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Pollen grains as Trace Evidence in Forensic Investigations

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Abstract

Forensic palynology i.e. study of pollen grains as trace evidence is an important tool in criminal investigations for determining the location of a sample when recovered from either crime scene or victim or suspect. It is used in court of law and has provided evidence for getting information related to location of disposed dead bodies in graves, contact of objects and places, determining primary crime scene and secondary crime scene etc. Palynology involves the pollens, plant spores and fungi identification. Pollen grains are often found trapped in clothings and belongings of the person and they can assist in resolving civil as well as criminal cases. Analysis of pollens began about a century ago for getting hints and clues about the environmental changes occurred in past and from there its use for forensic applications has been developed. In this study, a review has been done on pollen grains which can help in the forensic investigations when pollens grains are collected as trace evidences from persons and different substrates.

Keywords: *Pollen, Forensic Palynology, Trace evidence, Criminal Investigation.*

Introduction

Forensic palynology has been a used as a law enforcement tool for over 50 years. It is the application of analysis of pollen grains and spores in solving civil and criminal cases. Pollen grains and spores can be recovered from an extremely wide range of substrates, including bodies. Area can be located from the pollen grains by having the knowledge of dispersal patterns of spores and pollen and their expected. Collection of pollen grains and spores can be done from dirt, dust, soil, hair, mud found from inside the vehicles, shoes, skin, clothing of victim and suspect.

There is great diversity in exines of pollens and spore with respect to their species level, and their production and geographical location is also specific in nature. So, from pollen grains place or area can be located that helps a lot in criminal investigation. Pollen grains which

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stick and embed into the fabric are held strongly by the static charges and their surface sculpturing and this property makes them crucial trace evidence. [1]

Contaminated samples of pollens i.e. mixed with other samples like fabrics, footwear, digging implements and vehicles can also be encountered they may affect the analysis. Pollens can also be categorized into different types based upon their production of flowers and bearing of seeds. These are:

1) Plants that produce spores like fungi, ferns and mosses
2) Non-flowering and seed-bearing plants (gymnosperms) like cedars, pines, spruce and
3) Flowering and seed-bearing plants (angiosperms) like elms, aspen, oaks etc.

A large number of pollens and spores are produced by the plants which help in their dispersion. Plants like Cannabis, Rumex, Sorghum, Pinuscontorta and grasses, ragweed, eucalyptus (some species), hickory, filberts, birch, elms, walnut, alder produces millions of pollen grains which will help in dispersion. More than 10 times the amount of pollens per anther are produced by other anemophilous plants which produce a comparatively lower number of pollens. [2]

It has also been found that pollen grains as trace evidence can also be recovered from ink and paper thus forensic palynology can help in suspected fraudulent document cases. [3]

No significant differences have been found between fresh and dried pollens with respect to their retention on any fabric type but a significant difference was found between both with respect to their retention based upon wear intensity i.e. light wear or heavy wear. It has also been found that dispersal of pollens from insects showed retention at comparatively higher rate as compared to dispersed by wind. Removal of pollen grains by washing of fabrics was found considerably variable depending upon fabric type, plant type and the interaction between both. [4] A number of cases have been solved in which pollens served as crucial trace evidence. [1], [5]

Conclusion

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Pollen grains as trace evidence recovered from suspected persons, victims can help in criminal investigations as they are specific to their area of origin as well as season-specific also. Their retention with respect to external environmental conditions and on substrate make it as a valuable trace evidence for analysis.

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