

TECHNICAL NOTE

J. C. Beyer,¹ M.D.; W. F. Enos,² M.D.; and Marina Stajić,³ Ph.D.

Drug Identification Through Analysis of Maggots

REFERENCE: Beyer, J. C., Enos, W. F., and Stajić, M., "Drug Identification Through Analysis of Maggots," *Journal of Forensic Sciences*, Vol. 25, No. 2, April 1980, pp. 411-412.

ABSTRACT: The examination of insect larvae from decomposed bodies not only can serve in the estimation of the postmortem interval but also can be used in qualitative identification of drug substances.

KEY WORDS: toxicology, drug identification, larvae

The use of insect larvae as an aid in the establishment of the postmortem interval is a well-recognized procedure in the performance of medicolegal autopsies [1,2]. Recently we had the opportunity to collect larvae from a badly decomposed body in which there was strong presumptive evidence of death by an overdose of drugs. The complete absence of suitable tissue specimens for analysis led us to use the insect larvae as a source material for analysis. It was concluded that any drugs present within the larvae could have originated only in the decomposed human tissue.

The deceased individual was a 22-year-old white female who was found in a wooded area along a creek bed. The body was badly decomposed and skeletonized except for some fragments of skin. The clothes were in place and were intact except for artifacts produced in the postmortem period. The head, thorax, and abdomen were completely skeletonized except for some fragments of skin on the posterior aspect of the body. No soft tissue or organs were present within the calvarium, thorax, or abdomen. Large numbers of maggots were still present in the hair, in the interior of the skull, and within the thoracic and abdominal cavities. Some remnants of skin and badly decomposed soft tissue were present beneath the clothes on the upper and lower extremities. A pocketbook was adjacent to the body, and this appeared to be undisturbed and contained papers of identification as well as an empty bottle with a prescription label listing the date of filling, the name of the deceased, and the medication. Definitive identification of the remains was made through dental examination.

The deceased had been last seen 14 days before she was found by individuals hiking in the woods along the creek bed. Two days before she was last seen she had had a prescription filled for 100 tablets of phenobarbital. This was the empty bottle that was found in the purse adjacent to the body. The individual had a past history of five attempts at suicide. A hand-

Received for publication 15 June 1979; revised manuscript received 1 Aug. 1979; accepted for publication 9 Aug. 1979.

¹Deputy chief medical examiner, Office of the Medical Examiner, Commonwealth of Virginia.

²Director of laboratory, Northern Virginia Doctors Hospital, Arlington, Va.

³Toxicologist, Commonwealth of Virginia, Department of General Services, Division of Consolidated Laboratory Services.

written note was also found adjacent to the body, and its contents were strongly suggestive of suicide.

At the time of the autopsy, larvae were collected only for use in the estimation of the postmortem interval. In view of the absence of suitable tissue specimens for toxicological analysis and with the strong presumptive evidence of an overdosage of phenobarbital, it was concluded that the insect larvae might provide a suitable source for possible qualitative identification of the drug. Therefore, larvae were used in place of the usual body organs.

Larvae (10 g) were homogenized with distilled water (50 ml) and proteins precipitated by adding 22 ml 10% sodium tungstate, 4 ml 10% sodium hydroxide, and 20 ml 3*N* sulfuric acid to the homogenate.

The mixture was heated for approximately 30 min on a steam bath and proteins were subsequently removed by filtering through Whatman No. 1 paper. The aqueous filtrate was extracted with chloroform (twice, each time with 50 ml), the solvent was evaporated to approximately 100 μ l, and a 3- μ l aliquot was injected into the Hewlett-Packard 5710A gas chromatograph (1.2-m [4-ft] by 2-mm glass column packed with 10% OV-1 on Gas Chrom Q, 80-100 mesh; oven temperature, 140 to 220°C; helium flow, 30 ml/min). Apropobarbital (100 μ g/ml) was used as internal standard.

Phenobarbital was identified at a concentration of 100 μ g/g. The presence of phenobarbital was further confirmed by thin-layer chromatography using ethyl acetate/methanol/ammonium hydroxide (75:10:5) as developing system and 0.1% diphenylcarbazone followed by 0.3% mercurous nitrate spray reagents. An additional confirmation of phenobarbital was performed by gas chromatographic/mass spectrometric analysis (Du Pont Model 21-490B equipped with the Du Pont data system and Varian 2700 gas chromatograph).

Entomologists who were consulted identified the larvae as Diptera, Calliphoridae; *Cochliomyia macellaria* (F.). It was also their opinion that the drug could only have originated from the tissues upon which the larvae were feeding and could not have originated through any metabolic mechanisms of the larvae.

Acknowledgments

The authors wish to thank Dr. David Sipes for his dental identification, Dr. R. J. Gagne for the identification of the maggots, and Mr. Stuart Goza for performing the gas chromatographic/mass spectrometric analysis.

References

- [1] Glaister, J., *Medical Jurisprudence and Toxicology*, Williams and Wilkins Co., Baltimore, 1947, pp. 124-126.
- [2] Nvorteva, P., "Sarcosaprophagous Insects as Forensic Indicators," in *Forensic Medicine, A Study in Trauma and Environmental Hazards, Vol. II, Physical Trauma*, C. G. Tedeschi, Ed., W. B. Saunders Co., Philadelphia, 1977, pp. 1072-1095.

Address requests for reprints or additional information to
 J. C. Beyer, M.D.
 Northern Virginia District
 Office of the Chief Medical Examiner
 3300 Gallows Rd.
 Falls Church, Va. 22046