

DEVELOPMENT OF LATENT PRINTS

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THREE TYPES OF FINGERPRINT IMPRESSIONS

- **Patent fingerprints** – visible prints left on a smooth surface when blood, ink, or some other liquid comes into contact with the hands and is then transferred to the surface



THREE TYPES OF FINGERPRINT IMPRESSIONS

(CONTINUED)

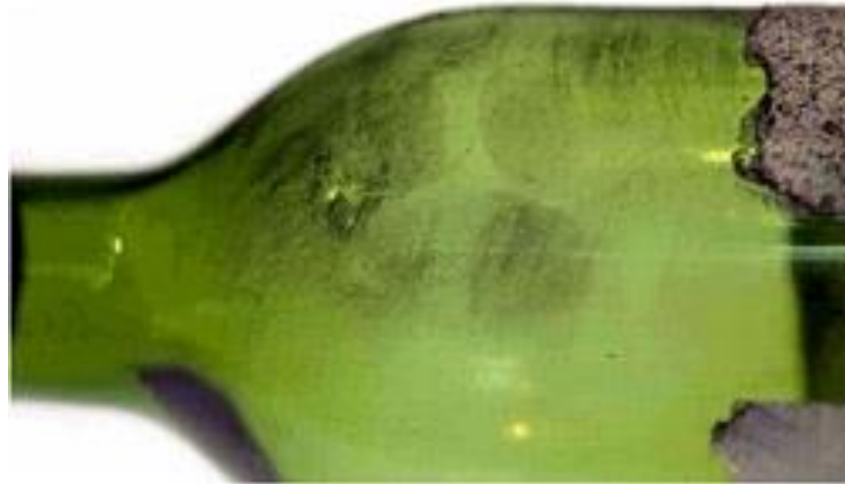
- **Plastic fingerprints** – actual indentations left in some soft materials such as clay, putty, wax, or dust.



THREE TYPES OF FINGERPRINT IMPRESSIONS

(CONTINUED)

- **Latent fingerprints** – hidden prints caused by the transfer of oils and other bodily secretions onto a surface. They can be made visible by different methods (dusting with powders, chemical RXN, etc.)



FINGERPRINT POWDERS

- Applied lightly to a nonabsorbent surface with a soft brush.
- They readily adhere to sweat residues and/or deposits of body oils left on the surface.

FINGERPRINT POWDERS (CONTINUED)

- **Gray and black powders** – the most common, chosen to make the best contrast with the surface
- **Magnetic powder** – applied with a special brush on leather and rough plastic surfaces.
- **Fluorescent powders** – used to photograph latent prints on multi-colored surfaces. They fluoresce under ultraviolet light.



FINGERPRINT CHEMICALS

- **Ninhydrin** – reacts with amino acids in sweat to form purple-blue prints. A 0.6% solution (in ethanol) is sprayed onto porous surfaces such as paper.



FINGERPRINT CHEMICALS (CONTINUED)

- **Physical Developer** – silver nitrate-based liquid reagent used on porous surfaces. It is often used as the last resort because it destroys protein.
- **Cyanoacrylate (superglue) fuming** – developed in 1982 by Japanese Police. It is used on a variety of materials not only to visualize latent prints, but also to semi-permanently affix them to the surface.



EVO603 – 3m x 6m Forensic unit

FINGERPRINT CHEMICALS (CONTINUED)

- **DFO (1,8-diazafluotr-9-one)** – newer replacement chemical for ninhydrin. It is 2.5 times more sensitive than ninhydrin.
- **Rhodamine 6G** is a fluorescent dye that may be used after cyanoacrylate fuming to visualize latent prints under laser light.



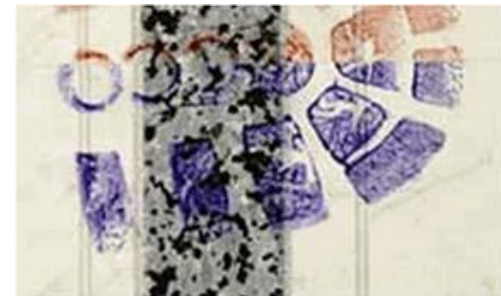
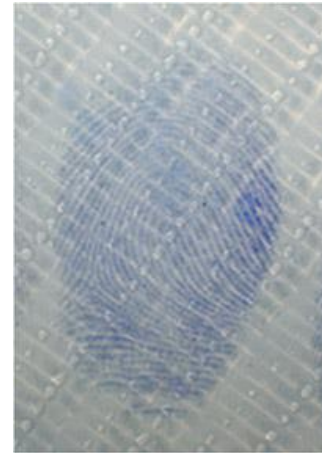
FINGERPRINT CHEMICALS (CONTINUED)

- **Iodine fuming** – one of the oldest latent print development methods. Solid iodine crystals sublimate and the vapor will react with fatty oils and some sweat residue. Iodine prints are not permanent and will begin to fade once the fuming process is stopped.



FINGERPRINT CHEMICALS (CONTINUED)

- **Gentian violet (or crystal violet)** – used for developing latent prints on the adhesive side of tape. An aqueous solution of crystal violet is sprayed directly onto the adhesive.
- **Amido Black** – protein dye stain that can develop faint bloody fingerprints on porous and nonporous surfaces.



FINGERPRINT CHEMICALS (CONTINUED)

- **LCV (Leuco Crystal Violet)** – a protein stain spray that can develop faint or invisible bloody fingerprints on non-porous surfaces



PRESERVATION OF DEVELOPED LATENT PRINTS

- Photograph
- Covering the print to preserve it in its entirety (if on a small object)
- Lifting the prints with adhesive tape and placing the tape with prints on a card with labels

COMPOSITION OF FINGERPRINTS

○ Sweat

- **99.0-99.5 % water**
- **0.5-1.0% solids**
 - 50% organic solids (mostly amino acids)
 - 50% inorganic solids (NaCl and KCl)

○ Contaminants

- Bodily fluids (blood, saliva, nasal secretions, semen, etc.)
- Oils and fats (sebum)



FACTORS AFFECTING FINGERPRINTS

- **Age** – thinner epidermis, flattening of dermal papillae, creases, etc.
- **Fine ridge structure** – less skin contact leads to a spotty appearance.
- **Stimuli** – sweating can be due to warmth, exertion, fever, drugs, anxiety, tension, pain, or spicy foods.
- **Occupational and medical condition** – teaching, and other positions in which a person handles or shuffles papers, can cause fine ridge structure.

FACTORS AFFECTING FINGERPRINTS (CONTINUED)

○ Transposal factors

- Receiving surface texture
- Contaminants on the hands
- Contaminants on the receiving surface
- The manner of contact
- The amount of pressure

○ Environmental factors

- Temperature
- Humidity
- Handling



TRENDS WITH FINGERPRINTS

- It is NOT possible to determine the age, sex or race of an individual solely from their fingerprints. **However:**
- Statistically in young adults, friction ridges of women are significantly finer than those of men.
- Fine ridges may be found in the very young and the very old.
- Manual labor tends to strengthen ridges.
- Women tend to perspire at a lower rate than men.
- Sodium chloride (NaCl) is lower for women.
- Creases are more common in women's FPs.

RESOURCES

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- Fisher, Barry A.J. Techniques of Crime Scene Investigation. 7th ed. Boca Raton, FL: CRC Press, 2004.
- Federal Bureau of Investigations <http://www.fbi.gov/about-us/lab/forensic-science-communications/fsc/jan2001/lpu.pdf>
- Do an Internet search for the following: Forensics you decide a man scorned