

Chapter 20

Fingerprints

Fingerprint evidence remains the most positive means of personal identification in forensics, to date. Though often compared with other modern innovations such as DNA, fingerprint evidence results in positive identifications whereas other evidence does not. Fingerprint evidence can also distinguish between identical twins. Identifications can be effected from fingerprints made in a victim's blood, paint, or other contaminants, which no other form of evidence can accomplish. There should not be competition between fingerprint evidence and other innovations because all should work hand in hand to solve identification questions.

DESCRIBING TYPES OF PRINTS

20-1. Latent prints can be seen or unseen and often require development. The word "latent" means "hidden," but normally the term latent prints refers to those prints left at crime scenes and/or on items of evidence. Another category of latent prints is patent prints. Patent prints are impressions that are visible in some form of contaminant. Plastic prints are those impressions left in materials, such as wax, window putty, or other pliable materials.

20-2. Record prints are the controlled recordings of the friction ridge skin contained on the palms of the hands and each finger, using various methods such as fingerprint cards, printer's ink, or electronic recording by way of "live scan." Though there are many variations on how to obtain record prints, the principles are the same. Traditionally, the term major case prints refers to finger and palm prints. Record prints can also be taken from feet, which also bear friction ridge skin. Record prints must be submitted for all victims, witnesses, suspects, medical and law enforcement personnel, and anyone known or suspected of handling evidence or entering a crime scene. Once legible and complete elimination prints for investigators are on file at USACIL, there is no requirement to resubmit record prints for each investigation conducted. In some cases, it may be necessary to record ear and lip prints for comparison. The laboratory should be contacted for guidance in these cases.

SEARCHING FOR, IDENTIFYING, AND PROCESSING LATENT PRINTS

20-3. Prints deposited on items of evidence are generally divided into the following two basic categories:

- **Porous evidence.** This type of evidence can absorb fingerprint residue into its surface. Porous evidence can be best described as a sponge that absorbs residue; for example, paper, checks, currency, unfinished wood, cardboard, and other similar material. These items do not require treatment by the crime scene investigators. In fact, the investigator should not attempt to process fingerprints on porous items of evidence because laboratory-processing procedures are best for this type of evidence. Clean gloves should be worn at all times when handling porous evidence. Little danger exists of destroying latent prints on porous evidence, but a high possibility does exist of accidentally depositing additional latents. All porous evidence should be placed in a paper envelope, bag, box, or wrapped in paper and sealed. The outside of the container should be marked with unique, identifiable markings. Investigators should be aware that the laboratory cautions against the field use of chemical agents commercially marketed for the development of latent prints on porous materials. Some of these products are of poor quality and can damage or destroy latent prints. Latents developed in the field can fade or totally disappear before laboratory examination. An example is latents that are developed using iodine and ninhydrin, which produce “fugitive” prints or prints that fade within a short period of time after initial development. If an investigator believes that a scene or evidence could best be processed using such chemicals, he should consult with USACIL for advice and guidance.
- **Nonporous evidence.** This type of evidence does not readily absorb water into its surface; for example, plastic bags, painted or sealed woods, metal, glass, some glossy magazine covers, knives, guns, computer equipment, and like materials. All nonporous evidence selected for latent-print examination should be processed as soon as possible. If ridge detail is visible, photographs should be exposed of them before any further processing. All nonporous evidence should then be exposed to superglue fuming. For most evidence, this fuming process could be all the processing necessary before shipment to the laboratory. In other circumstances, fumed latents can be photographed, powdered, and lifted. Do not submit evidence to the laboratory if the investigator has powdered the latent prints and they are capable of being lifted. Send only the photographs taken before lifting and the actual lifts. However, evidence requiring examination by other divisions of the laboratory should never be processed with fingerprint powder because contamination can hinder other examination processes. Evidence requiring additional examination merely needs to be fumed with superglue as soon as possible.

NOTE: Superglue should not be used on any evidence being submitted for trace evidence examinations.

PRESERVING LATENT PRINTS

20-4. Latent prints on nonporous evidence are often deposited on the surface of an item and are extremely vulnerable. Wearing gloves does not protect the latent prints from being destroyed if they are touched, rubbed, or smeared; they only prevent additional prints from being deposited. When it cannot be determined from appearance whether a drop of water would be absorbed into a surface, the evidence should be handled and processed as nonporous (such as a leather wallet, cigarette cartons, and shiny cardboard boxes). Photography, superglue-fuming, and fingerprint-powdering are techniques used to preserve latent prints.

PHOTOGRAPHY

20-5. The very first step in latent print preservation is photography. Visible latent prints should always be photographed to prevent the loss of evidence. Latent prints deposited in grease, blood, paint, and other visible substances will often not require additional processing before photography. Always use a scale in evidence photography and steady the camera using a tripod. It is best to use a macro lens, filling the entire frame. Do not use digital photographic field-issued equipment; digital photography has not advanced technologically for the recording of latent print evidence. Traditional photography is still required for latent print evidence to be suitable for identification. If there is no other choice but to use digital photography, use maximum resolution (largest photo file size) settings combined with good lighting and a tripod.

20-6. Attempt to keep the back of the camera parallel to the surface bearing the latent print. If it is necessary to photograph the evidence from an angle to catch the light in a manner that increases the contrast of the latent print, additional photographs should also be made of the same area with the camera back parallel to the surface bearing the latent print.

SUPERGLUE-FUMING TECHNIQUE

20-7. Superglue fuming, or cyanoacrylate fuming, remains the most effective way to develop, protect, and preserve latent prints on nonporous evidence. The superglue-fuming process can be accelerated using heat or chemicals. USACIL suggests heat to accelerate the fuming process. After the latent prints are developed, package and ship them to the laboratory. Studies conducted by USACIL have shown that latent prints on evidence that was superglue-fumed in the field are preserved better and have a significantly greater chance of being identified than latent prints not superglue-fumed, but forwarded to the laboratory as found. Superglue fuming preserves latent print evidence making it stable for shipment to the laboratory without any further processing. It can simply be placed in an envelope, bagged, or wrapped in paper without special packaging materials and shipped to the laboratory. Superglue-fuming procedures are as follows:

- Evidence should be placed in a suitably sized, sealed container and in an area that is well-ventilated.
- A test print should be placed in a container where it can be seen or checked. A small piece of a clear plastic bag will work.

- A few drops of liquid superglue should be put on a piece of foil or laboratory tin and placed on a coffee cup warmer, or a similar heat source, inside the container.
- The evidence should be observed—this is critical. When the test print has developed, any latent prints on the evidence will also develop.
- The evidence should be removed from the container and placed in a paper envelope, bag, box, or wrapped in paper to be transported to the laboratory.

20-8. Large items of evidence can be fumed in much the same way. The investigator may have to build a makeshift tent or enclosure to seal in the evidence. Latent prints developed with superglue fuming on large or immovable items of evidence should be dusted with fingerprint powder, photographed, and lifted. Only the lifts should be sent to the laboratory. This effort saves shipping and handling costs of large bulky items.

20-9. Caution should always be used to ensure the safety of investigators who are using this fuming process. Superglue fumes should not be inhaled or exposed to the investigator's eyes, especially if he is wearing contact lenses because these situations can create medical illnesses.

FINGERPRINT-POWDERING TECHNIQUE

20-10. The traditional fingerprint-powdering technique is still a vital piece of the identification and preservation process of fingerprint evidence. The preferred method of recovering latent fingerprints from a crime scene (especially those that are located on large, bulky, or immovable items) is to superglue fume it first and then powder and lift the latents.

20-11. Many latent prints can be developed and preserved using a fingerprint brush and powder. All latent prints developed with a brush and powder must be photographed (with a scale) before lifting. Latent prints found in dust, grease, blood, or other contaminants should not be processed using fingerprint powders. Fingerprint powders are supplied in crime scene kits in several colors. In most instances, the best powders to use are the black or gray general-purpose powders. Always choose a powder that contrasts best with the background of the evidence and the color of the lifter used. Fluorescent powders can be used to develop latent prints on multicolored surfaces. These powders require the use of an alternate light source or UV light to be able to photograph. Effective use of these light sources requires training and experience. They are very costly and can cause health issues. Only long-wave, UV light should be used; short-wave, UV light is harmful to the eyes and skin. Anytime UV light is used to develop latent prints, investigators must wear protective goggles and clothing.

20-12. Many types of fingerprint brushes are used to apply fingerprint powder. Examples of these brushes are fiberglass, animal hair, and feather brushes. For overhead work or in situations where it is critical that the brush elements do not come in contact with the surface, magnetic wands and

magnetic powders are used. The procedures for using fingerprint powders are as follows:

- Check the surface first using a test print. Lightly brush an area away from the subject surface and determine if any latent prints are present. If none are present, wipe the surface and apply and process a test print to determine how acceptable the surface is to the fingerprint powder processing. The investigator can make a test print by wiping an ungloved finger on his face or neck to collect skin oils. He should apply his finger to the test surface to deposit a latent fingerprint.
- Pour a very small amount of powder out onto a sheet of paper. Never dip the fingerprint brush into the container, this causes contamination and spoils the working properties of the powder.
- Touch the powder only with the tip of the brush. Shake off any excess powder and brush the surface using only the very tips of the powder-filled brush. The key to proper print development is to use a small amount of powder and a delicate touch. Use a twirling method to ensure that the sides of the bristles are not coming into contact with the surface and destroying latent prints.
- Watch for the latent print to become visible to ensure that it is not overbrushed. Overbrushing can destroy the print.
- Brush following the contour of the ridges and stop when the ridge detail is developed.
- Stop brushing when the ridge detail is complete.
- Discard any unused powder; never return contaminated powder to the container.

20-13. All developed prints should be photographed and then lifted. All lifts and photographs should be submitted to the laboratory for evaluation, examination, and comparison. All latent print photographs should include a scale. Sometimes a second lift of the same area is necessary to achieve the best possible lift. Superglue-fumed prints can be powdered and lifted many times without destroying the print; however, latent prints that have not been fixed using the superglue process can diminish or be destroyed while attempting to lift them.

LIFTING LATENT PRINTS

20-14. The most common means used to lift latent prints are commercially produced lifting devices, such as hinge lifters, lifting tapes, rubber and gel lifters, and various types of liquid lifting mediums. Hinge lifters and transparent lifting tape have the advantage of presenting the lifted latent print in its correct perspective. Latent prints on rubber lifters are in a reversed perspective and must be reversed again using photographic techniques to properly visualize and compare the latent print. However, rubber lifters generally work better than hinge lifters. Transparent lifting tape works better for taking prints from curved or uneven surfaces. Transparent tapes used in office work, such as cellophane tape, are not suitable for lifting fingerprints except in dire circumstances. A lift background that contrasts the color of the powder should always be used. A gel lifter is not as tacky as hinge, tape, and rubber lifters. It can be used on surfaces that are

more fragile where paint might be pulled away with a powdered print and is excellent for lifting dust prints. Hinge and rubber lifters and lifting tape store well; gel lifters may require refrigeration.

20-15. A lifter large enough to cover the entire print should always be used. The plastic cover should be removed from the rubber lifter with care in one steady movement. Any pause can result in a crease being left on the lifter surface. The adhesive side of the lifter should be placed to the developed, powdered print. It should be pressed down evenly and smoothed out over the surface. If an air pocket is sealed under the surface of the lifter, an attempt should be made to force it out. Use pressure or a pin to puncture the lifter and release the air by applying pressure to the bubbled area. The lifter should be peeled from the surface in one smooth even motion.

20-16. Transparent lifting tape is applied in much the same way as commercial lifters. One end of the tape should be placed on one side of the latent print and smoothed out across the surface of the print. Air bubbles should be worked out using a pin, if necessary, to expel air trapped under the surface of the tape. The tape should be pulled free with one continuous motion. The tape should be mounted on materials that contrast the fingerprint powder used. A black background should be used for gray or white powders. A white background should be used for black or dark powders. Commercial mounting cards usually offer the best types of mounting surfaces and have contrasting surfaces on each side of the card. Lifting tapes can be used to lift large areas of latent prints by being applied in overlapping strips, and a rubberized roller can be used to work out air bubbles. All of the strips should be pulled free from the surface in one continuous motion with all of the strips connected together. They should be mounted as one connected piece.

20-17. Many types of silicone and liquid lifting materials are available for lifting latent prints from uneven surfaces, such as appliances, computer equipment, and vehicle interiors. Most types work by pouring them over the powdered latent print and removing them after they dry.

CONDUCTING CHEMICAL PROCESSING

20-18. Only trained laboratory personnel should conduct the vast majority of chemical processing of latent print evidence in an approved laboratory facility; however, there are some instances where chemical processing can and should be conducted in the field by trained investigators. USACIL should be consulted when there is doubt about using chemical processing. The premature or improper use of chemical processes in the field can result in the loss and/or damage of latent print evidence. Most chemical processes are fugitive in nature, meaning that once the latent prints are developed with chemicals, they will fade and often disappear before the occurrence of proper photography and comparison of the evidence. One type of processing that may be used is small particle reagent (SPR). SPR may be more of a physical process than a chemical process in that the resulting action is physical in nature.

20-19. SPR is used on wet items of nonporous evidence, such as those covered in moisture or submerged in bodies of reagent. Metallic particles suspended in water, lodge themselves in the fatty and waxy residue of the latent print after

moisture has washed everything else away. SPR is simply applied and then rinsed away with water. It also works on metal and masonry type surfaces. It can be photographed and lifted as with powdered prints, after drying. SPR comes in contrasting colors and UV formulas.

OBTAINING RECORD PRINTS OF LIVING INDIVIDUALS

20-20. To classify, analyze, and compare record fingerprints, they must be complete and clear. It takes practice to obtain suitable record fingerprints and could take several attempts to obtain suitable prints from a particular individual.

20-21. Both the person being fingerprinted and the person taking the fingerprints should always sign and date the record fingerprint cards before the printing process, which will lessen the chances of smearing wet ink. It is difficult in court to prove the origin of record prints without both signatures. All blocks on the fingerprint card should be completed before using any ink to avoid smearing the prints after they have been transferred to a fingerprint card. The subject should wash and dry his hands thoroughly to remove any dirt, sweat, or grime. The subject's hands should be examined to ensure that they are absent of intentional disguises, such as coatings and any disfiguring. The following equipment is normally required for printing:

- *FBI Form Federal Document (FD) 249 (Arrest and Institutional Fingerprint Card).*
- Fingerprint card holder.
- Printer's ink.
- Ink roller.
- Ink plate.

TAKING RECORD PRINTS

20-22. Record prints are taken to show the entire friction ridge skin surface of the fingers, thumbs, and palms. Record fingerprints for submission to the laboratory should consist of at least two completed FBI fingerprint cards and a set of fully rolled fingers and fully rolled palm prints to include the web and side areas of the palms. (See *Appendix G.*) To prepare for recording the prints, the fingerprint card should be secured in the holding device. A small dab of ink should be placed on the inking plate and rolled until a thin, even film covers the surface. The consistency of the ink should appear almost opaque.

20-23. The motions for inking the finger and recording the finger are the same. The fingers are rolled from nail edge to nail edge and from approximately 1/8 inch below the crease of the first joint to as far up as possible. This area will allow for the recording of all ridge characteristics required for correct classification of each finger. The finger is rolled through the ink and then rolled in the corresponding block of the fingerprint card. When the investigator takes record fingerprints, he should grasp the top of the subject's hand to ensure that the finger to be printed is extended. The investigator uses his other hand to hold the finger at the base where it meets the palm. He tells the subject to look away, relax, and allow him to do all the rolling. Each finger should be rolled in one continuous and smooth motion.

The fingers and thumbs are rolled from awkward to comfortable, meaning from left nail edge to right nail edge for fingers on the right hand and right nail edge to left nail edge for fingers on the left hand. This allows the investigator to work with the anatomic features of the hands without fighting the natural resistance of the hands. The finger should not be rolled back and forth on the ink or the card since this will cause over inking, distortion, and ink lines to appear on the recordings. The pressure should be firm and even. Pressing too hard causes the furrows (grooves between the ridges) to fill in with ink. It is important that the investigator ensures the correct finger is rolled in the designated block.

20-24. The investigator will have to roll each finger in its entirety for cases being submitted to the laboratory. This means the investigator will have to use the ink roller to ink each finger separately and then roll that entire finger from nail edge to nail edge and from the tip where it connects with the palm of the hand. This will ensure that each joint of each finger is recorded. The tips of the fingers should also be rolled. They should be rolled from side to side just above the corresponding finger on the paper used to record the entire fingers. A separate full-finger card or piece of bond paper must be used.

PLAIN OR SIMULTANEOUS PRINTS

20-25. After all fingerprint blocks have been completed, the plain or simultaneous prints at the bottom of the card should be completed. They verify the order of the rolled record fingerprints and show characteristics that are sometimes distorted in rolled prints. Simultaneous prints are made on the card by pressing (not rolling) the four inked fingers onto the card in the appropriate blocks at a slight angle so they fit the space. The subject should hold his fingers straight and stiff. His hand should be level with his wrist. His wrists should be grasped with one hand and the fingers should be pressed onto the cards with the other hand. Thumbs are recorded by inking each thumb and pressing it on the appropriate thumb impression block.

RECORD PALM PRINTS

20-26. The investigator must obtain record palm prints from a person each time his record fingerprints are obtained for an investigation, especially if that case is being submitted to the laboratory. Ink should be applied to the subject's palms using the ink roller. Using the inking plate would cause ink lines, created by the edge of the plate, to appear in the record palm print. The palm print card or a piece of bond paper should be wrapped around a tubular object. The subject's heel or base of his palm should be placed on the tubular object and the palm rolled in a pulling motion from the heel of his hand to his fingertips. The investigator should ensure that he records the entire center areas of the subject's palms, which will require direct pressure being applied to the back of his hand. The investigator should also record his web area (between his thumb and index finger), thenar edge (the edge of his palm on his thumb side), and knife edge (the side of the palm opposite the thumb side). Several recordings of each palm should be taken to ensure that all areas are recorded properly.

PROBLEM RECORD PRINTS

20-27. Excessive perspiration and dirty hands and equipment may cause problems when recording prints. The investigator should always start with clean equipment and clean fingers. When the person whose fingers are being recorded are wet from perspiration, each finger should be wiped with alcohol, quickly inked, and rolled onto the fingerprint card. This process should be followed with each finger. Some people have dry and/or rough hands. Rubbing them with lanolin, lotions, or creams can often make them soft enough for clear, unsmudged prints. If the ridges are very worn or fine, alternate methods must be used to obtain prints, much like the methods for recording "postmortem records" (see *paragraph 20-30*). When nothing seems to work, USACIL should be consulted for suggestions and guidance.

20-28. If the hands and fingers are deformed, normal printing steps cannot be followed. The ink should be applied directly to the fingers with a spatula or small roller, and then a square piece of paper should be rotated around the finger. When an acceptable print has been made, the square is taped to the proper box of the fingerprint card.

20-29. If there is an extra finger (usually a little finger or a thumb), the innermost five are printed as usual on the card. The extra digit is then printed on the reverse of the card. Webbed fingers should be printed as best as possible in the rolled and plain impressions blocks of the fingerprint card. If a finger or a fingertip has been amputated, it should be noted in the proper box (such as AMP, 1st joint, FEB 1993 or TIP AMP).

OBTAINING RECORD PRINTS OF DECEASED INDIVIDUALS

20-30. Full record finger and palm prints are always obtained from deceased individuals. The record prints are used to identify the deceased and/or eliminate them as the source of the latent print evidence. The process of taking postmortem record finger and palm prints has always been cumbersome, but it is too important to take lightly. The investigator only has one opportunity to obtain postmortem prints before the body is interred. This process must be completed with accuracy and diligence. The key is to prepare for the process.

20-31. The means used to record the prints depend on the condition of the fingers and the investigator's ingenuity. For the recently dead, the process is the same as for live subjects. The process of inking the fingers and using inking spoons and square paper tabs on the fingers might be used if rigor has started. When rigor mortis is present, the investigator may have to massage and straighten the fingers. Breaking rigor requires a certain technique, and massaging the fingers and hands takes time (about 10 minutes per hand). Rigor can be broken using finger spoons or by bending the fingers backward and pressing down on the middle joint of the finger. If the investigator is not having any success using conventional methods, he should process the fingers and palms using equipment and other methods.

EQUIPMENT

20-32. The following items can be used for processing fingerprints and palm prints of deceased individuals:

- Black or aluminum fingerprint powder.
- A fingerprint brush (soft-hair type).
- Transparencies made from fingerprint cards without a textured surface.
- White case file labels (precut to finger block size and full-length size).
- Larger mailing labels for palm prints.
- Blank transparencies or document protectors.
- A permanent marker.
- Extra large ziplock plastic bags.
- Latex gloves.

METHODS

NOTE: The methods for obtaining record prints of deceased individuals include before and during procedures.

20-33. Before beginning, the investigator should think “safety first”. He should wear latex gloves when processing deceased individuals. When finished and before removing his gloves, he should put the postmortem prints just taken into a ziplock bag and discard the magic marker used to label the prints.

20-34. It is recommended that the body lie out for about an hour before taking the prints so that the body can adjust to room temperature, lessening the problems of condensation during recording. The easiest position from which to take the record prints is to lay the deceased in a prone position (face down) with the arms stretched out in front of the body.

20-35. The hands of the deceased should be clean and dry. The investigator may have to use some alcohol swabs to ensure that the skin is dry enough to receive a light dusting of powder. It may be necessary to massage the fingers and palms to make them more pliable and receptive to the print-taking process. This massaging will open up the palm area for better record taking. A small worktable should be used for laying out the supplies and equipment. This makes the printing process easier.

20-36. During the printing process, the fingerprint powder should be brushed on the palm side of the right thumb of the deceased. If the investigator always starts with the right hand in the following order: thumb, index, middle, ring, little finger, and then the left hand in the same finger order, it will help him stay organized and keep him from making mistakes with labeling. He should place a precut, white case file label on the tip of the finger and gently smooth out the label, molding it to the finger. He should use the same process until the complete fingerprint card is full. The larger labels should be used to complete the simultaneous prints.

20-37. To obtain full record fingerprints, the entire finger should be powdered from tip to base (where the finger joins the palm) and from nail edge to nail

edge. Again, the investigator should gently and steadily peel the label from the finger and attach it to the back of the blank transparency. He should immediately write on the front of the transparency just below the applied label which finger it is so as not to lose track or get the labels out of order. The investigator should remember that, when viewing the ridge detail through the transparency, it is a reversal of the pattern on the actual finger. The following includes methods for obtaining fingertip prints, palm prints, and guidance for special cases:

- **Fingertips.** The tip of the finger can be powdered and a label applied across the tip from side to side. This process should ensure that all of the ridge detail available has been captured. The recorded tip should be placed just above the corresponding finger on the blank transparency. The investigator should remember to keep all the labels for the same finger together on a transparency and label each accordingly. These same steps should be repeated for all ten fingers.
- **Palm prints.** The investigator should use the same method for taking palm prints as he did for taking fingerprints, but this time he should use the larger mailing labels. In most cases, the investigator will have to overlap two labels in order to obtain all the ridge detail on the palms. The investigator should remember to keep those two labels together when removing them from the hand and applying them to the back of the transparency. He should gently mold the labels to cover the center of the palms, the edges of each palm, both the little finger and thumb sides, the area where the wrist connects to the forearm (the wrist bracelet area), and the interdigital area where the palm connects to the fingers.

NOTE: In some cases where fingers and/or palms are too damaged to allow for the powdering of the skin, photography or other methods may have to be applied.

- **Special cases.** The hardest record prints to obtain are those from a body that has started to decompose. It may require techniques beyond the investigator's expertise. When the hands are badly damaged, the investigator may need to coordinate with USACIL for guidance on how to proceed.