Further Reading - Fingerprints

The CPS Identification Section began taking fingerprints of people charged or convicted of a serious offence, in 1913. The fingers are inked and then the finger is rolled onto a fingerprint card. Rolling the print gives it a square appearance and makes it easier to read. By 1915, the Calgary Police were exchanging duplicate sets of prints with other police departments and sending new sets of prints to the Central Identification Bureau in Ottawa. If you look at the ends of your fingers with a magnifying glass, you can see the ridges that make your fingerprints. These ridges are called friction skin and allow us to hold onto smooth objects.

When the ridge pattern found on the fingertips is transferred onto another object, it creates a fingerprint. No two fingerprints are alike, not even those of identical twins. If you look closely, you will see that even your own fingerprints are different, though some of them may look similar. Fingerprints that look similar are said to have the same pattern. There are ten pattern types used in fingerprint classification, though the possible variations are endless. Fingerprints have been studied for hundreds of years and have long been recognized as a possible means of identification. Scientists eventually proved that fingerprints were unique to a person and did not alter over time. Thus a set of fingerprints is a permanent record of a person's identity. Fingerprints were rarely used by police departments until a practical method of classifying them was established by Sir Edward Henry in 1900.

Before fingerprints were successfully classified, a fingerprint technician had to compare every set of prints available to the new set just received. Even in 1913 this would have involved comparing thousands of print cards. Today it would be an impossible task.

If you look at the top right-hand corner of a fingerprint card, you will see a series of fractions. This is the classification number. Each fraction requires a different calculation, which becomes more complicated as you go along. Cards are classified and then filed according to their classification number. This greatly reduced the number of cards to search.

The Henry Classification System is still taught to police recruits today, though the search for a possible matching set of prints is done by computer. The final comparison is still done manually by a fingerprint expert. Fingerprinting are still the most common method used by the police to positively identify a person. Before a person can begin classifying fingerprints, they should first be able to recognize the five basic patterns.

Some of the rules for determining the print pattern are complicated and it takes a great deal of practice before a person can correctly identify every pattern.

FINGERPRINT CLASSIFICATION

Ridge Characteristics

The black impressions caused by the inked fingerprint are called ridges. Ridge characteristics are what make the fingerprint unique. If you look at any fingerprint (see the arch pattern) you will notice that some of the ridges form small islands, some form small lakes and some split into two ridges. These characteristics, along with the points where ridges end, will be used to compare one arch with another. Since ridge characteristics never appear in the same sequence on two different fingerprints, only one person in the world will have this arch pattern on their finger.

The **ARCH** pattern is characterized by a general upward curving trend starting from one side of the page, followed by a downward slope that ends on the other side of the page. All of the ridges in an arch pattern follow the same course though some of the ridges may end before reaching the opposite side. An imaginary line traced from one of the ridge endings should follow the same path as the complete ridges. The arch is given the letter ‘A’ for classification purposes.

Arch

Tented Arch

The **TENTED ARCH** differs from the arch because some of the ridges do not follow the general arch pattern. Instead, some of the ridges abruptly thrust upwards forming a tent. An imaginary line traced from one of these ridges will not follow the general arch pattern. If you look closely at the tented arch, you can see that a triangular pattern forms where the ridges thrust upwards. This area is called the delta. All fingerprints except for the arch have at least one delta. The point of delta forms when the two innermost parallel ridges suddenly diverge to form the overall pattern. The first ridge or ridge particle directly in front of the divergence is the point of delta. The point of delta also occurs where a single ridge separates to form the overall pattern, when this ridge lies between the two innermost ridges that run parallel and then diverge. The point of delta in the tented arch always forms part of the up thrust. The tented arch is given the letter ‘T’ for classification purposes.

There are two kinds of loops, the **RADIAL LOOP** and the **ULNAR LOOP**.

Radial Loop

Ulnar Loop

Loops are termed as such because at least one of the ridges recurves or loops back in the direction from which it came. This means that the general pattern of the loop starts on one side of the page (or finger) and ends on the same side. The difference between a radial and an ulnar loop is not determined by how the pattern looks on the fingerprint card so much as how it looks on the finger itself. Radial loops curve back towards the radius bone in the arm, which joins the hand on the same side as the thumb. Ulnar loops curve back towards the ulna bone in the arm, which joins the hand on the same side as the little finger. The ulna bone is the protruding bone on the outside of the wrist.

Simple loops have one separate point of delta. This means that the delta does not form a part of the loop itself, as the delta in the tented arch forms a part of the tent. Radial loops are given the letter ‘R’ and ulnar loops are given the letter ‘U’ during classification. Loops and arches are the most common fingerprint patterns and often it is hard to distinguish between the two patterns.

The **WHORL** pattern has two points of delta, generally obvious at a glance.

WHORL

The whorl is made up of one or more recurving ridges that ‘whorl’ or revolve around a central axis. A line drawn between one point of delta to the other will cross or bisect one or more of the whirling ridges. The whorl is given the letter ‘W’ for classification purposes.

The **CENTRAL POCKET LOOP** can often be mistaken for a whorl because it also has one or more
recurving ridges revolving around a central axis. The central pocket loop also often looks like an ordinary loop at first glance. The difference is that the central pocket loop has two points of delta and a line drawn from one point of delta to the other will fail to cross or bisect any of the recurving or whirling ridges. The central pocket loop is given the letter ‘C’ in classification.

TWINNED LOOPS are usually easy to classify. They will have two loop patterns that are separate from one another. These two loop patterns originate on opposite sides of the page and recurve in opposite directions. Twinned loops will also have two separate points of delta.

The twinned loop is given the letter ‘D’ in classification.

LATERAL POCKET LOOPS also have two separate loop patterns, but these two loops will originate on the same side of the page and recurve back in the same direction. There will be two separate points of delta. The lateral pocket loop is also given the letter ‘D’ in classification.

A **COMPOSITE** print is composed of two or more separate patterns. A composite may look like a twinned loop but if a line is drawn from one point of delta to the top or cap of its pattern it will not cross any of the ridges that form the other pattern; it will only cross ridges forming its own pattern. The cap of a pattern is also the point of recurve. If an arch appears to be present as part of the pattern this does not make it a composite since there will be an arch-like quality to all patterns. Composites will have two or three deltas. The letter ‘X’ is given to the composites for classification purposes.

The rarest pattern of all is the **ACCIDENTAL**. The accidental generally has a small pattern area. The accidental also contains two patterns, but these patterns combine together rather than remain separate. The pattern area possesses the combined characteristics of two patterns. Again, the arch is not considered in the pattern combination. An accidental will have two points of delta. Accidentals are given the letter ‘X’ for classification purposes. To come up with the first fraction, or the Primary Classification number, in Henry’s classification system, it is not

necessary to be able to distinguish between twinned loops, pocket loops, composites and accidentals.

Arches, tented arches, radial loops and ulnar loops are termed non-numerical patterns and are given a value of 0. The other six patterns are termed numerical patterns and are given a value depending on their finger positions. If the pattern has more than one delta it will be a numerical pattern and be given a value according to the chart in the handout. Fingerprint cards were filed according to their primary classification number. Once a new set of prints was classified, the fingerprint technician would start comparing them with fingerprints on file. Even if all of the classification fractions matched, the technician still had to make a visible comparison of the individual fingerprints to insure that they were identical.

FINGERPRINT EVIDENCE

Latent Prints and Dusting

Fingers sweat continuously and it is for this reason that they leave their mark on anything that is touched. Fingerprints left on objects are called latent prints. Something is called latent if it is invisible but has the potential to become visible. When detectives search a crime scene for evidence they look for smooth flat surfaces near the place of entry and exit and for objects that appear to have been handled by the perpetrator. (The perpetrator is the person who actually committed the crime. An accused is someone charged with committing the crime but not yet proven guilty in court). Fingerprints on smooth surfaces like glass and metal can sometimes be seen with the naked eye. Fingerprints on plastic paper and wood are not so easily seen.

Identification detectives use various methods to enhance latent fingerprints so they can be seen. Different coloured powders can be gently brushed over the fingerprint ridges. If the fingerprint is found on a dark background, then a white or grey powder is used. This procedure is called dusting for prints. The powder makes the fingerprint visible and then the print can be photographed. Fingerprints on plastic, tin foil and paper are treated with special chemicals that react with sweat and oil and cause the ridges to turn a different colour from the background. The fumes given off by Super Glue, for example, are used to develop fingerprints on a porous or uneven surface. Scientists are continually adopting new methods and chemicals that will allow them to develop fingerprints on just about anything, including cloth and skin.

When a fingerprint is found, the location of the print is photographed and then a close-up is taken. Detectives must first prove that the print was actually found at

the scene of the crime. They must then show whom the fingerprint belongs to. If the resultant photograph is clear enough, it can be magnified with a photographic enlarger so that comparison with a suspect print is easier. If a good photograph cannot be made of the fingerprint or if the print is on an immovable object, the latent print may be lifted from the object. Early lifters were made of white or black rubber and had an adhesive surface. The sticky side is carefully placed over the print and then lifted off. A transparent cover protects the print. Lifting removes the print from the object and forces the detective to prove that the fingerprint was actually on the object in the first place. Also, using a lifter may smudge the fingerprint, rendering it useless. It is always preferable to leave the print on the object and obtain a photograph. Elimination prints are taken of family members, shopkeepers and anyone else who may have had legitimate access to the crime scene. These prints are compared to the latent found at the scene. Any latents that do not match an elimination print are assumed to be those of the suspect.

The Calgary Police Service purchased a fingerprint camera in about 1918, but it was many years before identification detectives were skilled enough to photograph latent prints successfully. Until the 1930s, the police still relied mainly on witnesses, confessions and catching the crooks red handed, in the act or with the loot. The main reason for the department's lack of expertise was a shortage of staff and the use of primitive equipment. By 1929, there were 45,000 fingerprint cards on file, created mainly by the constant excxchange of prints between cities. In 1930, the staff of the Identification Section increased to two.

In 1932, the Calgary Police Service made their first conviction based on fingerprint evidence. Latent fingerprints at this time were useful if the police had suspects. Latents could prove a suspect's guilt or could prove that a suspect was innocent. If there were no suspects, however, it was almost impossible to match a latent print when a single technician had to search through thousands of fingerprint cards. Modus operandi (or method of operation file developed in 1932), single print (1952) and three print (1970) files were developed in order to narrow down the number of cards to search. For these files, an extra set of prints were taken, classified and then filed according to the type of crime committed and the age of the suspect. A key search system developed in 1982 contained cards punched according to print pattern. A series of holes were punched along the outside edge of a punch card. Each hole represented a particular characteristic of that person's fingerprints. Cards to be searched were stacked together and a long thin probe was inserted into the hole that corresponded to the characteristic present in the latent print found at the crime scene. Thus, if a latent print was a whorl, then only those cards that contained a whorl were

searched. Matching a latent print could still take days. Today, a computer does the search in minutes.