



# THE MEANING OF TRACES #13

## Forensic science in question

### CRIMINALISTICS THROUGH THE SCOPE OF RESEARCH AND INNOVATION



**Technology**



**Innovation**



**Accuracy**

By tackling challenges – like analysing the microbiome of bodily fluids, or chemical imagery of papillary traces through mass spectrometry for example – laboratories across the world, such as the Gendarmerie Nationale's Criminal Research Institute (IRCGN) are innovating daily in the field of individual identification. Those technological developments could provide information about an individual (their identity and lifestyle), as well as add a contextual dimension to the traces that are being studied. For example, by studying the microbiome, it is now possible to distinguish between different types of biological fluids, and to obtain information about the health of an individual.

## Forensic science, a science growing finer and finer

The Sydney declaration gives a new framework to forensic science by giving it a clear object of study: traces. It stresses the importance of understanding their nature, thus to take into account their singularities be it while working on research and development or at any of the steps of their exploitation: detection, collection, conservation, analysis and result interpretation.

Faced with constant technical and scientific evolution, it is crucial to reflect on the direction in which scientific research, development and innovation in forensic science should go. One of the main axes of scientific research in this domain is understanding the mechanisms of trace generation and transfer, because such an understanding helps investigators elaborate and infer hypotheses of an unobserved past event.

Scientific  
progress

The central  
role  
of traces

Feedback  
on the  
practice  
environment



## Predictable orientations for forensic science

Faced with the rise of artificial intelligence and mobile technologies (like NIRLab), research and development in central laboratories is deployed on two fronts that complement one another: improving the detection of physical traces (for example fingerprints), biological traces (fluids and DNA), chemical traces (residues and reaction products) and digital traces (the new traceability of human actions); and the contribution of artificial intelligence as a support tool for the computing of an ever increasing amount of data arriving to or produced by the laboratories as well as for decision making (identification and association strength).



# 02 MAI

We are organising a webinar on Thursday the 2nd of May 2024, from 8:30 to 9:30 AM (UTC+2), about the Sydney declaration, how we at the PJGN implement it, and how even organisations that do not work directly for the judiciary can benefit from implementing it.

Be advised the webinar will be given in french..

[Webinar link](#)



### Scientific news

**Forensic DNA database and criminal investigation in the Sahel region, a need to update the National Security Policy?**, Zeye, M. M. J., Ouedraogo, S. Y., Millogo, M., Djigma, F. W., Zoure, A. A., Zeba, M., ... & Simporé, J. (2024). *Forensic Sciences Research*.

**Multi-omics integration strategy in the post-mortem interval of forensic science.** Li, J., Wu, Y. J., Liu, M. F., Li, N., Dang, L. H., An, G. S., ... & Sun, J. H. (2024).

**Desorption electrospray ionization mass spectrometry imaging of latent fingerprints revealed by Oil Red O.** Banidol, M., Kouider, S., Sergent, I., Pizzala, H., & Charles, L. (2024). *Rapid Communications in Mass Spectrometry*, 38(8), e9724

**Towards more relevance in forensic science research and development.** Weyermann, C., Willis, S., Margot, P., & Roux, C. (2023). *Forensic Science International*, 348.

**Analysis of microbial communities: an emerging tool in forensic sciences.** Gouello, A., Dunyach-Remy, C., Siatka, C., & Lavigne, J. P. (2021). *Diagnostics*, 12(1), 1.

**Providing illicit drugs results in five seconds using ultra-portable NIR technology: An opportunity for forensic laboratories to cope with the trend toward the decentralization of forensic capabilities.** Coppey, F., Bécue, A., Sacré, P. Y., Ziemons, E. M., Hubert, P., & Esseiva, P. (2020). *Forensic science international*, 317.

**The kodak syndrom : Risks and Oppoportunities created by Decentralization of Forensic Capacities.** Casey, E., Ribaux, O., Roux, C. (2019). *Journal of forensic Sciences*, Vol 64.

**The First Successful Use of Simple Low Stringency Familial Searching in a French Criminal Investigation.** Pham Hoai, E., Crispino, F., Hampikian, G. (2014).

### Surprising

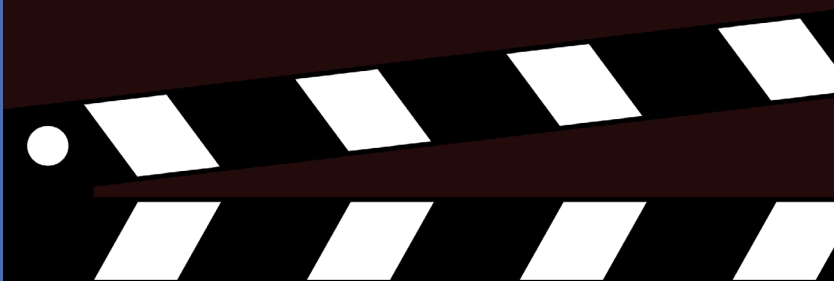
The Gendarmerie Nationale's Institute of Criminal Research is developing an AI-based app to estimate a bloodstain's age. This app takes several factors into account, including the temperature and atmospheric pressure. (a patent has been filed)



### Forensic science in fiction

In episode one of *La legge di Lidia Poët*, Lidia Poët, first woman ever to be enrolled in the Italian roll of lawyers (albo degli avvocati), investigates the murder of a ballet dancer. Being certain that her client has been wrongly imprisoned, she asks that he be submitted to a lie detector test, the first machine for such tests having been invented by Cesare Lombroso in 1885.

Bewildered by this unusual request and knowing nothing about this new technique and the possibilities it offers, the magistrate denies her request.



### Forensic science in action

Being – on this point at least – no different from any other innovation, it takes times for an innovation in forensic science to be accepted by its target audience, the legal system. Let us for example look at the Kulik case: the events took place in 2002, an article about DNA use in identification-oriented genealogical research was published in 2010, the use of this technique was allowed by French law in 2011, and the IRCGN's investigations allowed for the resolution of this case in January 2012.

The recency of the deployment in French overseas territories of devices used for rapid DNA-analysis in order to establish genetic profiles illustrates the gap between the validation of an innovation by experts of the field and the authorisation of its use by the judiciary. The challenge of supporting scientific research lies in reducing this gap.