

FORENSIC ENTOMOLOGY ANALYSIS REPORT

Case ID: FULL001
Date of Analysis: June 14, 2025
Investigator: Dr. Expert
Location: Chicago, IL
Discovery Date: 2024-06-01
Discovery Time:

EXECUTIVE SUMMARY

This report presents the forensic entomological analysis of specimens collected from the scene. The analysis was conducted using established accumulated degree days (ADD) methodology with temperature-corrected development models. **Key Findings:**

- Species identified: *Lucilia Sericata* (Green Bottle Fly)
- Development stage: 3Rd Instar
- Estimated PMI: 4.6 days (110.1 hours)
- Confidence interval: 3.7 - 5.5 days
- Analysis date: June 14, 2025

METHODOLOGY

This analysis employs the Accumulated Degree Days (ADD) method, which is the standard approach in forensic entomology for estimating postmortem intervals. The methodology is based on the principle that insect development is temperature-dependent and follows predictable patterns under known thermal conditions.

Calculation Formula

$$PMI = \text{Required_ADD} / (\text{Average_Temperature} - \text{Base_Temperature})$$

Where:

- Required_ADD: Species and stage-specific development threshold
- Average_Temperature: Environmental temperature during development
- Base_Temperature: Minimum temperature for development

Temperature Data

Temperature data was obtained from meteorological sources and adjusted for time-of-day variations when discovery time was provided. Temperature represents the average environmental conditions during the estimated development period.

DETAILED RESULTS

Species Analysis

Scientific Name: *Lucilia Sericata*
Common Name: Green Bottle Fly
Family: Calliphoridae
Colonization: Primary (0-3 days)
Development Stage: 3Rd Instar

PMI Calculations

Parameter	Value	Units
Estimated PMI	4.6	days
Estimated PMI	110.1	hours
Confidence Interval	3.7 - 5.5	days
Base Temperature	8.0	°C
Average Temperature	25.0	°C
Required ADD	78.0	degree days
Accumulated ADD	78.0	degree days

DATA QUALITY ASSESSMENT

Overall Data Quality: EXCELLENT
Quality Score: 105/100
Reliability Level: High

ALTERNATIVE METHODS ANALYSIS

Multiple PMI calculation methods were employed to validate the primary estimate. The methods showed **poor** agreement with a coefficient of variation of 166.1%. **Method Range:** 2.3 - 91.8 days
Mean PMI: 19.5 days
Standard Deviation: 32.4 days

Individual Method Results

Method	PMI (days)	Confidence Interval	Reliability
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Add Standard	4.6	3.7 - 5.5	85/100
Add Optimistic	2.3	2.0 - 2.7	70/100
Add Conservative	8.2	6.1 - 10.2	75/100
Adh Method	4.6	3.8 - 5.4	90/100
Thermal Summation	5.5	4.1 - 6.9	80/100
Development Rate	91.8	73.4 - 110.1	82/100

CONCLUSIONS

Based on the forensic entomological analysis of the submitted specimens, the estimated postmortem interval is **4.6 days** with a confidence interval of 3.7 to 5.5 days. This estimate is made with **high confidence** based on the available data and environmental conditions. The analysis utilized established forensic entomology protocols and temperature-corrected development models. The quality assessment indicates excellent data reliability for this type of analysis.

LIMITATIONS AND DISCLAIMERS

This analysis is subject to the following limitations and considerations: 1. Environmental Factors: Microclimate conditions, burial depth, clothing, and other environmental factors may significantly affect insect development rates and are not fully accounted for in this analysis. 2. Biological Variation: Natural variation in insect development rates, individual specimen characteristics, and population differences may affect accuracy. 3. Temperature Data: The analysis relies on meteorological data which may not precisely reflect conditions at the specific scene location. 4. Expert Interpretation: These results represent scientific estimates that must be interpreted by qualified forensic entomologists within the context of the complete investigation. 5. Legal Considerations: This analysis is provided for investigative purposes and should be presented as expert evidence only by qualified professionals in appropriate legal proceedings.

SCIENTIFIC REFERENCES

This analysis is based on established forensic entomology research and methodologies: 1. Amendt, J., Campobasso, C. P., Gaudry, E., Reiter, C., LeBlanc, H. N., & Hall, M. J. (2007). Best practice in forensic entomology—standards and guidelines. *International Journal of Legal Medicine*, 121(2), 90-104. 2. Catts, E. P., & Goff, M. L. (1992). Forensic entomology in criminal investigations. *Annual Review of Entomology*, 37(1), 253-272. 3. Higley, L. G., & Haskell, N. H. (2010). Insect development and forensic entomology. In *Forensic Entomology: The Utility of Arthropods in Legal Investigations* (pp. 287-302). CRC Press. 4. Ikemoto, T., & Takai, K. (2000). A new linearized formula for the law of total effective temperature. *Environmental Entomology*, 29(4), 671-682.

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