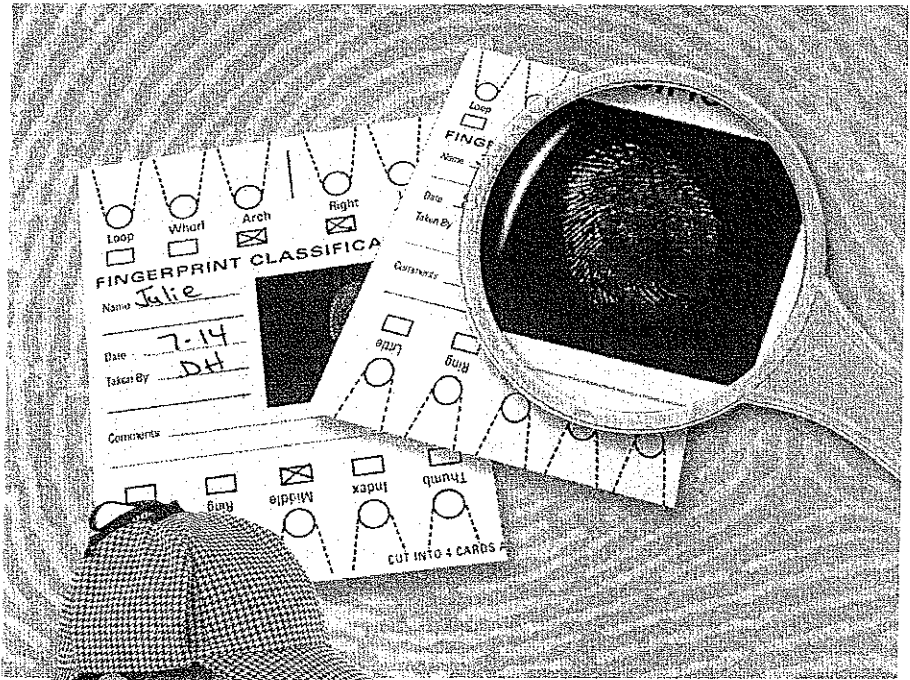


Ages 8 and Up

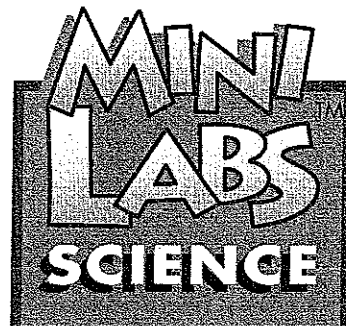
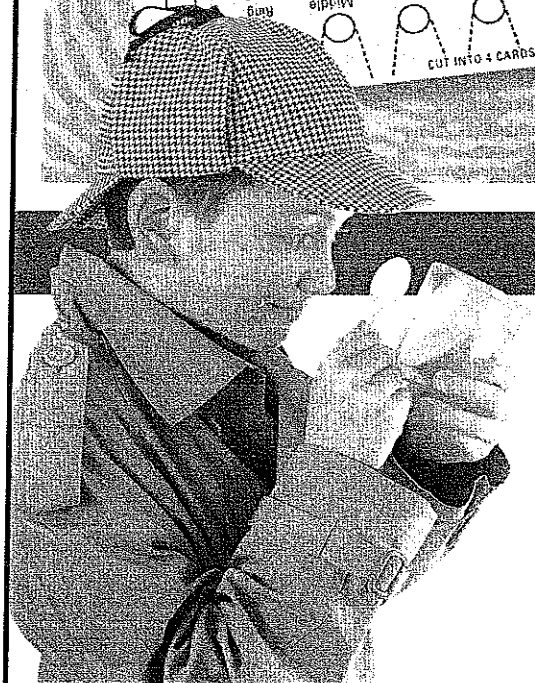


FINGERPRINT KIT

INSTRUCTION BOOK



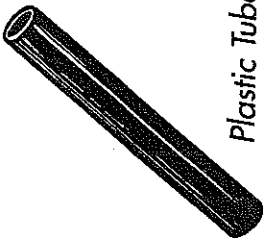
Collect fingerprints just like the Police and FBI!



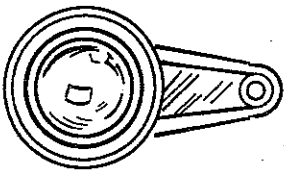
What's In Your Kit?



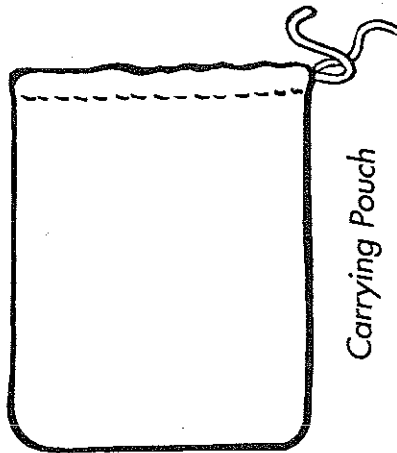
Feathers



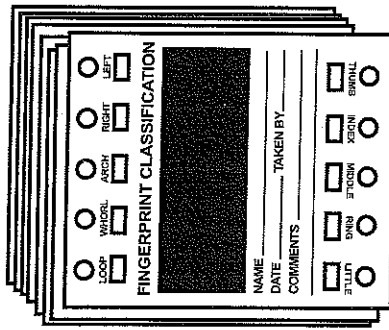
Plastic Tube



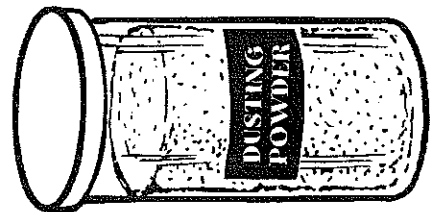
Magnifying Lens



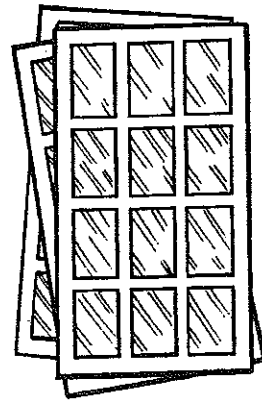
Carrying Pouch



Fingerprint Classification Cards



Dusting Powder



3 Sheets of Tape Squares

1. Looking at Your Fingerprints

Start off your fingerprint experiments by looking at the tips of your own finger in good light. You should notice several things about them:

- They are covered with tiny lines.
- The lines form patterns on the fingertips: Circles, loops, and arches (fig. 1).

Fig. 1



- The patterns are not the same on all your fingers. Some fingers may have one kind of pattern, some another.
- The lines continue all the way down the fingers and palms, and stop at the wrists.

These fingertip patterns are your **fingerprints**. They are yours alone. No one else in the world has patterns exactly like them. The FBI's fingerprint files contain over 214 million fingerprint cards, representing about 74 million people and no two fingerprints have **ever** been found exactly alike. You were born with the exact same fingerprints you have now. They grow larger as your fingers grow, but their shapes and patterns never change.

2. Using Your Lens

To get a closer look at your fingertip patterns, use the magnifying lens that comes in this kit. Here's a tip on how to use the lens. Hold it close to your eye (an inch or so away) and bring your finger up to it. Don't move the lens. Move your finger back and forth until you get the best view. You'll see more this way.

With the help of your lens, you should be able to see that your fingerprints are made up of raised ridges of skin. It is these raised ridges that "print," like a rubber-stamp, whenever you touch something.

3. Leaving Fingerprints

Inside your fingers, just beneath the raised ridges of skin that make up your fingerprints, are tiny glands that manufacture sweat and oil. This sweat and oil flow through pores to the outside of your skin, where it makes a thin film covering your fingertips.

When you touch something hard and smooth, some of the oil and sweat on the ridges of your fingerprints are left behind on what you are touching. You can often see the print, even without the help of the fingerprinting powders, if you look carefully.

Try it. Here are some tips on how to leave clear fingerprints:

- 1) The surface you touch should be hard, smooth, and shiny. Some good surfaces for showing fingerprints are:

Glass: windows, drinking glasses, glass jars, mirrors, glass doorknobs

Shiny Metal: the bowl of a spoon, the blade of a table knife, the side of a toaster, metal doorknobs, the plate of a wall switch, the faucets in a bathroom, shower or kitchen, jar covers

China: plates, cups, saucers, and mugs

Hard Plastic: a telephone, hard plastic toys

Enamel: (the hard shiny paint used to cover metal pots, pans, refrigerators, etc.)

Porcelain: (the hard glossy surface of bathtubs, sinks, etc.)

Transparent tape: (the sticky side)

Here are some surfaces that do not show fingerprints well:

Cloth, soft leather or suede, paper, rough-surfaced plastic or metal, cardboard

- 2) Make sure that the surface you touch is clean, not greasy, and free of other fingerprints.
- 3) Make sure your own hands and fingerprints are clean. You're trying to leave fingerprints, not dirt smudges. Wash your hands, then wait five minutes or so for the sweat-oil film to form on your fingerprints again.
- 4) Before you leave a fingerprint, rub your finger on the side of your nose. It will pick up extra skin oil and leave a better print.
- 5) When you leave a print, touch the surface firmly for just a second or so, then lift your finger without sliding it across the surface. Pressing too hard or sliding your finger will cause you to leave a blurred or smudgy print.
- 6) You need good light to see fingerprints made this way. Looking closely with your lens helps, too.

4. Making Fingerprints Visible

Fingerprints that are left behind on objects are called latent fingerprints. The word latent means "hidden", and these fingerprints are often nearly invisible.

You can make these fingerprints visible, however, by sprinkling them with fingerprint powder that comes in your kit. Here's how to do it.

- 1) Make a good latent print with one of your own fingers, just as you did in the last experiment.
- 2) Open the vial of fingerprint powder.

- Put your fingerprint brush together. Insert the ends of the feathers part way into the black plastic handle (Fig. 2).



Fig. 2

- Shake out a very small amount of fingerprint powder next to the fingerprint. You need only a very small amount. Remember, one of the commonest mistakes is to use too much powder.



Fig. 3

Use about this much powder

- Dust the powder lightly back and forth over the fingerprint with your feather brush. There's a trick you can use here. If you look at the feathers, you notice that the tip of each feather is fairly stiff. But further down towards the handle, there are several fluffy, hair-like parts of the feather. These are softer and less stiff than the tip (see Fig. 4 on next page). Use these soft plumes to brush the powder back and forth over the print.



Fig. 4

Brush softly, brush lightly, and keep brushing until very detail of the print is clear. The two commonest mistakes are brushing too hard and not brushing enough.

- When you have finished brushing, blow lightly across the print to remove excess powder.

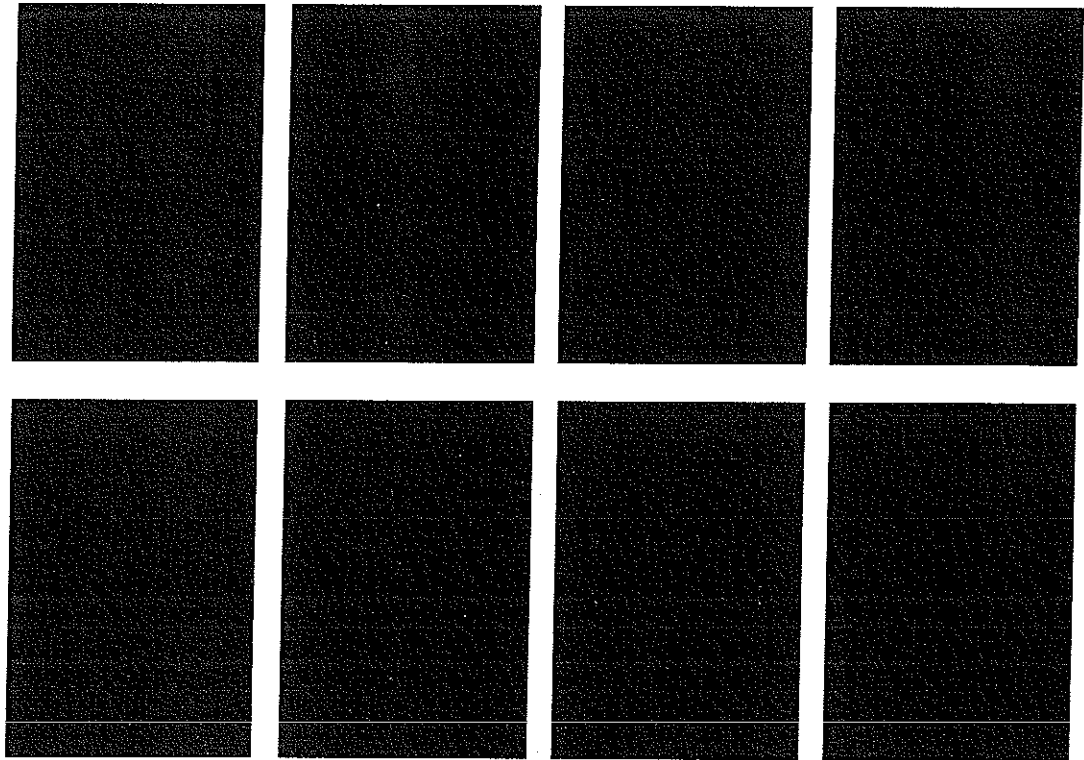
5. Lifting the Print

You can pick up the print you have just finished brushing and preserve it on a piece of paper or on a card. Here's how to do it.

- From the sheets of tape squares that come in your kit, peel off one square. Touch only a tiny corner of the square when you handle it—you don't want to get a fingerprint on it when you're taking it off the backing paper.
- Position the tape over the fingerprint. Then lower it until it rests on top of the print. You may smooth it down gently, but don't rub hard.
- Pick up the tape again by one corner. It will lift up the fingerprint with it.
- Place the tape on a piece of paper with a black background. For practice, you can place the tape on one of the squares printed below.
- Take several fingerprints this way. Try it on different surfaces, and with different fingers. Can you lift a print more than once with a single dusting?

Don't worry about using up tape squares or powder that can't be replaced. You have enough powder to take more than a thousand prints if you're careful. And if you run out of tape squares, you'll find that ordinary clear adhesive tape works just as well.

6) When you're through, wipe up the prints and any excess powder. Cap your vial of powder tightly. Put everything, including these instructions, into your carrying pouch.



Classifying Fingerprints.

The police and the FBI group all fingerprint patterns into **whorls**, which go in circles or swirls; **loops**, which have a single hairpin or upside-down U shape; and **arches**, shaped like a hill or a pointed tent.

These three patterns are then divided into eight types:

ARCHES (about 5% of all fingerprints):



Plain Arch



Tented Arch

- 1) **Plain Arch**, shaped like a low, rounded hill.
- 2) **Tented Arch**, shaped like a high, pointed hill.

LOOPS (about 65% of all prints):



Ulnar Loop



Radial Loop

- 3) **Ulnar Loop**, a loop that slants toward the little finger side of the hand. Named after the ulna, the arm bone on that side of the arm.

4) **Radial Loop**, a loop that slants toward the thumb side of the hand. Named after the radius, the arm bone on the thumb side of the arm.



Plain Whorl



Central Pocket Loop



Double Loop



Accidental Whorl

WHORLS (about 30% of all prints):

- 5) **Plain Whorl**, a pattern of circles or ovals, like a target.
- 6) **Central Pocket Loop**, looks like a whorl tucked inside a loop. It's classified as a whorl, even though it's called a "loop."
- 7) **Double Loop**, an S-shape.
- 8) **Accidental Whorl**, a catchall name for odd patterns that don't quite fall into the more common groupings. An accidental whorl may contain two or more of the other patterns.

Try classifying the fingerprints on your own fingers. Use your lens to look at them carefully, and write down what each one is:

	Left Hand	Right Hand
Thumb		
Index Finger		
Middle Finger		
Ring Finger		
Little Finger		

Using the Fingerprint Classification Cards

You can build up a file of fingerprints of yourself, your family, and your friends, using the fingerprint classification cards that come in your fingerprint kit. With the special "instant-access" feature of the cards, you can almost immediately match any unknown fingerprint you find, if it was made by one of the fingers recorded in your fingerprint file.

- 1) Take fingerprints of people you want a record of and put them on the fingerprint cards, one print to a card. To keep from using up your cards too rapidly, you may wish to start off with only a thumb and a forefinger of the hand most used-right-hand prints for right-handed people, and left-hand prints for lefties.
- 2) Fill in the card - name, date, exact classification of the print in question. Check off the correct boxes: the general type of print (loop, arch or whorl), the hand it came from, and the finger it came from.
(A hint: be careful about the difference between ulnar and radial loops. A loop that slants in one direction when you look at the finger itself will print slanting in the opposite direction. Look at the finger itself and the hand to find out what kind of loop it is.)
- 3) When the card is completely filled out, punch out all the holes on both top and bottom. Use a standard paper punch (not supplied) - don't just poke a hole with a pencil.

4) Use scissors to cut a notch above each box you checked. This is the "instant access" feature. You should cut 3 notches: one for the correct fingerprint pattern, one for the hand, one for the finger. A completely punched, notched and filled-out card should look something like Fig. 5.

FINGERPRINT CLASSIFICATION

NAME _____ DATE _____ TAKEN BY _____

COMMENTS _____

LOOP WHORL ARCH RIGHT LEFT
 THUMB INDEX MIDDLE RING LITTLE

Fig. 5

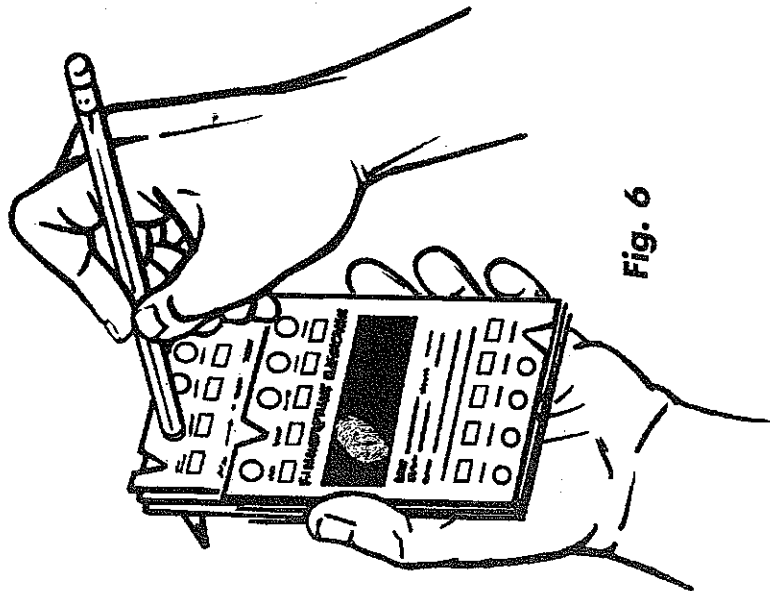


Fig. 6

5) Here's how to use the "instant-access" feature to find a fingerprint card you want-for example, a card with a whorl made by a left thumb. Hold all the cards in your left hand, oriented the same way. Insert the point of a pencil in the hole marked "WHORL" and lift. The cards with whorls will remain in your hand as all the cards with loops and arches are lifted by the pencil (see Fig. 6 on next page). Set aside the cards you have removed. Repeat, putting your pencil in the "LEFT" hole, lifting and setting aside the lifted cards. Finally, repeat using the "THUMB" hole. The only card (or cards) left in your hand will contain a whorl made by a left thumb.

Fingerprint Games

- 1) **Who stole the cookie?** A cookie is placed inside a clean glass jar. The detective leaves the room. One of the players left behind takes the cookie out of the jar and eats it, leaving fingerprints behind on the jar as he or she does so. The detective is called back into the room. The detective's job is to find the prints and identify the culprit in 5 minutes, using the contents of the fingerprint kit.
- 2) **Who left the Fingerprint?** Four clean objects are placed on a table. One of the players leaves the print of a right forefinger on one of them when the detective is out of the room. The detective's job: to find out which object was touched and who touched it, within 10 minutes.

3) **Hot and Cold Fingerprint.** This game is like the previous one, except that the item with the fingerprint on it is not left on a table. It is placed in plain sight somewhere in the room, but not identified. The detective walks around the room. The other players call out "HOT!" when the detective gets closer to the object and "COLD!" when he or she moves away from it. The players must inform the detective when he or she identifies the object correctly. The detective has 10 minutes to find the object and identify the print.

4) **Fingerprint ID Race.** Players divide into 2 sides. Each member of each side leaves a fingerprint on one clean object-a different object for each person-on a table. Then each side tries to identify who touched the other side's objects. The winner is the side to first identify all the other side's fingerprints.

5) **Who Touched the Object?** While the detective is out of the room, some-but not all-of the remaining players leave a fingerprint on an object. The detective comes back, tries to identify all the prints in 5 minutes.

Here are some suggestions for your games:

- These rules are fairly sketchy. Make up your own detailed rules.
- All fingerprints must be good prints. No smudges or smears allowed.
- For simplicity, all players use the same finger to leave prints.
- Preparing ID cards on each player's "print finger" beforehand speeds up the games.

History of Fingerprints

Through history, observant people have noticed the ridges and patterns on their fingertips. The Chinese and the Babylonians used fingerprints as signatures on some business contracts over a thousand years ago. But it was not until the late 1800's that modern, scientific fingerprinting methods were developed.

In the 1880's, a British anthropologist, Sir Francis Galton, began working on the first scientific system of classifying prints. His work

was published in 1892 as a book titled Fingerprints. By 1891, Argentina had begun to set up fingerprint files based on Galton's work. Only a year later, in 1892, the Argentine Police used fingerprints to identify a murderer who had cut her own throat to try to pass herself off as one of the victims!

In 1901, Britain established a system developed by the head of Scotland Yard, Sir Edward Henry. The United States adopted the Henry system, based on Galton's work, slightly more than one year later. It is still in use today!

In 1924, the U.S. Congress created the Identification Division of the FBI, which consolidated earlier fingerprint files into one central location. Today, the FBI has fingerprints of about 74 million people on file.

Why Use Fingerprints?

Another promising method of identifying criminals, called the Bertillon System, required a series of complicated measurements of bony parts of the body. Developed in the 1870's - only just barely before the Galton System, it was generally accepted and used for thirty years. However, the Bertillon system had two major defects. First, criminals do not usually leave their bones behind at the scene of a crime. Therefore, although the system could be used to establish identity, it could not place a criminal at the scene of a crime the way latent fingerprints can. Second, the Bertillon measurements were not infallible.

The superiority of fingerprints was proven in 1903, when two prisoners at Leavenworth Prison were found to have almost the same name (William West and Will West) and the same appearance (they looked like twins). More importantly, the two men actually were identical twins, even though they denied it. In a roundabout way, then, we have answered another fingerprint question - identical twins do have different fingerprints!

Common Fingerprint Questions

- 1) **Why do we have fingerprints?** The raised ridges on our fingers and hands help us grip things better, because a rough surface can hold on to things better than a smooth, slippery one.

- 2) **Why do fingerprints form patterns?** No one knows the answer to that one. And no one knows why it is that all fingerprints are different.
 - 3) **Do animals have fingerprints?** Monkeys and apes do. Dogs have individual nose and paw prints. And horses have calluses called "chestnuts" on the inner sides of their legs that are used for horse identification.
 - 4) **Can you change fingerprints?** No. Criminals have had the prints surgically removed from the tips of their fingers but they have still been caught because the fingerprint patterns extend all the way down their fingers. You would have to remove all the skin from your hand to get rid of your prints. (If you just remove the top layer of skin, the print grows back exactly as it was before.)
 - 5) **Do other parts of the body have prints?** You can judge from the story of a burglar named Fitts, who tried to avoid being caught by taking off his shoes and wearing his socks on his hands. He left no fingerprints, but he was caught because he left foot and toe prints, which are just as individual as fingerprints.
 - 6) **What else are fingerprints used for besides catching criminals?** Fingerprints have been used to identify amnesia victims, reunite lost members of a family and identify accident victims.
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