



B57 Current Efforts on Developmental Aspects of Forensic Botany in Brazil

*Renato T. Ferreira de Paranaíba, BA**, Brazilian Federal Police, Lab. de Genética Forense, INC, Polícia Federal, SAIS Quadra 07 Lote 23, Brasília, Distrito Federal 70610200, BRAZIL; *Carlos B. Carvalho, PhD*, Sqs 212 Bloco K Apt 207, Brasília, Distrito Federal 70275110, BRAZIL; *Jorge Freitas, PhD*, Departamento de Polícia Federal, Laboratório de Genética Forense, SAIS Quadra 07 Lote 23, Brasília 70610200, BRAZIL; *Gustavo Chemale, PhD*, Departamento de Polícia Federal, Laboratório de Genética Forense, SAIS Quadra 07 Lote 23, Brasília 70610200, BRAZIL; and *Katia Michelin, MSc*, Departamento De Polícia Federal, Laboratório De Genética Forense, Sais Quadra 07 Lote 23, Brasília 70610200, BRAZIL

After attending this presentation, attendees will better understand the current efforts of a forensic science subject that is less-developed, particularly in Brazil.

This presentation will impact the forensic science community by presenting the singularities of the forensic botany cases which will be discussed.

Botany is an area of study somewhat less developed than other forensic sciences. In fact, it can be said that botany is a promising subject of applied studies in criminal investigation. Plant DNA barcoding has emerged as a powerful and reliable tool for routine applications in forensic science. Furthermore, its application to plant species identification has provoked a renaissance for the use of taxonomy in basic science research.

Despite relevant initiatives and promised efforts by some groups, forensic botany in Brazil remains in its infancy when considering the advances of DNA technology. This is particularly surprising when the vast biodiversity of Brazil is considered; however, the application of plant DNA testing would have an impact beyond Brazil, as there are cases of plant materials suspected to be illicit that find their way into other countries. It would be useful to have a method to identify the same species in different places in an attempt to determine their origins. Demands addressed to forensic botany remain mostly unsolved; perhaps DNA testing could be helpful.

Cannabis sativa, *Salvia divinorum*, and *Lophophora williamsii* are all classified as controlled plants under Brazilian legislation and all are prohibited. Punishment for trafficking may be a sentence of up to 15 years in prison.

Identification of these plant materials is conducted using morphological observation based on specific features in addition to chemical tests to identify the presence of specific compounds. More recently, the intrinsic limitations of these techniques are giving rise to the opportunity of using DNA analysis, especially due to the advantages of this technology.

Seeds or leaves from plant material were pulverized and DNA was extracted using commercial kits. Universal Polymerase Chain Reaction (PCR) primers were used that would amplify four DNA regions (*matK*, *rbcL*, Intergenic Spacer (IGS)_trnL-trnF, and Internal Transcribed Spacer (ITS)) for most land plants. PCR amplifications of the DNA were performed in a 9700 Applied Biosystems® thermal cycler. PCR products were checked using a 1% agarose gel electrophoresis and ultraviolet detection by spectrophotometer and purified with the Exonuclease I and Shrimp Alkaline Phosphatase (SAP). Sequencing of the PCR products was performed using both the forward and reverse primers in PCR amplification and the BigDye Terminator 1.1 kit. After purification, the cycle sequencing products were detected by an Applied Biosystems® 3130 Genetic Analyser with Data Collection and Sequencing Analysis software. Sequences were assembled and evaluated with the SeqScape® software and were compared to those present in on-line databanks (Genbank® and Barcode Of Life Data Systems (BOLD) v3). Further analysis, including phylogenetic trees, was performed on Mega 6 software.

The kingdom Plantae is a very complex universe. Forensic botany is taking its earliest yet very important steps and its development in Brazil is even more recent than in other countries. The first experiences of a Brazilian forensic DNA laboratory with forensic botany are reported here; three cases regarding this matter are described along with their key points. Finally, an interesting point regarding the DNA extracting method is discussed. Plant DNA barcoding may fit well in the automated technology already available at many forensic laboratories. Adding plant DNA testing may be easier based on past experience with implementing techniques for forensic human DNA.

Plant, DNA, Barcoding