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Reliability of Morphological and PCR Methods for the Official Diagnosis of *Aethina tumida*: A European Inter-Laboratory Comparison

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The Small Hive Beetle
An invasive scavenger of honeybees
 Most of Europe free from this pest
A. tumida only present in the South of Italy

Early detection is crucial in case of introduction:

Awareness of beekeepers

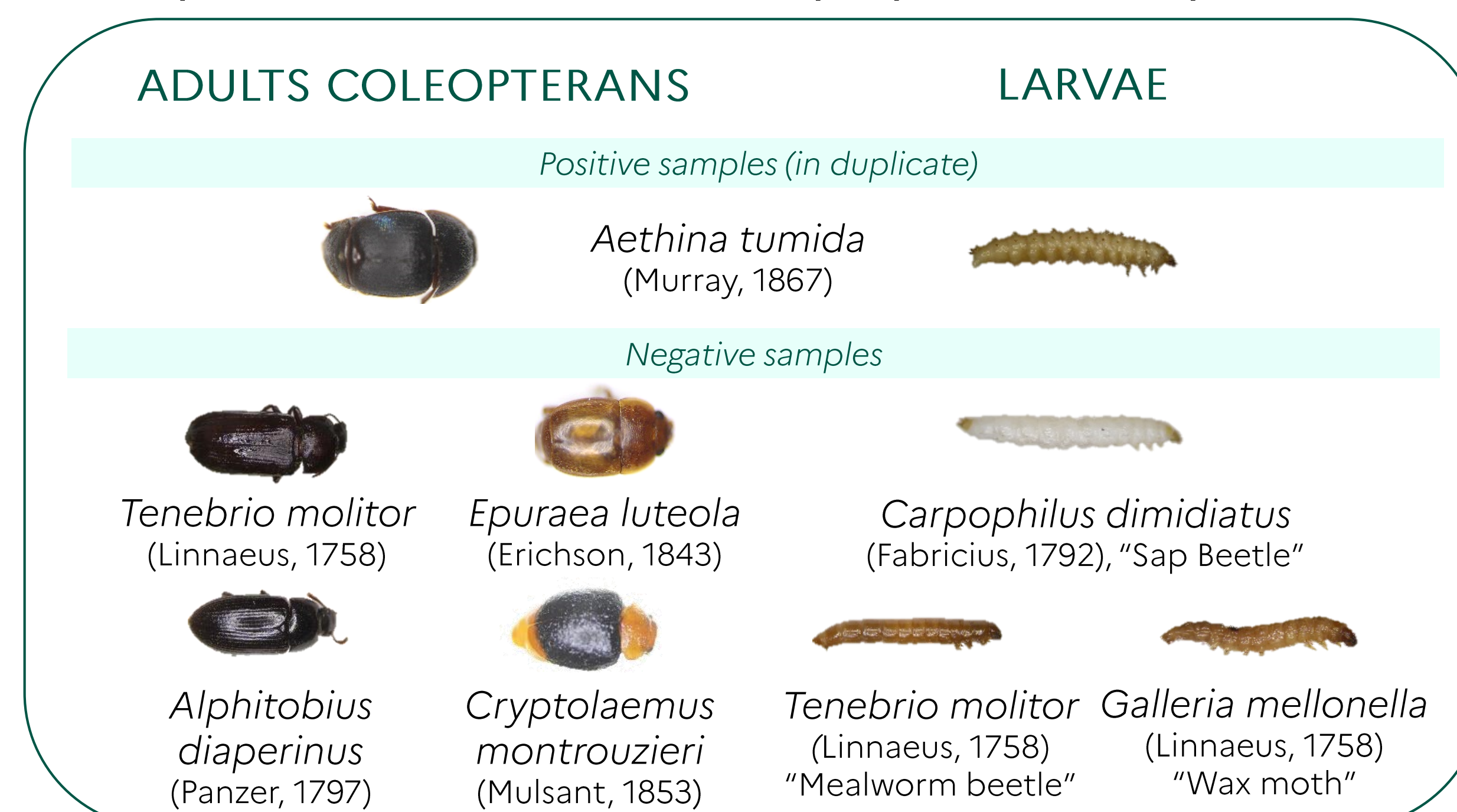
Field surveillance

Sentitive detection tools

Reliable identification of specimens by laboratories



Specimens included in the sample panel for comparison:



An inter laboratory comparison organised in 2020 by the European Reference Laboratory for Bee Health

- 22 participants from Europe (National Reference Laboratories)
- 2 official methods evaluated: Morphology and PCR
Methods referenced in the World Organisation for Animal Health Manual
- 12 samples for blind testing
- In compliance with the international standard ISO/IEC 17043

Overall performance of the official laboratory network:

| Predicted Result | Morphology | | PCR | | Analytical Conclusion | |
|--------------------|-------------------|-----------------------|-------------------|-----------------------|-----------------------|-----------------------|
| | Compliant Results | Non-Compliant Results | Compliant Results | Non-Compliant Results | Compliant Results | Non-Compliant Results |
| Positive | 88 | 0 | 88 | 0 | 88 | 82 |
| Negative | 152 | 2 | 150 | 4 | 148 | 6 |
| Sensitivity | 100% | | 100% | | 93.2% | |
| Specificity | 98.7% | | 97.4% | | 96.1% | |
| Accuracy | 99.2% | | 98.3% | | 95.0% | |

Results

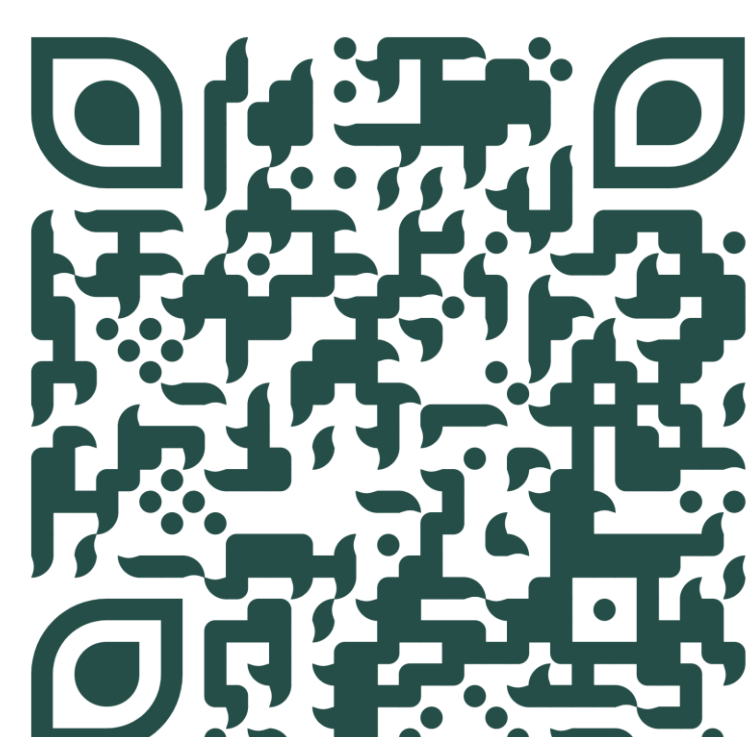
- Sensitivity: satisfactory
- Specificity: globally satisfactory except for 2 participants

Minor anomaly for one

For the other, issues for a larger number of results, especially real-time PCR (probably related to inexperience with the method)

First interlaboratory comparison organised at the European level

The study proved the reliability of official diagnosis, including the entire analytical process of identification: from the first step of the analysis to the expression of opinions



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 Doi: 10.3390/insects13010033