



Pathology/Biology Section - 2015

H24 Survival of Blow Fly Pupae After Submergence in Fresh, Salt, and Polluted Water

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After attending this presentation, attendees will understand that the pupal stage of a blow fly can add another capability to forensic entomology practice and add another dimension to determining the minimum Postmortem Interval (PMI) when insects are found on a floating corpse.

This presentation will impact the forensic science community by providing data that will be potentially useful in adding a new component to estimating the overall duration of the floating time of corpses in forensic investigations that can assist in determining the minimum time-since-death.

Blow flies (Diptera: *Calliphoridae*) are generally the first insects that colonize a corpse in the terrestrial environment. In an aquatic environment, a body proceeds through a series of sinking and floating phases (bloat) and it is during the float phase that calliphorids can colonize a body in the water. Calliphorids collected on a body found in an aquatic environment can help to determine how long the remains have been floating and this information can assist in determining the minimum time since death. At present, only incomplete experiments exist concerning the capacity of any calliphorid life-history stage to survive reduced oxygen tension and whether they can survive submersion in water. Many previous authors have alluded to the forensic utility of blow fly immatures when a body is submerged, but again it is all anecdotal evidence.

The goal of this research is to estimate the survival of *Calliphora vomitoria* L. pupae in sea water, fresh water, and polluted water. Polluted water was collected from the Po River in Turin, Italy. Waters used in this research were chemically analyzed (pH, hardness, salinity, Na, K, Ca, Mg, Cl, NO₂, NO₃, NH₄, PO₄, SO₄, NH₄, and HCO₃).

Pupae (N=30 for each treatment) were sampled at different stages of their development (24 hours, five days, and nine days following pupation) and placed underwater for a minimum time of one hour to a maximum time of ten days. Pupae were placed in an open-weave mesh bag and weighted down so they remained completely submerged. Pupae were then removed from the water and placed in a dry environment. The time required to eclosion and the survival rate was recorded and compared with non-submerged, control pupae (N=100). During the entire experiment, the environmental temperature was 23°C and the water temperature was 24°C.

Preliminary results to date demonstrate that the survival of pupae decreases with increasing time of submergence. In general, no pupae survived following five days of immersion. Lower survival also occurred among pupae submerged in seawater over equivalent time periods. The time required to eclosion for control pupae and pupae immersed for 24 hours is not statistically different.

This study provides data potentially useful in estimating the floating time of corpses in forensic investigations when pupae are found adhering to, or entangled in, the decaying flesh, hair, or clothes of a corpse that has become submerged after the larvae had developed and pupated. This research complements the study by Singh and Greenberg and adds vital details to the questions of floating time and, hence, the overall minimum PMI.¹

Reference:

1. Singh D, Greenberg B. Survival after submergence in the pupae of five species of blow flies (Diptera: *Calliphoridae*). *J Med Entomol.* 1994;31:757-9.

Calliphora Vomitoria, Pupae, Submergence