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THE UNIVERSITY OF ADELAIDE

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DEPARTMENT OF
ENTOMOLOGY

TOB:KT

3 February 1982

The Secretary,
Criminology Research Council,
P.O. Box 28,
WODEN, A.C.T. 2606

Dear Sir,

I enclose a report from Ms. Beryl Morris, a candidate for the degree of Master of Agricultural Science, on the work she has done with the aid of the grant made to me by your Council.

In my view Ms. Morris' studies have been highly successful, especially when we consider that they are being done in the time she can spare from her position with the S.A. Museum. By the end of this year I expect she will have produced the first critical approach to the problem of predicting the time of death from the stages of development of maggots in cadavers, and the ambient temperature records. This will be an important contribution to forensic studies.

May I take this opportunity of thanking your Council for providing the grant, without which Ms. Morris' work would have been much more difficult.

A final financial statement is being sent under separate cover.

Yours sincerely,

T.O. Browning,
Waite Professor of Entomology

Enc.

cc's: Mr. D. Dwyer (W93/647)
Mr. N.C. Stewart

To the Criminology Research Council

FINAL REPORT ON STUDIES ON BLOWFLIES

by Beryl Morris

to January 1982

Flies are known to be one of the first visitors to carcases and cadavers. They lay eggs on or in the carrion and the larvae develop through three growth stages before leaving the carcase in order to pupate. Entomologists have used the developmental stage of the maggots, the state of decomposition of the carcase and the presence of other arthropods to provide information on the time which has elapsed since death of human cadavers.

During the last few years studies have been made in Adelaide in an endeavour to make accurate predictions of time since death using blowfly development.

These studies have examined a number of parameters.

Seasonal Abundance

The seasonal abundance of blowflies at Tennyson, an Adelaide suburb and at Evanston Heights, an agricultural area 40 km north of Adelaide has been established for a two year period. The results are similar to those from studies carried out elsewhere in Australia: there are peaks in activity and abundance in spring and autumn; some species are present all year in low numbers; and, the green blowflies are virtually absent in winter. Trends were similar for the two stations, although fewer flies entered the trap at Evanston Heights.

Geographical Distribution

Flies were trapped at various times of the year in all thirteen State Herbarium vegetation regions of South Australia and in four other States. The presence or absence of nine species of flies was recorded. Results show that these flies were present throughout the entire study region.

Rates of Development

The time taken from egg to adult for several flies is now known for a number of temperatures. Rates of development are slow at low temperatures and faster at higher temperatures. However, development ceases at extreme high and low temperatures. These "cut-off" temperatures are yet to be accurately determined but are in the vicinity of $10^{o}C$ and $38^{o}C$. Temperature seems to be the most important criterion for determining the time since death of a cadaver.

Experiments have been done on rates of development on different types of meat (brains, liver, dog food) but no significant differences have been found.

It has been suggested that humidity may have some effect on developmental rate and although this has yet to be tested thoroughly, it is predicted that its influence will be minimal.

Maggots often develop in a liquid environment and this has so far not been found to change the time to maturity.

Identification of Larval Stages

The identification of larval stages of a number of fly species is now possible and, using results of experiments involving the rearing of larvae in the laboratory at constant temperatures, it has been possible to assist police, health inspectors, the RSPCA and IMVS in the identification and possible development rates of maggots collected in various situations.

Temperatures in Carcases

The recording of temperatures within freshly killed sheep, goat and pigs at Mortlock Experimental Station has been the major thrust of this study during the last year. As predicted, the temperature within the carcase fell initially and then rose, often to such levels that any maggots present would have died.

Temperatures within the body showed diurnal fluctuations but on average were about 10°C higher than air temperature.

This casts doubt on the present method of using known rates of development at constant temperatures within the laboratory to estimate time elapsed since death, in police and other cases.

Consequently, experiments are about to commence, using laboratory incubators, rearing flies at fluctuating temperatures similar to those recorded within carcases in the field and attempting to predict the time to complete development from data derived at constant temperatures.

The work will continue and I wish to express my gratitude to the Criminology Research Council for the assistance provided for this study.