Finger Prints
A Chapter in the History of Their Use for Personal Identification
By Henry Faulds

Two famous Tischborne case gave a great impulse to the study of identification as a question in jurisprudence. I was leaving this country for Japan in 1873 and the very next morning the old Court at Westminster impressed me greatly with the importance of the subject. Craniology seemed to many to have had its day, and the system of constantly varying methods had induced almost complete skepticism. If a race could not be distinguished on anatomical grounds, how could we ever hope to identify a single member of the human family on the basis of anatomy with confidence and precision? It had been deemed senseless contradiction, counter-proofs, and weak exceptions—but all the soft tissues, hair, skin, and the like, were now useless for such a purpose. I had studied photographs most carefully, but found them to be traitoress, the same people being made to look quite different in a changed light, by another mode of dressing, or by the psychological moods of the sitter. They were useful but not precise. After certain illnesses, too, the living face would change, as in typhoid fever, and change more temporarily in rage. The tragic effects of small-pox are well known to served readers. Our police in England used not long ago to keep an indexed record of tattooed-marked persons who had once been convoluted. I doubt if they ever had a case like that of a Japanese once employed by me in their collection. This man's case was unique, I think, his whole skin surface being one soot-stained, not only intemperate but really beautiful. Now such a case might be copied, at great trouble and expense, to win a fine estate. But no one else in the world could order the simplest finger-print pattern in living tissue. It may be destroyed, whereas, on the other hand, a simple tattoo pattern can be created but once and is scarcely destroyable. Sir Edward Henry says that finger-painters that they are out of all proportion more noticeable and more interesting, such reasonable features as as tattoos, but I think he cannot have contemplated such cases as that just described.

A beautiful beach of the Bay of Yedo, where the hospital-was which I had charge of, were many shell-beaches or kitchen middens. Some of them were ancient, while others had an almost unknown history coming down to our own day. Amid the oldest of these there was found fragments of sun-baked pottery, on which ancient finger-marks had been impressed when the clay was soft. These seemed to have been made by children, perhaps young girls, whose ancient fingers had dusted the edges of the soft ware as pie-crusts are still moulded by the thumb of baker or pastry-cook. Similar articles were found (1878) made and sold as toys, and I bought many of them in the bazaars of Tokyo. Ancient ware, baked in the sun but never fired, and marked with finger impressions, was requisite for the ceremonial tea-drinking of Japan, but it is quite incorrect to say, as has been said and written, that no other is ever used in those depressing festivities. Sometimes the furrows or ridges of the ancient finger-marks came out sharp and clear, but other times were blurred or smudged by movement during the act of impressing. In the modern toys, however, the impressions were better impressed and were obviously intended for ornament. Endowed, or afflicted, with myopic eyes, I was led very early to notice how, in the modern ware, one peculiar pattern of lines would reappear with great persistency, as if the same artist had again left her sign-mark on her work.

I examined directly many thousands of living fingers, then passed on to consider impressions on putty, bees-wax, sealing-wax, clay, and other substances, taken from my own fingers, those of students under my care, and medical men, foreign, and out-patients who might visit the hospital. These were at first very roughly classified and analyzed. I am quite sure that at this point the conception of a wide and general method of identification flashed upon me with suddenness. Almost immediately I was possessed with the idea of using this new resource for one of the most important duties of the moral responsibility and danger. What if someone were wrongly identified and made even to suffer innocently through a defective method? It seemed to me that a great deal had already been said to preserve the adoption of such a scheme. Till then we had used wax and other plastic substances (and on the whole, paraffin was found to be better) and had derived lessons on botany I received in Anderson's College, Glasgow, as a boy, and trained extending business. We used to print like the leaves collected in Saturday afternoon excursions with an oily mixture of burnt cork. Using good printing ink in Japan, these leaves were easily traced and excellent finger impressions. Their variety was wonderful, and we could study details with much greater ease and delicacy than in relief impressions. From that stage onward I made steady observations, seeking specially to determine whether the patterns characteristic of one individual ever varied from time to time, either in general arrangement or in linear detail. At this time I had noticed that the pigment in human freckles and in the skin affections of the pectoral region (often referred to as the "white leprosy" of the Hebrews) migrated, as my teacher, Lord Lister, had shown to be the fact with the pigmentation of blotches. I took to test whether his ridges ever shifted their situation or changed their form was by shaving away their elevations or rubbing them down with various powders to smoothness, having first taken careful imprints of the patterns. After the skin grew up again fresh imprints were taken and compared with the old ones. These were scrutinized very carefully for changes, but in many hundreds of cases, tested thus three or four times, no one solitary example of a variation in pattern was detected.

The patterns always came up with perfect fidelity to the old standard. Arrangements were made for a still more extensive test extending also over a greater period, but exhausting the investigations from climate and overwork caused a return to England, and broke for a time the thread of my investigations. I returned to Japan after a rest, but had again to come back to England in 1884. The former conviction, however, was established in my mind, which nothing has ever changed, that skin furrows for the purpose of identification could be variable throughout adult life. Observations of select cases from that period—thirty-two years ago—till now have been made from time to time only to confirm my early results.

Fig. 1. —Raised Finger-Print Showing Sweat Pores.}

Fig. 2. —Rapae or ridges on the under surface of a finger. A typical example of the general form of these is shown in Fig. 3.

Fig. 4. —Smudge from a finger. A typical example of the chief cause of confusion in finger prints. Such smudges are not uncommon and are often due to the hard pressure of an instrument on the finger or to the touch of the stenographer, in the case of a written instrument, or to pressure of the hand, or palm or palmar surface of the fingers. Indeed, they are even found in the forefinger of a man with the same general form as in the diagram. (See Fig. 2.—spider-monkey's tail.) Near the middle of the last joint of each finger there are usually linesations

Fig. 3.—Skin Lignation (diagrammatic).

On February 15th, 1880, I wrote to Charles Darwin, sending specimen of prints and an outline of my results, and requesting him to aid me in obtaining access to imprints from lemurs, monkeys and anthropoids, as I had found them to show linesations which I hoped might be serviceable for the elucidation of man's lineage. I had failed to find any trace of previous notices of the subject in anatomical or recent biological works.

The great naturalist's reply, two years before his death, was as follows:

Down, Brighton, April 7th, 1880.

Dear Sir: The subject to whom your letter refers of February 15th seems to me a curious one which may turn out interesting; but I am sorry to say that I am most unfortunately situated for offering you any assistance. I live in the country and from weak health seldom see anyone. I will, however, forward your letter to Mr. F. Galton, who is the most likely man that I know of to think of taking up the subject to make further enquiries.

Wishing you success.

Yours faithfully,

(Signed) Charles Darwin.
The original of the above, holograph letter, with envelope addressed by Mr. Darwin and duly postmarked, along with the proof sheet of the first copper-plate form to receive finger-prints, made for me in Japan, is now in the library of the Royal Faculty of Physicians and Surgeons, Edinburgh. On October 28th, 1893, Mr. Tunbridge, appeared a contribution by me, "On the Skin-furnaces of the Hand," which was printed in the Index Medicus of the London and other medical periodicals as the first recorded contribution on that subject. At the International Medical Congress, also held in Edinburgh, Dr. E. K. S. S., the then editor of the Index, said, in a speech: "Just as each individual is in some respects peculiar and unique, so that even the grooves and furrows at the end of his forefingers differ from those of all other forefingers, and are sufficient to identify," and so on. (Report in The Times, Aug. 28th, 1893.) My proposition was the first public suggestion to establish a scientific method of identification on the basis of finger-prints. Sir William Hunter, in his address to Varro, for mutilating my priority of publication, but stating that he had used a method of identification by finger-prints in India before. There is no dispute between Sir William Herschel and myself, as each had reached his own conclusions quite inde- pendently, was able to prove an essential fact, or introduced it into Nature (October, 1894) and in Gegenbauer’s Jahrh. for 1905, in which the date of my first contribution is considered the starting-point of recognition of my sub- ject. In 1881, Monseur Bertillon, of Paris, brought out his delusive anthropometric system, to which the inde- pendent fingerprint method from England was super- added. The fingerprint method alone was used in a United States census in 1860, and was tried in San Francisco, as afterward in South Africa, to identify the fluctuating population of Chinamen. In the year 1891, the first register returned to England was used, which was around in the summer. Herbert Spencer tried to explain the origin of the ridges in an article in The National Review, May, 1886, to whom Charles Darwin wrote in 1880 that he would read the later paper. Spencer began the study of the law of "Finger Prints," in 1888. In that same year, Inspector Tunbridge from Scotland Yard was officially appointed to investigate my proposals. No report has ever been made public, but Mr. Tunbridge told me that he was too busy to work, and that nothing could be done, at least without fresh legislation. Some years afterward he was appoint- ed to New Zealand, and he says that the prison authorities and police to apply the method, which has been now in successful operation all over Australand, for which Tunbridge wrote to me in 1907.

In 1901, the ten-finger method in serial order, exactly as originally advocated by me in 1880, was finally adopted by those that are free by the water were also the minerals of the rare earths, and every one in a while some of them of the rare earths. It will be found that the process of the rare earths in the surface soil, so that it has been found within our means to prove their occurrence. Just as sea water contains and accumulates the infini- mimal particles of matter in the sea water, so the marine material has, owing to its great specific weight, accu- mulated together with other minerals such as titantium, oxide, granite, feldspar, and quartzite. The process by which sandbanks are deposited in the sea is similar in nature. Sea waves, when breaking against monasite-bearing, crystalline sands, loosen the latter, and, washed away the heavy earthy and minerals, leave along the coast concentrated deposits of monasite sands, mixed with greater or less quantities of other minerals.

The Genesis of Rare Earths:
Their Relation to the Earth’s Past History

By Dr. R. Böhm

It is of the large monazite sand deposits in Brazil, the total quantity of all the rare earths probably does not exceed all told 1/1,000,000 per cent of the entire crust of the earth. When the latter was still considered of a mixture, composed of a vast number of minerals, the number of the elements, the atoms probably united to form the principal components of the earth’s crust. In that condition, the rare earths were formed gradually and slowly, and the smaller was the number of the rare earths, the smaller the number of the rare earths. The rare earths, in the course of the original parts of the earth, could not keep pace with the growth of the more common and larger kinds of rocks. They had to search too long for their chemical affinities. Anser von Weishauch in his experiments with the salinity of thorium, and in the other minerals, for whose recovery we are now doing and searching through the primitive rocks, which have been formed. Thus the shining particles of gold passed into quartz, and the modest little dark crystals of monazite, thorium, gadolinium, exenite, and other derivatives of the rare earths were saturat- ing the granite. However small their dissemination in the course of the earth, that granite was aggre- gated with like, and the rare earths were simply im- pressed in the group of the powerful giant granite. But the young granitic wilderness of the young prime- powerfull giant appeared upon the scene and began to fight an obstinate war with granite, which lasted millions of years. This young giant was soon followed by the younger west rest or interruption, swift and mobile, yet fighting with unerring persistence, he renewed his attacks on the old granite again and again, and though his advances were but slow, he was always victorious in the rocks of monazite and sandstones, which held the iron oxide and other minerals of the rare earths in the surface soil, so that it has been found within our means to prove their occurrence. Just as sea water contains and accumulates the infini- mimal particles of matter in the sea water, so the marine material has, owing to its great specific weight, accu- mulated together with other minerals such as titantium, oxide, granite, feldspar, and quartzite. The process by which sandbanks are deposited in the sea is similar in nature. Sea waves, when breaking against monasite-bearing, crystalline sands, loosen the latter, and, washed away the heavy earthy and minerals, leave along the coast concentrated deposits of monasite sands, mixed with greater or less quantities of other minerals.

To-day the designation “rare earths” hardly has any meaning, a fact of which I was astonished, when, at the time when the incandescent gas light, in whose production some of the rare earths play an important part, was invented. I have already presented a heavy mona- site-sand from the corrosion and decomposition pro- ducts of the rocks. The monasite sand is also associ- ated with granite, but it is not easy to find an easy enough explanation in what has been said above. The gold district of Carinha contained wash drifts of the monazite sands, which contained mainly, brown or yellowish brown crystals. This so- called more concentrated and distinguished the at- traction of the miners, at the time when gold washing was in full swing, by its heavy weight, but it had been thrown aside as worthless till the genius of Aner von Weishauch recognized its real value. The commercial importance monazite sand deposits lie in the alluvial deposits of the rivers and their tributaries, as well as in the sand deposits along the sea coast. Such deposits could only be formed in countries which remained immune from the ero- sive action of glaciers. The monazite sand deposits have been covered for a long time a large portion of the earth’s surface, especially in the northern hemisphere. The monazite sand deposits have been covered for a long time a large portion of the earth’s surface, especially in the northern hemisphere. The monazite sand deposits have been covered for a long time a large portion of the earth’s surface, especially in the northern hemisphere. The monazite sand deposits have been covered for a long time a large portion of the earth’s surface, especially in the northern hemisphere.