PRINCIPLES OF FINGERPRINT SCIENCE

CONTENTS

Introduction

Principles of Fingerprints form the basis for adoption of FP Science for identification

FP Expert equipped with scientific information can accurately and concisely communicate the principles of FP identification

What is fingerprint ?

The palmar surface of the hands, fingers and the sole of the feet including toes is covered with a special kind of skin called ‘friction ridge skin’.

The skin’s peculiarity lies in it being formed of minute ridges which are raised lines having the mechanical function of helping to prevent slipping, when in contact with smooth external objects

Friction ridge

Each individual possesses a unique set of minute raised ridges on volar pads called ‘friction ridge skin’. These clear and apparent unique outlines of the ridges are called fingerprints.

A fingerprint is highly individualistic and forms the basis for personal identification in forensic examinations.

Structure of Friction Skin

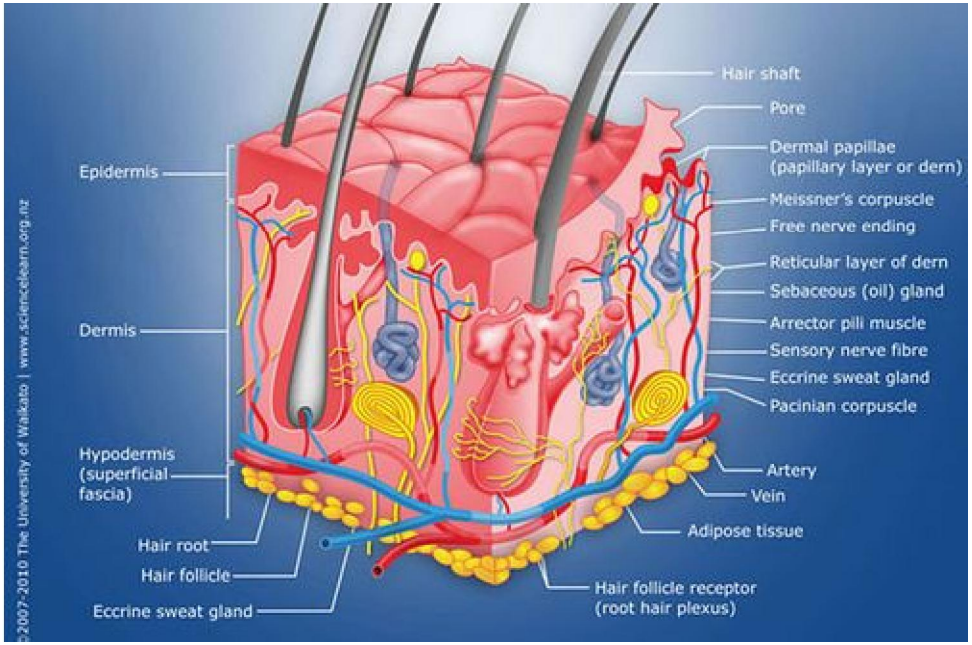
Composed of two basic layers:

Outer epidermis

Inner dermis .

The epidermis and dermis are separated by a basement membrane

Diagrammatic 3-dimensional representation of skin structure



Structure of Friction Skin

Sweat Glands

Present in the dermal region of the skin

Sweat pores on the surface run in single rows along the ridges and communicate through the sweat ducts with coiled sweat glands.

Sweat contains 98.5 % to 99.5 % water and 0.5 % to 1.5 % solids – chiefly salt, urea, acids etc.

Friction Ridges

The ridges are first visible in the fourth month of foetal life and are fully formed by the sixth.

According to Dr. Harold Cummins, in embryo, ridges differentiate earlier in the hand than in the feet. Ridges appear on the digits before they are found on the palm or sole.

Friction Ridges

Ridges are characterized by numerous minute peculiarities called ‘minutiae’, here dividing into two and there meeting with one another or dividing and almost immediately reuniting enclosing a small circular or elliptical space etc. These peculiarities are known as Galton details.

Two fundamental principles of FingerPrints

The Principle of Permanence

The Principle of Individuality

PERMANENCY

The Principle of Permanence

Key to understanding this feature lies within the structure of the skin

The principal structural elements of skin allow for the permanence of friction ridge detail

INDIVIDUALITY

The Principle of Individuality

Individuality of friction ridge skin is biological uniqueness.

The individual traits are programmed by nature in DNA which provides a blueprint for assembling proteins and directs cellular functions leading to infinite variety which is impossible to duplicate.

Personal Identification

The above discussed principles of fingerprints form the basis for personal identification in forensic examinations.

One of the most valuable suggestions offered by Dr. H.Faulds was that FPs found at the scene of crime might serve to identify the criminal.

Wrap up

The two basic premises - persistency and individuality of the friction skin, have been scientifically validated over time through academic research and the work of experts in the field of fingerprints.