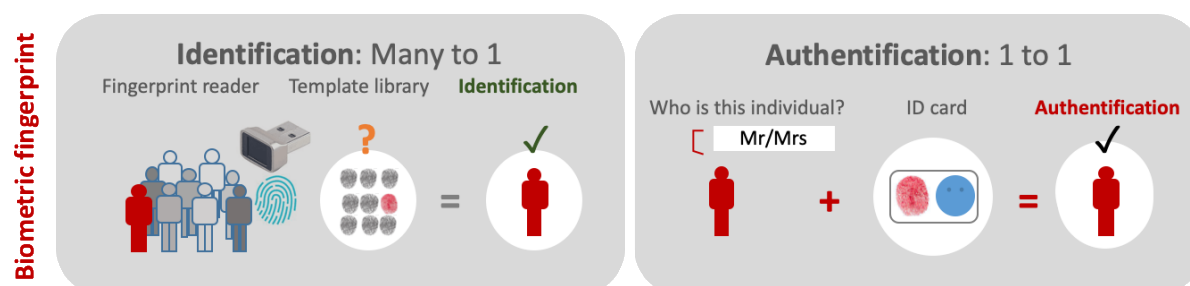**An individual "blood test" to monitor the impact of stressors on bee health**

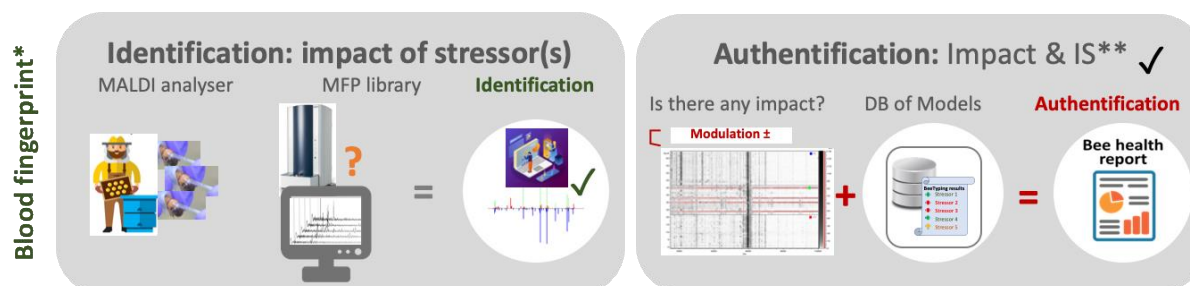**An individual blood test to track the health status of bees**
In health care, a blood test is done to check how organisms (animal and human) cope, for example, with infection, medication or pathology. If the blood test results are abnormal, it gives indications of how to treat or prevent future problems.
For bees, a "blood/haemolymph test" performed by mass spectrometry (MALDI BeeTyping®) produces a record of molecular fingerprints (MFP) representative of a bee's physiology, in the same way that a biometric fingerprint is exclusive to one human (and can be used both for identification and authentication, see diagram below).

How to track the impact of a stressor on bee health?
A molecular fingerprint is generated and compared to a library of reference MFPs obtained under different stress conditions (e.g., bacteria, parasites, bad nutrition, pesticides). MALDI BeeTyping® enables classification of bees according to their responses to stressors and gives the immune status of the bee.

* A molecular fingerprint (MFP)   ***IS: immune status; ± : grey line intensity is the level of modulation*

From a "haemolymph test" to a Health card
The result of this "blood test" will be provided as a series of impact scores that indicate how closely the blood profile matches to a library of stressors. The overall impact level and the immune status of the bee will be represented by an appropriate "traffic light" colour code: green, yellow and red for low, medium and high impact, respectively. This MALDI BeeTyping® approach is designed as a user-friendly read-out of bee health status.

The lab report can be interpreted by the beekeeper or bee veterinary services, who can integrate it with complementary analytical measurements (detection of viruses, residues of chemicals, etc.) and field observations of bee hive health.

Compared to other molecular approaches that look at gene expression in bees, MALDI BeeTyping® is fast (< 5 min), reliable and cost-effective, and thus could provide a valuable tool for bee health.

Sources
https://doi.org/10.1002/pmic.201900268, https://www.theses.fr/2020GRALV009