OP-216 [Beekeeping Technology and Quality]
Forensic melissopalynology: is pollen in honey fit for court?

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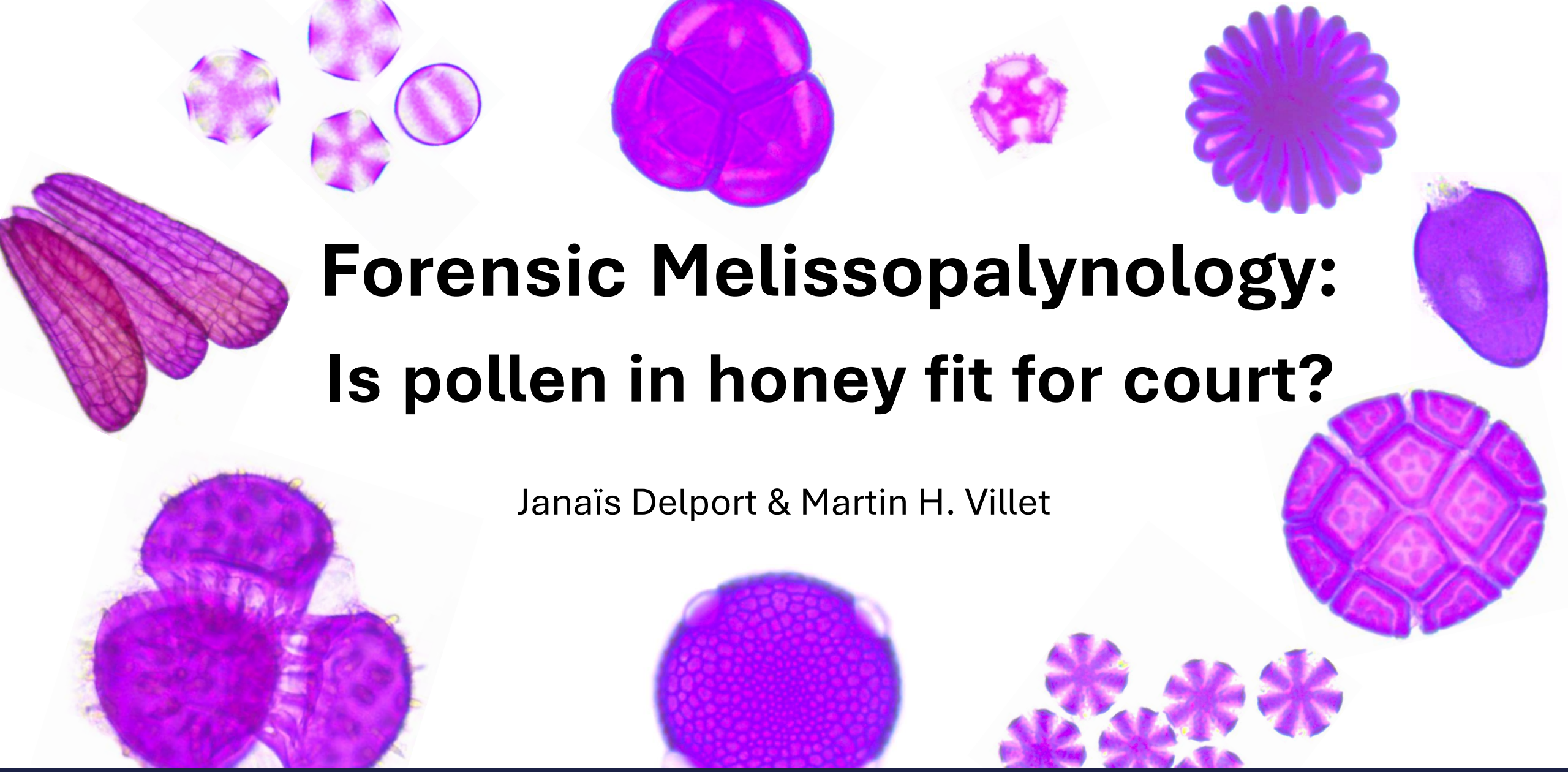
We trace the origin of the need for forensic melissopalynology, evaluate its ability to meet that need, and identify future opportunities to enhance the evidentiary value of the science. Melissopalynology, the study of pollen and spores in honey, can provide scientific evidence about the authenticity of honey, which is becoming a medical, economic and legal problem globally. The pollen spectrum of a honey can be used to investigate whether the botanical and/or geographical origin alleged on the product's labeling is consistent with its palynological, and so chemical and physical properties. By requiring explicit indication of origins on the labeling of honey, legislation can counteract honey fraud, protect producers and consumers, and create premium economic products for small-scale honey production. Germany, Croatia, Greece, and other countries have used melissopalynological information to legislate benchmarks to authenticate selected monofloral honeys. If a legal challenge arises, the widely used techniques of melissopalynology must be able to provide admissible forensic evidence but are currently under-evaluated as a forensic science. Many jurisdictions have explicit tests for the admissibility of scientific findings as forensic evidence, including considerations of the accuracy, repeatability, reproducibility, error rates, peer review, and general professional acceptance of the methods and techniques of the science. For instance, the United States' Supreme Court's so-called Daubert criteria provide an adjudicatory framework that is explicit, reasoned, and extensively discussed in forensic literature. Forensic melissopalynology overwhelmingly satisfies the Daubert criteria and, by implication, the evidentiary requirements of many other jurisdictions. There remain opportunities for further development, especially in calibrating the limitations and risks of error of melissopalynology, and in calibrating legislative benchmarks. If benchmarks are vague or unduly permissive, fraudulent and adulterated honeys may remain in the market; if they are too strict and unaccommodating of natural variation of authentic specialist products, sellers may be unfairly accused of criminal fraud or unnecessarily excluded from global marketplaces. International standards exist that will help forensic melissopalynology to meet these goals.



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Does forensic melissopalynology matter?

Honey Authenticity

- **Authentic products**
- **Authentic descriptions**

EU Revised Honey Directive (2001/110)

Mandatory origin labelling for honey

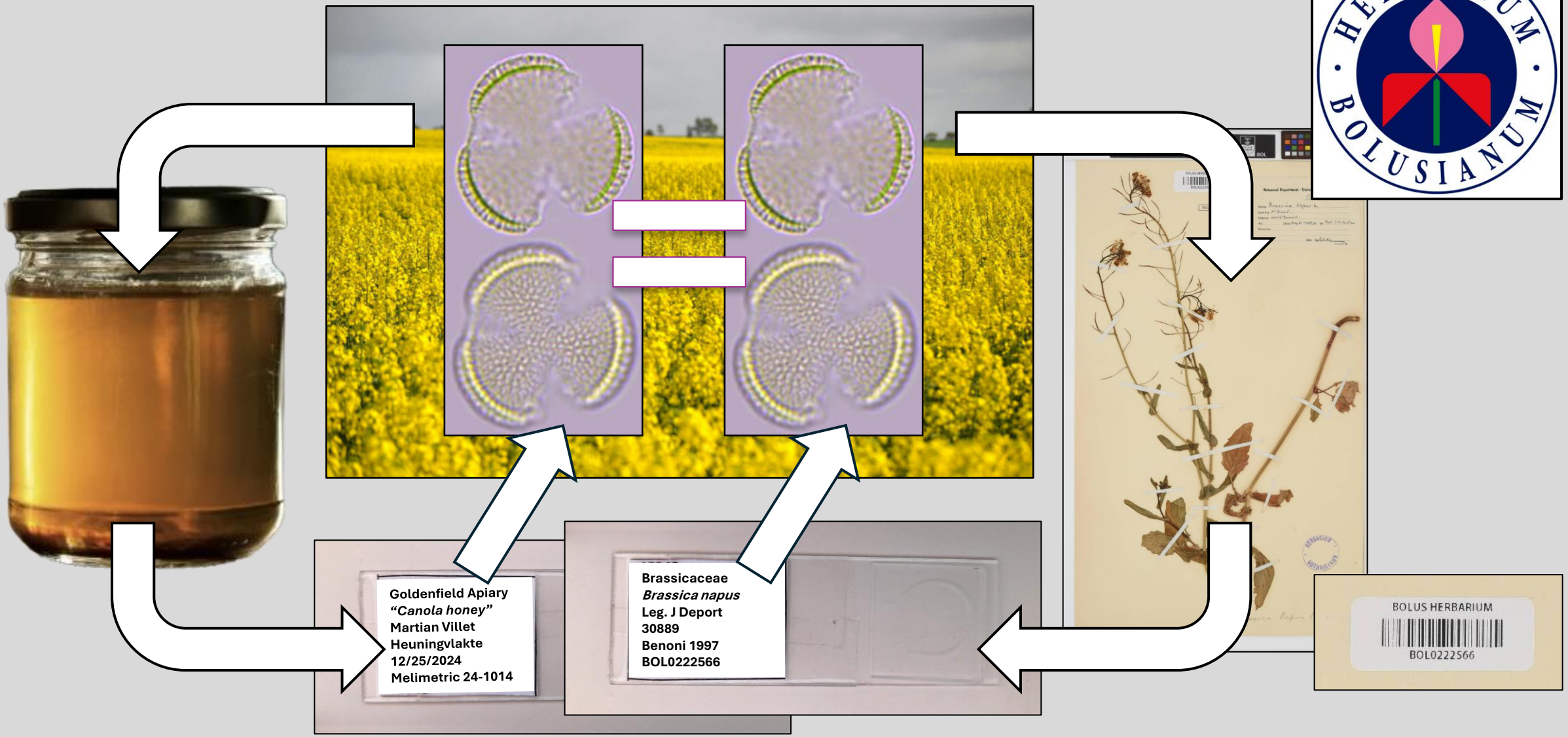
- In EU from **2026**, labels **must mention the countries of origin in honey blends**
  - … in descending order
  - … with the percentage share of each origin (Ts & Cs)

What generally counts as forensic evidence?

Example: The U.S's. **Daubert Standard** for forensic evidence

1. Is the science tested?
2. Is the science published and reviewed by peers?
3. Is the science's error rate known?
4. Are there standards for doing the science?
5. Is the science widely accepted in its scientific community?

Criterion 1: Is the science tested?

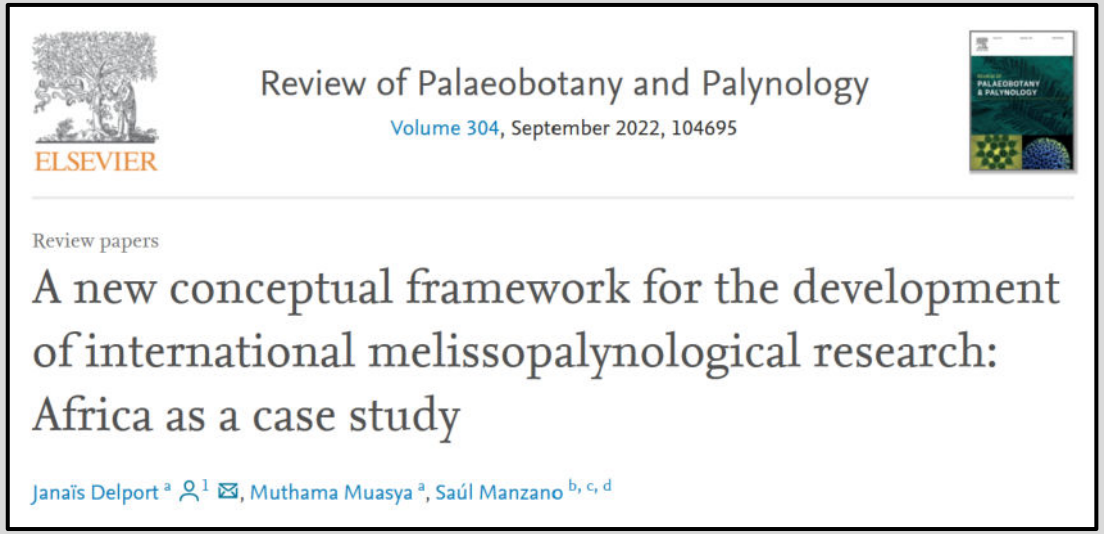


Criterion 2: Is the science published and reviewed by peers?

Scopus: > 1300 scientific papers

Google Scholar: > 17 000 papers, books, cases, etc.

Palynology journals	
Palynology	
Review of Palaeobotany and Palynology	
Grana	
Food science journals	
Food Chemistry	Procedia Food Science
Food Bioscience	Food Research International
Food Control	Journal of the Science of Food and Agriculture
Current Research in Food Science	European Food Research and Technology
Foods	…



ELSEVIER

Review of Palaeobotany and Palynology

Volume 304, September 2022, 104695

Review papers

A new conceptual framework for the development of international melissopalynological research: Africa as a case study

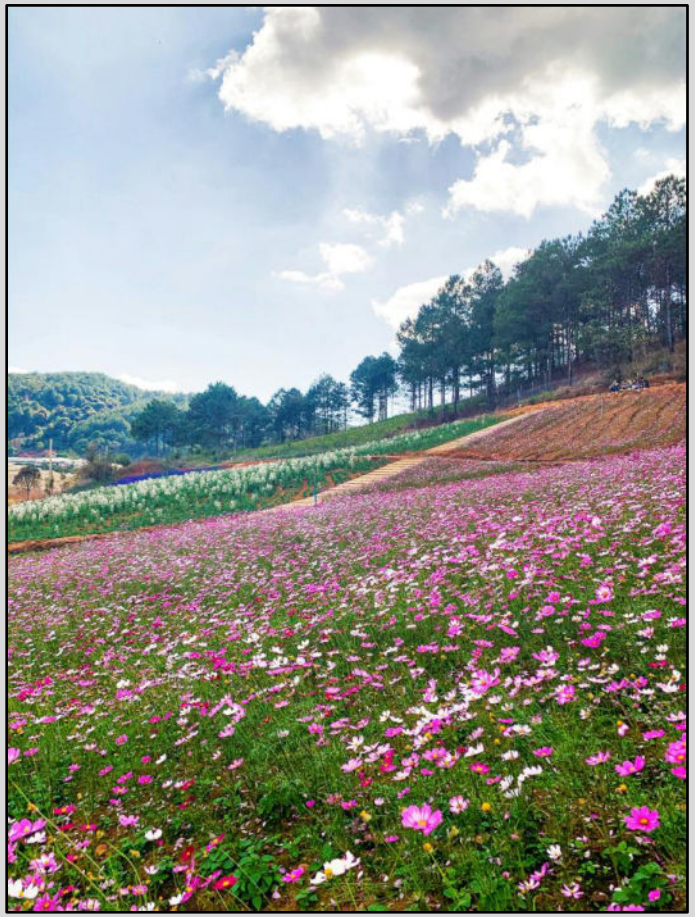
Janaïs Delport [a] [1] ✉, Muthama Muasya [a], Saúl Manzano [b, c, d]

Harmonised methods (Von der Ohe *et al.* 2004)
Cited > 500 times

Methods of melissopalynology (Louveaux *et al.* 1978)
Cited > 1100 times

Criterion 3: Is the science's error rate known?

Hive-related sampling



Administration

Lab-related analyses

Criterion 4: Are there standards for doing the science?

Professional conduct

Lab management

Analytical standards

SACNASP
South African Council for Natural Scientific Professions
Integrity in science

ISO

METHODS OF MELISSOPALYNOLOGY*

by J. Louveaux, Anna Maurizio and G. Vorwohl

International Commission for Bee Botany of IUBS

SAQA
SOUTH AFRICAN QUALIFICATIONS AUTHORITY

ASTM INTERNATIONAL

Harmonized methods of melissopalynology

Werner Von Der Ohe[a]*, Livia Persano Oddo[b], Maria Lucia Piana[b], Monique Morlot[c], Peter Martin[d]

Criterion 5: Is the science widely accepted?

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Palynology Research Laboratory PRL Texas A&M University

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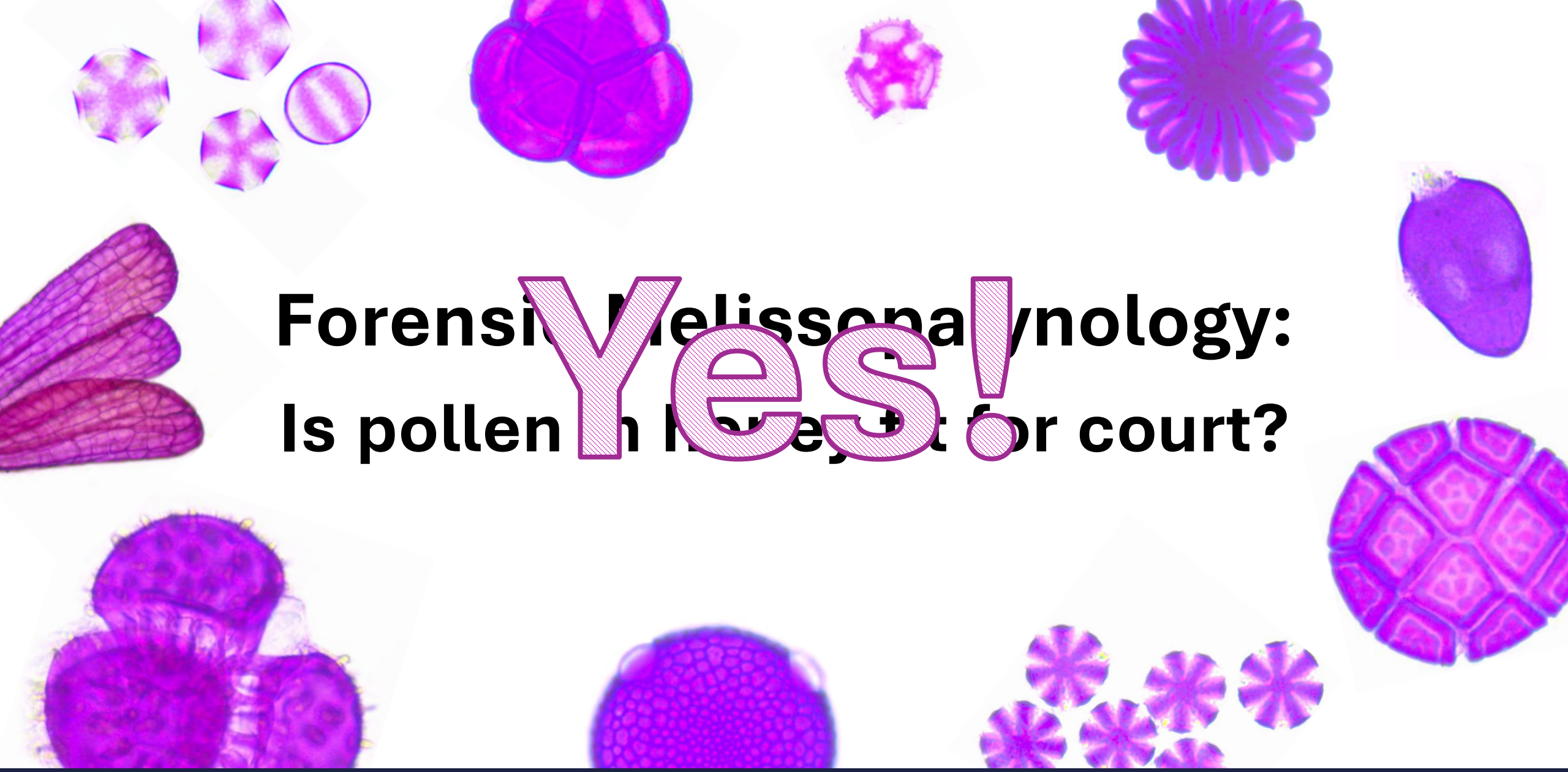
Honey and Pollen Diagnostic Lab



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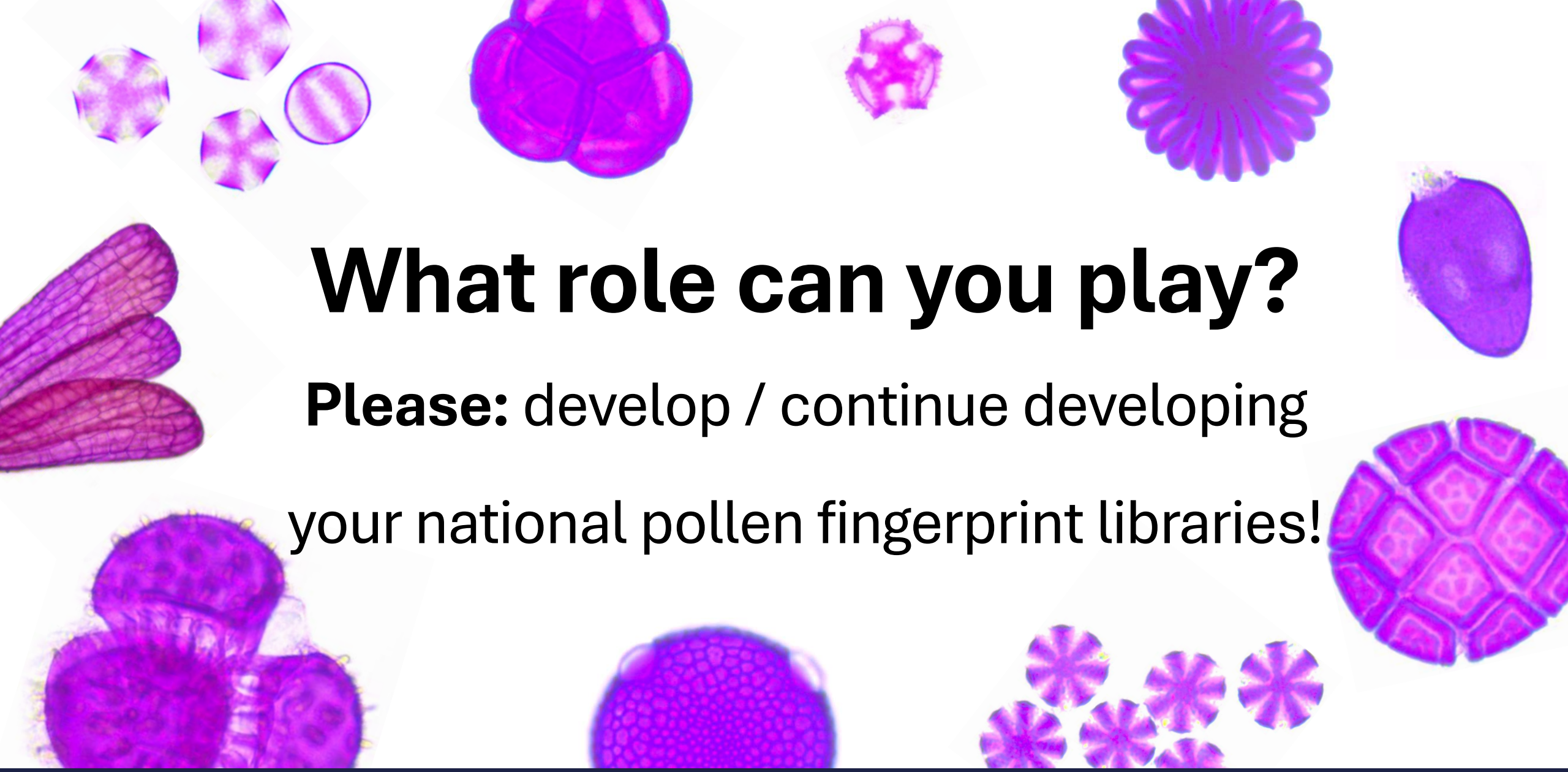

What role can you play?

Please: develop / continue developing

your national pollen fingerprint libraries!

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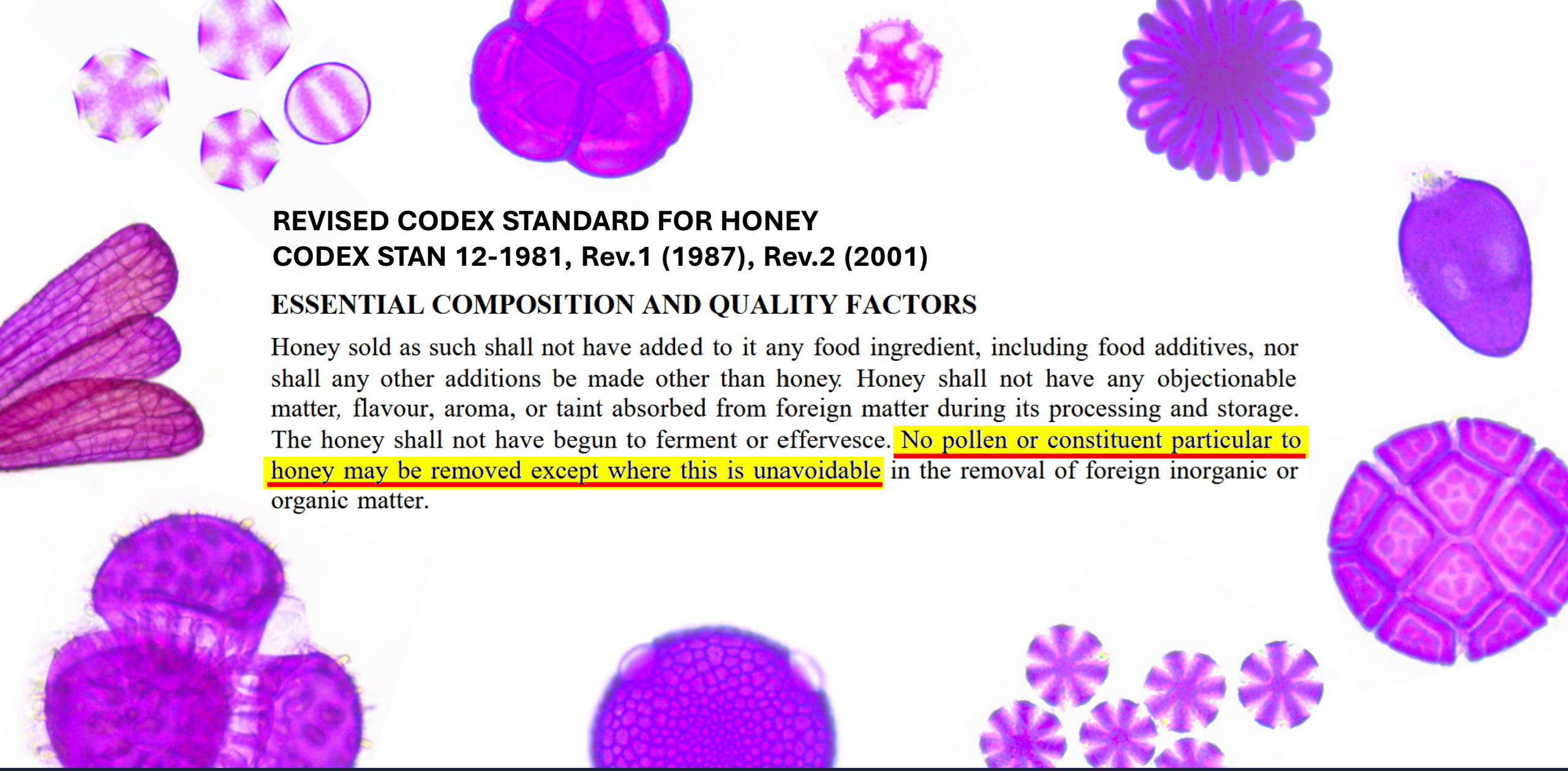

REVISED CODEX STANDARD FOR HONEY
CODEX STAN 12-1981, Rev.1 (1987), Rev.2 (2001)

ESSENTIAL COMPOSITION AND QUALITY FACTORS

Honey sold as such shall not have added to it any food ingredient, including food additives, nor shall any other additions be made other than honey. Honey shall not have any objectionable matter, flavour, aroma, or taint absorbed from foreign matter during its processing and storage. The honey shall not have begun to ferment or effervesce. No pollen or constituent particular to honey may be removed except where this is unavoidable in the removal of foreign inorganic or organic matter.