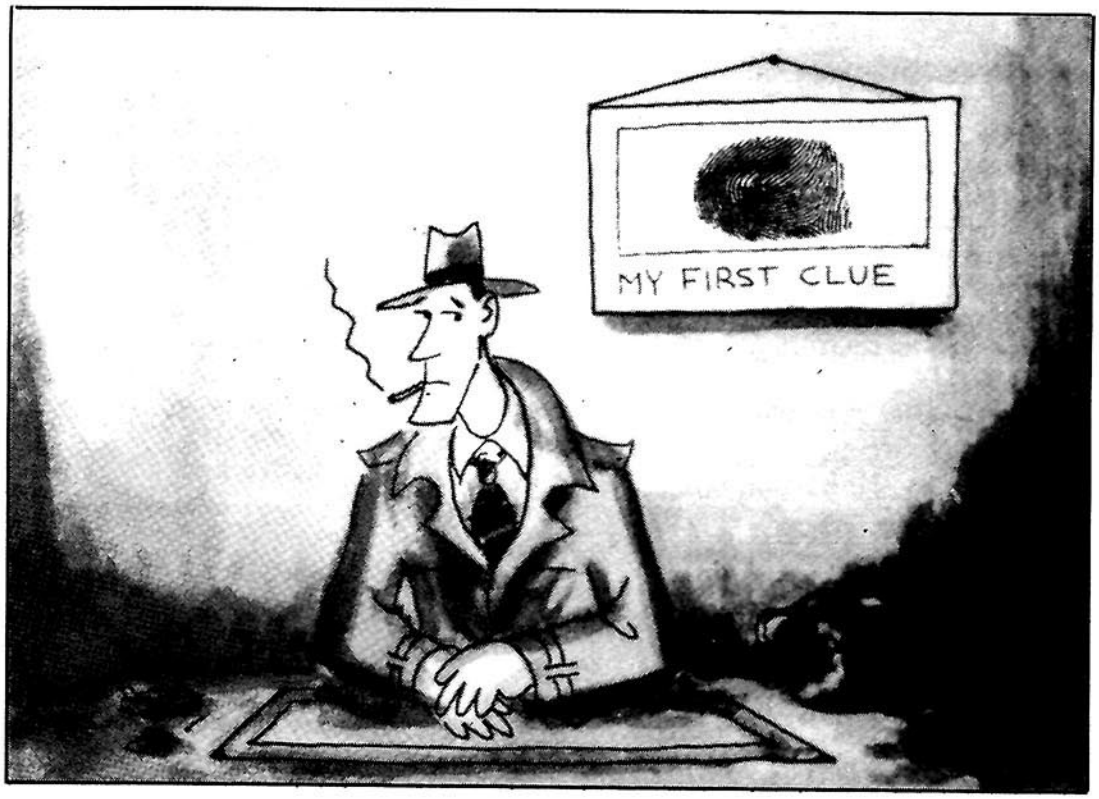
MERCENARIES SPIES & PRIVATE EYES™

SET:1

IDENT-A-KIT

FINGERPRINTS

A COMPLETE FINGERPRINTING SYSTEM FOR ALL CONTEMPORARY ROLE-PLAYING GAMES



Notes to the GameMaster

The IDENT•A•KIT series of playing aids has been developed to enhance all mystery, adventure and investigative games. IDENT•A•KIT 1 will enable you to give the added dimension of Fingerprints to your characters. In the world of mystery gaming this is more than just a cosmetic addition. It gives you, the GameMaster, another tool for building greater realism and complexity into your games.

When Bill Lamb and I were first developing the Fingerprint system for *GUMSHOE* we saw how the skill of being able to identify individuals by their Fingerprints gave a whole new dimension to the mysteries we were able to develop. When we completed *GUMSHOE* we went to work on a system that could be used for role-playing. IDENT•A•KIT 1 is that system.

Thanks to Marc Bilgrey for permission to reprint this cartoon from The Private Eye Cartoon Book, *Andrion Books, 1985.*

System Components

IDENT•A•KIT 1 contains:

1. Five sheets of self-sticking Fingerprints. Each sheet has 10 unique prints, 5 copies of each. Two of the prints are rolled and numbered, three are plain. This gives a total of 50 unique prints, 5 each, for a total of 250 prints. Rolled Fingerprints are obtained directly from the individual for use with official records, i.e. *Classification Cards* and *Character Sheets*. The plain prints can be used as latent print clues in your adventures.

2. Ten Classification Cards. These cards will be used to set up the GameMaster's Identification Bureau. There are ten cards, one for each classification of Fingerprints. In our design, the Identification Bureau represents official records such as those of the Federal Bureau of Investigation, local police, or the armed forces, and only the prints of characters who would logically have a criminal or military record would be available to investigators. As always, of course, if you as GameMaster wish to include the prints of all characters, you may do so.

Following is a listing of the Fingerprints used in this kit with their file numbers and classifications:

0101-0105	**Plain Arches**
0161-0165	**Tented Arches**
0221-0225	**Loop/5**
0281-0285	**Loop/6**
0341-0345	**Loop/7**
0401-0405	**Central Pocket Loops**
0461-0465	**Twin Loops**
0521-0525	**Whorls/inner**
0581-0585	**Whorls/meeting**
0641-0645	**Whorls/outer**

3. *FINGERPRINTS SIMPLIFIED.* A 16-page book that explains Fingerprint classification.

4. Master List of Fingerprints. For use by the GameMaster only, a list of all Fingerprints by number and the characters and players to whom they have been assigned. Use pencil so assignments can be changed as needed. The GameMaster may wish to make copies of the blank Master List for future games.

5. 3X Magnifier. For use by players to aid in identifying prints.

Use of System

To assign a character a Fingerprint, find an unassigned print on your *Master List* and enter the character's name. The number on the master list will match the ID number on one of the prints. Place one of the numbered rolled prints on the proper *Classification Card*, if appropriate. The other rolled print can be placed on the character's *Character Sheet*. The latent prints are to be used as clues.

Example:

A player finds an abandoned hideout and wants to fingerprint it. The following is an example of the type of information that might be gathered and deduced from such an examination. You, the GM, should choose the prints of the characters that used the hideout and give them to the investigator(s). Figure 1 shows four plain prints mounted on a 3"x5" card. Figure 2 is a floorplan of the hideout house. This then is your basic information, but by looking at the distribution of the Fingerprints and their frequency we may be able to infer other information.

Fingerprint A is found only in the living room and the bathroom and with less frequency that any of the other three prints. Fingerprint B is found throughout the house and is the only print found in bedroom II. Fingerprint C is found throughout the house and is the main print found in the kitchen and in bedroom I and its connecting toilet. From its size we can assume it belongs to a woman. Fingerprint D is found throughout the house and in bedroom I.

Fingerprints have also been found on objects in the house, most notably on whiskey bottles, ashtrays and the medicine cabinet. There are a number of empty Wild Turkey whiskey bottles found in the house; most are covered with only Fingerprint B. Two empty Milk of Magnesia bottles found in the bathroom are also covered with B's prints. A crumpled pack of Chesterfield cigarettes are found with Fingerprint B. There is a half empty gin bottle with C's prints.

The ashtrays are inprinted with Fingerprints B and C. The ashtrays contain Chesterfield butts along with Lucky butts that also have lipstick marks. Fingerprint B is found frequently on the medicine cabinet in the bathroom whereas Fingerprints C and D are found in the toilet off bedroom I. There are no ashtrays in bedroom I.

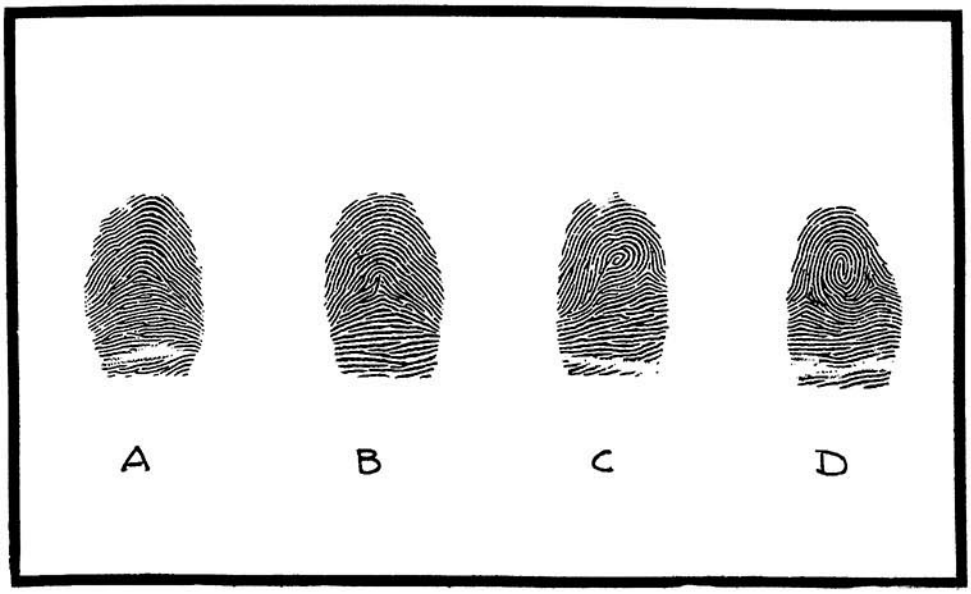


Figure 1

What can we infer from this information? First, that three of our four gangmembers, B, C and D, have been living at the hideout. Apparently A only visited since his fingerprints are found only sparcely in the living room. C is most likely a woman who is coupled with D, with whom she shares bedroom I. She smokes Lucky Strikes and drinks gin. It looks as if D neither drinks alcohol nor smokes. His fingerprints are not found on any of the bottles or ashtrays and no ashtrays are found in bedroom I which is used by C and D. B, on the other hand, looks as if he may be an alcoholic. The many empty Wild Turkey bottles with his prints as well as the Milk of Magnesia bottles lead us to this conclusion.

As GM you can add other clues as you wish and give them to the players dependent on their skills and skill levels. Time is also a factor in how much information you will want to give out. To fingerprint a house of the size used in this example would take the better part of a day for a high level fingerprint expert. If a player only wants to take a short time, cut the information and the clues accordingly.

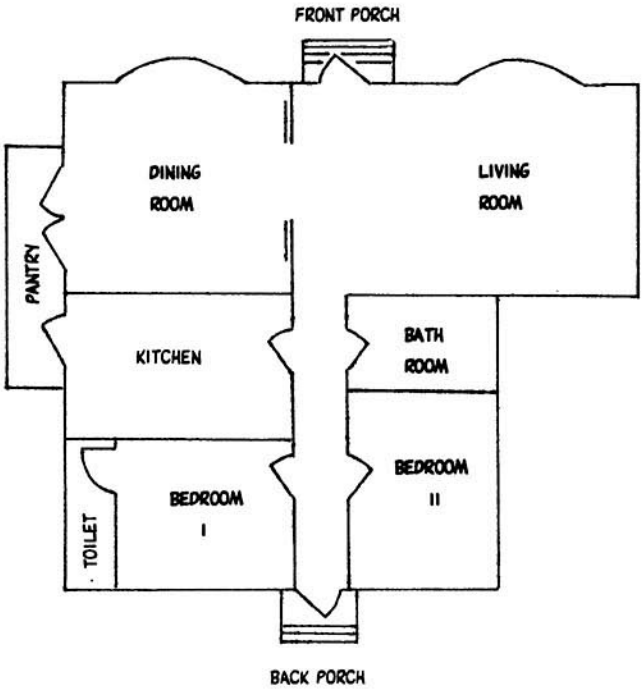


Figure 2

Player's Use of Prints:

Now that the player has the fingerprints, you, as GM, have a number of approaches you may take. You might decide to give the player fingerprint classification information based solely on the player's character's characteristics and skills. Or you might let the player use his own skills and the knowledge that he has gained from reading *Fingerprints Simplified* to attempt correct classification.

For example, Fingerprint A is a Plain Arch. If the player classifies this print correctly and asks for the Plain Arch *Classification Card,* he should then be able to match it with print 0101. By checking the back of the *Classification Card,* the player will get the name of the character to whom the print belongs. Remember, the *Classification Cards* are supposed to represent the *Identification Bureau* (FBI), so only characters with criminal or military histories would have prints on file.

In the case of Fingerprint C in the above example, the player may correctly identify the print as a Central Pocket Loop and request that *Classification Card,* but the print cannot be matched. This will tell the player that this character does not have a government record and that the identity will have to be found elsewhere, e.g., Motor Vehicle Department, medical records, etc. Similarly, the investigator may be able to deduce whose print he or she has found by comparing prints found in several locations or by knowing whose house, office or car has been "dusted."

Conclusion:

We have tried to design the *IDENT•A•KIT FINGERPRINT SYSTEM* to give maximum flexibility in its use. Each GM has developed his own approach to adventure gaming, so feel free to develop your own approach to fingerprinting.

Gary Grady

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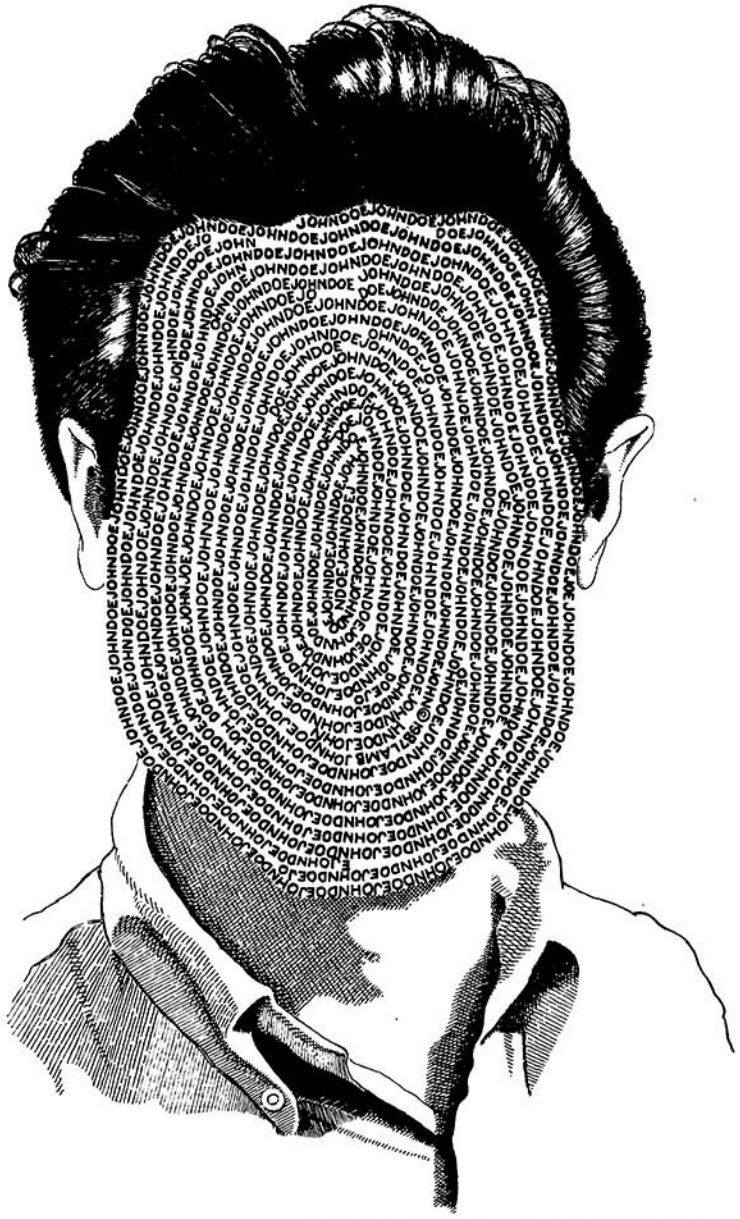
Stock No. 7501

IDENT-A-KIT: I

FINGERPRINTS



. . . . Nothing, I think, has played a part more exciting than that enacted by the fascinating loops, whorls, and arches etched on the fingers of a human being

J. Edgar Hoover

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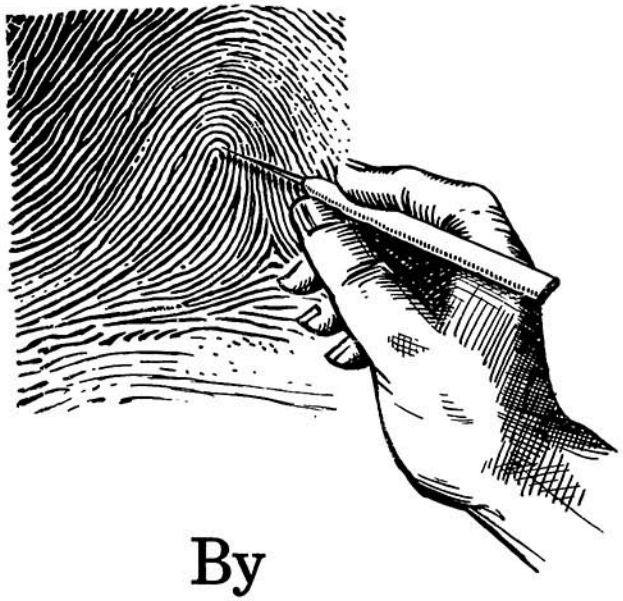
FINGERPRINTS SIMPLIFIED

A PRIMARY HANDBOOK IN THE SCIENCE OF FINGERPRINT IDENTIFICATION



By

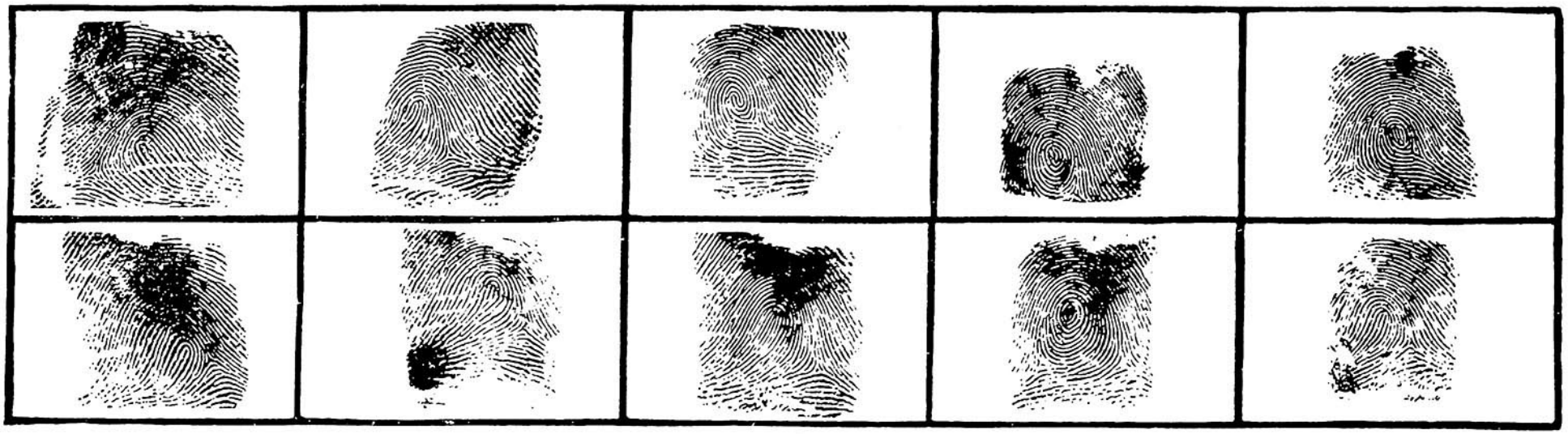
William Lamb

Fingerprints Designed By: William Lamb

IDENT•A•KIT Designed By: Gary Grady

Sleuth Publications • San Francisco

ILLINOIS STATE BUREAU OF CRIMINAL IDENTIFICATION AND INVESTIGATION
SPRINGFIELD, ILLINOIS



$5,000.00 REWARD

JOHN DILLINGER is wanted in several mid-western states for numerous felonies including murder.

The Governors of Indiana, Michigan, Minnesota, Ohio and Illinois, have issued a proclamation offering a reward of Five Thousand Dollars ($5,000) for the apprehension and delivery of John Dillinger to any sheriff of the above mentioned states.

Description: Age, 31; ht., 5 ft 8½; wt., 160 eyes, yellow slate; hair, medium chestnut; complexion, medium.

Notify any sheriff of Indiana, Michigan, Minnesota, Ohio, Illinois, or this Bureau. Illinois State Bureau of Criminal Identification and Investigation, T. P. Sullivan, Supt., Springfield, Illinois.

BRIEF HISTORICAL NOTES

Rocky Ridges stiffened in his chair. He had been under interrogation for seventeen straight hours and the Lieutenant just nailed him with the clincher.

"We know you were there ... in that room, we're not sure when, but we *know* you were there."

"How do you know that?" Rocky was mystified and muttering to himself, "No one saw me, I'm sure of it ... no one could have ..."

"Warts, Rocky, if you want to know where you blew it, warts gave you away."

"Warts?" Rocky half replied, still mystified.

"They've got someone else confused with me ..." His mind was racing now. "Maybe I'll get out of this yet." Rocky actually began to feel better for the first time since the ordeal had begun.

"I don't have any warts!" Rocky blurted loudly.

"Well, in a manner of speaking, we all have warts, Rocky." The Lieutenant was warming up to the subject now. "You see, it all began many millions of years ago ..."

As early animals began to move about on land their feet evolved pads to cushion and absorb the weight. Tiny little warts were formed on the surface of these pads. Originally these warts were grouped in circular clusters distributed across the pad area. As time and evolution progressed these minute mounds started to fuse together, forming ridges or furrows across the pad surface. This manner of alignment provided for better grip for animals increasingly dependent upon speed and climbing ability.

As man's early ancestors took to the trees, less grip became necessary, and the furrows flattened and receded into the surface. This process continued up to the time of higher primates and man. Evolution having done its job, it now remained for man to discover and make use of the results.

We have much evidence through cave paintings and rock carvings that fingerprints were recognized and regarded by prehistoric peoples. Their early use, however, was probably on a spiritual and religious level. Evidence of more practical applications emerge from early clay tablets and pottery of Assyria and Babylonia. Here we may find a proud craftsman affixing a thumb print to a finely-made vase or a merchant imprinting a clay bill of lading as incontestable proof of ownership.

Chinese society began using fingerprints early on to seal business and legal documents. An early crime novel *The Story Of The River*, from the twelfth century Chinese author Shi-naingan contains this passage: "Wu Sung captured the two women who had killed his brother. ... He compelled them to ink their fingers and to record their fingerprints." In fact it was the Chinese who first began to classify finger impressions by type for the identification of criminals. A description of this system, which is based on *loops* and *whorls*, appeared in an American journal of 1886 and was read by Francis Galton, an English anthropologist and co-developer of the Galton-Henry system.

EARLY DACTYLOSCOPY

Dactyloscopy (the modern word for the technique of fingerprinting) was discovered by two men living in Asia but working independently of each other.

In 1858, Sir William J. Herschel prevented impostors in India from receiving pension money by means of fingerprinting. This work led to a report on fingerprints which Herschel sent to the Inspector General of Indian Prisons in 1877. No official action ever came of the report and Herschel continued working with fingerprints with no notice from the outside world until 1880.

In 1880 an article signed by one Henry Faulds appeared in the science journal *Nature*. This article described fingerprinting but more importantly noted that chance impressions could be left at the scene of a crime. Dr. Faulds made his discoveries while working in Japan and knew nothing of Herschel's work in the same field. Herschel, not to be outdone, wrote in the next issue of *Nature* detailing his work of twenty years in India—establishing himself as a pioneer of modern fingerprinting.

Herschel's establishment of fingerprints as a positive means of identification and Faulds' discovery of their criminal detection possibilities paved the way for the scientific foundation of Dactyloscopy.

THE BERTILLON SYSTEM

At this point mention should be made of Alphonse Bertillon, one of history's outstanding criminologists. Until the establishment in 1882 of Bertillon's Bureau of Identification, methods of criminal identification were unscientific and unreliable. In fact very little progress had been made from those methods used by the Egyptians. About 1860 a man named Stevens, then warden of a prison in Louvan, France, began to record the measurements of the hands, ears, feet, breasts and body lengths of known criminals. He was working under theories previously advanced by the Belgian statistician Quetelet, that no two human beings in the world are of the same size. Bertillon, then a clerk in the Paris police department, readily seized and expanded upon the work of these two men.

Anthropometry or *Bertillonage* was based on the principle that the human skeleton does not change after age twenty and that no two humans have bones exactly alike. Eleven specific measurements were taken of the body, head and limbs:

BODY

1. Standing height
2. Width of outstretched arms

3. Sitting height

HEAD

4. Length of head
5. Width of head
6. Width of face across the cheekbones
7. Length of right ear

LIMBS

8. Length of left foot
9. Length of left middle finger
10. Length of left little finger
11. Length from left elbow to the top of the outstretched left middle finger.

After measurements were taken the results were classified (mainly into categories of small, medium and large) then filed in certain order to facilitate search. Boys and young men were classified according to the color of eyes and details of the ears which are highly individual in each person.

Bertillon also perfected the photographic methods in use at the time. He made them uniform and used a fixed scale by which bodily measurements could be calculated from the photographs. Eventually Bertillon came about to photographing the front view and profile, the forerunner of the modern mug shot.

After initial opposition from skeptical critics, Bertillon was able to establish the Bureau of Identification with himself as director in 1882. The immediate results were impressive. In the first year 49 individuals were properly identified after giving false names. This figure increased from 241 the next year to as many as 680 by 1892. Even in the face of these successes, however, anthropometry was destined to be only a temporary solution to the problems facing law enforcement officers.

For Bertillonage had serious flaws. Its basic premise that the human skeleton does not change from adolescence to maturity was proven untrue. Too much depended upon consistency and accuracy. Measurements taken years later of a person had to be performed in exactly the same way as earlier readings. Changing bodily conditions due to obesity, sickness or aging coupled with human error made the system just barely workable. These factors led police officials to seek elsewhere for more practical solutions. By 1894, in London, Bertillon's methods were being combined with the fingerprinting system then being advanced by Sir Francis Galton.

THE GALTON-HENRY SYSTEM

Sir Francis Galton was the leading British scientist of his day. As an anthropologist he began to study fingerprints in hopes of establishing an hereditary link. Although this did not prove successful, what did emerge in his 1892 work entitled *Fingerprints* proved invaluable to the field of criminology.

In this book he was able to prove mathematically that there could not be two identical fingerprints. This does not sound like a major statement to those of us living in the late twentieth century. But at the time, when very few actual fingerprints were on file, there was skepticism about Galton's calculations having any validity beyond the purely theoretical.

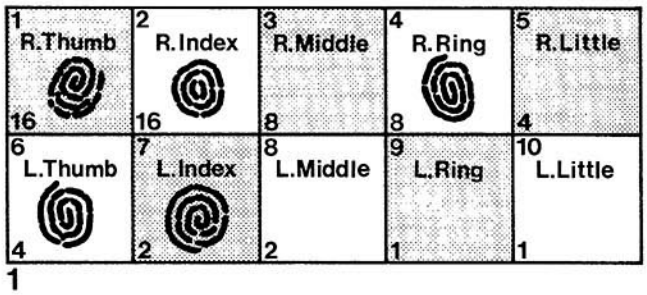
Galton proposed useful methods for classifying fingerprints. He divided the basic patterns into Arches, Whorls and Loops (after the Chinese system which he had researched) and proposed a system for subclassification by ridge counting which was later adapted in part.

Sir Richard Henry, a police commissioner, expanded upon Galton's theoretical and statistical groundwork with practical working knowledge. Henry had studied with Herschel in India and as Inspector General of the Bengal police had brought about a very advanced system of fingerprinting in India at a time when most countries were still clinging to the Bertillon system of body measurements.

After Galton had gained acceptance for the superiority of fingerprinting as an infallible means of identification, the main task that lay ahead for law enforcement was the development of efficient and accurate ways to file and search those prints. Galton's basic classifications served well for a time, but by the 1900s they would no longer suffice. Henry broke the three groups down further. Arches were subdivided into *plain* and *tented* categories. Loops were separated into *radial* and *ulnar* types. Whorls and composites were incorporated into a unique arithmetical arrangement called the *primary grouping*.

This grouping takes all ten fingers into account and expresses them into a formula which can range from 1/1 to 32/32 (1024 combinations). Diagram 1 will help explain how this works. The only pattern to receive a value will be the whorl (includes composites) patterns. Each finger is numbered starting with the right thumb and ending with the left little. Odd numbered squares will become the numerator and even numbered will be the denominator. Thus the rule is to add the numerical value (appearing in the lower left of the square) of any whorls appearing in fingers 1, 3, 5, 7 and 9, then add 1 to obtain the denominator. Use the same process for 2, 4, 6, 8 and 10 to get the numerator.

For example, suppose you have obtained the fingerprints of an individual having whorls appearing in the



1

right thumb, right index, right ring, left thumb and left index (see Diagram 1). Add the values in the odd squares which have whorls (#1 and #7) then add 1 to get the denominator of 19 (16 + 2 + 1 = 19). Now add those values in the even squares which have whorls (#2, #4, and #6) plus 1 to get the numerator of 29 (16 + 8 + 4 + 1 = 29). Thus we have a primary classification of 29/19. The one is added to keep from using zero which could be confused with O.

Henry's development of the primary classifications provided for a further 1,024 subdivisions ranging from no whorls (1/1) to whorls on all ten digits (32/32). This step greatly facilitated the search process at a time when the number of sets of prints on file was rapidly mounting.

The primary grouping, though very effective in itself, is only the first step in the Galton-Henry classification process. Interested readers are referred to the excellent work *Practical Fingerprinting* to delve further into the system.

In 1903 Galton-Henry was inaugurated into Scotland Yard and the Bertillon system was in decline. An incident occurring at Leavenworth Penitentiary in 1903 (excerpted from the book *Crime Lab* by David Loth) illustrates the reason:

> The demonstration that discredited Bertillon fluttered the records office of the Federal Penitentiary at Leavenworth, Kansas, in 1903. A prisoner named Will West was brought into the room where a clerk measured and photographed new inmates according to the system. This clerk was sure he had seen and measured West before, and under the same name, too. But West was listed as a first offender, and he denied ever having been in a prison anywhere. The clerk persisted. He got out his records and, sure enough, found one for a William West. The measurements on the file card were exactly those of this new prisoner, the photograph an excellent likeness. But the William West they identified was at that moment still in Leavenworth, serving a life term for murder. The F.B.I. now exhibits the photographs and records of the two Wests to show why the Bertillon system was discarded.

Despite this we should not give short shrift to Bertillon. Physical characteristics, especially facial descriptions, are a valuable tool for police officers. Bertillon in his *Portrait Parle* (spoken pictures) gave useful guidelines for describing wanted persons, many of which are in use to this day.

Alphonse Bertillon died in 1914 and because of his strong opposition to fingerprints (in preference to his own anthropometric process) it was not until after his death that the fingerprint system was officially adopted in France. By 1942 the F.B.I. Identification division (established in 1924) had more than fifty million sets of prints on file, a formidable weapon in the war against crime.

SOME NOTES OF GENERAL INTEREST CONCERNING FINGERPRINTS

The first rule of Dactyloscopy states: *"There are no two identical fingerprints."* Early opponents of the new science of fingerprinting were skeptical of this rule. Today, however, after many millions of individual impressions have been taken, there have never been found to exist any two fingerprints which are identical and the mathematical probabilities of this ever happening are truly astronomical. Furthermore, there is no link from parents to children or between brothers and sisters from a dactyloscopic point of view. Anthropologists have found certain similarities of a very general nature among racial groups, especially when there has been little intermingling, however these are never conclusive enough to serve the needs of criminology.

"Fingerprints are not changeable" is the second rule of dactyloscopy. Once the ridge pattern is formed on the fingertips of a fetus (within 100 to 120 days) it will remain the same throughout the life of the individual. Barring leprosy, no illness will influence the pattern. Abnormalities in growth will only change the distance between the friction ridges, the same as enlarging or reducing a photograph would do: the basic pattern will remain completely unaltered. Criminals who practice self-mutilation by cutting and burning only get temporary results. When the scars heal the ridges will reappear exactly as before. If the cuts are deep enough they will become a permanent part of the ridge pattern making criminal identification that much easier.

As if the criminal did not have enough going against him by the fingerprint pattern itself, this pattern under magnification will reveal a further incriminating design, that of the sweat pores. Poroscopy, a sub-science of fingerprinting, was discovered by the eminent criminologist E. Locard. The tiny openings, when enlarged by the camera and viewed, can be shown to be completely individual in size, shape, position on the ridge, number and distance between each other (see Diagram 2). Like the ridge pattern, pore patterns do not change and cannot be altered. The shape of the sweat pore openings stays constant regardless of the pressure applied, unlike the ridge print which can be obliterated or saturated under too much or too little pressure. The diameter of this opening varies between .08 and .25 of a millimeter and is much smaller in women than in men. Poroscopal identification comes in to best play when only a fragment of a print exists and not enough to classify as to pattern.

What can be told from immediate observation of a fingerprint about the person who made it? As we noted earlier, it's not practical to determine race or heredity from examination of a ridge impression. However, it may be possible to state with some

assurance the sex and age of the maker. The table below shows how the number of ridges within a given space may vary from the newborn infant to the adult of twenty years.

Age	*Ridges per 5 mm Space*
Newborn	15 to 18 ridges
Eight years	13 ridges
Twelve years	12 ridges
Twenty years	9 to 10 ridges

2

3

In some cases extremely large hands may produce a ratio of six or seven ridges in the adult male . Needless to say, the table should not be taken as absolute—some persons mature earlier than others, and individual physical characteristics vary. It may also be possible to discern the print of an elderly person if the ridges show signs of skin creases (see Diagram 3) or are flattened and ragged with edges no longer smooth and sharply defined.

There is also some relationship between the general physique of a human and that individual's skin structure. Friction ridges of a more coarse appearance are likely to point to a burly, large man whereas the opposite, small and delicate, tend to indicate those of a woman. Tall people will exhibit fingers and fingerprints which are elongated and unequal in length. Short and stout statured persons will display short, stubby fingers more equal in length.

Some effort has been made towards defining occupational markings i.e., the prints of seamstresses and upholsterers should have tiny pits visible from needle marks; and dishwashers' fingertips would show broad vertical wrinkles from prolonged soaking. However, this method has only proven true in extreme and very pronounced cases. It may sometimes be possible to recognize a musician's fingermarks; a guitar or bass player may have heavy callouses on one hand, a saxophonist often has a substantial callous inside the right thumb. Only investigators who have vast experience of the normal and abnormal in fingerprints and will not jump to unreasonable conclusions can draw useful conclusions. As with so much investigative work, much of what seems sketchy when considered in isolation, pieced together with other evidence and bits of information can add up to quite a case.

LATENT FINGERPRINTS

"Latent" is from the Latin word meaning "something hidden." In our subject this is a bit ironic—a print may be left by the criminal yet hidden from the criminal, only to be revealed to the trained investigator.

These "chance impressions" found at the scene of the crime fall into one or more of four categories: molded (or plastic), visible, negative and most important, the latent.

A *molded* impression is formed by pressing the friction ridges into a plastic material such as soap, wax, tar or putty and leaving the molded form of the fingerprint embedded in the material. The technician merely brings out the definition with oblique lighting and photographs the result.

As you might guess, *visible* prints are those which can be readily seen—they are made with a staining substance such as blood, ink, or dust compounded with perspiration or grease. Though this type of print may seem to be very useful, actually it's rarely of much help. Often an inexperienced policeman, first on the scene, will show this type of print with pride to the expert examiner who will immediately dismiss it as useless owing to smudged or indistinct and indiscernible ridge patterns.

However, occasionally they are legible. Even a bloody palm print which would contain no identifying ridges may hint at the size and form of the owner's hand—a clue to that person's general proportions.

Negative impressions are formed when the finger touches upon a dust surface and produces a negative or non-dusty area where the ridges were. This kind of print may be photographed or lifted as the situation dictates.

Latent fingerprints, by far the most common, are also the most beneficial to the technician. Often discernible to the unaided eye, they can be powdered to bring out the contrast. At other times a developing or disclosing treatment applied to the surface will reveal a print.

How are latent prints made? Normally each of us carries a colorless residue of oil and perspiration, called "body wax," on our fingertips and hands. However, the amount of oil actually secreted from the palms and hands is minute—most of the oil which goes into the formation of a latent fingerprint is "picked up." In fact, if criminals were of the hygienic type, careful to wash their hands and keep them away from the more oily parts of the body (i.e., face and hair) they would leave no fingerprints at all. Fortunately for society, criminals are not generally of this type. Also, a person in the act of a crime, being nervous, will perspire more and will inadvertently pick up more body oil, grease and dirt, leaving behind legible latent prints.

Now that we have an idea how fingerprints are left behind let us explore the best methods of finding them and revealing their intimate story.

EXAMINING THE SCENE OF THE CRIME

Although certainly it is not always the case, habitual criminals tend to fall below the normal intelligence level. The emotional stress involved in committing a crime also impairs normal ability, and these two factors together put the criminal at a decided disadvantage.

On the other hand, the criminologist will have the advantage and every facility of modern science to call upon. An experienced technician will not let even the tiniest detail pass without notice, proceeding methodically and calling upon skilled specialists when needed. The criminal hasn't a chance! With this psychological boost in mind let us proceed to the scene of the crime.

It is of the utmost importance that the locale of a crime be left undisturbed. If the area is indoors it should be cleared of all persons at the earliest possible moment. An outdoor setting or a vehicle should be enclosed with rope or wire to keep intruders out.

Once the area is secured, the investigating expert will select a starting place. In the case of a burglary, this would be the presumed point of entry and from here our expert does a preliminary survey of the entire premises. The trained technician will notice anything unusual or incongruous: furniture which is disarranged, objects out of place or damaged for no apparent reason, anything out of the ordinary is observed and noted on paper.

Nobody can walk through a room without leaving some trace. A bit of thread from clothing, a loose hair, a footprint in the dust, or a fingerprint on the lamp base. The investigator notices everything and touches nothing but pen to paper. After the initial survey has been made, our expert will return to the starting place to begin the second "go over."

Investigation of the exterior of the building should include all probable points of entry. The intruder may have tried several doors and windows prior to gaining entry. The inspector must imagine himself as the criminal. Objects such as window latches, window sills and fragments of broken glass may contain valuable fingerprints. Once inside, common sense again prevails. What was the object of the crime? A desk or a jewel box, a safe or strong box? Did the burglar leave any tools behind? Were materials at hand used as tools? Careful inspection of furniture is required as the hard smooth surface of polished wood is ideal for trapping latent fingerprints. Look *under* chairs and tables. Examine the *bottoms* of drawers which may have been pulled out and shoved back. High places such as shelves and bureau tops may contain prints where the burglar felt about for keys or loot. Shelves which are out of normal reach can contain finger impressions in the dust which lies there. If the crime took place at night, the criminologist should pay special attention to lighting fixtures, switches and equipment.

Paper objects such as books, letters, magazines, documents inside of briefcases or purses may have been handled by the criminal. These should be given immediate treatment as fingerprints tend to evaporate quickly on paper.

Strange as it might seem, it is not unusual for burglars to eat or drink while on the premises. Eating utensils, cups and plates can prove to be useful items containing latent fingerprints. Food itself can be a resource. There are cases on record of ridge impressions which have been successfully developed from fruit peelings, sausage skins and egg shells.

In the case of auto theft great care must be taken by the examiner. Most of the prints on the steering wheel will be those of the owner or regular users of the vehicle. A more likely spot to find a useful print will be the rearview mirror. This is almost always adjusted by any new occupant of a vehicle and a criminal preoccupied with the getaway may often leave a legible thumb print in the lower right hand corner of the mirror.

Don't forget the "outside" surfaces of the vehicle. License plates may have been substituted or the vehicle may have been pushed some distance to avoid starting the motor within hearing distance of the owner.

Many wonder "Why doesn't the criminal wear gloves in performing these acts?" There are several answers to this question. Often an intruder uses gloves to gain entry then, once inside, removes them without thinking. If the crime was committed in the dark, there is more chance of this as the criminal relies more on the sense of touch. The patient investigator knows this and will continue searching for latents even though the burglar was known to have worn gloves.

A flashlight will prove invaluable in the search for latent fingerprints. Impressions not readily seen through normal observation may be brought out in relief with a beam of light held in sharp angle to the area in question. If no prints are revealed through this method and the spot is particularly promising, further techniques such as fuming or dusting are used.

Certain surfaces just don't retain ridge impressions well. Irregular and porous surfaces—rough and rusty metal, unfinished wood, soft leather or coarse fabrics—are especially bad for holding prints. Other conditions also come into play. Persons having oily skin, of course, will leave more enduring prints. Prints left on glass and exposed to less air movement will remain viscid for months. Body wax is retained under water and may be dried and developed at a later time.

Certain developing techniques are used on paper materials which are highly suspect of containing latents. The best method is to apply a uniform coating of a three percent solution of silver nitrate (some cases may require a more concentrated solution). The silver

nitrate reacts with the salts contained in the perspiration to form silver chloride. This, exposed to light, darkens to reveal the ridge patterns. Paper suspected of bearing prints should be fumed first to bring out the more oily latents as the silver nitrate will wash away the body oils.

Photograph First

Whenever possible, latent prints discovered at the crime scene will be carefully transported to the lab for further development. Before this is done, however, a photograph of the untreated latent as it appears on the object itself is taken. In court it is often advantageous to show where the prints were found and their position on the materials or objects bearing them. Also a photograph may bring out fine details of the ridges which could be lost through later treatment.

Many surfaces under suspicion must first be powdered before they are photographed. This brings out the ridge patterns in as much contrast as possible to their background. If the prints appear on a white material such as porcelain or light wood trim, a fine grained commercial black powder would be used. Conversely, for prints that lie on dark objects or glass, white lead, aluminum powder or the commercially marketed white powders are advisable. Impressions which are opposing each other on both sides of a drinking glass or sheet of glass are developed separately. One print is treated with white lead then photographed and exposed to ammonium sulphide to blacken it. Next, the other side is powdered white and a black paper is held against the opposite side to render the first print (now blackened) invisible and provide contrast for the photograph.

Many techniques and materials can be called upon by the specialized technician to develop and enhance the visibility of latent fingerprints. Powdering, fuming, and lifting are some of these; other methods are sometimes employed. Each instance has its own peculiarities requiring an individual treatment. The reader is referred to the several books listed in the bibliography for more detailed explanations of these processes.

CLASSIFICATION AND USE OF THE FINGERPRINTS IN THIS SYSTEM

Now that we have discovered the chance impression at the scene, powdered or otherwise treated it, and photographed it we are ready to classify and identify the print.

Comparison or *elimination* prints should be taken from suspects and victims alike. Even the fragment of a latent when matched with these comparison prints can serve the purpose of revealing who it does *not* belong to.

Which Finger?

Prints discovered at a crime location are rarely found individually. Usually they will be grouped in twos and threes with thumb, index and ring fingers being most common. The position of the prints together and a common-sense analysis will help determine which fingers of which hand are involved. Try to visualize handling the object—how would you have picked it up, what pressures would have been applied and in what direction?

Sixty-five percent of all fingerprints are of the Loop category. (The reader may wish to refer to Diagram 7 for pattern types.) Of these the largest percentage are *ulnar* (toward the little finger) sloping. *Radial* (toward the thumb) loops are less common and appear most often in the index finger which, incidently, shows the greatest variety of patterns. Diagram 4 presents a four-finger grouping of the right hand. Three of the digits exhibit ulnar slants while the index shows a radial direction. For the left hand the observer has only to picture a mirror image of the right hand example. The middle and ring fingers are the two most often confused, but they are not often found singly and therefore the superior length and greater pattern area of the middle finger will help differentiate the two. Little fingers, of course, have the least pattern area and rarely hold radial loops.

4

Thumb prints are easily distinguished by their relatively larger size. When found singly in the latent form the thumb can be identified by its greater distance from core to upper edge of the impression. These upper ridges will almost always have a decidedly ulnar slant (see Diagram 5). Notice in the diagram that the inner loop has a nodding tip. This formation is called a *nutant* loop, and usually if not always will appear in one or both thumbs and have a radial slope. Other aspects of patterns which can be helpful in determining which hand is involved can be found in whorls and twin loops. Elongated whorls normally show an ulnar slope. Spiralling whorls will exhibit a *clockwise* direction in the left hand and a *counter-clockwise* in the right. Twin Loops are likely to have an ulnar slant on the *ascending* loop. Diagram 6 shows clockwise (a) and counter-clockwise (b) Whorls and a Twin Loop (c) which would appear to belong to the right hand owing to the ulnar slant of its ascending loop.

5 6a b c

At this point in our venture we are in possession of a latent print or prints which presumably can be identified as to pattern type and to which finger it belongs. Before proceeding to the classification section it may help to learn about the two main fingerprint systems in use today, namely the Battley single-fingerprint system and the Galton-Henry method.

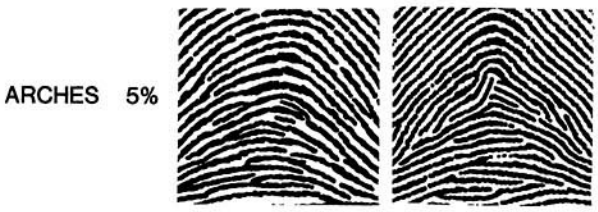
Battley is an attempt to file all ten prints taken from a suspect in such a way that they can be retrieved later if the criminal investigator is only in possession of a single print. Galton-Henry files all *ten* prints from a suspect under a formula which begins with a primary classification (explained earlier) and goes further into subclassifications. Galton-Henry functions best in establishing the identity of a criminal in custody. Battley's system would be unmanageable if it had to deal with all the prints on file, so it only keeps on record those prints belonging to criminals likely to commit robberies and burglaries. A police unit really up to snuff would have access to both systems and would also have on hand a *current latent* file against which recently apprehended persons could be checked.

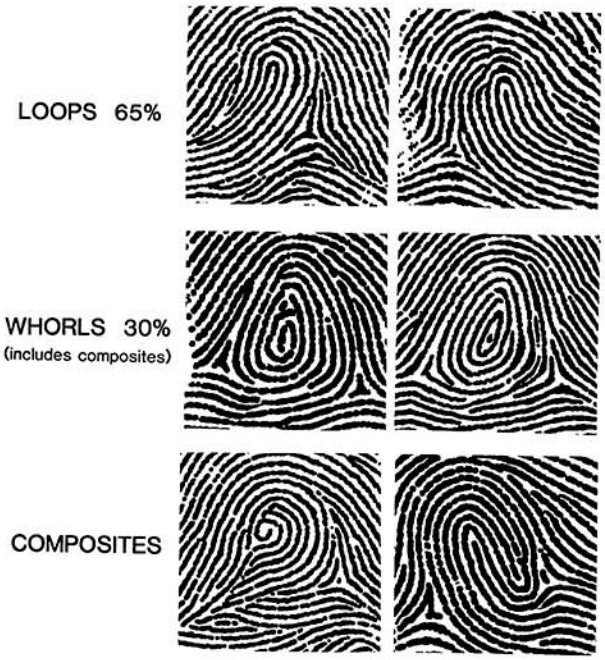
(Note to readers of the modern age: Police units operating in the late twentieth century using computers with the latest scanning technology are able to retrieve single fingerprints from among millions within minutes.)

CLASSIFICATION OF FINGERPRINTS

Fingerprint patterns fall into four main groupings: *Arches, Loops, Whorls,* and *Composites*. Diagram 7 shows these main groups and the patterns within each which will be used in this Ident•a•kit.

7





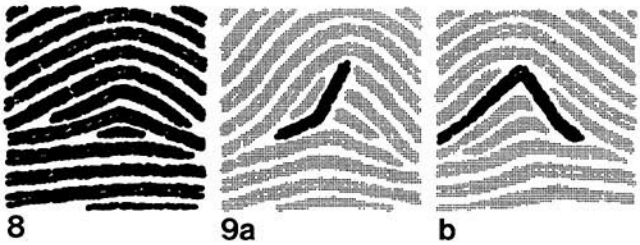
7

Plain Arches

Not much has to be said of this type. Ridges enter from one side of the pattern and flow or tend to flow toward the opposite side (Diagram 8). There will be a rising or arching at the center, however nothing abrupt as in the tented arch. If there are ending ridges or dots these will align themselves with the general flow and none of these lines will loop back upon itself.

Tented Arches

This pattern may have any one of several characteristics which will distinguish it from plain arches. Diagram 9a shows an ending ridge which thrusts upward at forty-five degrees or more. Diagram 9b reveals an angular formation. Whenever this is present the pattern will be considered a tented type since an angle can only be formed by two ridges abutting against each other and not by the smooth flow of a single ridge. In Diagram 9c we have a ridge which loops back the way it came. Since there is no delta present this will be given tented arch status. Deltas are explained in the Loop section.



8 9a b


9c

10


11

Loops

By far, the most commonly occurring pattern is the loop. They comprise approximately sixty-five percent of all fingerprints. Loops which slant toward the little finger are called *ulnar* and are the most commonly occurring (see Diagram 4). *Radial* loops slope toward the thumb and are most often found in the index finger.

To qualify as a loop pattern there must be present an uninvolved (no appendages) ridge of sufficient recurve, a delta and a ridge count across a looping ridge. All this activity will be taking place within the pattern area. The pattern area will be defined by *type lines*. These can be seen in Diagram 10. Starting from the left (in this case) the type lines run parallel to each other until reaching the point marked X. Here they separate and outline the upper and lower boundaries of the pattern area. Diagram 11 shows how to follow the type lines if they are not continuous. As shown, the method is to keep going *outside* to the next ridge.

Unlike the arch pattern in which the lines enter from one side and exit on the opposite side, the loop will enter and exit (or tend to exit) from the *same* side. Diagram 12 shows ridges x, y, and z coming in to the pattern area from the right side, recurving and exiting toward the same side.

12

Counting the Ridges

Since the loop pattern is so commonly found it is necessary to further classify them using a process called ridge counting. To count the ridges within the pattern it is first necessary to establish a *line of count*. Focal points for this line of count lie at the *delta* and *core*. Diagram 13 shows the line of count with the intervening ridges.

13

Counting the ridges within the loop pattern
A line of count is established between the delta (D) and core (C)

(a) 1st count—a short ridge (b) 2nd count—also a short ridge (c) No count here (d) 3rd count—one side of an enclosure (e) 4th count—other side of enclosure (f) 5th count—ending ridge (g) 6th count—dot (all structure having the weight of a ridge regardless of length is counted) (h) 7th count and (i) 8th count—when the line falls across the point of bifurcation, both sides are counted (j) 9th count—short ridge (k) 10th count—final count before reaching the core.

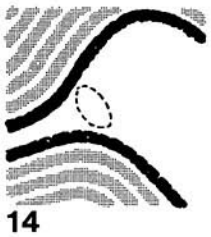
As the diagram shows, establishing the delta and core is crucial. If the line is even off by the width of a ridge it can mean the difference of a count.

The Delta

Location of the delta may be within a complex piece of ridge structure or it can exist as a mere dot (of sufficient weight). The important consideration is the *position* rather than the form of the delta.

Diagram 14 shows in dotted lines the area which will usually contain the delta. B.C. Bridges in his excellent book *Practical Fingerprinting* defines the delta for us:

> The delta is the first fork or bifurcation ( ), abrupt ridge-ending ( ), meeting of two ridges ( ), island or enclosure ( ), dot (•), ridge fragment ( ), or any ridge formation of any nature, at or nearest the center of the divergence of the two type-lines, or directly in front of that point. This rule remains constant even if such ridge, meeting of ridges, fork or other ridge formation, is or appears to be joined to either or both of the type-lines, or to ridges converging upon it within the pattern area.


14

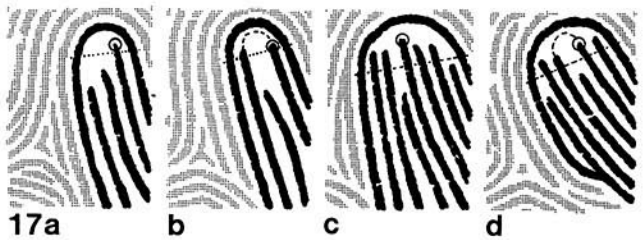
The Core

The core will be found on or within the *innermost* loop and therefore will be at the approximate center of the pattern.

Diagram 15 shows the core located *on* the shoulder *opposite* the delta. Shoulder points **a-a** depict the places at which the ridge is definitely turning back on itself. In its handbook *The Science of Fingerprints* the F.B.I. uses the term *innermost sufficient recurve* to define this inner loop. Sufficient in this case means that the loop must pass through the line of count. Diagram 16 shows two ridges at the innermost position in the pattern.

In 16a the ridge does not recurve enough to pass through the line of count and this pattern would be considered a tented arch. Example 16b does meet the requirements and is considered a loop pattern with a count of one. Notice also that the ridge does not actually exit the pattern area but only tends to do so. This is enough to classify as a loop as long as the recurve passes through the line of count. Mention again will be made here of the three conditions which must be met to be designated as a loop. First there must be a ridge of sufficient recurve. Secondly, a delta must be present and thirdly, you must be able to obtain a ridge count of at least one. Careful study of diagrams 9c and 16a will reveal patterns in which all three conditions are *not* met and hence these prints will receive the preferential designation of tented arch.

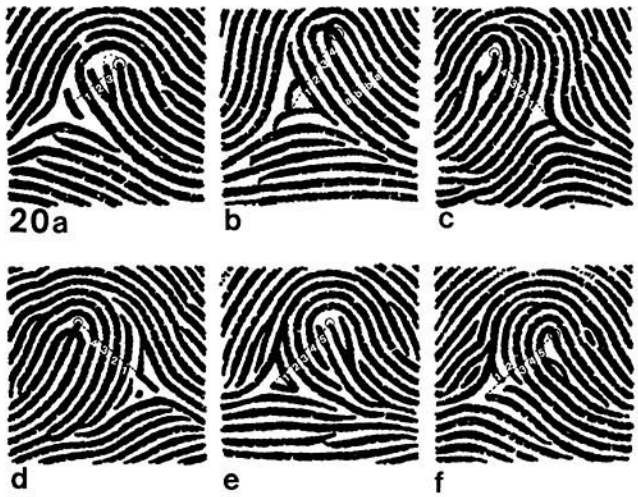
When there are rods to be seen inside the inner loop they must be of shoulder height or greater to affect the count. Diagram 17 shows several core configurations and how the core is located within each. In 17a we have one rod of sufficient height and the tip of this will serve as the core. Diagram 17b pictures two poles which reach above the shoulder line. If you can connect them in your mind as the dotted line shows, the situation will now be the same as in Diagram 15, with the tip of the rod away from the delta acting as the core. When an odd number of posts are above the line the one in the middle is chosen as the core (see Diagram 17c). Diagram 17d has four rods which meet the requirements. If the inner two are mentally connected we will again have the situation of 17b.



When there exists an appendage at right angles between the shoulders and on the outside of the loop it is said to spoil the recurve. This condition (shown in Diagram 18) will actually result in the pattern being classified as a tented arch since no other loops are present. Diagram 19 reveals how such an appendage can affect core location in the loop pattern. The two inner loops are each traversed by the rod which spoils their recurve and one has to go to the third loop to find the core (circled).

Several examples of delta and core configurations along with appropriate ridge counts are given in Diagrams 20a-f.

In 20a the delta is focused at the center of a ridge fragment nearest the divergence of the type lines and the core fits the even numbered rule (refer to Diagram 17d). Diagram 20b shows the delta at the bifurcation near the center of divergence. When two loops cross within the inner pattern the two outer ridges **a-a** will assume the role of surrounding loop while ridges **b-b** are seen as two inner rods with the core as shown. In 20c there are two forks near the center of divergence. In this case take the one closest to the core to be the delta. Diagram 20d has the delta aligned with the line of count and is focused at the tip nearest the core. Also to be seen in the pattern is a dot, but this is too far off center to be considered as the delta. The delta in 20e is attached to a ridge coming off the upper type line which becomes the first count. There must always be a gap between the delta and the first count. In 20f the delta is at the tip of the ending ridge nearest the center of divergence.



Plain Whorls

Whorls and composites comprise thirty percent of all fingerprints. The plain whorl must have a ridge which makes a *complete* circuit or recurvature about the central pattern area. Diagram 21 shows this. This recurvature can spiral to the right or left or can take the form of concentric circles. Usually, two deltas will be present within the plain whorl type. Plain whorls are also very numerous and are further sub-divided into three classifications to facilitate searching. These classifications are termed as *inner, outer* and *meeting* and they are arrived at by a process called *ridge tracing*.

Inner

Diagram 22 shows an inner whorl. Tracing begins at the left delta. Notice that the delta ridge ends about one third of the distance to the right delta. When this is encountered simply drop *down* to the next ridge as shown. Keep following until proximity of the right delta is reached. If this traced ridge falls inside (above) the right delta and there are three or more intervening ridges this will constitute an inner classification.

Outer

In Diagram 23 we have an outer tracing. Starting at the left delta we trace the ridge rightward until a bifurcation (forking) is reached. When this happens follow the lower fork as shown at **a** and again at **b**. If, upon reaching the right delta, the traced ridge falls outside (below) the delta with three or more (in this case four) in between we will have an outer classification.

21

22

23

Meeting

All other tracings are known as meeting. Diagram 24 has a short delta after which tracing immediately drops below to a broken ridge. When gaps appear in a traced ridge continue to follow along as though they were not present. At the right delta we have one intervening ridge and this is classed as a meeting.

24

25

In Diagram 25 the traced ridge falls inside the right delta with less than three ridges interposing and again we have a meeting.

Composites

This group is so called because they combine characteristics from two or more pattern types. We will use two composite patterns in this kit; *central pocket loops* and *twin loops*.

Central Pocket Loops

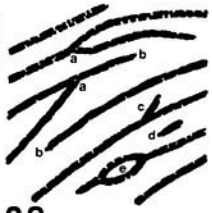
This pattern is one of predominating loops having at the center (or pocket) a ridge which makes a complete recurve as in the whorl type (see Diagram 26). In the diagram you will notice several loops which meet in a common stem. These loops even though they come together are not considered as complete recurves since the angle formed with the stem is not ninety degrees. If a line is drawn as shown in the diagram with the line of flow of the exiting and entering loops, and this line encounters a ridge at ninety degrees, that ridge is said to have a complete recurve.

Twin Loops

This pattern is easily recognized as two distinct loops either trying to become whorls or attempting to surround each other (see Diagram 27).

26

27



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RIDGE CHARACTERISTICS

Two prints having the same pattern classification must be further identified through comparison of the ridge details. Even a fragment of a latent having no discernible pattern may be identified by close scrutiny of these ridge characteristics. Diagram 28 shows the main points to look for: **a**=bifurcating ridges, **b**=ridge endings and beginnings, **c**=hooks, **d**=islands and **e**=enclosures. Generally speaking, if two prints are seen to have twelve of these characteristics in common they are said to match. Close attention to details such as angles and lengths of forks must be paid, especially when a fragmentary print is involved.

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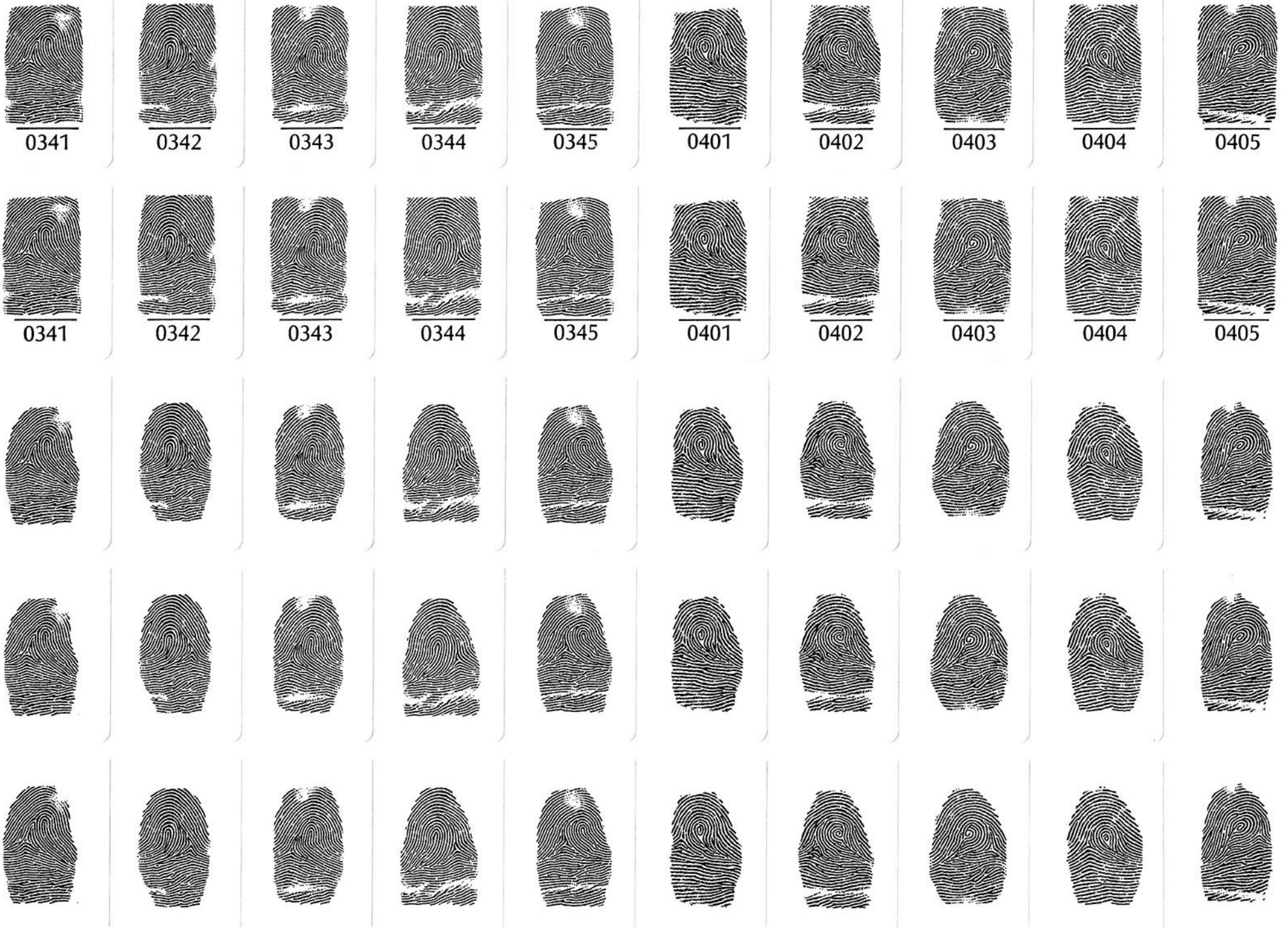
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