



The Importance of Palynology in Forensic Investigations



Marzia Boi*

Departamento de Biología, Universidad de las Islas Baleares, Spain

***Corresponding author:** Marzia Boi, Laboratorio Botánica, Departamento de Biología, Universidad de las Islas Baleares, Palma de Mallorca, Spain

Submission: June 06, 2018; **Published:** August 17, 2018

Introduction

Palynology is the scientific discipline concerned with the study of plant pollen, spores, and certain microscopic planktonic organisms, by this way diatom, in both living and fossil form [1]. This field is associated with the plant sciences as well as with the geologic sciences, notably those aspects dealing with stratigraphy, historical geology, study of organic microfossils (palynomorphs) extracted from ancient coals, paleontology and archaeology. Palynology is extremely broad showing applications in the whole botany as well as in science related with them, but also found high interest in the forensic discipline and in a crime scene investigation. In a real forensic case, look for pollen and spore can be very significant and conclusive; these particles, because passing naked to the human eyes and, at the same time, that they are very common in the environmental, helped to solve a crime investigation. In this way, thanks to its durability to the pass of time, pollen can be extremely valuable to determine some forgotten data or evidence not considered before in a crime. For this reason, it can be very helpful to open up different new information in search of the truthfulness in a specific investigation or to link objects and person implicated in the fact crime, inside the crime scene or out, including many times after the event was committed.

For the exiguous size of these elements of pollen and spore, palynology requires the use of microscopy for its study. In this way, this science has been evolved thanks to Wodehouse, the most important American botanist specialized in pollen of the XX century [2]. In its book "Pollen grains" (1937) discover the multiple application and the use of pollen, in the field of the science as well as he composed a master dichotomous key about pollen features of different important botanic families. The Swedish botanist Erdtman [3] was a biologist and an expert in palynology which published "An introduction to pollen analysis" (1943) and "Pollen morphology and plant taxonomy. Angiosperms" (1966) [3,4]. Erdtman develops the method of acetolysis, a chemical method of preparation for recognize the external pollen morphology. These basics texts, along with others modern publications, make it possible better investigations thanks also to the electron microscopes which allow the observation of this particles with high magnification. In fact, the importance of search for pollen and spore is extremely important because its defined ex-

ternal features which allow us the recognizing of the vegetal organism which produce them.

The base for using pollen in forensic applications comes from the discipline of pollen analysis, which began a century ago to search for clues about past environmental changes. Pollen and spore production and its dispersion are also important parts to considerate in forensic studies. Foremost, knowing what the expected production and dispersal pattern of spores and pollen for the plants in each region is, help to recognize what type of "pollen fingerprint" expected in samples that come from that area. Because dirt and dust are common elements at almost every crime scene, they should be collected carefully because often these contain abundant pollen and spores. Along with this, samples of dirt collected from clothing, skin, hair, shoes, or car of a victim might prove useful in linking the victim with the location where the crime occurred.

However, forensic palynology has gained importance for its ability to provide information about microscopic pollen and spores trapped in clothing as well as in other items of interest needed to help resolve criminal and civil cases, including instances of homicide, terrorism, genocide, bombings, forgery, theft, rape, arson, counterfeiting, manufacturing and distribution of illegal drugs, assault, cases of hit and run, poaching, and identity theft. Palynology in forensic field was used in Austria at the first time in 1959; in Europe it is often used in the United Kingdom and less in other countries, although currently it is underutilized. Nowadays it is particularly employed in New Zealand and Asia, even though it is still underused in the United States. There are different historic cases that were solved with the help of the analysis of pollen as those reported by [5-11] and many others. Furthermore, different other publications help to build protocols as well as demonstrate that pollen is an efficient evidence to search in objects or people implicate in a crime [12-16]. Moreover, palynology had helped to found funeral rituals and old ointments in very old objects [17,18].

Finally, pollen and spore for being part of a very complex but complete science are difficult to search for anyone efficient police force; for example, it will be very complicated for scientific police to know and accomplish all the methods as well as the procedure along with pollen and spore morphology and its final species deter-

mination. In the same way, merely is especial important to commit these very subtle investigations by scholar specialists or expert in pollen investigation to not fall in inaccuracy which will be lead to a serious mistake in a particular crime study and do not get to solve it or even solve it badly because of wrong conclusions.

References

1. Britannica E (2009) Encyclopædia britannica. Common Law, Chicago, USA.
2. Wodehouse RP (1937) Pollen grains: Their structure, identification and significance in science and medicine. *The Journal of Nervous and Mental Disease* 86(1): 1-104.
3. Erdtman G (1943) An introduction to pollen analysis. Read Books Ltd, The Chronica Botanica Company, Massachusetts, USA.
4. Erdtman G (1966) Pollen morphology and plant taxonomy. Angiosperms. An introduction to palynology. Hafner Publishing Company, New York, USA, p. 86-87.
5. Szibor R, Schubert C, Schöning R, Krause D, Wendt U (1998) Pollen analysis reveals murder season. *Nature* 395: 449-450.
6. Brown AG, Smith A, Elmhurst O (2002) The combined use of pollen and soil analyses in a search and subsequent murder investigation. *J Forensic Sci* 47(3): 614-618.
7. Mildenhall DC, Wiltshire PE, Bryant VM (2006) Forensic palynology: why do it and how it works. *Forensic Sci Int* 163(3): 163-172.
8. Mildenhall DC (2008) Civil and criminal investigations The use of spores and pollen. *SIAM J* 4: 35-52.
9. Wiltshire PE (2009) Forensic ecology, botany, and palynology: some aspects of their role in criminal investigation. *Criminal and Environmental Soil Forensics*, pp. 129-149.
10. Wiltshire PE, Hawksworth DL, Webb JA, Edwards KJ (2015) Two sources and two kinds of trace evidence: enhancing the links between clothing, footwear and crime scene. *Forensic Sci Int* 254: 231-242.
11. Mildenhall J (2017) Forensic botany and stomach contents analysis: established practice and innovation. *Taphonomy of Human Remains: Forensic Analysis of the Dead and the Depositional Environment: Forensic Analysis of the Dead and the Depositional Environment*, pp. 187-200.
12. Mildenhall DC (2006) Hypericum pollen determines the presence of burglars at the scene of a crime: an example of forensic palynology. *Forensic Sci Int* 163(3): 231-235.
13. Bryant VM, Jones GD (2006) Forensic palynology: Current status of a rarely used technique in the United States of America. *Forensic Sci Int* 163(3): 183-197.
14. Boi M, Servera G, Capó M, Llorens L (2009) Horses as pollen trap. I cavalli e le loro qualità come campionatori pollinici. *European Journal of Aerobiology and Environmental Medicine* 5(2): 25-33.
15. Hawksworth DL, Wiltshire PE (2011) Forensic mycology: the use of fungi in criminal investigations. *Forensic Sci Int* 163(3): 231-235.
16. Boi M (2015) Pollen attachment in common materials. *Aerobiologia* 31(2): 261-270.
17. Boi M (2017) Pollen on the shroud of Turin: The probable trace left by anointing and embalming. *Archaeometry* 59(2): 316-330.
18. Mora SR, Servera Vives G, Picornell Gelabert L, Cabanis M, Boi M, et al. (2017) Pollen Signatures of a Ritual Process in the Collective Burial Cave of Cova des Pas. *The Bioarchaeology of Ritual and Religion*, 28, Late Bronze Age, Minorca, Balearic Islands, Spain.



Creative Commons Attribution 4.0 International License

For possible submissions Click Here

[Submit Article](#)



Forensic Science & Addiction Research

Benefits of Publishing with us

- High-level peer review and editorial services
- Freely accessible online immediately upon publication
- Authors retain the copyright to their work
- Licensing it under a Creative Commons license
- Visibility through different online platforms