

Forensic entomology

Murder followed by suicide in a forest - determination of postmortem interval

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At the crime scene

On 26 May 2000, two corpses were discovered in a forest located in the property of Charlie Chaplin near Vevey (canton de Vaud, Switzerland). The first one was the remains of a female on the ground with the head a part. As the forest presents a succession of banks, the body probably slipped down to the next bank. The remains showed high decomposition and the head was partly mummified. The area next to the head was like burned, showing that the body spent some time before slipping down to the lower bank, where it was found. Adult beetles as well as adult flies were collected.

A few meters beside the body of a hanging male was found. The corpse was fully clothed and in a late stage of decomposition. Eggs and empty puparial cases of flies were observed and collected as well as adult flies and beetles.

On autopsy of the female body the medical examiners found no evidence that the head had received antemortem traumatic injury. Cervical vertebra (atlas and axis) showed no impact of any sort. During the autopsy beetles larvae (*Necrophorus humator*) were seen and collected. There were very few flies larvae, as last stage of blow flies (*Calliphoridae*) leave the remains to pupate nearby. Concerning the male body the medical examiners concluded that hanging was the cause of the death. Curiously the body was less damaged than the female one. Numerous flies larvae were collected in the abdominal cavity and in the chest.

Identification of the collected material

Diptera:

The following species were identified



Calliphora vomitoria



Lucilia caesar



Protophormia terranova



Calliphora vicina

Coleoptera:



Necrobia violacea



Necrophorus vespilloides



Hister unicolor



Dermestes undulatus



Omnitars discolor



Necrophorus humator

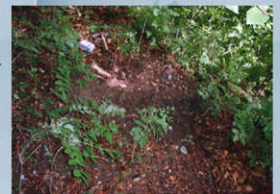
Research of entomological at the crime scene and recording of local temperature

Sequence of events

May 26, 2000: discovery of the two bodies and collection at the crime scene of adult flies and beetles

May 27, 2000: morning collection of entomological material during autopsy (fly pupae, pre-pupae and larvae, beetle larvae). Live maggots were reared in the laboratory.

Afternoon: close examination at the crime scene permitted collection of fly pupae, pre-pupae and larvae as well as beetle larvae. All this material was brought back to the laboratory to be reared under constant temperature.



Estimation of weather data

The crime scene was located at an altitude of 475 m a.s.l. close to the lake of Geneva. The southern slope of the location is influenced by the lake and the local climate is considered as rather warm.

In forensic entomology, obtaining data for determining insect development is a crucial need. Therefore we looked for the two nearest recording weather stations: the first one (Pully) located about 15 km North-West of the crime scene (461 m a.s.l.) and the second one (Aigle) about 16 km South-East (381 m a.s.l.). They both belong to MeteoSwiss. This federal institute was able to provide data for the months of April, May and June. In each weather station, temperatures data are collected four time a day (1 a.m., 7 a.m., 1 p.m. and 7 p.m.) and a day mean temperature is also available. We used this last one for estimating postmortem interval. In order to allow for possible adjustments in estimates, a temperature recorder was left at the crime scene on May 27 for 26 days.

Temperatures adjustment

To reduce variations we combined daily mean temperatures of the two recording weather stations and compared it with the data obtained during the month of June at the crime scene. We found that daily mean temperatures at the crime scene was 2.5°C lower than that of the combined weather stations. Therefore we subtract this difference for the time preceding the discovery of the two bodies in order to make an accurate estimation of postmortem interval.



Estimation of postmortem interval

Using data from the literature as well as our own data we could provide the following assessment related to the day of presence of the first egg laying flies on the two bodies:

- Calliphora vomitoria*: April 25 2000
- Calliphora vicina*: April 27 2000
- Protophormia terranova*: April 25 2000
- Lucilia caesar*: April 25 2000

With the exception of *C. vicina*, the three other species showed a remarkable constancy. These three species laid their eggs on April 25. Concerning *C. vicina*, we know that this species is less abundant in forest than the three others and could arrive later.

Therefore when adding some error intervals (+/- 24 hours) we could assume that the two victims died between April 24 and April 26.

Other evidences from the investigation showed that the couple was last seen on April 25 2000 at 11 p.m.

Conclusion

In this case, it is very interesting to see that we obtained a precise determination of postmortem interval with three of the four fly species, which nevertheless have different development time. This support also the fact that blow flies are among the first insects to discover and colonize human remains within hours.

This criminal investigation demonstrated the importance of using insects in order to determine postmortem interval. It is therefore very important to add this aspect, when possible, in all criminal investigations to increase our knowledge on insects of forensic importance and their value to estimate postmortem intervals.

