G93 Diatoms and Their Forensic Significance

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The goal of this presentation is to demonstrate that diatoms could be critical evidence in criminal investigations when aquatic communities are involved. This research shows that diatoms are a good example of trace evidence and very valuable investigative tools, which can be used to link an individual to a crime scene. Additionally, this study findings support that these microorganisms can be recovered by using a simple methodology; and providing investigators with a reliable and quick technique that could help them determine the presence of diatoms in physical evidence recovered from a crime scene and/or individual.

This presentation will impact the forensic community and/or humanity by showing that diatoms could be critical evidence in criminal investigations when aquatic communities are involved. This study will provide investigators with a simple, reliable and quick technique that could help them determine the presence of diatoms in physical evidence recovered from a crime scene and/or individual. These results can be used to educate crime scene investigators and police officers on what kind of valuable trace evidence should not be overlooked at a crime scene or evidence items that show the presence of soil, mud, or water.

Diatom analysis could help determine if the person was dead or alive when the body is removed from the water. Because of the diatoms vary morphologically and taxonomically depending on their habitat, it is possible to determine the location or site of drowning. Moreover, if there is a possibility of linking a victim to the site of the drowning, there is also a possibility of linking a suspect to a crime scene. It is imperative to try to recover as much evidence as possible from a crime scene, especially; the type of evidence cannot be seen with naked eye such as trace evidence. Therefore, recovering diatoms from a crime scene or from articles of clothing of the victim or a suspect can provide an important evidence for use in criminal investigations. The use of diatoms for forensic purposes in the United States is very limited and under-utilized

Samples used in this study were collected from three different bodies of water; marine (beach shore), brackish (estuarine), and from a freshwater source (lake). Neutralized buffered formalin (NBF 10%) was added to each sample to fix and help in the preservation of the diatoms. The temperature and the pH of the water were recorded at the time the samples were collected, as well as the ambient temperature. Samples were stored at 4ºC.

Under restrict sterile condition; the samples were centrifuged for three minutes at 2982 rpm and then re-suspended in a few drops of distilled water. A drop of each sample was placed on a glass slide and a high refractive index mounting medium was used to fix the cover slip to the slide. The samples were observed under the microscope for the presence of diatoms, identification, and comparison. Images were recorded of the different genera observed under the microscope. The second experiment consisted of manually transferring some of the samples to different articles of clothing, in a spotted manner. The articles of clothing examined were a white cotton t-shirt, white socks, and jeans. Each piece of clothing was cut in small pieces measuring three by four inches. The samples once impregnated with the marine, brackish and freshwater samples were placed in plastic containers (16 oz) used for this experiment. These samples were treated and processed in the same manner as the first experiment.

Diatoms were recovered from all the samples collected, and a qualitative analysis was performed. Diatoms were abundant in the estuarine and freshwater samples. On the other hand, the seaweed sample yielded the least amount of diatoms, and only six different genera were observed. To determine if a common habitat or source could be indicated; comparison of the diatoms from different samples showed a total of 23 genera in all samples collected. For recovering the diatoms of different fabrics such as pieces of t-shirt, sock, and jean material, results showed 66% success. These findings prove that diatoms can be recovered, analyzed and can be categorized as trace evidence.

In conclusion, diatoms have proven to be a powerful tool that can be used as evidence in forensic cases. It was concluded that diatoms could be transferred to different items of clothing, car carpets, sneakers, etc., if an individual comes in contact with an area where diatoms are expected to be present. These results can be used to educate crime scene investigators and police officers on what kind of valuable evidence should not be overlooked at a crime scene or evidence items that show the presence of soil, mud, or water.

Trace Evidence, Diatoms, Crime Scene

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