

HISTORY OF FINGERPRINTING (#1)

- NOVA SCOTIA PRE-HISTORIC HAND WITH RIDGE PATTERNS
- **14TH CENTURY PERSIA SEAL OFFICIAL GOVERNMENT PAPERS**
- HISTORY OF **PEOPLE WHO MADE PROGRESS IN FINGERPRINTS:**
 - MALPIGHI – 1686 – STUDIED RIDGES WITH **MICROSCOPE**
 - PURKINJE – 1823 – **CLASSIFICATION SYSTEM**
 - HERSCHEL – 1858 – **CONTRACTS SEEN AS “MORE BINDING”**
 - **BEGAN TO SEE POTENTIAL USE AS IDENTIFICATION**
 - **FAULDS – 1880 – CREDITED WITH FIRST IDENTIFICATION**
 - **ALSO CLASSIFIED PRINTS**
 - **THOMPSON – 1882 – FIRST AMERICAN TO USE PRINTS FOR I.D.**
 - MARK TWAIN – 1883 – FINGERPRINTS AS I.D. IN **TWO BOOKS**
 - GALTON – 1892 – COUSIN OF CHARLES DARWIN
 - **GALTON – 1892 – PROVED PRINTS WERE INDIVIDUAL AND PERMANENT**
 - **STUDIED PRINTS AS A MEANS OF I.D.**
 - **DEFINED BASIC CHARACTERISTICS TO CLASSIFY**
 - **GALTON’S DETAILS STILL IN USE TODAY**
 - VUCETICH -1892 – **POLICEMAN STARTED FINGERPRINT FILES**
 - **1892 VUCETICH MADE FIRST CRIMINAL FINGERPRINT I.D.**
 - **MURDER – BLOODY FINGERPRINTS**
 - **HENRY SYSTEM – 1891 – SIR RICHARD HENRY CLASSIFICATION SYSTEM**
 - **ENGLAND**
- **FIRST USES IN UNITED STATES – 1902-1903**
 - **NEW YORK CIVIL SERVICE JOB APPLICANTS 1902**
 - **NEW YORK STATE PRISON SYSTEM 1903**
- **LEAVENWORTH FINGERPRINT BUREAU – 1904**
 - **HELPED POLICE EXCHANGE FINGERPRINTS**
- **MILITARY USE – STARTED 1905 WITH THE U.S. ARMY**
- **FBI STARTED USING IN 1924**
 - **FBI BEGAN EXCHANGING WITH OTHER COUNTRIES IN 1932**
- **FIRST ‘LATENT’ (INVISIBLE)PRINT TAKEN FROM HUMAN SKIN 1979**
 - **MIAMI MURDER CASE IN 1979**
- **INTEGRATED AUTOMATED FINGERPRINT I.D. SYSTEM – 1999**
 - **IAFIS BUILT IN 1999**
 - **WHAT TOOK 40 DAYS CAN NOW BE DONE IN UNDER 2 HOURS**

CIVIL VS. CRIMINAL IDENTIFICATION (#1)

- IDENTIFYING PARTIES WHO COMMIT CRIMES = **CRIMINAL IDENTIFICATION**
 - MURDER
 - THEFT
 - OTHER CRIMES
- IDENTIFICATION INVOLVING THE GENERAL PUBLIC = **CIVIL IDENTIFICATION**
 - **MISSING PERSONS**
 - **AMNESIA** VICTIMS
 - ONE TIME A GUY CALLED THE POLICE AND **DIDN'T KNOW WHO HE WAS**
 - THEY FOUND HIS PRINTS FROM HIS NAVY RECORDS AND GOT HIM BACK WITH HIS FAMILY
 - HE HAD AMNESIA
 - CASUALTIES OF **WAR**
 - **DATABASE** FOR CHILDREN IN CASE THEY GET LOST OR HURT
 - **APPLICATION** FOR MILITARY, GUN PERMITS, SOME JOBS...
 - PEOPLE **KILLED** IN CATASTROPHES
 - EXPLOSIONS
 - FIRES
 - AIRPLANE CRASHES
 - EPIDEMICS
 - FLOODS
 - HURRICANES ← KATRINA
 - EARTHQUAKES ← HAITI

AUTOMATED FINGERPRINT I.D. SYSTEMS VS. BIOMETRIC (#2)

- **AUTOMATED** FINGERPRINT IDENTIFICATION SYSTEMS – **AFIS**
 - USED BY **POLICE** (AND GOVERNMENT)
 - COMPUTER SYSTEMS THAT **ANALYZE PRINTS TO POSITIVELY I.D. PEOPLE FROM ALL RECORDS**
 - THOUSANDS OF COMPARISONS PER SECOND CAN BE MADE WITH COMPUTERS
 - BEFORE **AFIS**, POLICE HAD TO USE COMPLICATED CLASSIFICATION SYSTEMS
- **BIOMETRIC** FINGERPRINT SYSTEMS
 - **CONTROL ACCESS TO A BUILDING OR COMPUTER SYSTEM**
 - BUILDINGS
 - BANKS
 - OTHER BUSINESSES
 - MILITARY
 - GOVERNMENT BUILDINGS
 - AIRPORTS
 - COMPUTER ROOMS
 - SYSTEM COMPARES PRINT **TO PRE-AUTHORIZED FINGERPRINTS**
 - BIOMETRIC MEANS 'LIFE MEASURING'

SURFACES OF THE BODY WHERE PAPILLARY RIDGES ARE FOUND (#3)

- **FRICION SKIN**
 - FINGERS
 - PALMS
 - TOES
 - SOLES OF YOUR FEET
 - FRICTION SKIN HELPS **AVOID SLIPPING**
 - HELPS NOT DROP SMOOTH THINGS
 - OR FALL ON SLIPPERY SURFACES
- WHEN YOU TRANSFER DIRT, OIL, INK, OR OTHER STUFF FROM FRICTION RIDGES TO A SMOOTH SURFACE, **YOU MAKE FINGERPRINTS**
- FRICTION SKIN IS LIKE **CORRUGATED CARDBOARD**
 - EXAMPLE – FRICTION SKIN RESEMBLES THE RIDGES OF CORRUGATED CARDBOARD
 - PEEL AWAY THE PAPER COVERING FROM A PIECE OF CORRUGATED CARDBOARD TO SEE RIDGES
- FRICTION SKIN IS ALSO KNOWN AS **PAPILLARY RIDGES**
- THREE LAYERS OF SKIN:
 - 1) EPIDERMIS ← OUTSIDE SKIN
 - “YOUR EPIDERMIS IS SHOWING” HA-HA!
 - 2) **DERMIS ← LAYER UNDERNEATH**
 - MUCH THICKER THAN EPIDERMIS (15-40X)
 - **SURFACE OF DERMIS HAS MANY TINY PEGS OR PAPILLAE**
 - PAPILLAE HELP DERMIS AND EPIDERMIS **STICK TOGETHER**
 - FRICTION RIDGES ARE **MADE UP OF PAPILLARY RIDGES**
 - 3) SUBCUTANEOUS TISSUE ← WAY DOWN

TWO BASIC PRINCIPALS OF FINGERPRINT SCIENCE (#3)

- **PERMANENCE**
 - FINGERPRINTS NEVER CHANGE
 - THEY GROW WITH YOUR FINGER BUT THEY **DO NOT CHANGE!**
- **INDIVIDUALITY**
 - NO TWO FINGERPRINTS ARE ALIKE
 - IN OVER 100 YEARS OF FINGERPRINT STUDY, LOOKING AT BILLIONS OF FINGERPRINTS, **NEVER BEEN TWO IDENTICAL**
 - RIDGES ON HANDS AND FEET HAVE **DISTINCTIVE DETAILS**
 - **EVEN IDENTICAL TWINS HAVE DIFFERENT FINGERPRINTS!**

WHAT IT TAKES FOR A POSITIVE FINGERPRINT I.D. (#3)

- **POSITIVE IDENTIFICATION**
 - FRICTION-RIDGE DETAILS FROM TWO IMPRESSIONS **MUST MATCH EXACTLY WITHOUT ANY UN-EXPLAINABLE DIFFERENCES**
 - HUMAN SKIN IS FLEXIBLE AND PEOPLE MOVE
 - EXPERTS STUDY THE CAUSES OF VARIATIONS TO EXPLAIN NORMAL DIFFERENCES
 - VERSUS UN-EXPLAINABLE DIFFERENCES THAT MEAN THERE IS NOT A POSITIVE MATCH
 - **POSITIVE I.D. CAN BE FROM ONLY ONE FINGERPRINT OR EVEN A PART OF ONE!**

- **NO MINIMUM** AMOUNT OF AREA OR NUMBER OF FEATURE POINTS IS REQUIRED
 - OFTEN AN AREA THE SIZE OF THE TIP OF A **PENCIL ERASER** IS ALL THAT IS NEEDED FO POSITIVE I.D.
 - WITH A POOR QUALITY PRINT, A LARGER AREA IS NEEDED

MAKE A CLEAR SET OF PRINTS (#4)

- **USING LIFTING TAPE**
 - PENCIL
 - TAPE
 - DRAW RECTANGLE
 - COLOR IT IN WITH PENCIL
 - RUB THUMB OR FINGER IN PENCIL AREA
 - APPLY TAPE TO FINGER OR THUMB (TO THE FIRST JOINT)
 - PEEL TAPE OFF
 - STICK TAPE ON PAPER
 - WRITE WHICH FINGER THAT CAME FROM
 - RIGHT, LEFT
 - THUMB, INDEX, MIDDLE, RING, PINKY
 - USE WIPEY TO CLEAN UP
-
- **USING FINGERPRINT CARDS**
 - INK, 8"X8" I.D. CARD
 - ROLLED IMPRESSIONS
 - PLAIN IMPRESSIONS
 - USE WIPEY TO CLEAN UP
-
- **FINISHING THE CARDS**
 - NAME
 - AGE
 - DATE OF BIRTH
 - MALE OR FEMALE
 - OTHER IDENTIFYING INFO...

THREE BASIC TYPES OF FINGERPRINT PATTERNS (AND SUB-CATEGORIES) (#5)

- **LOOPS** – MOST COMMON – **65%** OF ALL FINGERPRINT PATTERNS
 - RADIAL LOOP – START AND END ON THE OUTSIDE OF YOUR THUMB
 - THE RADIUS IS YOUR ARM BONE ON THE INSIDE OF YOUR ARM
 - ULNAR LOOP
 - THE ULNA IS THE ARM BONE ON THE OUTSIDE OF YOUR ARM

- **ARCHES** – LEAST COMMON – ONLY **5%**
 - PLAIN ARCH – SLIGHT RISE OR WAVE IN THE CENTER
 - TENTED ARCH – RIDGES AT THE CENTER MAKE A MORE DEFINITE UP-THRUST

- **WHORLS** – **30%** OF ALL FINGERPRINT PATTERNS
 - **PLAIN WHORL** – RIDGES MAKE A COMPLETE CIRCUIT (A CIRCLE!)
 - TWO DELTAS
 - **CENTRAL POCKET LOOP** – LIKE A PLAIN WHIRL
 - BUT HAS AN OBSTRUCTION THAT APPEARS AT RIGHT ANGLES TO THE DIRECTION OF THE PATTERN
 - ALSO TWO DELTAS
 - **DOUBLE LOOP** – TWO SEPARATE LOOPS THAT LOOK LIKE A YIN/YANG
 - **ACCIDENTAL WHORL** – TWO OR MORE PATTERNS WITH TWO OR MORE DELTAS
 - **DELTA**
 - LOOKS LIKE THE DELTA AT THE END OF A RIVER (SO LIKE A “Y”)

THREE BASIC TYPES OF FINGERPRINT PATTERNS (AND SUB-CATEGORIES) (#5)

1) LOOPS MOST COMMON – **65%** OF ALL FINGERPRINT PATTERNS



LOOP



LOOP

2) ARCHES LEAST

COMMON – ONLY **5%**



PLAIN ARCH



TENTED ARCH

...THREE BASIC FINGERPRINT PATTERNS; CONTINUED...

MORE DEFINITIVE UP-THRUST

3)

WHORLS 30%

OF ALL FINGERPRINT PATTERNS



PLAIN WHORL



CENTRAL POCKET LOOP



DOUBLE LOOP



ACCIDENTAL

“YIN/YANG”

LOOK AT YOUR OWN HAND (#5)

- **IDENTIFY** THE TYPES OF PATTERNS YOU SEE

OTHER STUFF ON FINGERPRINTS

- **LATENT PRINTS**
 - **VISIBLE**
 - LIKE IF YOU HAD PAINT ON YOUR FINGER AND PUT IT ON PAPER
 - **PLASTIC**
 - LIKE IF YOU PUT YOUR THUMB INTO A PILE OF CLAY
 - **LATENT**
 - HIDDEN OR INVISIBLE PRINTS LIKE ON A GLASS OR SKIN
- POLICE **“DUST” FOR PRINTS**
 - POWDER STICKS TO OILS FROM FINGER SKIN
 - TALCUM POWDER
 - GRAPHITE POWDER
 - FEATHER OR SOFT BRUSH
 - TAPE

- BLACK OR WHITE CONSTRUCTION PAPER BACKING

- WHEN YOU ARE BORN, YOUR FINGERPRINTS AND FOOTPRINTS GO ON **BIRTH CERTIFICATE**
 - AND YOUR MOM'S FINGERPRINT TOO!!!

- **FORENSIC SCIENTISTS** USE SCIENCE TO FIND CRIMES AND CRIMINALS

- **CRIMINALISTS** PIECE TOGETHER EVIDENCE TO SHOW IF AND HOW A CRIME OCCURRED