B167 Fingerprints and Ancestry: Is It in the Details?

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Learning Overview: This presentation will discuss the plausibility of using Galton features, specifically the certain types of Galton features to determine a person's ancestry.[1] Such research could aid law enforcement in shortening an otherwise lengthy suspect list or even aid in the exoneration of those wrongfully convicted.

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 and new tools that could be used to determine a fingerprint's origin.

Over the years, Sir Francis Galton, and more recently, Fornier and Ross have explored this concept of ancestry determined from fingerprint minutiae.[1,2] Galton studied and compared the fingerprints of English pure Welsh, Hebrew, Black, and some Basques from Cambo in the French Pyrenees to look for differences in patterns and minutiae characteristics.[1] His study had a sample size of more than 100 individuals. While his study did not yield significant scientific results, Galton claimed to be able to tell a difference in fingerprint minutiae between the different ancestries. 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.[2] Overall, 243 right index fingerprints were chosen, including 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, shows promise as a method to predict the ancestry of an individual to some degree of certainty.

Researchers at the University of Central Oklahoma conducted 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 America-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 was ascertained based on self-identification and demographic information. In order to collect the prints, each participant had their right index finger rolled on an index card using fingerprint ink. Each print shows a complete nail-to-nail roll 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 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 it 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 highlights 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. Additionally, this forensic tool could also aid in the exoneration of those wrongfully convicted. This presentation could greatly impact the forensic science community by shedding light on innovative ways that fingerprints can be used in the application of criminalistics to crime scenes.

Reference(s):

1. Galton, S.F. *Finger prints.* London: Macmillan and Co. (1899).
2. 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).

Fingerprints, Ancestry, Minutiae

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