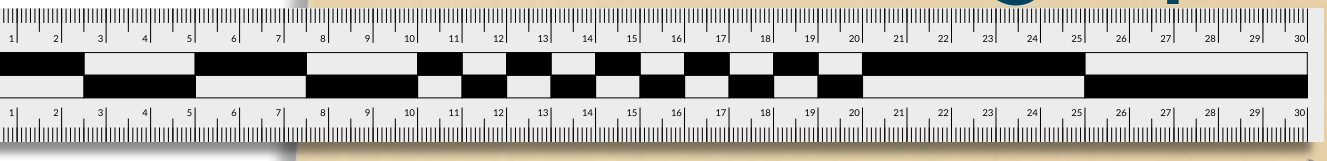
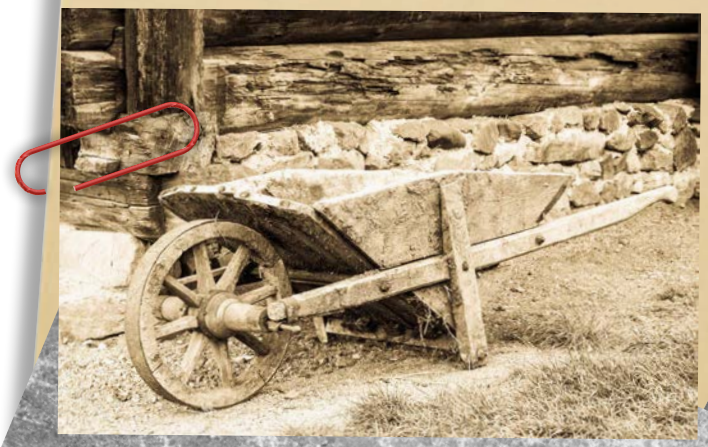
Lesson 16

Human Fingerprints





I praise you, for I am fearfully and wonderfully made. Wonderful are your works; my soul knows it very well (Psalm 139:14).

CASE STUDY

Case Study: The Patent Fingerprints

Prior to 1900, fingerprints had never been used to convict a criminal in court in the United States. This changed in 1910, when the very first criminal case to use fingerprints as evidence resulted in a conviction using said evidence. Around 2:00 a.m. on September 19, 1910,[236] Thomas Jennings rolled a wheelbarrow under a window at 1839 West One Hundred and Fourth Street. Standing on the wheelbarrow and using a crowbar, Jennings pried open the window and entered the home of Clarence Hiller and his family in South Chicago. Jennings entered the bedroom of Hiller's daughters. The two daughters were alerted to the intruder and began screaming, which woke up Clarence. Clarence confronted the intruder, Thomas Jennings, and during the scuffle, both men fell down the staircase. Hiller's daughter Clarice told police she heard gunshots before Jennings fled through the front door. Hiller collapsed lifeless from two gunshot wounds at the foot of the stairs.[237] Sherlock Holmes so famously said, "To a great mind nothing is little."[238] In a case, the smallest detail is important.

Neighbors notified the police, who apprehended Jennings a few blocks from the Hiller home. Jennings gave the police a false name of William Jones. During the crime scene examination, Captain William F. Evans observed "fingermarks," an early term for fingerprints, on the front porch rail. The porch rail had been freshly painted. Clear, visible fingerprints were impressed into the wet paint. Impressed fingerprints in a soft surface that result in a three-dimensional impression are called plastic prints. Investigators cut the wood away from the rail and delivered it to the police station. Black powder was sprinkled over the impressed prints to make them more visible for examination. It was quickly discovered that William Jones was really Thomas Jennings, a convict and recent parolee.

Facts about the case:

- When police apprehended Jennings, his coat was covered in blood, and he was carrying a loaded revolver.
- Captain Evans was a fingerprint operator in the Bertillon identification system (also known as anthropometry). This case occurred during the period between Bertillon identification (identification based on body measurements) and the change to fingerprint identification.
- Captain Evans had a son named Emmett, who was also a police investigator. In 1904, Evans sent his son to the World's Fair in St. Louis to learn about the new technique of fingerprinting. He told his son, "I don't think it is any good but look and see."[239] Emmett returned with positive remarks for the new system of identification, and Chicago began collecting fingerprints from criminals in 1905.
- Captain Evans compared the fingerprints to those on file for the suspect and found 33 points of minutiae to be a perfect match.[240]

- Other than the three fingerprints (index, middle, and ring fingers of the left hand) left behind on the front porch rail, all other evidence linking Jennings to the case was circumstantial.
- Captain Evans was one of the first fingerprint examiners in the United States.

During the trial, Jennings' defense attorney, W.G. Anderson, questioned the veracity of fingerprint identification. In forensic science, it is difficult to enter new evidence into the courtroom proceeding if it does not have precedence in the system. In an attempt to disprove the uniqueness of fingerprints, the defense team acquired random fingerprints from the public to show that two people could have the same fingerprint patterns, only to discover that it backfired. It was quickly discovered in the courtroom that their sample did not have matching fingerprints.

Jennings was convicted of the murder of Hiller and sentenced to be hanged. He appealed the conviction on the basis that fingerprints were not infallible. But in 1911, in *People v. Jennings*, the Illinois Supreme Court made a ruling that stands as the landmark case for the use of fingerprints as a form of unique identification. The court upheld the conviction due to "Standard authorities on scientific subjects discuss the use of fingerprints as a system of identification, concluding that experience has shown it to be reliable."[241] Thomas Jennings was hung for his crimes in 1912.

The unique characteristics that make up the friction ridge skin on every individual (and some animals) point to the ingenuity of the Creator God. Job 37:7 tells us, "He seals up the hand of every man, that all men whom he made may know it."

Fingerprint patterns are the primary tool used for criminal identification. Fingerprints are the patterns created by the friction ridge skin located on the entire surface of the hands and feet. Due to the design of friction ridge skin, an uneven surface is created that provides a nonslip surface and firmer grip. Fingerprints develop in the mother's womb between 10 and 16 weeks of fetal development and remain with an individual until the dermal and epidermal skin fully decomposes after death. The value in fingerprint identification lies in three qualities: individuality, identifiable characteristics, and unchanging structure. The beauty, design, and complexity behind the structure of friction ridge skin testifies to a Master Artist and Creator God who loved every single person so much He gave them 20 unique friction ridge skin patterns (ten on the fingers and ten on the toes) unlike anyone else who will ever live on the face of the earth . . . past, present, or future.

FINGERPRINTS FROM A BIBLICAL WORLDVIEW

When studying friction ridge skin, the book of Psalms most closely manifests the unique design reflected in fingerprint patterns. Psalm 139:13–14 says, "For you formed my inward parts. . . . I am fearfully and wonderfully made." Job 10:8 describes the hands of God as having "fashioned and made me." Genesis 1 clearly describes the creation of humans as supreme to all other created things because they are formed in the image of God. God designed fingerprints to develop early in the womb. This is a testament to the value of a human life. At ten weeks of fetal development, humans have unique fingerprint patterns that remain with them for their entire lifetime. There is no question this person is fully human and entitled to the life God has planned for them. Also, at the moment of fertilization, a human has six feet of DNA that contains all the genetic instructions to form their fingerprints, as well as the information needed to fully develop. At the moment of fertilization, that tiny single-celled person is fully human. The abortion of a child in the womb at any point in a pregnancy is nothing short of the murder of a human life.

Fingerprints not only provide identifiable features, but the surface of friction skin is extremely sensory and can relay information directly to your brain. Imagine if you were blindfolded and someone placed a feather in your hand. Would your sense of touch allow you to distinguish the object? Absolutely! The intricate design of the hands (and feet) provides humans with the ability to pick up a heavy gallon of milk and an air-filled marshmallow at the same time while discerning the difference.

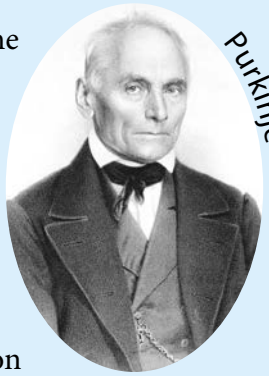
Also, the Creator God recognized the benefit of providing humans with a nonslip surface on their hands and feet. Therefore, the hands can grasp a cup without dropping it, and the feet walk barefoot without slipping. The uneven surface created by friction skin provides grip. Think about it — what is on the bottom of sneakers? Ridges and an uneven surface. Shoe manufacturers simply copied God's brilliant design when they developed nonslip footwear. And what is even more amazing is that God could simply have created friction skin to aid in gripping, but He went one step further and gave humans a special identity through their friction skin patterns in the form of over 10,000 unique details. In the estimated 108 billion humans that have lived in the last 6,000 years, there are not two people who even had one identical fingerprint, much less even ten points of minutiae that are identical. And imagine what the fingerprints of Jesus, who was born as a perfect human, must look like. Those who are believers know they will be able to look at the fingerprints on the nailed-scarred hands of the Savior when they get to heaven.

HISTORY OF FINGERPRINTS

The history of fingerprints dates back over 4,000 years. There is evidence on early stone artifacts, clay seals, pottery, and documents that demonstrates early civilizations recognized that fingerprints held value in someone's identity. Though there is no evidence to suggest these civilizations recognized every person has a unique set of prints, it does demonstrate recognition of a personal mark of identification.

Other historical documents have identified fingerprints as having patterns and include descriptions of spirals and loops, as well as descriptions of the thickness of the skin. In a petroglyph from the early 1700s, the Mi'kmaq peoples carved the ridge detail from a person's hand into slate.[242] There is clear recognition of patterns on the tips of the fingers and a whorl on the thumb, as well as ridge detail (lines) on the palmar area.

Chinese fortune tellers used fingerprint patterns and the number of whorls for their predictions. Though this is a form of witchcraft and holds no validity, it does demonstrate an awareness of friction ridge skin patterns.


Purkinje

But it was not until 1788 that Dr. Johann Mayer published the first information about the uniqueness of friction ridge skin. Mayer stated, "Although the arrangement of skin ridges is never duplicated in two persons, nevertheless the similarities are closer among some individuals. In others the differences are marked, yet despite their peculiarities of arrangement all have a certain likeness."[243] The first person to organize the patterns into a form of classification system was J.E. Purkinje in 1823. Purkinje was also one of the first to publish observations on primate friction ridge patterns as well as the fingerprint-like pattern on the prehensile tail of spider monkeys. Animal fingerprints will be discussed in Lesson 17.


Faulds

In 1879, an important advancement was made in identification by Alphonse Bertillon. Bertillon was a French criminologist who recognized everyone has unique body measurements. He devised the first system of classification based on a series of nine core body measurements. This system came to be known as anthropometry and was so successful that it spread to North America and was used in the United States as a means of filing criminals according to measurement. In 1903, the system was found to have fallibility and was discontinued. This occurred during the West case, the importance of which in relation to the science of fingerprints will be discussed later in the lesson.

Though various publications continued to surface over the next few decades, it was not until 1880 that the first article was published suggesting that fingerprints left at a crime scene could be used for identification. Dr. Henry Faulds is given credit for first publishing this practice, but it is Sir William Herschel, in response to Faulds' article, who stated he had been practicing this method for over twenty years in India. Therefore, Herschel is credited as the first European to implement the methodology of fingerprint identification.

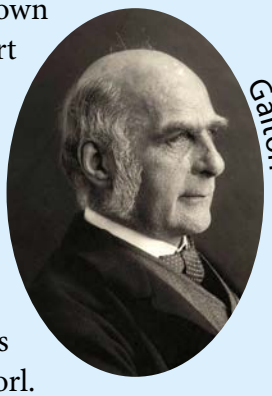
First fingerprints taken by Herschel, 1859

Now that fingerprints were recognized for their value in identification, it became necessary to develop a way to organize fingerprint files aside from someone's name. During this period, scientists also began toying with the idea of creating a superior human race. This initiative was called eugenics. Eugenics is defined as the study of how to force reproduction within a human population to increase the occurrence of heritable characteristics regarded as desirable. The scientist who coined the term eugenics and is considered the father of the eugenics movement, Sir Francis Galton, collected one of the largest repositories of fingerprint files for this period in history. As part of his eugenics research, he spent ten years studying over 8,000 ten-print fingerprint cards and classified each print according to pattern type and ethnicity for the sole purpose of determining what pattern type was special to a particular "race" of people. He published a book titled *Finger Prints* in 1892 that included an important conclusion:

> It may emphatically be said that there is no peculiar pattern which characterizes persons of any of the above races (English, Welsh, Hebrew, Black). There is no particular pattern that is special to any one of them, which when met with enables us to assert, or even to suspect, the nationality of the person.[244]

Once again, observational science confirms the truth of God's Word. The Bible states in Genesis 1 that God created Adam and Eve. Therefore, everyone in the human population is descended from them. In Acts 17:26a, the Bible emphasizes this again by saying, "And he made from one man every nation of mankind to live on all the face of the earth." Galton's own research confirmed that there is no particular fingerprint pattern that can be attributed to one particular people group but that patterns are randomly distributed across the whole of humankind, one human race made in the image of God.

It is important to note that the eugenics movement influenced the Nazi agenda and the extermination of millions of humans they considered less desirable, including those of Jewish descent, the disabled, and other minority groups. But the eugenics movement did not end with the defeat of the Nazi agenda. Eugenics still occurs today. Some countries like Iceland pride themselves on eliminating Down Syndrome,[245] but this is nothing short of eugenics. These countries have made it legal for parents to participate in selective abortions for the sole purpose of eliminating those babies that society deems less desirable.



Galton

In his book *Finger Prints*, Galton, who is also considered the father of fingerprint classification, developed the first system of organized fingerprint classification based on pattern type. In his book, he described the three types of fingerprint patterns still used today: arch, loop, and whorl. Expanding on Galton's research, Sir Edward Henry, a British official in India, developed a systematic method to classify fingerprints by assigning numerical values to fingers with the presence of the whorl pattern. The Henry system was so successful that it was brought to the United States in 1903, though it was used secondarily to the Bertillon method of anthropometry, which remained the primary means of identification until the historic West case.

William West

Will West

In May of 1903, a man was arrested and taken to Leavenworth Penitentiary in Kansas for processing. The clerk recognized the arrestee named Will West. When searching his anthropometry measurements, they found they were very close to another prisoner's — William West — measurements. Upon closer examination, they discovered these two men were identical twins who were unaware they had a twin brother. This case brought to light a discrepancy, or fallibility, in the method of anthropometry. When the fingerprints of Will and William West were analyzed, the technicians discovered they were uniquely different. Identical twins do not have the same fingerprints. The West case forever changed the use of fingerprints, and fingerprints remain the primary means of identification today.

ANATOMY OF FRICTION SKIN

Skin is the largest organ on the human body and covers an average of 22 feet on an adult. The ridged skin found on the hands and feet is distinctly different than the skin found on most of the body. Not only are the palms of the hands and bottoms of the feet two of three places on the body where there is no hair, but this is the location of unique pattern formation. Ridges develop in the womb and create identifiable characteristics. These ridges aid in gripping, and the creases in the ridges allow the skin to flex and bend. Friction skin is composed of two distinct layers: the epidermis and dermal layers. The epidermis is the thinner, outer layer of skin. This layer serves as a barrier against contagions and contains the sensory receptors. Damage to the epidermis in the form of cuts, burns, warts, etc., will undergo cellular repair, and often, no damage is visible in the friction skin patterns after healing.

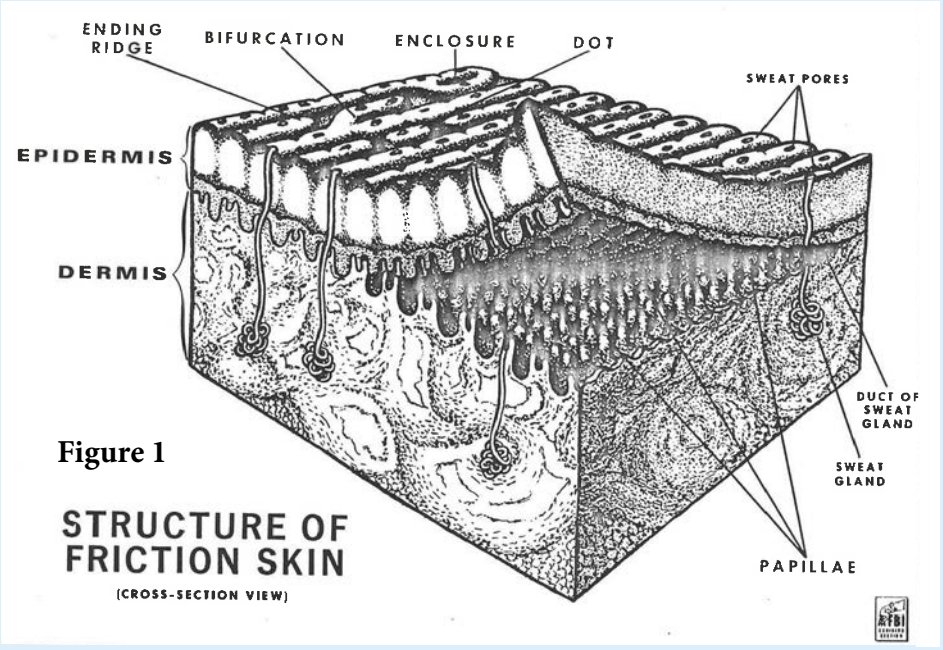


Figure 1

The dermal layer is the connective tissue that nourishes the epidermis. **Figure 1** shows that the fingerprint ridges and furrows are anchored deep within the dermal layer. A deep wound into the dermal layer will result in a permanent scar on the surface of the friction ridge skin. Permanent scars have the potential to become an identifiable feature as unique as minutiae characteristics. Sweat ducts from the dermal layer make their way to the surface of friction skin, secreting perspiration in the form of water (99%), fatty acids, amino acids, sugars, and other chemicals through the eccrine sweat glands. These eccrine sweat glands are the only appendage of friction ridge skin.

THE INDIVIDUALITY OF FINGERPRINTS

Analysis of fingerprints for over a century has confirmed the randomness of minutiae in friction ridge skin as a unique form of identification. In theory, it is a 100% certainty that no two people will have identical fingerprint patterns. God's design is truly amazing to study when you consider that all ten fingers will vary from those of the ten toes on one person. The 20 unique pattern arrangements on each finger (though some people may have more or less than twenty) will be unlike anyone else who will ever be conceived. All fingerprint patterns can be grouped into three basic categories: loops, whorls, and arches. Loops are the most common fingerprint in humans, consisting of 65% of all patterns, whorls are the second most frequent at 30%, and arches are the rarest at 5%.

loops	whorls	arches
65%	30%	5%

Considering there are an estimated 108 billion people who have been conceived in human history and there are only three general fingerprint patterns, what makes a person's fingerprints unique? Friction skin is made of thousands of little characteristics. The unique, comparable characteristics are called minutiae.

IDENTIFIABLE CHARACTERISTICS

The word minutiae basically means "details," and fingerprint patterns are made of thousands of details. It is estimated there are over 10,000 minutiae characteristics covering the entire surface of the hands and feet. Common examples of minutiae are listed below (though deltas and cores are not technically minutiae but common locations in a print).

Figure 1

- *Ridge ending:* the location where a ridge abruptly ends and does not continue.
- *Bifurcation:* the location where a single ridge splits into two separate ridges.
- *Island:* the location of a single spot of friction skin.
- *Crossover:* the location where two ridges cross and form an "X."
- *Delta:* the location where two ridges diverge and a point of reference or friction skin is visible at the center of the divergence. The term comes from the geographical term for a river delta.
- *Core:* the location of the center of the pattern area.

What makes minutiae characteristics so useful is the location of each point in relation to each other. The orientation of minutiae and how they make up the patterns of fingerprints are what is unique to everyone. The minutiae can be compared, counted, and analyzed against other known prints. Biometric software on phones, tablets, and computers are searching minutiae characteristics, not overall pattern type. When two points of minutiae on two different prints occur in the same location, it is considered one matching point. The examiner now begins the process of establishing additional concurring points (see **Figure 2**).

Figure 2

With over 10,000 characteristics on the surfaces of the hands and feet, it only takes between seven and ten minutiae on average to confirm a unique match. There is no official number of minutiae required for an identification, and each comparison is evaluated on its own merit. The greater the number of matching points, the greater the confidence level. If there is even one characteristic that does not match or cannot be explained, the examiner should begin leaning toward an inconclusive opinion. It is fascinating to think that ten minutiae only make up a surface area of about 1 cm^2 of one fingerprint, and this is enough information to confirm someone's identity. God created every single human with identifiable precision in friction ridge skin, made up of tiny details that form recognizable patterns unlike anyone else in His creation.

Biometrics:

A system of body measurements and calculations related to human characteristics for identification. (This topic is discussed further in Lesson 18.)

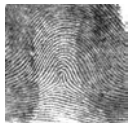
Unchanging Structure. The structure of friction skin remains unaltered during an individual's lifetime. There may be a wearing down of the ridges due to a person's profession or permanent scarring from injuries, but the identity found in the structure of the patterns is unchanging. The patterns that develop in the mother's womb between 10–16 weeks remain with a person until they decompose beyond the dermal layer of the skin. There have been cases when a body's epidermis is gone due to decomposition, but their identity has been verified by using the dermal layer of skin.[246]

FINGERPRINT CLASSIFICATION

Fingerprints are classified into three pattern groups: arch, loop, and whorl. These three basic patterns are further subdivided into eight total patterns, described in the following sections.

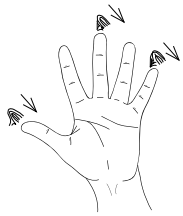
The Arch. Arches are characterized by not having a delta or core. The ridges in an arch enter one side and flow out the other side.

Plain arch: The ridges of a plain arch flow, or tend to flow, from the left side of the print to the right side of the print and create a gentle hill within the pattern area. A plain arch has no upthrust in the core of the fingerprint as seen in the tented arch.



Tented arch: The tented arch has a distinct upthrust in the shape of a camping tent or tepee in the core of the print. A tented arch may also be classified as such when it resembles a loop but lacks one of the three requirements to be classified as a loop.

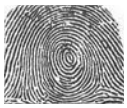
The Loop. The type of loop is determined by the flow of ridges in relation to the ulna and radial bones of the arm. A loop must meet three essential points: sufficient recurve, presence of a delta, and a ridge count of at least one. A ridge count is the number of ridges between the core and the delta.



Ulnar loop: Of the total eight pattern types, ulnar loops are the most common. In an ulnar loop, the ridges flow or tend to flow toward the pinky finger or ulna bone of the arm. The flow of ridges resembles a slide, as the ridges start at the base (delta) and flow upward over the core and then slope down off to the other side of the print.

Radial loop: Radial loops are less common and are characterized by ridges that flow or tend to flow toward the thumb or radius of the arm.

The Whorl. Whorls are characterized by the presence of two deltas and a core. There are four types of whorls:



plain whorl

central pocket loop whorl

double loop whorl

accidental whorl

When looking at all eight subclassifications of fingerprints and their frequency by pattern types, the following percentages reflect their commonality or rarity.

Loops		Arches	
Ulnar	Radial	Tented	Plain
60%	4%	1%	4%

Whorls			
Plain	Central pocket loop	Double loop	Accidental
21%	4%	4%	1%

HENRY CLASSIFICATION

Henry

Sir Edward Henry is given credit for the fingerprint classification system used in the United States. The system is based on the presence of whorls in fingers or thumbs. A point value is only given if a whorl is present. If no whorl is present, no value is given for that finger or thumb. The fingerprint classification is written in fraction form. To avoid a value of "0" when no whorls are present, an arbitrary "1" is always added to both the numerator and denominator. Therefore, an individual who has no whorls present on any of their fingers or thumbs has a primary classification of 1/1. Someone who has whorls on all ten of their fingers, after applying the Henry system, will have a classification of 32/32. Therefore, all primary fingerprint classifications fall within the range of 1/1 to 32/32.

A complete fingerprint classification includes the components below in the format of a large fraction.

	Key	Major	Primary	Secondary	Sub-Secondary	Final
Numerator	The ridge count of the first loop. If there are no loops, there is no key.	The ridge count or whorl tracing of the right thumb. If a small letter group, this will take precedence.	The value of fingers 2, 4, 6, 8, 10 + 1.	The capital letter representation of the right index print pattern (A, T, U, R, W).	The ridge count codes (I, O) or whorl tracings (I, M, O) in fingers 2–4 of the right hand. If a finger has a print in the small letter group, this will take precedence.	The ridge count of the pinky finger in the right hand. If there is no loop in the right pinky, the left-hand pinky is used and placed in the denominator. If there is no loop in either pinky finger, there is no final.
Denominator	If there is no value for the key, this is left blank.	The ridge count or whorl tracing of the left thumb. If a small letter group, this will take precedence.	The value of fingers 1, 3, 5, 7, 9 + 1.	The capital letter representation of the left index print pattern (A, T, U, R, W).	The ridge count codes (I, O) or whorl tracings (I, M, O) in fingers 2–4 of the left hand. If a finger has a print in the small letter group, this will take precedence.	The ridge count of the left-hand pinky finger when there is no loop in the right pinky. If there is a loop in the right hand, this is left blank. If there is no loop in either pinky finger, there is no final.

Step 1: Identify the pattern of each finger with a letter under the finger: whorls (capital W in all fingers), arch (lowercase a in all fingers except the index finger where a capital A is used), tented arch (lowercase t in all fingers except the index finger where a capital T is used), radial loop (lowercase r in all fingers except the index finger where a capital R is used). The only exception is for ulnar loops, which are the most common type of fingerprint. A diagonal line slanting in the direction of the loop is used to signify an ulnar loop — "\" in the right hand and "/" in the left hand. Notice that the diagonal line follows the flow of ridges toward the ulna bone in that hand. See the fingerprint card to the right.

Step 2: Once the patterns have been identified, identify the ridge counts in the loops and the type of tracing in the whorls.

- *Ridge counts in ulnar and radial loops:* Count the number of ridges that cross an imaginary straight line from the delta to the core of the fingerprint. This value is written in the top right corner of the fingerprint block.

- *Whorl tracings:* Trace from the center of the left delta to the center of the right delta. Assign a value of I (inner) for a tracing that flows inside the right delta, M (meet) for a tracing that aligns with the core of the right delta, or an O (outer) for a tracing that flows outside the right delta. The tracing is written in the upper right corner of the fingerprint block along with the type of whorl (plain "P," central pocket "C," double loop "D," accidental "X").

Inner tracing (I)

Meet (M)

Outer (O)

Step 3: Record the Key. The key is the ridge count of the first finger with a loop pattern. The first finger to have a loop is the right index finger, and when counting the number of ridges from the delta to the core, the count is 7. The key is placed in the numerator. If there are no loops in the ten fingers on the fingerprint card, there is no key.

Step 4: Record the Major. The major is either the whorl tracings or ridge count code in the thumbs. If a whorl tracing, only use the capital letter for the trace type, I (inner), M (meet), or O (outer).

For ridge counts, the coding for the thumbs is:

		Grouping Sizes		
	Coding	**Small**	**Medium**	**Large**
Right hand	When the left thumb is 16 ridge counts or less	1–11	12–16	17 and over
Right hand	When the left thumb is 17 ridge counts or over	1–17	18–22	23 and over
Left hand		1–11	12–16	17 and over

The right thumb's information is placed in the numerator and the left thumb's in the denominator.

Step 5: Record the Primary. Calculating the primary is the most important step in the classification process. A point value is given only if a whorl is present in the assigned finger block. The chart below provides the point value given to each finger. The whorl can be any one of the four types of whorl patterns.

Finger 1 Right thumb 16 points	Finger 2 Right index 16 points	Finger 3 Right middle 8 points	Finger 4 Right ring 8 points	Finger 5 Right pinky 4 points
Finger 6 Left thumb 4 points	Finger 7 Left index 2 points	Finger 8 Left middle 2 points	Finger 9 Left ring 1 point	Finger 10 Left pinky 1 point

To formulate the primary or numerical portion of a classification, the whorl value assigned to each finger is added to create a numerator and denominator.

The numerator is the sum of the values of fingers 2, 4, 6, 8, and 10, if a whorl is present, plus arbitrary 1.

Numerator: sum of fingers
2, 4, 6, 8, 10 +1

The denominator is the sum of the values of fingers 1, 3, 5, 7, and 9, plus arbitrary 1, only if a whorl is present.

Denominator: sum of fingers
1, 3, 5, 7, 9 +1

Observe the fingerprint card below. Using the Henry system of classification, the primary is calculated as 1/17.

Numerator: no whorls in fingers
2, 4, 6, 8, 10 + 1 = 1

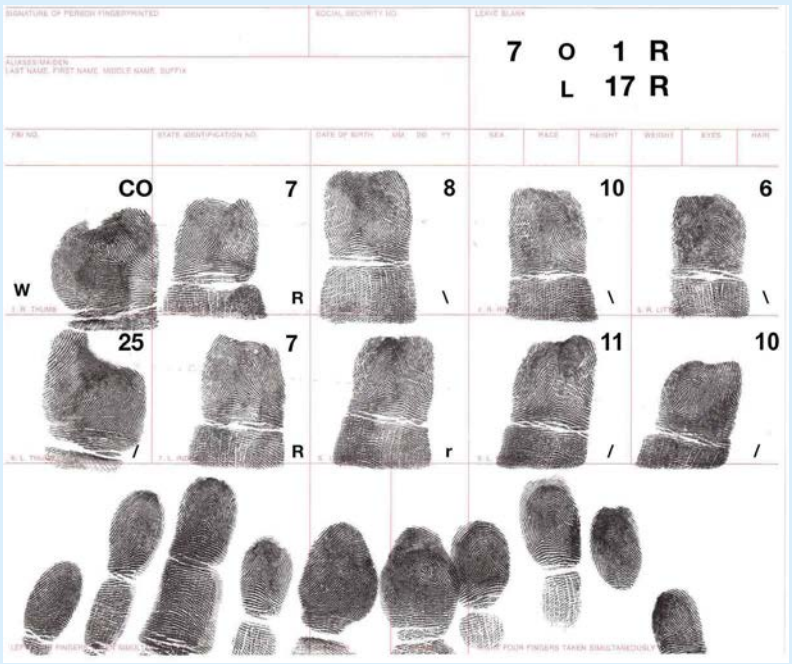
Denominator: 16 points for finger 1, no whorls in
3, 5, 7, 9 + 1 = 17

Step 6: Record the Secondary. Following the primary is the secondary, which is simply the pattern type in the index fingers. This is represented by a capital letter:

Whorl	Plain arch	Tented arch	Ulnar loop	Radial loop
W	**A**	**T**	**U**	**R**

Observe the fingerprint card below. Using the Henry system of classification, the secondary is R/R.

The secondary is written directly next to the primary.



Step 7: Record the Sub-secondary. The secondary is followed by the sub-secondary, which is the pattern types in the index, middle, and ring fingers of both hands, unless there is a member of the "small letter group" such as a radial loop, tented arch, or plain arch in the middle fingers (fingers 3 and 8), ring fingers (fingers 4 and 9), pinky fingers (fingers 5 and 10), or thumbs (fingers 1 and 6) of either hand. Due to the rarity of these pattern types outside of the index fingers, they are given priority in the classification. Small letters are brought up to the classification in their exact position adjacent to the index finger (secondary) in both the numerator and the denominator. If there are multiple small letters, a dash is used in between the letters to indicate an absence. If a small letter is in the thumb, that letter is placed to the left of the index (secondary).

If there are no small letters present in the middle fingers, ring fingers, pinky fingers, or thumbs, then the following process is followed for loops and whorls.

Ulnar loops: In the example below, there is a ridge count of 17. The number of ridges present in each finger determines the code of I or O.

Code	Index	Middle	Ring
I	9 or less ridges	10 or less ridges	13 or less ridges
O	10 or more ridges	11 or more ridges	14 or more ridges

The ridge count is written in the upper right corner of the fingerprint box. The right-hand codes are written in the numerator and left hand in the denominator.

Observe the fingerprint card to the right. Using the Henry system of classification, the sub-secondary is R/Rr.

This is because the radial loop in the middle finger is considered in the small letter group. Since it is in the middle finger of the left hand, it is placed in the denominator directly next to the index finger.

Step 8: Record the Final. The final is the ridge count of the pinky in the right hand. If the pinky of the right hand does not have a ridge count (such as when an arch or whorl is present), then use the ridge count in the left pinky finger and write in the denominator. If no ridge count is present in either pinky, leave this section blank. Observe the fingerprint card below. Using the Henry system of classification, the final is 6.

CONCLUSION

Fingerprints are fascinating to study because every single one is different. There is always something new to discover in the field of dactyloscopy (classification of fingerprints). God's ingenuity and creative design is reflected in the arches, loops, and whorls through the functionality of friction ridge skin. The rippled surface aids in gripping and provides a nonslip surface on the hands and feet. There is no question that fingerprints are just one example of how the human body is fearfully and wonderfully made.