H44 Beetle Poop: Interpret With Caution in Southeast Texas

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The goal of this presentation is to present new data on Coleoptera peritrophic membrane. The observed postmortem interval (documented by investigational evidence and independent entomologic data) is significantly shorter than has been previously described, specifically as little as one month. The results suggest that use of peritrophic membrane as a temporal marker should be only cautiously made when correct species/variety can be established and when detailed environmental information is available. Through novel data, this paper extends the usefulness of coleopterids, and, in particular, the peritrophic membrane, as forensically useful time markers in the estimation of death interval.

This presentation will impact the forensic community and/or humanity by presenting new data documenting the presence of Dermestes maculatus peritrophic membrane associated with a recent, well-documented recovery, autopsy and subsequent entomological evaluation in a case with a postmortem interval of approximately one month. Independent documentation of the minimum period of time since death, including developmental data for a species of Phoridae (Diptera), Megaselia scalaris, is presented. This case suggests that presence of peritrophic membrane may be associated with significantly shorter postmortem intervals than previously reported.

Numerous species of Coleoptera (beetles) are associated with insect mediated decomposition of human remains. These different species have different relationships to the remains and, typically, arrive in a predictable successional pattern. This pattern has been used to provide an estimate of the minimum period of time since death. Typically, those Coleoptera species feeding directly on the remains tend to arrive during the mid to late stages of decomposition (postdecay to skeletal). Insect species produce a peritrophic membrane to protect their gut from mechanical trauma after ingestion of hard food particles. In late arriving species, particularly those in the family Dermestidae (skin beetles), this peritrophic membrane is quite durable; its appearance on remains provides a temporal landmark for estimation of minimum time since death. At present, most documented cases involve remains with a postmortem interval of at least three months.

The decedent was a 67-year-old man with a medical history of atherosclerotic disease, including coronary artery stenosis, cerebrovascular atherosclerosis (with prior ischemic cerebral strokes and resultant hemiparesis), depression and shortness of breath. He was also a heavy alcohol user. His prescription medications were common drugs for cardiovascular disease, with consistent pill counts. A neighbor reported having not seen the decedent in one month. A survey of the man's house confirmed the neighbor's recollection in that the oldest dated mail was from one month prior to discovery of his body. Independent entomological confirmation of the minimum postmortem interval in this case was provided by developmental data for a species of Phoridae (Diptera), *Megaselia scalaris*, also present at the scene. The setting was in southeast Texas (Houston), during late June – early July. The month in question was quite warm with unusually low humidity and precipitation; the average high temperature was 95.2° F (range 82 – 101° F), the average low 74.1 °F (range 69 -80° F), and the total precipitation measured 4.19 inches. The decedent was in a locked and secure residence, with all windows and doors closed and secured, and all curtains and blinds drawn. An air conditioner unit was available but was not on. The decedent was inside the residence, supine on the floor of the living room. The anterior aspect of the body was mummified, while the posterior aspect was moist, with skin slippage. Abundant adult and larvae of *Dermestes maculatus* beetles were on the body surfaces, and crawling through the orifices. Abundant tangled masses of peritrophic membrane were packed on various parts of the body. The decedent's genitalia were essentially replaced by a mass of the stringy residue, with admixed beetle larva and exuviae.

Our observations present new data on Coleoptera peritrophic membrane. The observed postmortem interval (documented by investigational evidence and independent entomologic data) is significantly shorter than has been previously described, specifically as little as one month. The results suggest that use of peritrophic membrane as a temporal marker should be only cautiously made when correct species/variety can be established and when detailed environmental information is available. Through novel data, this paper extends the usefulness of coleopterids, and, in particular, the peritrophic membrane, as forensically useful time markers in the estimation of death interval.

Coleoptera, Peritrophic Membrane, Postmortem Interval

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