Natural Traces in forensic investigations – how pollen imprints can solve crime

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According to the size of pollen grains, amount of pollen production and possibility of identification of local floras, palynology could be very useful not only for (palaeo)ecological or palaeogeographical research, but also it can work as a very fruitful application in case of forensic scientific needs. Forensic palynology is a branch of forensic sciences focused on palynology that approaches pollen and spores in the investigation of crimes giving microbotanical evidence useful to crime investigators. Detailed review on the possibilities of implementation of palynological results into the crime investigation was made, for example, by Mildenhall et al. (2006). Despite the potential of using these proxies, it is reported that only in New Zealand palynological methods have been used in an everyday routine in forensic investigations (Bryant et al., 1990). Additionally, some forensic palynological works were made in Australia, UK and USA. It can be connected to the methodological difficulties and questions like unified and standardized protocols of the method and, thus, the value of the evidence can differ from case to case (Horrocks, Walsh, 1998). Some works on the methodology were made by Horrocks and Walsh (1999), Horrocks et al. (1998; 1999), Grandi et al. (2002) and Horrocks (2004). It is also needed to be put into account that only complex study of the area during the investigation like geobotanical (vegetation cover) and aerobiological (pollen calendars) data collection and analysis could give reliable results of the pollen analysis (Montali et al., 2006; Mercuri, 2015). This was also mentioned in a case study that was performed by Ochando et al. (2018) in a semi-arid territory in the vicinity of Cartagena city in Murcia, Spain.

The aim of this research is to extend the existing sampling methods and analysis of pollen and non-pollen palynomorphs to dry (terrestrial) surfaces such as soil, clothing, or bodies, combining them with the sampling and analytical methods of forensic aerobiology and to choose the most optimal methods that can be implemented into forensic investigation practice further. Simulations or real cases (with agreement to be defined) will be considered with the aim of testing palynological analysis on different matrices and contexts. The research is mainly aimed at producing the most effective, simple and not expensive in performance methods of sampling and sample treatments that will work with the most common types of materials and allow crime scene investigators implement it into an everyday practice.

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