

DNA Station

1. Identify yourself! DNA (deoxyribonucleic acid) is the genetic material that identifies all of us as unique...unless you're an identical twin. Even between identical twins, fingerprints are unique. Research the three types of fingerprints that police and the FBI use to identify people (see Taking Legible Fingerprints). Which type do you have? Find out by using clear tape, a No. 2 pencil, two pieces of paper and a magnifying glass. Rub the pencil on a piece of paper until a dark smudge appears (this is graphite). Beginning with the little finger, rub it on the smudge until the fingertip is covered with graphite. Then place a small piece of tape over your fingertip. Press the tape down gently. Carefully remove the tape and stick it on a clean, white piece of paper. Record which finger it came from. Repeat the process for the other four fingers. Examine the prints closely. Based on the three types of fingerprints, which kind do you have?

AND

2. Forensic fruit files: Perform DNA extraction in your kitchen. (See Biotechnology in a Lunchbox) Why would you want to extract DNA from a fruit? Besides being a cool experiment, it could be useful for solving a crime scene in your refrigerator.

OR

3. Extract DNA from your own cheek. (see Wind your way around your own DNA)

Taking Legible Fingerprints



Section I. Introduction

The purpose of this program is to provide information regarding the nature of fingerprints and outline techniques for taking legible fingerprints.

Fingerprints can be recorded on a standard fingerprint card or digitally. Obtaining quality fingerprint impressions can be a matter of using proper techniques. Even though the methods of recording fingerprints may differ, the techniques for obtaining quality fingerprints are very similar.

Section II. Fingerprint Pattern Types

Fingerprints are the result of minute ridges and valleys found on the hand of every person. In the fingers and thumbs, these ridges form patterns of loops, whorls and arches.

Outline

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- III. Fingerprint Impression Types**
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- IV. Basic Fingerprinting Equipment**
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 - 2. Bandaged Fingers
 - 3. Scars
 - 4. Deformities
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 - 6. Extra Fingers
- VII. Quality Checklist**



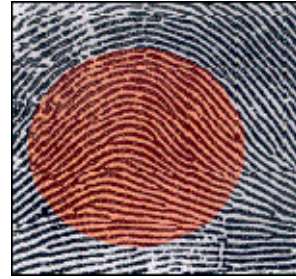
LOOP

In a loop pattern, the ridges enter from either side, re-curve and pass out or tend to pass out the same side they entered.



WHORL

In a whorl pattern the ridges are usually circular.



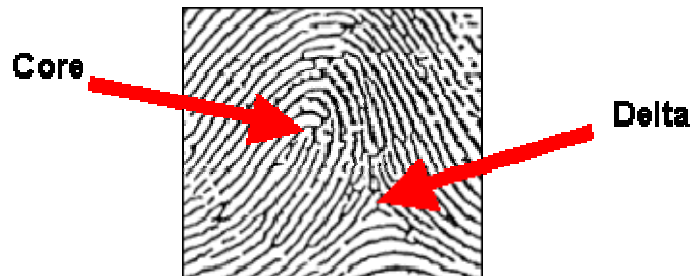
ARCH

In an arch pattern the ridges enter from one side, make a rise in the center and exit generally on the opposite side.

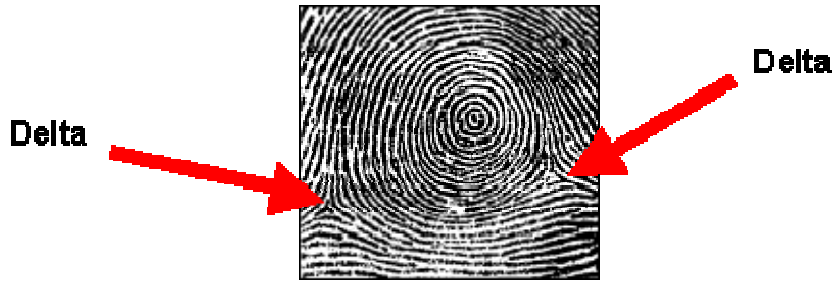


Each of the three pattern types have focal points which are used for classification.

In the **Loop** pattern there are two focal points: the **Core**, or the center of the loop, and the **Delta**. The **Delta** is the area of the pattern where there is a triangulation or a dividing of the ridges. When recording fingerprints, the delta and the area between the delta and the core must be completely recorded.



A **Whorl** pattern will have two or more deltas. For a whorl pattern, all deltas and the areas between them must be recorded.



The **Arch** pattern has no delta or core; but, it too, must be fully recorded so that its individual characteristics can be readily distinguished.



Section III. Fingerprint Impression Types

There are two types of impressions involved in taking fingerprints. The upper ten impressions are taken individually, thumb, index, middle, ring, and little fingers of each hand. These are referred to as the "rolled" impressions because the fingers are rolled from one side of the fingernail to the other, in order to obtain all available ridge detail.

The impressions at the bottom of the card are taken simultaneously without rolling, printing all of the fingers of each hand at a forty-five degree angle and then the thumbs. These are referred to as "plain," "slapped," or "flat" impressions. The plain impressions are used to verify the sequence and accuracy of the rolled impressions.



Section IV. Basic Fingerprint Equipment

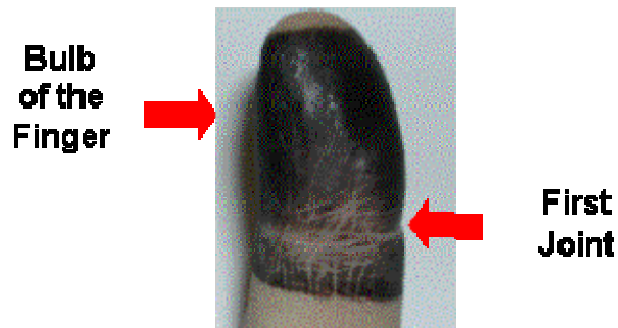
Fingerprints can be recorded with any of the following materials:

- Ink (Black Printers Ink or Porelon Pad) and Paper (Standard Fingerprint Card, FD-249 Criminal Card or FD-258 Applicant Card). A Porelon Pad contains a built-in ink supply.
- Chemicals and Paper (Standard Fingerprint Card)
- Livescan. For a list of FBI certified Live Scan and Card Scan devices see the FBI Certified Equipment List at www.fbi.gov.

Section V. Steps for Fingerprinting

The recommended height for the fingerprinting device (Card or Live-Scan) is approximately thirty-nine inches from the floor. This will allow the forearm of an average adult being fingerprinted to be parallel to the floor, at which position it is best to roll and record fingerprints. If the fingerprinting device is not at this height, care must be taken or the finger tends to rise off the device. If this happens, the technician will fail to capture the lower portion of the first joint and necessary ridge detail will be missing.

1. Fingers to be printed must be clean and dry. Wiping the individual's fingers with an alcohol swab and then drying them should prevent perspiration from being a problem. If the individual's occupation has caused a wearing down or rough surface on the fingers, use lotion to soften the fingers (be sure to wipe the lotion off before printing).
2. The individual being fingerprinted should be asked to stand in front of and at a forearm's length from the fingerprinting device. The individual should stand to the right and rear of the person taking the fingerprints.
3. Encourage the individual being fingerprinted to relax. Ask them to look at some distant object to distract them from what you are doing.
4. Grasp the individual's right hand at the base of the thumb with your right hand. Cup your hand over the individual's fingers, tucking under those fingers not being printed. Guide the finger being printed with your left hand.
5. If using the ink and paper method, roll the finger on the inking plate or Porelon Pad so that the entire fingerprint pattern area is evenly covered with ink. The ink should cover from one edge of the nail to the other and from the crease of the first joint to the tip of the finger. Using the right amount of ink is of vital importance. Too little ink and the impression will be too light. Too much ink and the fine details will run together.



6. In taking the rolled impression, the side of the bulb (see illustration above) of the finger is placed upon the paper fingerprint card or the fingerprinting device, and the finger is rolled to the other side until it faces the opposite direction. Care should be exercised so the bulb of each finger is rolled evenly from tip to below the first joint. Generally, the weight of the finger is all the pressure needed to clearly record the fingerprint.

7. In order to take advantage of the natural movement of the forearm, the hand should be rotated from the more difficult position to the easiest position. This requires that the thumbs be rolled toward and the fingers away from the center of the individual's body. This process relieves strain and leaves the fingers relaxed when rolling so that they may be lifted easily without danger of slipping which smudges and blurs the fingerprints.

8. Roll each finger from nail to nail in the appropriate space taking care to lift each finger up and away after rolling, to avoid smudging.

9. If using the ink and paper method and a rolled impression is not acceptable, you may use an adhesive re-tab to cover the fingerprint in its space. (No more than one re-tab per finger block is permitted.) For live scan, the image can be deleted and retaken.

10. Plain impressions are printed last, at the bottom of the card. The technician simultaneously presses the individual's four fingers (on the right hand), keeping the fingers together, on the surface of the fingerprint card or the fingerprinting device at a forty-five degree angle in order to capture all four fingers in the allotted space (see illustration). Repeat this process for the left hand. Print both thumbs simultaneously in the plain impression thumb blocks (to ensure that they are in the proper spaces).



Please Note: Never place a fingerprint impression on the back of a fingerprint card.

11. If using the ink and paper method, complete the information at the top of the fingerprint card (masthead). If using live scan, complete the required information.

Section VI. Special Situations

Special attention must be given when fingerprinting an individual with abnormalities of the fingers, thumbs or hands. Special situations include:

- Amputations
- Bandaged Fingers or Hands
- Scars
- Deformities
- Worn Fingerprints
- Extra Fingers
- Webbed Fingers

Amputations

An amputation exists when an individual has one or more fingers, thumbs or hands missing. This condition should be noted in the appropriate block of the fingerprint submission. Total amputation should be designated using the following notations:

- Amputation (AMP)
- XX
- Missing at Birth (MAB)



Please Note: The term "Missing," is **not** interpreted as amputation by the FBI.

Bandaged Fingers or Hands

If the individual has a bandage or cast on a finger, thumb or hand, place the notation, "Unable to Print" or "UP" in the appropriate finger block.

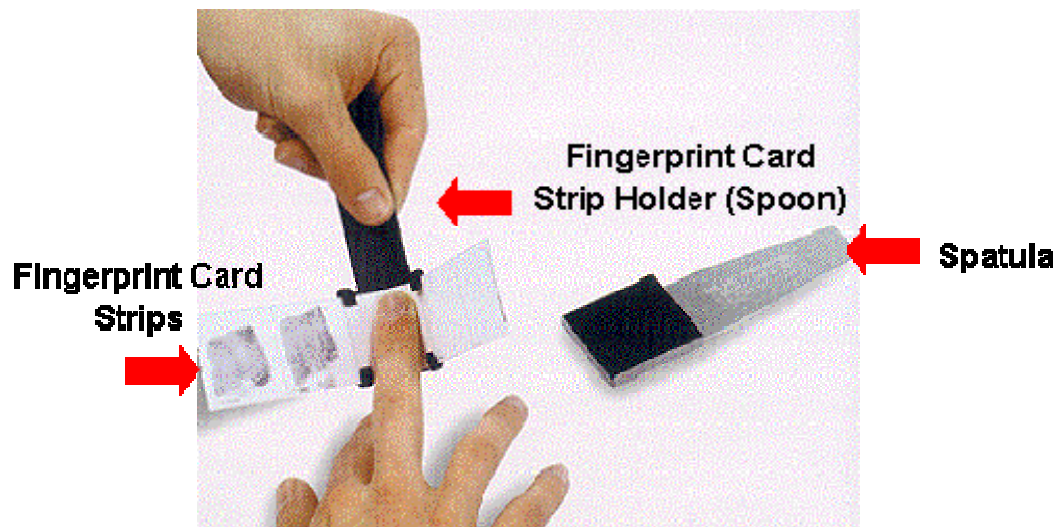
Scars

A scar exists when an individual has permanent tissue damage to finger, thumb or hand and when only pattern areas that have been totally destroyed or the ridge detail appears distorted. These fingerprints should be taken as they exist. The scars can be noted as "Scarred," but it is not required.

Deformities

A deformity may exist as a result of an injury, birth defect or disease. An attempt should be made to fingerprint the individual with the techniques outlined previously; although special equipment (e.g., a fingerprint spoon) may be needed when fingerprinting individuals with deformities. The equipment can be found in the "Postmortem Kit" and consists of:

- Black Printers Ink
- Spatula
- Fingerprint Card Strip Holder (Spoon)
- Fingerprint Card Strips



How to Use the Fingerprint Spoon

1. Place a fingerprint card strip in the fingerprint card strip holder (spoon).
2. Using the spatula, ink the finger (starting with the right hand) and be sure to apply ink from nail to nail.
3. Place the inked finger on the fingerprint card strip holder (curved area) and press down. **Do not** roll the finger. The curved shape of the holder will serve the same purpose as rolling the finger.
4. Cut out the finger block from the card strip and paste in the corresponding block on the standard fingerprint card.
5. Repeat these steps for each of the remaining fingers. Be sure to record the correct finger in the correct finger block.



Please Note: A strip of fingerprint re-tabs can be substituted for the fingerprint card strip

If utilizing Live-Scan equipment, the use of a Fingerprint Spoon is not an option. You may want to fingerprint the individual on a standard fingerprint card using either Black Printers Ink, Porelon Pad or the Chemical method so that a Fingerprint Spoon may be used. Then either scan the fingerprint card and submit electronically, or mail the card.

If Live-Scan is the only option, then the finger block(s) should be left empty with a notation of "Unable to Print" or "UP." However, the number of finger blocks without fingerprint images should be kept at a minimum (no more than five).

Worn Fingerprints

An individual may, by the nature of their work or age, have very thin or worn ridges in the pattern area. Light pressure and very little ink are used to record these types of fingerprint impressions. A technique known as "milking the fingers" can be used to raise the fingerprints prior to fingerprinting. The technique involves applying pressure or rubbing the fingers in a downward motion from palm to fingertip. In a situation of dry, flaky fingers, simply add a small amount of hand lotion or ridge builder prior to fingerprinting.

Extra Fingers

If an individual has more than ten fingers, the thumbs and the next four fingers should be printed. When a subject with more than ten fingers has an intentional amputation performed, it is invariably the extra finger on the little finger side that is amputated.



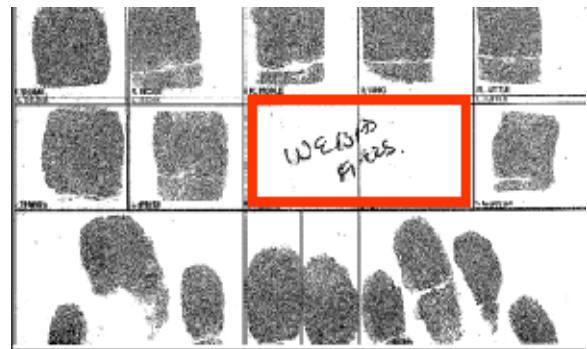
Webbed Fingers or Split Thumbs

An individual may have two or more fingers webbed or grown together, making it impossible to roll such fingers. Such fingers should be rolled as completely as possible, and a notation made to the effect that they are joined or "webbed."

Print if possible ...



...Or make a notation

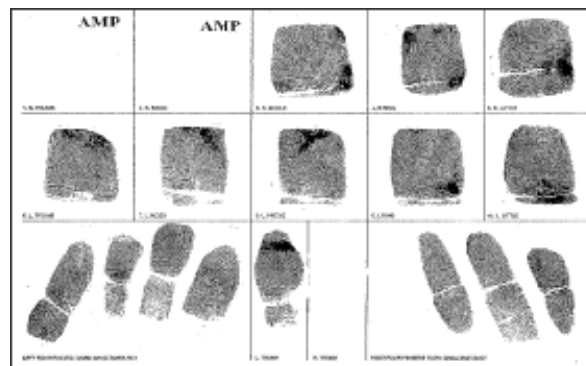


Section VII. Quality Checklist

To verify that the fingerprint impressions meet the FBI's requirements, please use the following checklist:

1. Is there a fingerprint impression in each finger block? If there is a missing fingerprint impression, is there a reason noted in the finger block (e.g., AMP, missing at birth, unable to print, etc.)?

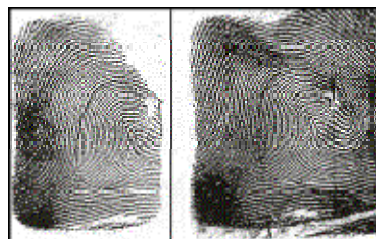
Make sure to note when images are amputated or unable to print...



2. Are the fingerprints rolled fully, from nail to nail?

Same finger . . .

**Not rolled
fully**



Acceptable

3. If the fingerprint impression is a loop, are the delta and core present?
If the fingerprint impression is a whorl, are all deltas present?
4. Are the fingerprint impressions clear and distinct?
5. Are the fingerprint impressions uniform in tone and not too dark or light?

Too Dark
(too much ink or pressure)



Too Light
(too little ink or pressure)



Ink Unevenly Distributed
(causing light and dark areas)



6. Are the four finger impressions and a thumb impression in the plain impression block for each hand?
7. Are the rolled fingerprint impressions in the correct finger blocks when compared to the plain impressions?

Verify images are in correct order ...



Please Note: *If using live scan equipment to capture fingerprint impressions, it is important to clean the equipment regularly and calibrate routinely per the manufacturers guidelines, to ensure the quality and integrity of the fingerprint images.*