



## FINGER PRINT AS A PERSONAL IDENTIFICATION TOOL IN FORENSIC SCIENCE

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### ABSTRACT

Forensic science deals with various streams of investigating techniques in anthropology among which personal identification techniques has a keen role in the human anthropology investigation. Personal identification can be done using finger print technique. Finger print is the oldest and important investigating tool in forensic science. Fingerprints have general characteristic ridge patterns that allow them to be systematically identified. Fingerprints are made of ridges on the skin on the hands. It is thought that they are formed during pregnancy in a mechanism involving how the blood flows over the skin of the unborn baby. The scientific study of fingerprints began in about 1900. The system is based on three main print patterns: Whorls (Spirals), arches and loops. A fingerprint sample is composed of grease and dried sweat left behind by the tips of the fingers. The palms of the hand also leave identifiable prints, as do the soles of the feet. Application of finger print is majorly important in forensic science while investigating cases. Thus, finger print technique has a large scope in development in forensic science.

**KEYWORDS** : Finger print, Science, Forensic, Skin, Identity.

### Introduction

Forensic is a science in which application of civil and criminal laws converge in order to investigate, evident and identify the true knowledge about any form of mal practices, criminal issues and death accidents. The term forensic comes from the Latin term forensis, meaning "of or before the forum". Forensic science deals with various streams of investigating techniques in anthropology among which personal identification techniques has a keen role in the human anthropology investigation, Personal identification is the process of establishing the identity of any individual whether living or dead. Individual identification is necessary when a person is alive and dead. Personal identification when related to forensic investigating cases it involves different evidencing techniques such as finger print and palm print, lip print and bite marks, foot print and shoe print, blood, saliva, semen and urine, DNA finger printing, bones and body parts, teeth, tattoos and body piercing, voice analysis, scars, surgery marks, handwriting and signature analysis, facial features, hair analysis and image analysis. Among the various techniques finger printing in the major and the first technique which help the investigator to identify the person involved in the crime. This paper deals with the finger print techniques and importance of finger printing in personal identification.

### Finger print

Finger print is one of the oldest and most important evidence categories in forensic sciences. The use of individual friction ridge skin patterns on the end joint of fingers is centuries old. Finger print match is widely accepted as certain evidence of a particular person. In forensic science, fingerprints are used to locate, identify and eliminate suspects in a criminal case. Finger prints can also be used in identification of human remains (Pillay, 2009). Fingerprints are one of many biometric identifiers- such as retina or iris patterns, voice recognition or face thermography. (Bharadwaja et al., 2004)

A fingerprint is the impression made by the papillary ridges on the ends of the fingers and thumbs. Fingerprints afford an infallible means of personal identification, because the ridge arrangement on every finger of every human being is unique and does not alter with growth or age. Any ridged area of the hand or foot may be used as identification. (Sharma et al., 2008). Finger impressions are preferred to those from other parts of the body because they can be taken with a minimum of time and effort. Each ridge of the epidermis

(outer skin) is dotted with sweat pores for its entire length and is anchored to the dermis (inner skin) by a double row of peglike protuberances, or papillae. Injuries such as superficial burns, abrasions, or cuts do not affect the ridge structure or alter the dermal papillae, and the original pattern is duplicated in any new skin that grows (Adebisi, 2009). An injury that destroys the dermal papillae, however, will permanently obliterate the ridges.

According to Anne (2017), fingerprints follow 3 fundamental principles:

- A fingerprint is an individual characteristic; no two people have been found with the exact same fingerprint pattern.
- A fingerprint pattern will remain unchanged for the life of an individual; however, the print itself may change due to permanent scars and skin diseases.
- Fingerprints have general characteristic ridge patterns that allow them to be systematically identified.

Three basic patterns are classified by Rastogi and Keerthi (2010) described arches, loops and whorls in fingerprint. Arches can be plain or tented, loops are radial and ulnar, depending on whether direction of slope of pattern is towards inner arm bone (radius) or outer arm bone (ulna). Whorls- most complex and contain central pocket, double loop, and accidental. Loops constitute about 65 percent of the total fingerprint patterns; whorls make up about 30 percent arches and tented arches together account for the other 5 percent.

### History of Fingerprinting

Picture writing of a hand with ridge patterns was discovered in Nova Scotia. In ancient Babylon, fingerprints were used on clay tablets for business transactions. In ancient China, thumb prints were found on clay seals. In 14th century Persia, various official government papers had fingerprints (impressions), and one government official, a doctor, observed that no two fingerprints were exactly alike. In earlier civilizations, branding and even maiming were used to mark the criminal for what he was. The thief was deprived of the hand which committed the thievery.

Early anatomists described the ridges of the fingers. But interest in modern fingerprint identification dates from 1880, when the British scientific journal Nature published letters describing the uniqueness and permanence of fingerprints. Their observations

were experimentally verified by the English scientist Sir Francis Galton, who suggested the first elementary system for classifying fingerprints based on grouping the patterns into arches, loops, and whorls.

The Galton-Henry system of fingerprint classification, published in June 1900, was officially introduced at Scotland Yard in 1901. It quickly became the basis for its criminal-identification records. The system was adopted immediately by law-enforcement agencies in the English-speaking countries of the world and is now the most widely used method of fingerprint classification.

### **Fingerprint Classification**

Fingerprints are classified in a three-way process: by the shapes and contours of individual patterns, by noting the finger positions of the pattern types, by relative size, determined by counting the ridges in loops and by tracing the ridges in whorls (Brian, 2002).

### **Dactyloscopy:**

Technique of fingerprinting, involves cleaning the fingers in benzene or ether, drying them, then rolling the balls of each over a glass surface coated with printer's ink. Each finger is then carefully rolled on prepared cards according to an exact technique designed to obtain a light gray impression with clear spaces showing between each ridge so that the ridges may be counted and traced. Simultaneous impressions are also taken of all fingers and thumbs.

### **Latent Fingerprinting:**

This involves locating, preserving, and identifying impressions left by a suspect in the course of committing a crime. In latent fingerprints, the ridge structure is reproduced not in ink on a record card but on an object in sweat, oily secretions, or other substances naturally present on the suspect's fingers. Most latent prints are colourless and must therefore be "developed," or made visible, before they can be preserved and compared. This is done by brushing them with various gray or black powders containing chalk or lampblack combined with other agents. The latent impressions are preserved as evidence either by photography or by lifting powdered prints on the adhesive surfaces of tape.

### **There are actually three kinds of CRIME-SCENE prints. These are:**

1. VISIBLE PRINTS which are prints made by fingers touching a surface after the ridges have been in contact with a colored material such as blood, paint, grease, or ink.
2. PLASTIC PRINTS which are ridge impressions left on a soft material such as putty, wax, soap, or dust.
3. True LATENT PRINTS which are invisible print impressions caused by the perspiration on the ridges of one's skin coming in contact with a surface and making an invisible impression on it. Perspiration contains water, salt, amino acids, or oils and easily allows impressions to be made.

### **The most common techniques used to find latent or hidden fingerprints**

1. Dusting with Carbon Powder on white or light colored surfaces.
2. Dusting with Lanconide Powder for black surfaces.
3. Dusting with Aluminum Powder for hard or dark colored surfaces as well as mirrors and metal surfaces.
4. Use of Cyanoacrylate (Super-glue) fuming.
5. Use of Iodine fuming techniques.
6. Use of ninhydrin.
7. Use of Silver Nitrate.
8. Use of Gentian violet.
9. Use of Laser technology.

### **Tools of finger prints:**

A number of portable fingerprint scanners were developed mainly by computer companies to provide a secure access for the users. In 1998, Compaq was the first to have a print reader attached to the computer. Some companies, police offices, and high-security

government buildings require fingerprint identification for access to the building or its selected parts.

In order to protect sensitive data, some businesses and the military often use scanners that are attached to computers (the U-Match mouse, for example) or installed in keyboards. These provide either immediate identification for access to the terminal or remote identification for access to secure documents or archives.

New scanner trials are on the way to provide the same protection for e-commerce and Internet banking in order to secure transactions. In order to combat cell phone thefts, the industry is considering equipping phones with fingerprint readers. Five U.S. airports, including Chicago's O'Hare have installed finger-print scanners to check employees' backgrounds. Some banks use fingerprint scans before a check is cashed. Similarly, government agencies sometimes utilize fingerprint scans to ensure that payments are given to the proper recipients.

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