

## The Cornerstone of Forensics: Locard's Exchange Principle



Every contact you make with another person, place, or object results in an exchange of physical materials. If you own a pet, this exchange of materials is well known to you. Look at your clothes and you're likely to see cat or dog hair clinging to the fabric — a pain in the behind if you want to keep your clothes looking sharp, but an incredible boon for forensic science. You may also find that you transfer these hairs to your car, your office, and any other places you frequent.

Known as the *Locard Exchange Principle*, after Dr. Edmond Locard, the French police officer who first noticed it, the exchange of materials is the basis of modern forensic investigation. Using this principle, forensic scientists can determine where a suspect has been by analyzing *trace evidence* (any small piece of evidence) — fibers on clothing, hair in a car, or gunk on the soles of shoes.

### Looking at Locard's principle in action

As an example, say that you have two children and a cat. You run out to take care of some errands that include stopping at a furniture store, the laundry, and the house of a friend who has one child and a dog. From a forensics standpoint, this sequence of events can provide a gold mine of information.

You leave behind a little bit of yourself at each stop, including

- ✓ Hair from yourself, your children, and your cat.
- ✓ Fibers from your clothing and the carpets and furniture in your home and car.
- ✓ Fingerprints and shoeprints.
- ✓ Dirt and plant matter from your shoes.
- ✓ Biological materials, if you accidentally cut yourself and leave a drop on the floor or sneeze into a tissue then drop it in a trash can.

But that's not all. You also pick up similar materials everywhere you go:

- ✓ Fibers from each sofa or chair you sat on at the furniture store ride away on your clothes, as do hair and fibers left behind by customers who sat there before you.
- ✓ Fibers of all types flow through the air and ventilation system and settle

- ✓ Hair from your friend, her child, and her dog latch on to you as you walk away. You also collect fibers from your friend's carpet and furniture.
- ✓ Fibers and hairs that have fallen to the floor attach to your shoes and pants at each stop.
- ✓ Dirt, dust, plant material, and gravel are collected by your shoes everywhere you set foot.

In short, by merely running errands, you become a walking trace evidence factory.

## *Reading the trace evidence*

An examination of your clothes after the expedition detailed above reveals all sorts of fibers and foreign hairs and essentially provides a travelogue for your errands. If someone robbed your friend's house that evening while your friend was away, criminalists would find your fingerprints, your hair (as well as that of your children and your cat), and fibers from the carpets in your house and car. They could place you at the scene of the crime.

Of course, you'd have an alibi (I hope) and a legitimate reason why your trace evidence was found at the scene. The thief would not be able to offer a legitimate reason for his trace evidence being at the scene, which means the presence of his prints, hair, and carpet fibers would need an explanation.

## *Determining who did what where*



Placing a suspect at the scene of a crime is one of the basic functions of forensic science. The analysis of fingerprints, blood, DNA, fibers, dirt, plant materials, paint, glass, shoe and tire impressions, and indeed every test done by the crime lab is performed to create an association between the perpetrator and the crime.

In many cases, the mere fact that a suspect can be placed at the scene is an indication of guilt. A fingerprint on the faceplate of a cracked bank vault, semen obtained from a rape victim, or paint from the fender of a car involved in a hit-and-run accident connects suspects to crime scenes where they have no innocent reason for being.