Faculty of Science
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EFFECTS OF DRUGS IN DECOMPOSING TISSUES ON THE DEVELOPMENT OF THE NECROPHAGOUS FLY *Chrysomya megacephala* (Fabricius) (DIPTERA: CALLIPHORIDAE) AND IMPLICATION OF THESE EFFECTS ON ESTIMATION OF POSTMORTEM INTERVAL

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Abeer Mohsen Mohamed Salem
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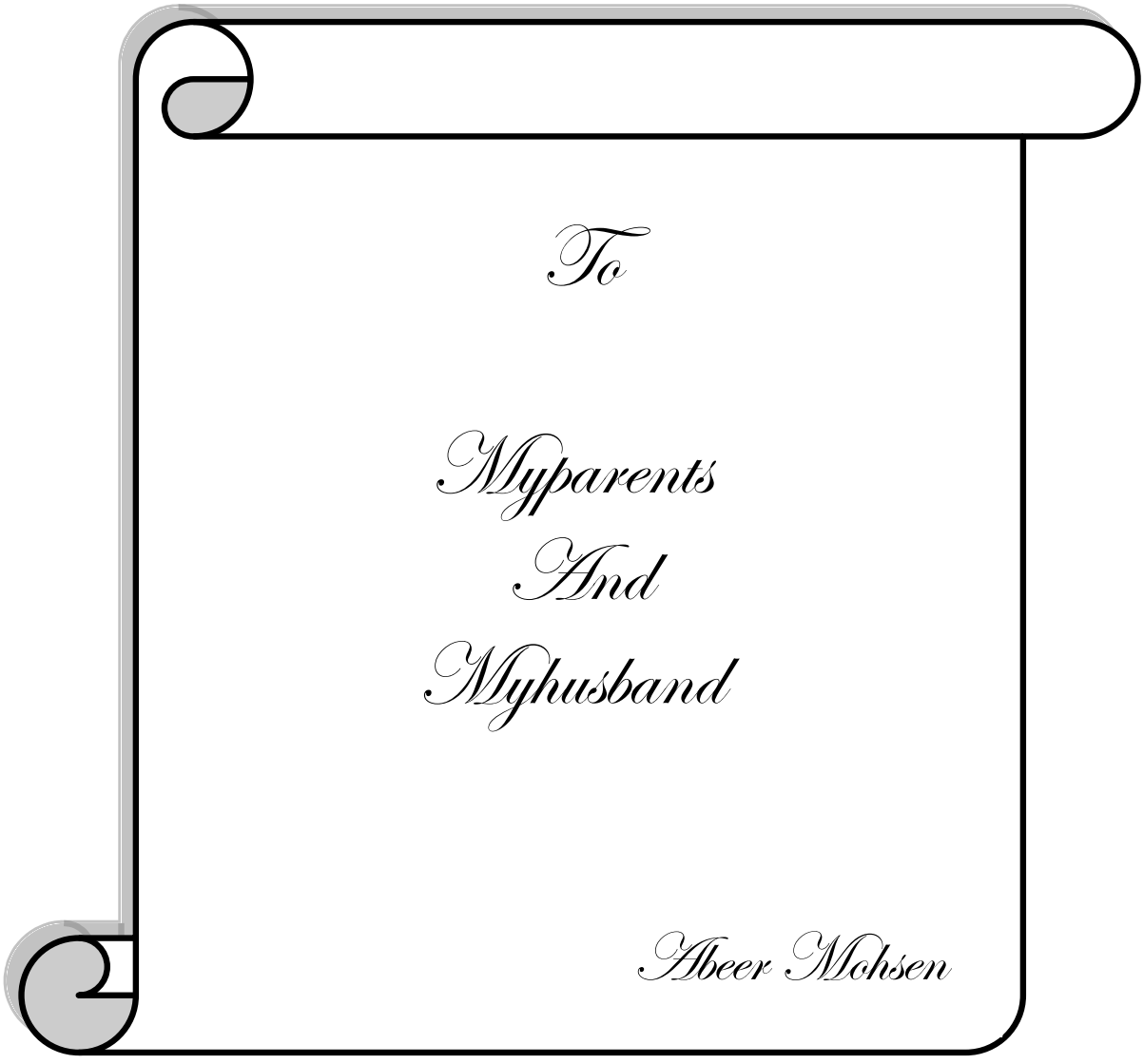
Dedication



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ABSTRACT

Larvae of *Chrysomya megacephala* (Fabricius) (Diptera: Calliphoridae) were reared in summer season under laboratory conditions where the temperatures were 32 - 36 ºC and relative humidity levels were 73 - 88%, on rabbit carcasses administered lethal (20mg) and twice lethal (40mg) doses of morphine hydrochloride or lethal (2.2g) and twice lethal (4.5g) doses of meprobamate to study the effects of these drugs on the development rate of this species. Following administration of the drugs, rabbits were sacrificed in carbon dioxide chamber and samples of tissues were taken for toxicological analysis. Egg batches or larvae of the same age, were placed on the rabbit carcasses and sampled at 12 hours period to observe and determine the duration, mortality, percent of moulting, length, weight and concentration of drugs in larvae and empty puparial cases. The differences observed in the rates of development were sufficient to alter post mortem interval estimates based on larval development by up to 15.92hr and estimates based on puparial development by 7.92 to 25.92hr in case of morphine. In case of meprobamate, an underestimation of postmortem interval of 12.95hr based on larval development and 4.56 to 19.68hr based on puparial development is possible if the presence of meprobamate is not considered. Analysis by high performance liquid chromatography revealed the presence of morphine in all samples of rabbit tissues, 3rd larval instars and empty puparial cases from all the colonies of the rabbits administered different dosages of morphine hydrochloride, while gas chromatographic analysis revealed the presence of meprobamate in all samples of rabbit tissues, 3rd larval instars and empty puparial cases from the colonies of the rabbits administered twice lethal dose of meprobamate and in

liver, muscle and 3rd larval instars from the colonies of the rabbits administered lethal dose of meprobamate.

Key words: *Chrysomya megacephala*, Forensic Science, Forensic Entomology, Toxicology, Morphine, Meprobamate, Drugs.

INTRODUCTION

Since time immemorial, flies (Order: Diptera) have always been one of the most notorious pests in Egypt. The favorable climatic conditions which prevail almost all the year round have greatly contributed to the abundance of all sorts of flies. Among the multitude of flies of medical and veterinary importance are the blow flies which belong to the family Calliphoridae.

Blow flies, with their characteristic metallic blue or green colour, are found everywhere. Most of them are scavengers; the larvae feed on carrion, excrement, and similar materials, while the adults feed on sugary substances and are attracted to meat. They play an important role in our life. Many of these flies may act as mechanical vectors of various diseases for man and animals. Some blow flies lay their eggs in open sores of animals or man and the emerging larvae attack living tissues and cause what we call myiasis. Others perform a valuable service to man by helping him to remove dead bodies from the landscape or the treatment of osteomyelitis when larvae were reared under aseptic conditions, and used to debride wounds (**Baer**, **1930**; **Stewart**, **1934**; **Sherman and Pechter**, **1988**). After death, bodies undergo a series of decompositional stages with characteristic insect species being associated with each. Thus, producing a faunal succession on cadavers. Together with the knowledge of growth rates under specific environmental conditions, this faunal evidence provides an estimate of the minimum time since death, or the postmortem interval, PMI (**Nuorteva**, **1977**; **Nishida**, **1984**; **Kashyap and Pillay, 1989; Catts**, **1992**; **Vanin *et al.***, **2008**).

One of the first groups of insects that arrive on a dead body is the blowflies (Diptera: Calliphoridae) (**Goff**, **1991a**; **Schoenly**, **1992; Goff**, **1993**). Usually the females oviposit within hours after death of the vertebrate. If we know how long it takes to reach the different stages in an insect's life, we can calculate the time since the egg was laid. This calculation of the age of the insects can be considered as an estimate of the minimum time of death. But even if the estimate of the insect age is correct, the death of the victim (usually) occurred before the eggs were laid. This period is quite variable and depends on temperature, the time of day that the death occurred, the time of year that the death occurred, whether the corpse is exposed or buried in soil or immersed in water. As a general rule insects will lay eggs on a corpse within a few hours of death or less (**Nuorteva, 1977, Anderson and Vanlaerhoven, 1996)**. The insects on the corpse can be of help in establishing whether the corpse has been moved after death, by comparing local fauna around the body, and the fauna on the body (**Lord, 1990**), also the insect fauna found on a body can be used to indicate cases of abuse (children, rape, neglect) (**Benecke, 2001**; **Insects in Legal Investigations, 2009**). Some of these insects are known to be associated primarily with living bodies and others to carrion. Thus, if persons are not properly cared for and cleaned, some insects are attracted to their bodily wastes, where they deposit their eggs. Extreme temperatures can also be indicated by the presence of dead larvae on a corpse. These larvae can be useful in the determination of the time of death of the victim provided that species identification is possible along with the time and cause of death of the larvae (**Staerkeby, 2001**).

The scientific application of insects and their arthropod relatives associated with corpses in the legal investigations of crimes and even civil