Y15 Fingerprints and Ancestry: Is It All in the Details?

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Learning Overview: The goal of this presentation is to discuss the plausibility of using Galton features, specifically the types, locations, and number of minutiae, to determine a person's ancestry.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by creating a greater understanding of criminalistics, specifically as it relates to the viability of fingerprints left at a crime scene.

This concept of ancestry from fingerprint minutiae has been explored over the years by Sir Francis Galton, and more recently, Fournier and Ross.[1,2] Galton studied and compared the fingerprints of English pure Welsh, Hebrew, Negro, and some Basques from Cambo in the French Pyrenees to look for differences in patterns and minutiae characteristics[2]. His study had a sample size of more than 100 individuals. While his study did not yield significant scientific results, Fournier and Ross conducted a similar study with the purpose of exploring the influence of sex, ancestry, and pattern type on minutiae in African descendent and European descendent males and females.[1] Overall, 243 right index fingerprints were chosen to include 61 African American females and 61 African American males for a total 122 African Americans as well as 60 European American males and 61 European American females for a total of 121 European Americans. Based on this study, fingerprint minutiae, specifically the total number of bifurcations, show promise as a method to predict the ancestry of an individual to some degree of certainty.

Researchers at the University of Central Oklahoma have been conducting a study made up of 250 participants: 25 Hispanic descendant males, 25 Hispanic descendant females, 25 Asian descendant males, 25 Asian descendant females, 25 Native American descendant males, 25 Native American descendant females, 25 African descendant males, 25 African descendent females, 25 European descendent males, and 25 European descendent females. The sex and ancestry of each participant is ascertained based on self-identification and demographic information. In order to collect the prints, each participant had their right index finger rolled on a ten-print card using fingerprint ink. Each print shows a complete nail-to-nail roll to be recorded for later analysis of friction ridge detail. Because of the statistical likelihood that the right index finger is the print most often encountered at crime scenes, those prints were used for analysis. With the assistance of AFIX Tracker® technology, each print was analyzed and marked by the researcher for each of the five main fingerprint minutiae characteristics: bifurcations, enclosures, dots, ending ridges, and short ridges. It has been found that the amount of bifurcations in one's fingerprint yields significant results as relates to ancestry. Interestingly, it has been found that African American descendants have slightly more bifurcations than European American descendants.

Significant results in the above research yields new possibilities for law enforcement personnel. Deriving someone's ancestry from their fingerprints can serve as corroborative evidence that could aid in the conviction of criminals who could otherwise walk free. This presentation could greatly impact the forensic science community by shedding new light on innovative ways fingerprints can be used in the application of criminalistics to crime scenes.

Reference(s):

1. Fournier, N. and Ross, A. Sex, Ancestral, and Pattern Type Variation of Fingerprint Minutiae: A Forensic Perspective on Anthropological Dermatoglyphics. *American Journal of Physical Anthropology*. (2015).
2. Galton, S.F. *Finger prints.* London: Macmillan and Co. (1899).

Fingerprints, Minutiae, Ancestry