



# Literature review on the use of microbes as a method for calculating time since death



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## Introduction

As soon as someone dies, the microbes in and around the body start to change. We wanted to see if those microbial changes could be used to discover how much time has passed since death, also known as Postmortem Interval (PMI).

The way that the Postmortem Interval (PMI) is currently determined in a death investigation is by measuring decomposition which is combined with environmental factors. Along with those factors, including the surrounding insects' lifecycles is also important. These combined influences on the dead can make finding the PMI much harder.

Though the use of microbes in forensics does occur, this investigation was to see if there was literature related to how microbes could be used in determining PMI.

## Research question

What is known on the use of microbes in determining the postmortem interval based on current literature?

## Methods

In this literature review, our first search included key terms time since death and postmortem interval. These findings were then separated by how PMI was established, such as dental, temperature, blood pH, cardiology, decomposition, entomology, eyes fluid, microbiome, rigor mortis, and soil. Afterward we grouped those ways into sections. The sections were elements, internal body, lividity of body, microbiome, entomology, and other. Then, we looked at the few that had microbes as the methods, as well as investigated more literature that were specifically about microbes and PMI. Next, we chose several of the articles on the topic and took note on what each was about specifically and the view on the future of PMI estimation with the use of microbes.

Graphs were produced in R.

## Findings and Results

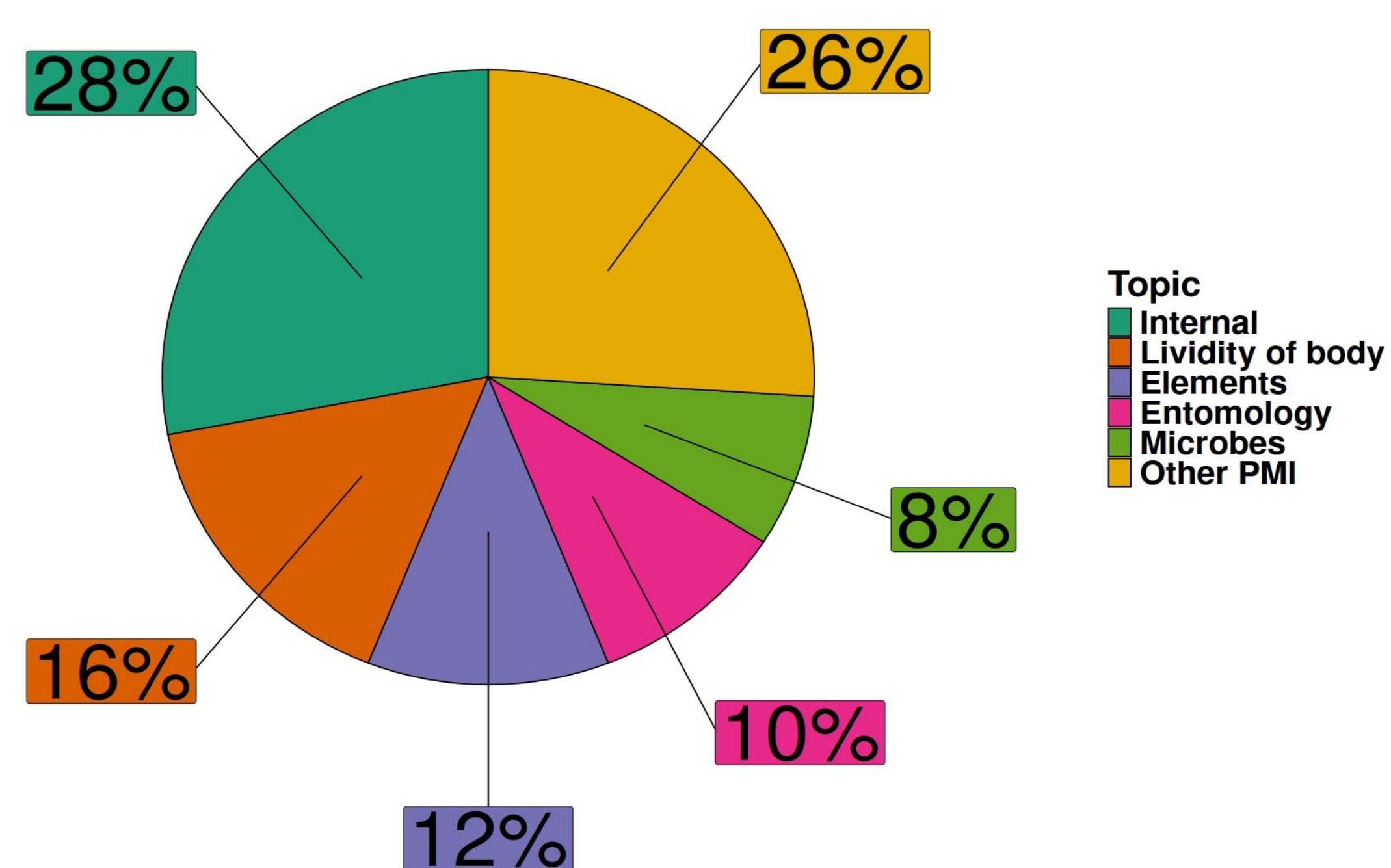


Figure 1. Selected articles based on criteria listed in methods.

**Table 1. Article breakdown and distillation.** Summary of key findings in literature related specifically to using microbial counts in calculations of time since death

Metcalf, J., 2019	Estimating the postmortem interval using microbes: Knowledge gaps and a path to technology adoption	<ul style="list-style-type: none"> <li>- Areas needing more attention: timeframe, environmental variables, body location and sample types, modeling approaches and parameters</li> <li>- Offered technological paths to take for using microbial data</li> </ul>
Hilal, M et al., 2021	Exploring microbial communities, assessment methodologies and applications of animal's carcass decomposition: A review	<ul style="list-style-type: none"> <li>- States that there needs to be more data on the microbial communities</li> <li>- Microbes are essential for decomposing and adds the known origins of those microbes</li> </ul>
Y, Kalanjali & Isukapatla, Arjun Rao, 2026	Postmortem microbiome dynamics: Review of forensic microbial clock	<ul style="list-style-type: none"> <li>- Studying microbes can help enhance the current PMI estimation techniques</li> <li>- The accuracy of the analysis of datasets can be improved by AI/Learning Systems</li> <li>- Addresses needing a bigger microbial database set and more advanced technology</li> </ul>
Moitas, B et al., 2024	Microbiology and postmortem interval: a systematic review	<ul style="list-style-type: none"> <li>- Microbial communities are a good tool for estimating PMI</li> <li>- There has to be more data; more samples with more variables</li> </ul>

## Conclusions

The use of microbiology in a forensic setting has been present for a while, but using microbes to determine the Postmortem Interval is a newer application. The research is limited on the topic and states that much more information, such as larger sample sizing and other technology, is needed for the area. The literature on this topic is optimistic for the use of microbes and the microbial clock in PMI estimation. The microbial clock is the way that the microbes develop that can be measured to be able to tell the time since death.

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