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# ABSTRACT BOOK

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whereby individuals found to be criminally responsible for crimes in the ICC jurisdiction may be ordered to make reparations to the victims (individuals or groups) of the crimes. In this regard, the issue of asset recovery and tracing may be an avenue where document examination has a contribution to make to international justice. Some of the challenges of conducting document examination in international investigations will be explained with suggestions on mitigating these challenges. Language is an obvious limitation when the script of the questioned documents is one that the document examiner is not familiar with. Language challenges are also present if any forensic report has to be translated into another language, not to mention interpretation done at trial. Given that many of the disputed documents are in the custody of entities that will not provide the originals to the laboratory, copy quality then becomes a significant impediment to many examinations. Against all of this are the general challenges of logistics and security which are intertwined with all of the above.

**Disclosure:** All authors have declared no conflicts of interest.

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### MALDI TOF MS IMAGING AS A NOVEL TOOL FOR ESTIMATION OF POST-MORTEM INTERVAL IN MUSCLE TISSUE

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**Objective:** Estimation of post-mortem interval (PMI) is very important in the forensic sciences. Although many approaches have been used for estimation of PMI, accurate PMI calculations are still difficult. It is significant complicated and difficult to determine the post-mortem interval. The environment conditions and death causes are important factors to influence the estimation of post-mortem interval. Thus, new methods are required to improve the accuracy of PMI estimation. **Methods:** Here, we present a novel matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) method that can be used for the estimation of PMI using molecular images and multivariate analyses. We also carry out the traditional HE staining for the observation of changes in rat and human quadriceps femoris muscle at different PMIs. **Results:** In this study, we found that from a PMI of 0 h to 144 h, the fibers in the muscle cells showed progressive changes, including gradual swelling, disintegration, and fracturing. Transverse striations were obscured as the PMI increased. For the generated images, the peaks at  $m/z$  1511, 1543, 1564, 1586 in rat muscle tissues, and 1597, 2133, 2559, and 3241 in human muscle tissues showed marked decreases in intensity between 0 h and 144 h post-mortem. Using genetic algorithm (GA), supervised neural network (SNN), and quick classifier (QC) methods, we built 6 classification models, which showed high recognition capability and good cross-validation. The histological changes in all the samples at different time points were also consistent with the changes seen in MALDI imaging. **Conclusions** MALDI IMS with PCA can be used to estimate intermediate PMIs based on protein or peptide signatures in both rat and human muscle tissue samples. The MALDI IMS data and the histological changes were well correlated. The classification models constructed can be used for the estimation of PMI.

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### AN OUTLOOK OF THE FORENSIC ENTOMOLOGY IN COLOMBIA CONTRIBUTIONS FROM TECNOLÓGICO DE ANTIOQUIA

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The first reference about forensic entomology in Colombia date to 1947, then in 1999 this scientific area is activated by the first national Workshop at the National Institute of Legal and Forensic Medicine (INML-CF) and since 2000 a long list of studies have been published. In 2004 the law 206 about physical evidence was contextualized and found a legal framework.

Thus insects were included as biological evidence in the procedures, chain of custody and the prosecution manual of the INML-CF. National development of the discipline was evident in the largest cities and focused on the ecological studies of necrophagous successional fauna and basis on carrion flies. Colombia is a Megadiverse country and inhabit a vast number of organisms with forensic importance due to the geographical extension, topography, climate and environmental differences of landscapes, these fauna requires more basic research in order to provide reliable data to apply in the legal context; in this sense we propose a coherent agenda to contribute to the current knowledge. The Ciencias Forenses y Salud Research Group from the Tecnológico de Antioquia had been follow the progress based in three guidelines. 1. Biological systematics (dealing with taxonomic regards, dealing with morphological and genetically data-Barcode, new species and phylogenies), 2. Bionomic aspects (lifecycles, synanthropy and autoecology) 3. The chorological and biogeographical aspects. Based on our results we aim to point and to lead the use of the complex predictive models of the decomposition ecology to contribute to the local and regional forensic entomology.

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### USING BIOAFFINITY-BASED CASCADES FOR THE DISCERNMENT OF BIOLOGICAL SEX FROM FINGERPRINT SAMPLES

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Fingerprint analysis traditionally refers to the process of comparing fingerprint patterns by an expert and/or an automated fingerprint identification system. Currently, the analysis ends with this matching methodology causing the field to be dependent on the presence of a stored matching print or a matching print from an individual that is physically present. Due to this limitation, a latent fingerprint may be judged to be too smudged or smeared to be of use. What is often overlooked is that those latent prints are created by sweat and sebum emulsions excreted by the fingertips. Those emulsions have their own unique chemical compositions for each individual making them possible biological samples for analysis. Our lab has developed a bioaffinity-based cascade for the determination of biological sexes from the chemical composition of the sweat/sebum left as the latent prints. The research presented here addresses the current limitations in fingerprint analysis using a bioassay system that focuses on the components of fingerprints. Bioaffinity-based assays have been developed for the determination of biological sexes from those components. In one assay, L-amino acid oxidase was used to target the amino acids present in the sebum and sweat left on latent fingerprints. Further research has led to the testing of authentic fingerprint samples collected from various surfaces as well as the development of other bioaffinity-based assays capable of differentiating between biological sexes via less complex systems. Other bioaffinity-based assays will also be developed in the future for the determination of other physical attributes such as age group and ethnicity.

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### PROACTIVE FORENSIC SCIENCE: INCREASING THE CONTRIBUTION OF FORENSIC SCIENCE TO COMBATING CRIME

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By applying “out of the box thinking” we are trying to increase the contribution of forensic science to combating crime. One approach which is both feasible and proven is the concept of “proactive forensic science”. Forensic science for the most part is reactive and responsive to crimes which have already been committed. A proactive forensic science is a conceptual change, a fundamental shift in viewing the scope and endeavor