a minimum postmortem interval of 3 days, and this is consistent with forensic medicine determination which is 3 to 4 days (Dr. Omer.M. Abd Albagi, director of Wad Medani teaching hospital mortuary, personal communication).



**Figure 2** (Case no. 2) the corpse of an alcoholic 43 -year-old man found in a farm at Alhosh area south of Wad Medani, Gezira State, on 7<sup>th</sup> of November 2010. This photograph was provided by The General Directorate for Criminal Investigation. Wad Medani, Gezira State

### Case 3:

An unknown man in his forties was found at Alfao area, village 23 east of Wad Medani, Gezira State, on 19<sup>th</sup> April 2011. He wore Jalabia and shoes. Fly larvae were collected from his head and mouth and bred in a container covered with piece of mosquito netting and fed with small pieces of meat. The first adult emerged on 1<sup>st</sup> of May and was identified as *Sarcophaga tibialis* (Diptera:Sarcophagidae). In a previous

observation it was found that *Sarcophaga tibialis* developed to adult within 15 days under similar temperature.(30° C). Minimum postmortem interval of 2 days was calculated, and it is shorter than the forensic medicine determination which is approximately 5 days because the corpse was preserved in a refrigerator (-4°C) for one day (Dr. Omer.M. Abd Albagi the Director of Wad Medani Hospital mortuary, personal communication).





Case (3) Corpse of an unknown man in his forties found at Alfao area village (23) east of Wad Medani, Gezira State on 19<sup>th</sup> April 2011. This photograph was provided by The General Directorate for Criminal Investigation. Wad Medani, Gezira State.

#### 4. Discussion

Anderson (1995) reported that forensic entomology is a very useful method of determining elapsed time since death after 72 h, and can be used earlier. It is accurate to a day or less, or a range of days, and may be the **only** method available to determine elapsed time since death. He added that he has successfully defended this evidence in court many times. It is vital that the insects are collected properly and its accuracy depends on this and on suitable conditions for insects.

Although the corpse of the child was wrapped, adult sarcophaga laid their larvae on it (case1). Anderson, (2005) said if the body is wrapped or packaged in some way the insects may be excluded, but the wrapping must be completely secure. A body part was found sealed in a garbage bag which had been tied securely at the top, but the remains were maggot-infested, and showed severe insect damage. The adult females had probably laid their eggs

at the knot, and the minute first instar larvae had crawled in. the development of even one single species can help to give a good estimate of PMI (case 2). Preservation of corpse in a refrigerator (after discovered) leads to a shorter Minimum Postmortem Interval (case 3).

In this study all remains seen at the mortuary, not in their sites, which may affect the accuracy of determination. Anderson (1995) as a forensic entomologist has suffered from the same problem, and he said (**I am always willing to come to a scene if it is possible**). Unfortunately, the entomologist is often not called until after the body has been removed from the death site. We usually see the remains at the morgue, and in some cases, do not actually see the remains at all, so our evidence is **dependent** on **accurate** collection by the investigating officers [WWW.sfu.ca/~ganderson/forensic-entomology-h.htm](http://WWW.sfu.ca/~ganderson/forensic-entomology-h.htm).

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