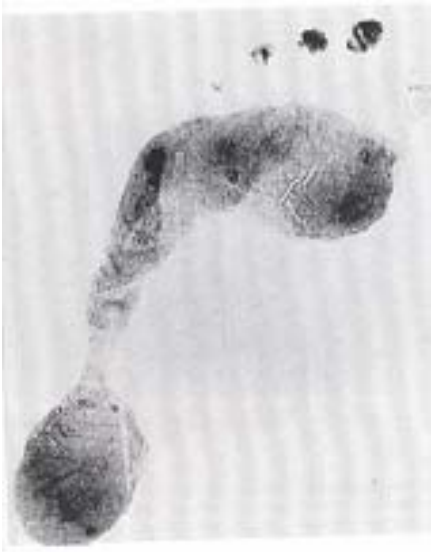
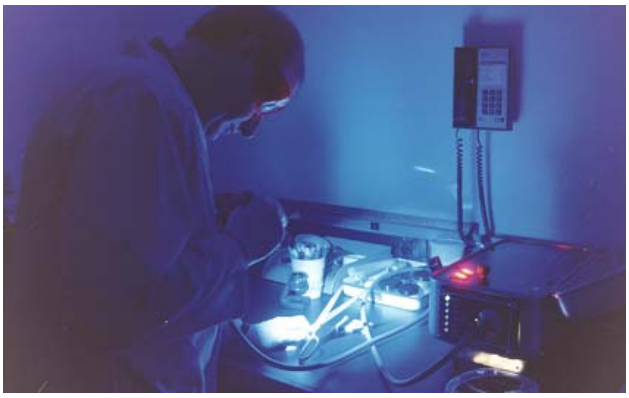
LATENT PRINT SECTION

For over 100 years one of the most sought after pieces of forensic evidence is the latent print – the hidden residue left when bare fingers, hands, toes and feet come in contact with a surface. If properly recovered, the latent print can potentially lead a criminal investigator to the perpetrator of a crime and later be used as strong evidence against that individual at trial.

The skin that covers the underside of the fingers, hands, toes and feet is called friction ridge skin. Unlike the skin that covers the rest of our bodies, friction ridge skin is corrugated: a network of raised areas of flesh called ridges and the recesses between called furrows. Lining the tops of the ridges are thousands of sweat pores that, in most people, regularly emit perspiration. Biologically, friction ridge skin improves our ability to grip and gain traction. But, when it comes in contact with a surface, there is usually a transfer of perspiration and other contaminants the ridges have picked up (oil from hair bearing portions of our body, grease from food, etc.) onto the surface. The impression left behind is a replica of that portion of friction ridge skin that made contact. Because the impression is often not detectable with the naked eye, it is called a latent print. Latent means present, but not evident.



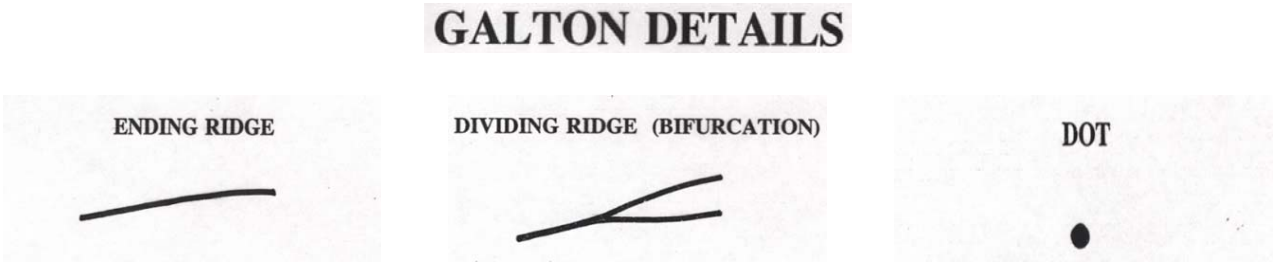
Friction ridge skin identification (individualization, to use a more accurate term) or exclusion is based on permanency and uniqueness, two principles firmly established by the biological sciences, most notably embryology, genetics and anatomy. Permanency pertains to the fact that friction ridge skin, once formed and barring serious injury, will not undergo any fundamental natural change. It grows and ages as the individual grows and ages, and can become worn due to work, but the ridge characteristics used in individualization will not change location or position and will continue to reproduce exactly. Uniqueness is created during the formation of friction ridge skin during fetal development by a wide range of random forces: timing events, stresses placed on fetal hand and feet tissue as it grows, distribution of cells, chemicals, disease and countless other factors. These random forces insure that friction ridge skin is unique to the individual. Identical twins do not have the same friction ridge skin nor is any bit of friction ridge skin duplicated on the same individual.



The examiners of the Latent Print Section of the West Virginia State Police Forensic Laboratory receive thousands of pieces of evidence a year, collected from crime scenes by police investigators for the various law enforcement agencies throughout the state. The evidence is put through a variety of physical, chemical and electronic processes designed to reveal the presence of latent impressions. Some of the processes are old and familiar such as powdering – known to fans of crime dramas as "dusting for prints." Others of more recent vintage are perhaps less familiar such as super glue fuming, ninhydrin, fluorescent dye stains and forensic light sources. Latent prints are revealed when the chosen process adheres, stains or reacts to constituent properties contained in the residue that makes up the impression. Choice of development technique or sequence of techniques is made by the latent print examiner or one trained in latent print processing. Factors involved in the processor's decision will include the type of surface of which the item is made (absorbent or nonabsorbent, smooth or textured) and the condition of the item at the time it is being processed. Preservation of any developed latent prints is usually determined by the choice of development method and surface type with photography and "lifting" being the essential methods of saving a latent print.

Once a latent print is developed and preserved, a latent print examiner will begin a study of the impression using a methodology called ACE-V, an acronym for analysis, comparison, evaluation and verification. ACE-V mirrors the scientific method of observation, experimentation, development and testing of a hypothesis and validation. A latent print **analysis** focuses on the clarity and content of a print (and this will vary from impression to impression) and is conducted on three distinct levels. *Level one* looks at class characteristics, or those traits that are common among us all, such as fingerprint patterns. That which we commonly refer to as a fingerprint is actually the friction ridge skin that is contained just on the first joint of our fingers. The ridges form patterns here and generally take one of three shapes: loops (the most common), whorls and arches (the least common). A fourth group, called composites, consists of patterns that have traits of two or more of the three main pattern groups. Though ridges can form patterns in other areas of our friction skin (particularly the palms), the presence of a pattern in a latent print usually is an indication that a finger made the impression.

Level two looks at what the discipline calls Galton details (named after Sir Francis Galton, an early pioneer in the field). The ridges of friction skin are not continuous, but rather, contain numerous interruptions – the Galton details. These details are more commonly called "characteristics" or "points of identity" and consist of three basic types: ridge endings, birfurcations (a ridge that divides) and dots. These "characteristics" or "points" are randomly scattered during friction ridge skin formation and their position, like all components of friction ridge skin, are not duplicated from one individual to the next or from one finger to the next. Though a predetermined minimum number of points are not required in order to make an identification, the Galton details are usually instrumental when an identification is made.

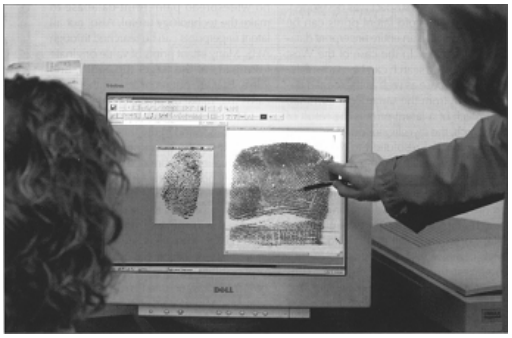


Level three looks even closer at the ridges to ridge and pore structure, placement and contour. Needless to say, in order for an examiner to make observations on this level, the clarity must be of the highest order.

If a print is too smudged, blurred, contains an abundance of superimposed impressions or simply lacks ridge detail, then the print would probably be of no further value. However, if the impression contains ridge detail that is clear (or within an acceptable tolerance range for distortion), has a recognizable pattern and sufficient ridge minutia, then the print will be considered of comparison value. If clarity and content are sufficient, the impression is then **compared** to an exemplar containing friction ridge skin impressions made by a known subject. Class characteristics and minutia structure and placement are compared between the questioned impression and the known impression. An **evaluation** is then made as to whether the known individual's friction ridge skin is the source of the questioned. If there is sufficient agreement in class characteristics and the structural and positional relationship of minutia placement, then individualization is the result. If class characteristics are not alike or differences in the structural and positional relationship of minutia placement exceeds what can be accounted for by distortion, then the impressions could not have had the same contributor and an exclusion is the result. The analysis, comparison and evaluation are then submitted to a second qualified examiner for **verification**. The second examiner will conduct his or her own analysis, comparison and evaluation of the latent print and will either validate the first examiners opinion or disagree with that opinion.

Many technological advances have been made in the latent print discipline during the past 100 years, but none more important than AFIS, or Automated Fingerprint Identification System. AFIS, is a sophisticated computer system that is capable of rapidly searching fingerprint images through a database of hundreds of thousands (and in the case of the FBI, millions) of fingerprint cards. Though search times will vary, most take only fifteen to thirty minutes. The West Virginia AFIS (WV AFIS) was designed and built by Lockheed Martin, the corporation's first foray into this field. The WV AFIS has two primary users: the Criminal Identification Bureau's (CIB) Records Section and the Forensic Laboratory's Latent Print Section. CIB uses AFIS as a portal for entering inked fingerprint images from arrest fingerprint cards taken and submitted by the various law enforcement agencies throughout the state. This creates the AFIS database used by the Latent Print Section. Latent fingerprints received from police officers or that were developed in the section that are of comparison value—meaning that they can be identified—can be searched through AFIS in an effort to place a name to the crime scene print. Though the "I" in AFIS stands for identification, what the system actually does is present a qualified latent print examiner with a list of candidates possessing a fingerprint closest in detail to the questioned latent fingerprint. The latent examiner will then conduct an on-screen comparison between these known images and the latent print and will decide whether there is a match or not. The biggest advantage of AFIS is to the criminal investigator with an unknown crime scene fingerprint and no suspects. This was the scenario that resulted in the first latent hit by the WV AFIS. An investigator arrived at the scene of a B&E and began processing relevant areas for the presence of latent prints. Two clear latent fingerprints were developed in an area in which only the two victims would have had legitimate access. The latent fingerprints were lifted and sent, along with the elimination fingerprints of the victims, to the Latent Print Section. Once a standard latent print comparison ruled out the victims from having made the latent prints, an AFIS search was conducted. The search was completed in seventeen minutes with the number one candidate selected by AFIS being the individual who had indeed made both latent fingerprints. Prior to

AFIS, this search would not have been possible and it would have been up to the investigator to first find a suspect. Now, the investigator can be given a name. While it is important to remember that a latent print at a crime scene is not an indication of an individual's guilt, merely that individual's presence at the scene, it is also important for the investigator as a starting point for getting the investigation off the ground.



Once an examination has been completed, the latent print examiner will write and issue a report to the investigator explaining the results. Numerous times a year, the examiner will be subpoenaed by state and federal courts to appear and offer expert testimony. Additionally, examiners of the Latent Print Section will render assistance to the Office of the Chief Medical Examiner of West Virginia in identifying deceased individuals, provide instruction to all law enforcement officers in the state in basic fingerprint techniques at the State Police Academy, lecture on various discipline related topics at local universities, state colleges and high schools and participate in our own continuing professional education by attending classes, workshops and conferences specific to latent prints.

The work we do here rarely resembles the visually stunning, glitzy world of the folks who populate the TV hits *CSI* and *CSI: Miami* or seldom provides us with high profile cases soon to be featured on *The New Detectives* or *The Forensic Files*. The work we *do* perform is, however, important and intrinsically rewarding and most of us doing this for a living feel fortunate to be earning our daily bread at a job we love and one that is often referred to as *cool*.

EDUCATIONAL REQUIREMENTS:

The current educational requirements for a latent print examiner in the West Virginia State Police Forensic Laboratory is a Bachelor's Degree from an accredited four-year college or university with a major in chemistry, biology, biochemistry, molecular biology, forensic sciences, or other natural sciences. Latent print specific training is conducted through apprenticeship study under a qualified latent examiner, combined with classes conducted by agencies such as the FBI and qualified independent instructors. The training mirrors the guidelines put forth by the International Association for Identification (IAI) and the Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFST) and lasts approximately two years.