The Fingerprint Examination

by

A. Fletcher

There is plenty of evidence to show that for many centuries man had been interested in the configurations formed by the skin ridges on his fingers and palms, and in many societies a thumbprint has been accepted in place of a signature; potters in Roman times left a print on the base of their work to show it was theirs. As you read this you are holding the book and your prints will be left on the cover and on the pages as you turn over to read on.

If you look at the inner surface of your hand, and touch the soles of your feet, you will find that the skin of these two parts is very different from that covering the rest of your body. It is a hornier type of skin, taking the form of a system of minute skin ridges, roughly parallel with each other, changing direction here and there whilst forming clearly defined patterns, particularly on the last joints of the fingers and thumbs. These ridges are called friction ridges. You will see, if you look again at your own fingers, that these ridges are not continuous; there are frequent interruptions in their flow which are called ridge characteristics. A ridge may end suddenly in any direction or it can fork into two diverse ridges; short independent ridges which lie between two others are a regular occurrence, and there may also be formations resembling lakes. All these are the more common type of characteristics, although there are others. All along the summits of the ridges and characteristics are microscopic pores which, along with others all over the body surface, serve for the discharge of sweat from the body. When an article capable of retaining a finger-mark is touched, an impression of the ridge detail and the characteristics may be left on it, in sweat. We can make this visible by the application of a suitable developer.

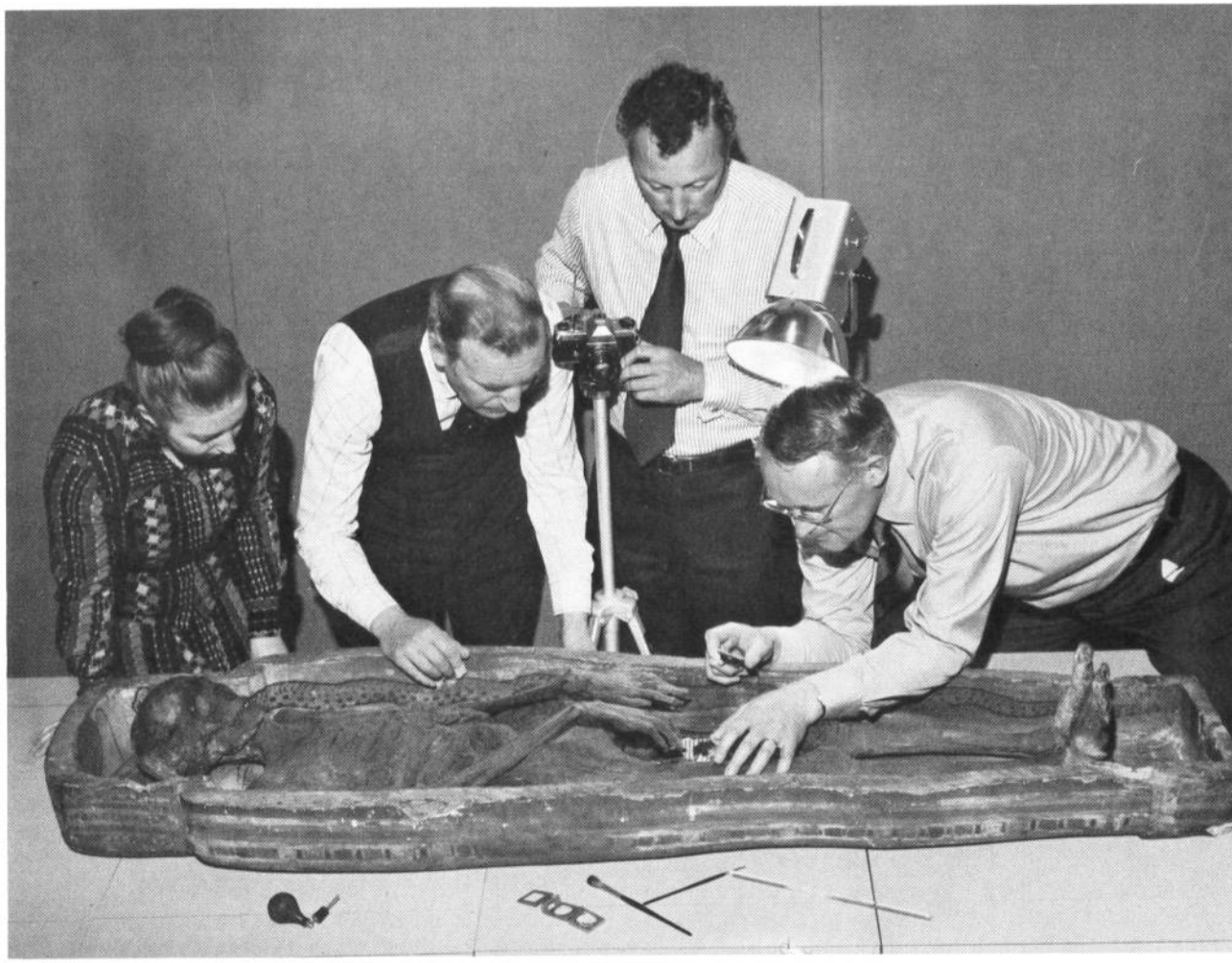
Our knowledge and continual research show that the friction ridge surfaces are there from birth and persist throughout life. Although the ridges, patterns and characteristics are common to all hands, no two impressions taken from different skin ridge surfaces, whether they be from the same hand or from different hands, have the same characteristics appearing in the same order relative to each other. Because of this, identity can be established by comparing fingerprints taken from a person with fingerprints left elsewhere. Whilst the task of the fingerprint officer is normally to identify the criminal it is often necessary to fingerprint dead bodies in order to establish their identity. These bodies may have been dead over a long period of time, often having been recovered from water, and as a result the flesh is putrified and fragile. Nevertheless, there remains a certain amount of flexibility in the fingers, and prints can be obtained by conventional methods. In certain circumstances, where the ridge surface is visible, it is possible to record the prints with the use of photography. The technique involves the use of oblique lighting. This casts shadows from the ridges into the depressions, thereby highlighting the ridges in contrast. Similar effects were obtained when photographs were taken of craters on the surface of the moon.

Nobody, of course, was trying to show that Asru had been a burglar, but nevertheless all the knowledge we have outlined was brought into use when we examined the mummy. Asru was not simply an ordinary dead body. This meant that we had to use extreme care because of the delicate rigidity of the flesh. The position of the hands excluded the use of photography to record the prints, as there simply was not enough room to position and manipulate a camera.

Apart from actual fingerprints, the palms of the hand can provide certain information about a person's activities during life. The hands of a man who does manual work, for example, have callouses and thickened skin; alternatively, the hands of a clerk may have a small seg where he holds his pen to write. A man who dresses poultry may have soft but strong hands; the softness will result from the fat in a chicken's inside but the physical strength used in preparing a bird for the oven ensures a firm, well-used hand. Soleprints and toeprints can show not only deformity and fungal infections but also the damage which can arise from constantly walking barefoot. In the Western world few of us walk barefoot but in the past it was not always so.

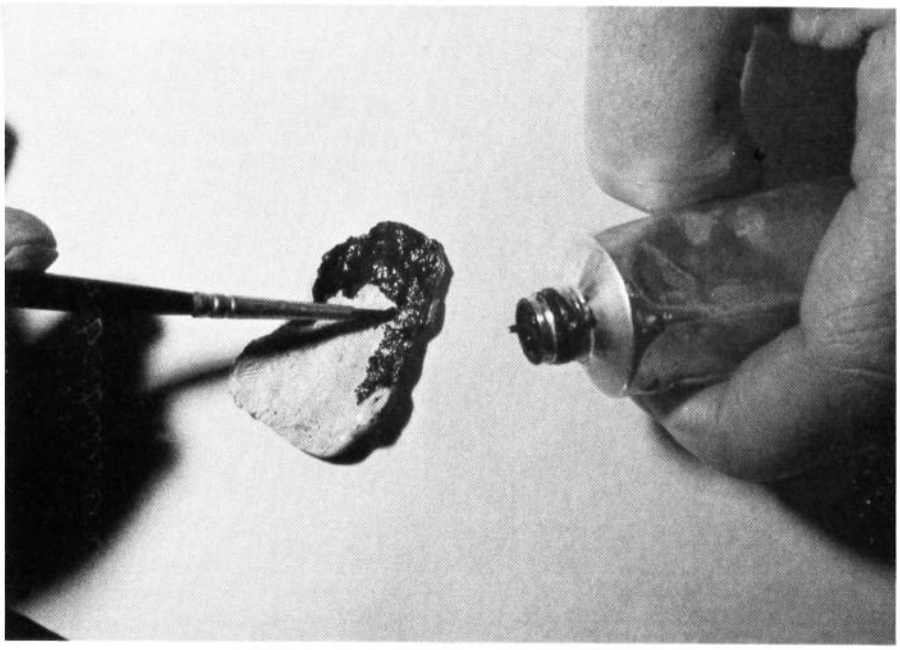
In the case of Asru there was a very great difference between taking her fingerprints and taking those of a living person. With the latter, one finger at a time is inked and then rolled in a special place on a pre-printed form. However, we were unable to move Asru's fingers in order to apply this technique for fear of damaging the delicate tissue, so yet another method was needed.

Fortunately there is a special and very useful compound now in use in the dental profession. It combines at once a quick-setting quality with easy flexibility. We prepared small quantities of this compound, which looked very much like the grey putty used by a glazier. Then, with one fingerprint officer holding Asru's delicate but rigid hand from the top, another officer carefully applied the grey compound to the surface of each finger, passing it gently upwards in the narrow space available. It was allowed a few moments to set, and then was carefully peeled away. The eight fingers and two thumbs were all treated in this way. Afterwards, several coats of black acrylic paint were applied to each of the moulds, and then peeled away. These acrylic casts were then inked and printed in the manner previously described. The

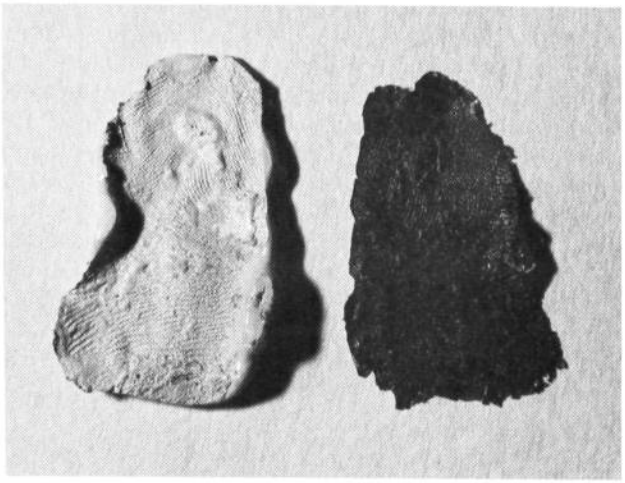


A mirror is placed beneath the fingers and the reflected image then photographed.

Rubber mould being removed from mummy's left toes.



The first of several coats of acrylic paint being applied to mould to form a cast.



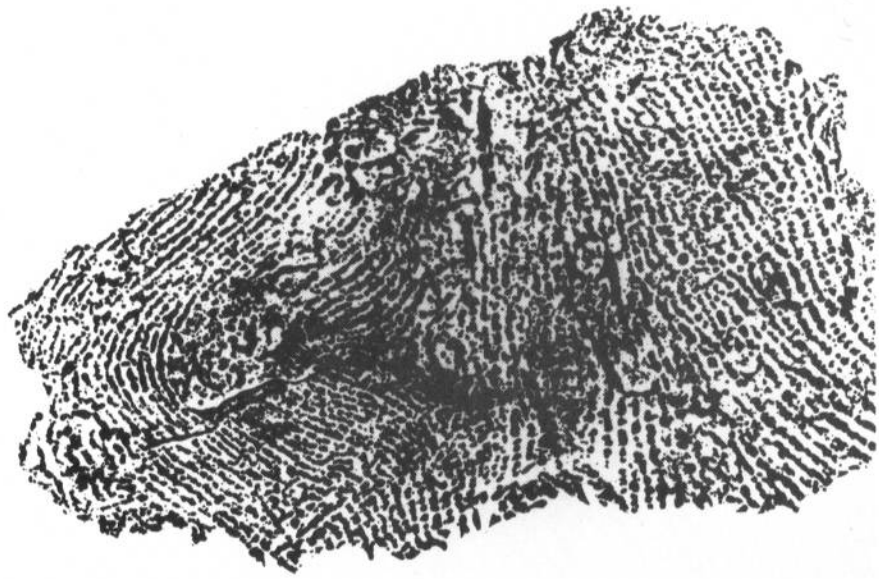
Rubber mould alongside black acrylic cast.

prints are not quite perfect because very small fragments of the mummified flesh are damaged. Nevertheless, their ridge characteristics are very clearly defined. A comparison of these shows that no fundamental change has occurred in the ridge system over theyears. If Asru had been suspected of breaking into an Egyptian grocer's and had left tell-tale marks, there is no doubt that suitable evidence could be produced against her.

Most fingerprint work involves comparison of the prints of a suspect, taken in a police station, with the marks found at the scene of a crime. Sometimes the police have only the marks left at the scene of a crime and no trace of similar marks already on record. Then it is a matter of using years of experience to form a judgement. Frequently, this judgement can be surprisingly accurate. For instance, experience can provide a reliable estimate of the age of a person leaving fingerprints. Although body cells are cast from the skin all the time and are replaced at the same rate, the texture of the ridges is affected and the degree of wear and scarring will vary significantly. These features, if interpreted correctly, may lead to an estimation of age, a guide to the nature of occupation, and an indication of general body structure. One recent example was that of a finger impression left behind at the scene of a murder. The opinion of the experts was that it had been made by a man aged between thirty-five and forty years, who did not do hard manual work and was fairly tall. When interviewed he turned out to be thirty-seven years of age, was a hairdresser, and was five feet eleven inches tall.

The examination of Asru's fingerprints led to the conclusion that she was, at the time of her death, in her early forties. This estimate was later supported by evidence from other sources. It was also fairly clear that she did not do hard manual work. Her fingers had not met with the small accidents commonly encountered by a housewife looking after her home, or by a woman working in the fields. This type of work tends to crease the skin, to lessen the depth of the ridges, and to effect adversely the general condition of the skin.

Asru's toeprints were taken in the same way as her fingerprints. Asru had come from the Temple of Karnak



Fingerprint pattern reproduced by inking and rolling acrylic cast.

and she was almost certainly either a dancer or a chantress, that is, one who was concerned with the chanting or singing of accompaniments to various temple rites. Three thousand years ago Egyptian temple dancers performed their ritual dances barefoot, the foot being used as part of the body's expression. The sole was in constant contact with the ground and even on the smoothest of flooring there would be friction and consequent wearing of the ridges on the underside of the toes and ball of the foot. Asru's feet did not show any traces of this constant contact with the floor; the depth of the furrows and the clarity of the characteristics were not consistent with her having been a dancer and the alternative of her being a chantress was much more acceptable.

It is not often that such an unusual opportunity occurs for fingerprint officers to exercise their skills. Most of their working day is concerned with crime and those committing it. Look again at your own hand; the pattern of your fingerprints and the lines on your hand are unique to you. There is nobody quite like you in the whole world. This remains true for the burglar and for Asru, the temple chantress. This individuality can be identified throughout a whole spectrum of activities and has allowed us to explore the annals of history more thoroughly. The skilled tracker can identify the prints of an animal, human or otherwise, from those of another. The essential qualities needed are accurate observation and the application of knowledge, experience, and common sense. Today, we have the benefit of recent scientific development and a great deal of this has been used by the whole investigation team. The sum of knowledge increases all the time and we are glad to have been able to contribute to it.