



### **D54 An Overview on the Wood and Hair Digital Images Databank Project of the Brazilian Federal Police Anatomical Laboratory of Biological Samples**

*Guilherme H.B. de Miranda\**, Departamento de Polícia Federal, Academia Nacional de Polícia, Rodovia DF 001 - Km 2, Setor Habitacional Taquari, Brasília, 71559-900, BRAZIL; and *Marcelo G. de Barros, MS*, and *Fabio J.V. Costa, MS*, Departamento de Polícia Federal, Instituto Nacional de Criminalística, Setor Policial Sul - Quadra 7 - Lote 23, Brasília, 70610-200, BRAZIL

After attending this presentation, attendees will understand details about the Brazilian initiative concerning the use of anatomical features to identify wood and wildlife.

This presentation will impact the forensic science community by showing some specific aspects of the anatomic analysis adopted by the Brazilian Federal Police Forensic Team that works with environmental crimes (deforesting and wildlife) to identify the seized biological material (wood and hair).

Brazil, as a mega-diverse country, has an ecological relevance with its great variety of ecosystems, some of them considered the richest of the world (e.g., Amazonia, Atlantic Forest, and Cerrado), but are seriously threatened by a sort of environmental crimes. In Brazil, the Federal Police has the duty of the judiciary police, established by the Federal Constitution. Among the several acting areas (such as fighting drug trafficking, money laundering, cyber crimes, among others), recently, the Federal Police has developed a specialized intervention investigating and performing various operations to combat environmental crimes in areas under the authority of the Federal Government (Indian Lands, Federal Conservation Units, Public Forests, and Public Lands). Great effort has been spent in selection, hiring and training of skilled professionals, as well as improving infrastructure and logistics.

This presentation describes the deployment of the Anatomical Laboratory of Biological Samples to aid in forensic examination of seized material (wood and hair) subject to federal criminal investigation, arising from arrests in cases of environmental crimes (under the Brazilian Environmental Crimes Law), such as deforestation, transport/trade of illegal flora products, wild animal trafficking, illegal hunting, etc. The National Institute of Criminalistics of the Technical-Scientific Directorate of Federal Police is a modern forensic complex, with over 20,000 m<sup>2</sup> of floor space, located in Brasilia. Its facilities are divided into sectors and laboratories that comprise the most different areas of expertise (accounting, ballistics, chemistry, computer science, and environmental, among others). The Anatomical Laboratory of Biological Samples is part of the Area of Expertise of Environment that, because of its recent and multidisciplinary character, has a great need and momentum of expansion and development. The exams of materials seized are performed on a workstation composed of a binocular microscope coupled to a high resolution digital camera, allowing evaluation and record of microscopic images of layers of biological samples, which is thus compared and feeds digital database hosted on the intranet of the Federal Police and accessible to federal experts distributed throughout Brazil. The Anatomical Laboratory is particularly useful in actions to refrain the illegal logging, when there is no possibility of dendrological identification by leaves, fruits, flowers and seeds, as well as the trafficking of wild animals, illegal hunting and other forms of crimes against wildlife, which demanding the identification of parts of animals by examining their morphological and anatomical structures. These crimes cause several damages to the society affecting soil, water, flora and fauna, and represent a usurpation of the Brazilian public property and a threat to the national genetic heritage. The anatomic identification of wood takes place, either by a naked eye exam, from the general characteristics (odor, color, grain, etc.) as by anatomical features (layout, distribution, density, size of vessels, parenchyma, fibers) visualized with increases of 10 to 80x. Similarly, the identification of wild mammals is done with the analysis of anatomical structures (cuticle and medulla) with species-specific features present in certain regions of the hair (rod and shield). In general, are also used increases of up to 80x optical with additional digital magnification (up to 500x). Examining the image of the wire capillary allows identification which occurs through the morphology of the scales of the cuticle (the hair surface region) and the characteristics of their bone marrow, located within the capillary structure. The records obtained feed electronic databases consist of anatomical and morphological information extracted from images generated by a set of optical stereoscopic vision with increased optical to 80x, plus a digital camera to record real-time image. This set also features dual light source and is guided and connected to a personal computer with software for viewing, measuring and storing images of anatomical elements, allowing the realization of statistical calculations and enhancement of images, as well as the information store. Operations to repress environmental crimes have intensified resulting in the arrest of several involved, but it is worth noting that, to convict the defendants, it is imperative to be demonstrated the materiality of the crime, namely that the material aspects to confirm the crime are presented. The fight against illicit environment acts depends on proper instruction of police investigation and lawsuits with the aid of good forensic expert reports.



## General Section – 2011

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### Wood Exam, Anatomic Identification, Hair Exam