

ch 16 - Fingerprints

1. History of Fingerprinting

A. Alphonse Bertillon (1883) - system relied on:

- (1) portrait parlé - verbal description of a perpetrator's physical characteristics & dress - provided by eyewitness
- (2) anthropometry - 11 measurements of human anatomy including height, reach, width of head, & length of left foot
(a) thought to remain constant from 20 yrs on up.
- (3) considered most accurate system for more than 20 years

B. Early Use of Fingerprints

- (1) Chinese used thumb to sign legal documents up to 3000 yrs ago
- (2) William Herschel, ^{an} civil servant in India, required natives to sign contracts w/ an imprint of their right hand.
(before Bertillon)
- (3) 1880 - Henry Fauld suggested fingerprint ridge patterns could id criminals.

C. Early Classification of Fingerprints

- (1) 1892 - Francis Galton - published textbook, Fingerprints
 - (a) anatomy of a print
 - (b) methods for recording prints
 - (c) 3 types of prints: loops, whorls, & arches
 - * (d) showed no 2 prints are identical & one's prints do not change
- (2) 1897 - Sir Edward Richard Henry - developed a classification system for prints
- (3) 1901 - 1st systematic & official use for personal id adopted by the NYC Civil Service Commission - to certify civil service applicants
- (4) 1904 - fingerprinting began to be used in all major cities in the US
- (5) 1924 - print records from Bureau of Investigation & Leavenworth merged to form the id. records of the FBI
- (6) 1999 - United States v. Byron C. Mitchell - challenged the admissibility of fingerprint evidence. Defense argued that they couldn't be proven unique under Daubert guidelines. Was vigorously disputed by govt. experts. Judge upheld the admissibility as sci. evidence & ruled
 - (1) human friction ridges are unique & permanent
 - (2) human friction ridge skin arrangements are unique & permanent

2. Fundamental Principles of Fingerprints

A. 1st principle: a fingerprint is an individual characteristic; no two fingers have yet been found to possess identical ridge characteristics

- (1) FBI has nearly 50 million fingerprint records; no 2 are identical!
- (2) probability of 2 of people have an identical print is extremely low

(3) ridge characteristics (minutiae) - ridge endings, bifurcations, enclosures, & other details, which must match in 2 fingerprints in order for their common origin to be established.

see picture #1 & 2

- (a) ~150 individual ridge characteristics can be used by experts
- (b) 8-16 are normally sufficient for experts

B. 2nd principle: a fingerprint remains unchanged during an individual's lifetime

see picture #3

(1) fingerprints are a reproduction of friction skin ridges - found on the palm side of fingers & thumbs, palms, & soles of feet

- (a) designed by nature to help grip things

(2) composition of skin

(a) epidermis - outer portion of skin

(b) dermis - inner portion of skin

(c) dermal papillae - b/w epidermis & dermis - shape of this boundary of cells determines the form & pattern of skin ridges

↳ each ridge has a single row of pores that are openings of sweat gland ducts - Perspiration comes from these!

(3) can fingerprints be changed? NO!

(a) an injury that reaches 1-2mm beneath the skin's surface & reaches the dermal papillae can damage them, leaving scars but it's almost impossible to obliterate all the ridge characteristics on a hand. & a scar is a new individual characteristic for id.

(b) John Dillinger - tried to destroy his prints by applying corrosive acid. But prints taken at the morgue after he was shot were comparable to those taken before he used the acid. 14 matching characteristics

see picture #4

C. 3rd principle: fingerprints have general ridge patterns that permit them to be classified.

(1) classes (based on general pattern)

(a) loops -

(i) 65% of population




(ii) have 1 or more ridges entering from one side, recurving, & exiting from the same side

- ulnar loop - opens toward little finger
- radial loop - opens toward thumb

(b) whorls

(i) 30-35% of population



(ii) rounded or circular ridges

- plain whorl 
- central pocket loop  > have at least 1 ridge that completes a loop
- double loop 
- accidental - contains 2 or more patterns (except plain arch)

(c) arches

(i) 5% of population

(ii) ridge lines enter from one side & exit from the other

- plain arch 
- tented arch 

D. The ACE-V Process - 4 step process to identify & individualize a print

(1) Analysis - id distortions associated w/ friction ridges, as well as an external factors (surface or deposition factors or processing techniques) that may impact the print's appearance

(2) Comparison - compare questioned print to known print on 3 levels

(a) Level 1 - general ridge flow & pattern configuration

(b) Level 2 - locating & comparing ridge characteristics

(c) Level 3 - examining & locating ridge pores, breaks, creases, scars, & other permanent minutiae

(3) Evaluation - requires 1 of 3 decisions to be determined

(a) identification - prints are the same

(b) exclusion - not from same source

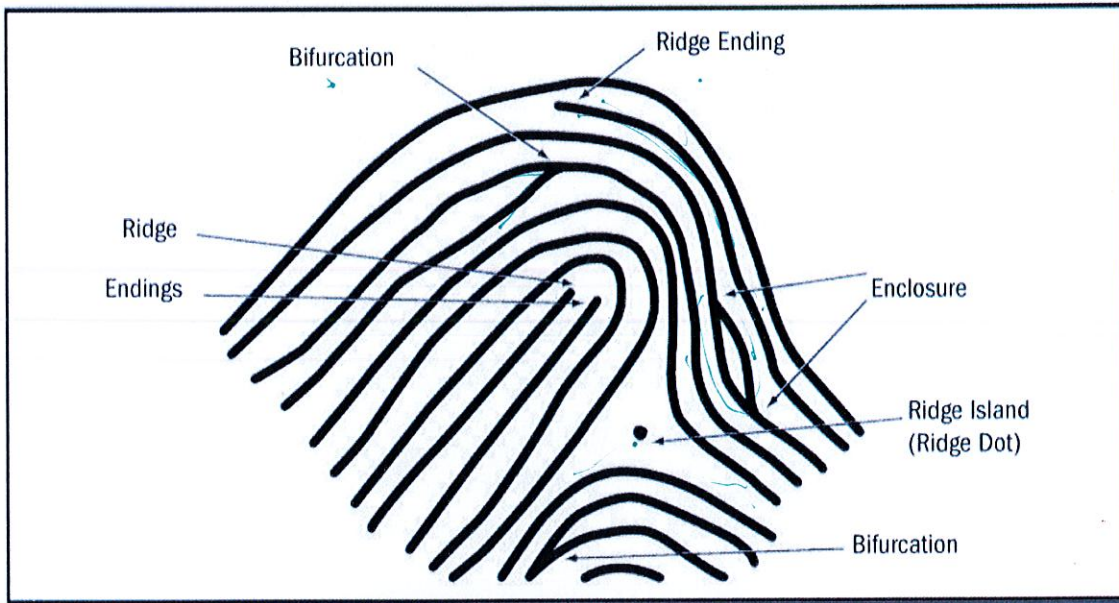
(c) inconclusive - can't sufficiently be determined

(4) Verification - independent exam by a 2nd person.

see picture #5

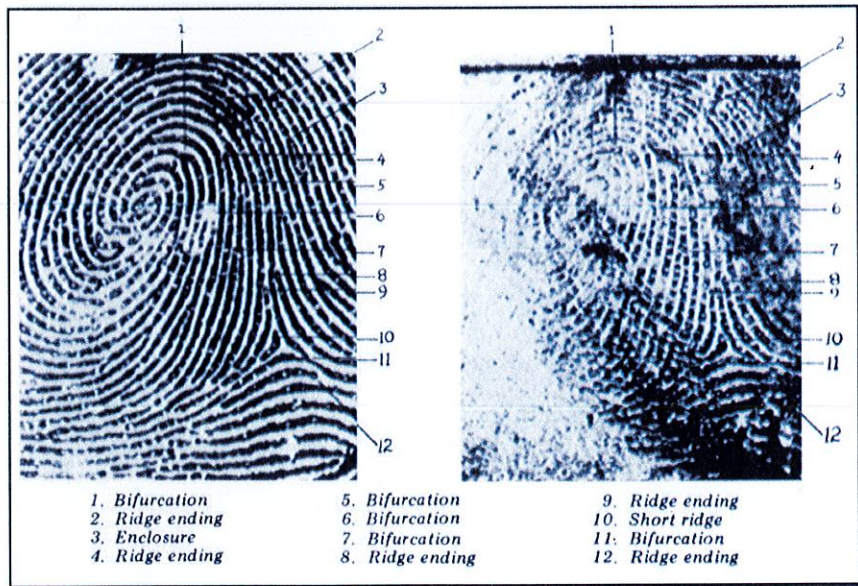
can individualize a print

#1



#2

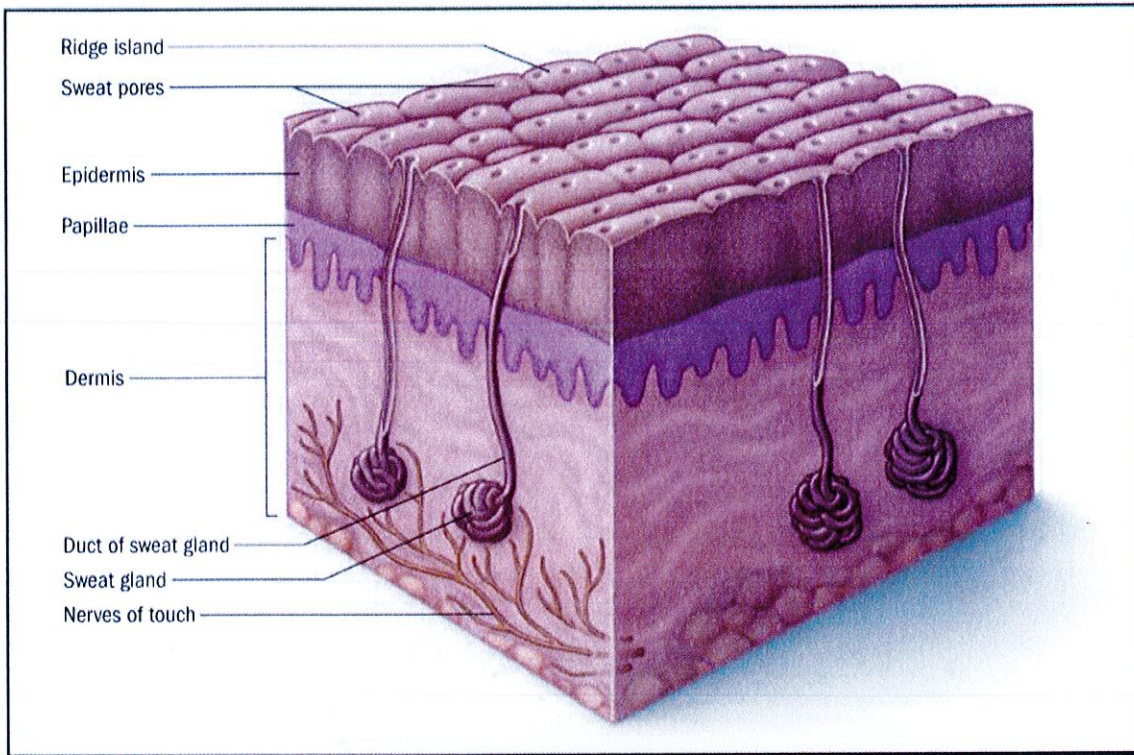
FIGURE 16-4
A fingerprint exhibit illustrating the matching ridge characteristics between the crime-scene print and an inked impression of one of the suspect's fingers.



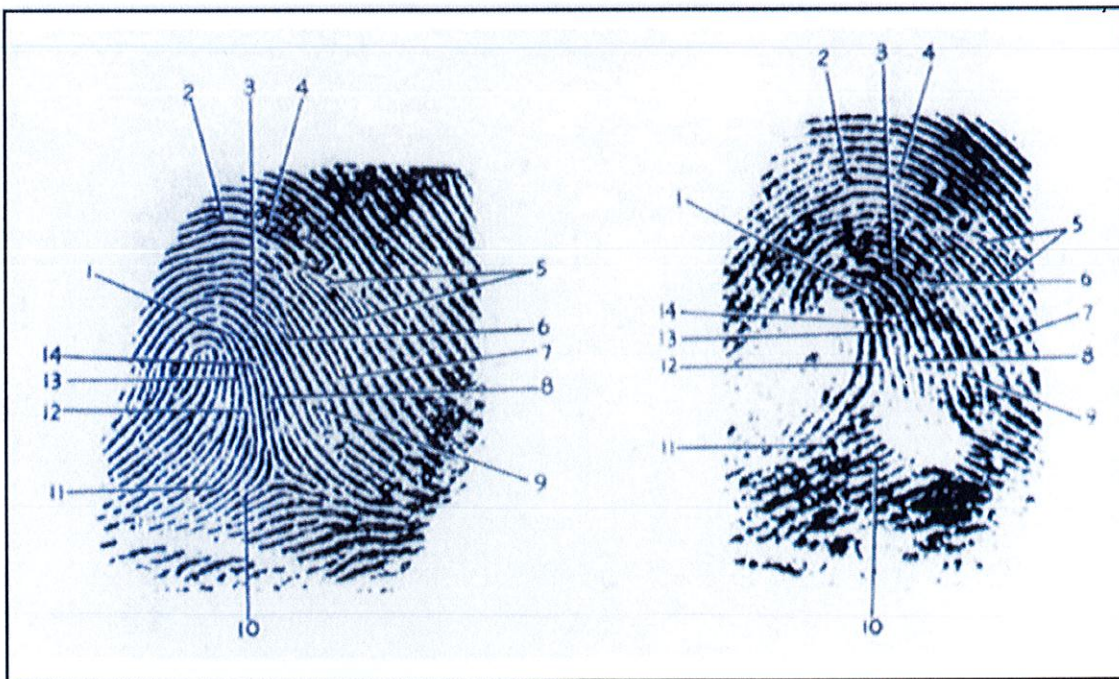
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#3

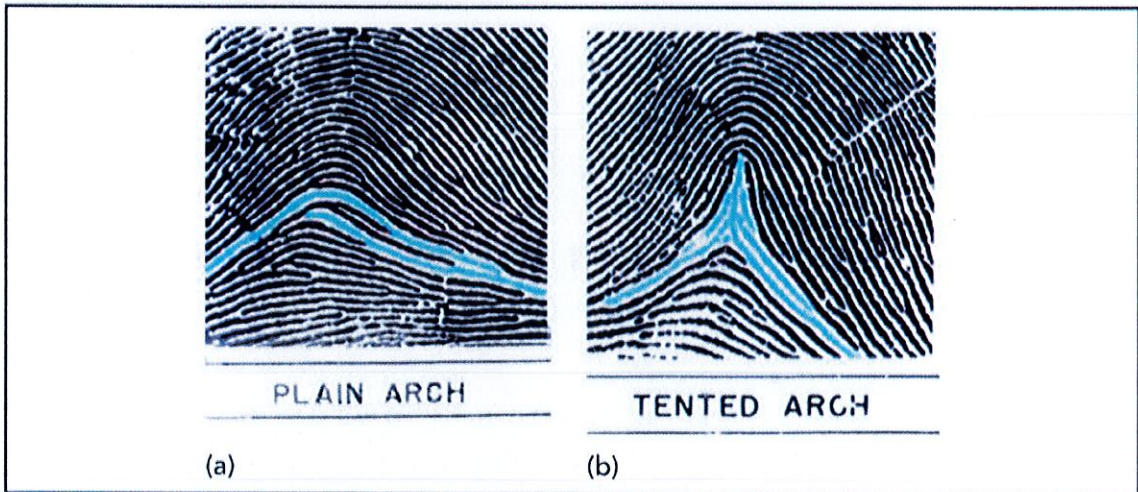
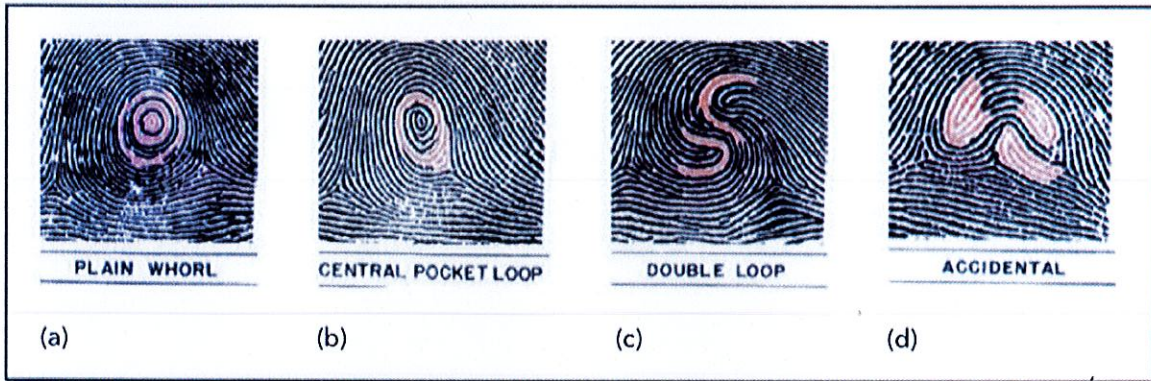
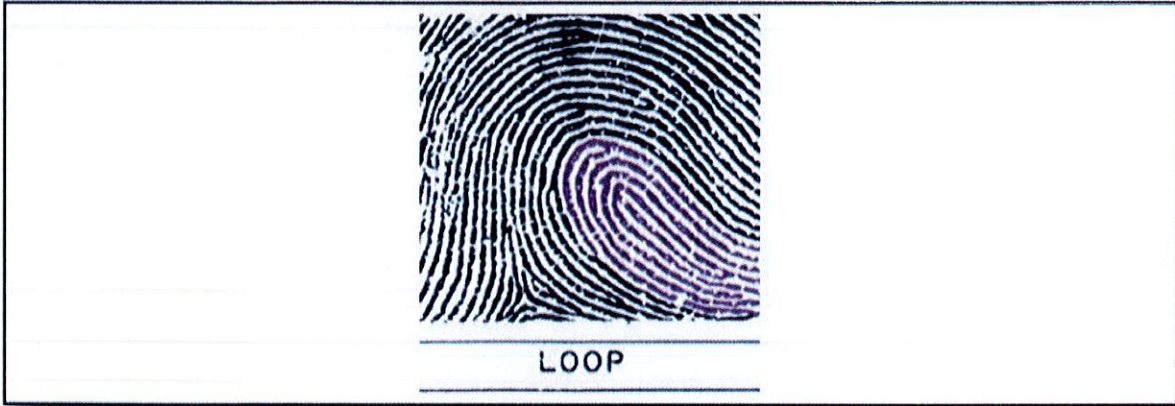


#4



John D.
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#5



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