Indian civilization and the science of fingerprinting

G S Sodhi*
Department of Chemistry, S.G.T.B. Khalsa College, University of Delhi, Delhi 110 007
and
Jasjeet Kaur
Rajguru College of Applied Sciences for Women, University of Delhi, Jhilmil Colony, Delhi 110 095

Sir William Herschel (1833-1917), an English officer, started studying fingerprints when he was posted in India during the later half of nineteenth century. He propounded the concept of ridge persistency, according to which the patterns of criss-cross lines on the fingertips or palms of an individual remain unchanged from birth till death. He also made it mandatory for the natives to impress their handprints or fingerprints on official documents. Word quickly spread that Herschel was the first pioneer to recognize the utility of fingerprints for identification purposes. However, this was fallacy, for Indians knew about the science of fingerprinting much before the English had an inkling of it.

Keywords: Fingerprinting, Ancient science.

William Herschel was born on January 9, 1833 at Slough, UK. His interest in overseas trading prompted him to join the Haileybury College. This institution imparted administrative training to those aspiring to work with the East India Company. In 1853, when Herschel was 20 years old, the company deputed him to Bengal. After the Mutiny, the Company was taken over by the British Crown and Herschel automatically became a member of the Indian Civil Service. He was posted at Jungipoor.

Modern Era

It was here that Herschel, on behalf of the government, entered in an agreement with a local contractor, Rajyadhar Konai, for supplying material for the construction of roads. In order to authenticate the covenant, Herschel asked Konai to place his right handprint on the agreement (Fig. 1). Konai obliged by the conditions of the contract. Subsequently Herschel realized that it was more advantageous to use the impressions of right index and middle fingers as against using the whole hand.

In 1877 Herschel was appointed magistrate and Collector of Hooghly. The courts, the prison, the deed registration office and the pension office now fell under his purview. He,
therefore, decided to put the fingerprint system to practical usage. He introduced the practice of taking pensioner's fingerprints to avoid impersonation by others after their death. He also made it mandatory on the part of the concerned individuals to put their finger impressions on the legal deeds.

In 1916, Herschel published a book entitled, *The Origin of Finger-Printing*, in which he took pains to emphasize that Konai's contract was the first official document bearing the handprint as a mark of personal identification. In the preface, Herschel writes:

---

Fig. 1—Handprint of Rajyadhar Konai
The following pages have two objectives: first, to place on record the genesis of the finger-print method of personal identification; secondly, to examine the scanty suggestions of evidence that this use of our fingers had been foreshadowed in Europe ....

....I believe these pages will suffice to show the originality of my study of its two essential features, the strict individuality and the stubborn persistence of the patterns on our fingers.

Why did Herschel ask Konai to put his hand impression on the contract? In his own words:

....I was only wishing to frighten Konai out of all thought of repudiating his signature hereafter.

Eight decades later, the website on history of fingerprinting corroborates Herschel's point of view:

The English first began using fingerprints in July of 1858, when Sir William Herschel had Rajyadhar Konai, a local businessman, impress his hand print on the back of a contract.... The native was suitably impressed, and Herschel made a habit of requiring palm prints....on every contract made with the locals.

Rajyadhar Konai fulfilled the conditions of the agreement not because he was afraid, but because he, being an Indian, understood the significance of handprints.

Medieval Era

Herschel further writes in his book:

Many must have heard of some such use of a man's hand; and the correspondence that has taken place has brought to light old instances of the hand, or the nail of a finger, or the teeth in one's mouth, being used to certify a man's act or a woman's. But these have all been isolated instances.

These were not isolated instances. It was rather a common practice among rulers of medieval India to sign the routine documents, but to put their handprints on more important ones. Fig. 2 shows the hand impression of Mughal Emperor Shah Jahan. This has been reproduced from a farman (royal edict) addressed by the Emperor to Dalan Singh, the king of Gidhour (in present day Bihar).
Concerning Mughal farmans, Hasan⁶ says:

Three marks of distinction were established as a tradition by which the king, according to the rank of the addressee and the extent of favour desired to be bestowed upon him, could exalt him.

1. By putting his signature in addition to the official seal
2. By adding a line or two at the top in his own hand...
3. By putting the mark of the royal hand on the farman.

In 1637 AD, the joint forces of Shah Jahan and Adil Khan, under the command of Khan Zaman Bahadur, invaded the camp of Shahuji Bhosle, the ruler of Poona (in the present day Maharashtra). The joint army defeated Shahuji, who was compelled to accept the terms of peace⁷:
Plate 1—Farman issued by Aurangzeb, bearing his handprint
Since the garrison (of Shahuji) was now reduced to great extremities ....Shahuji wrote frequently to Khan Bahadur in the most humble strain, promising to pay allegiance to the crown. He at the same time solicited a written treaty ...stamped with the impression of his hand.

In 1613 AD, Mughal Emperor Jahangir defeated Amar Singh Sisodia, the ruler of Udaipur (in present day Rajasthan). The following is recorded in the biography of Jahangir³:

> When Rana Amar Singh Sisodiya of Udaipur was brought under the yoke of obedience, he demanded the royal *panja* as a condition of treaty....and the condition was complied with.

Another Mughal king, Aurangzeb, issued a *farman* (Plate 1) in 1659 AD bearing his handprint⁴. Plate 2 depicts the handprint of Maharaja Ranjit Singh. This has been reproduced from a treaty dated April 13, 1827 AD between the Maharaja and Fateh Singh, the king of Kapurthala (in present day Punjab).
The question then arises that how did the Indian rulers came to know about the importance of fingerprints. The science of fingerprinting has always been a part of Indian culture and civilization. A Hindu scripture, *Samudra Shastra*, compiled by Samudra Rishi tells us a great deal about fingerprinting.

When Sir Edward Richard Henry, Inspector General of Bengal Police, devised a classification formula for maintaining fingerprints' record in 1897, he identified three broad types of patterns: Arches, loops and whorls (Fig. 3). He also observed that statistically, 5% of fingerprints have arch pattern, 60% are loops and 35% are whorls.

*Samudra Shastra* too identifies three types of fingerprints. It says that two are of common types, viz. *sankhas* (corresponding to loops), and *chakras* (corresponding to whorls), while the third type, *seeps* (corresponding to arches) are rare. It is not surprising that both Henry and Samudra Rishi reached the same conclusion. What is astonishing is that what the police officer inferred merely hundred years ago, the holy man ratiocinated the same more than 5000 years ago!

The modern science of fingerprinting asserts that parallel ridges on fingertips are interrupted by seven types of irregularities, known as *characteristics* (Fig. 4). It is the combination of these irregularities that makes each fingerprint unique. Thus the fundamental principal of fingerprinting states that no two persons and no two fingers of the same person have identical ridge patterns. This makes fingerprinting an infallible means of identification. *Samudra Shastra* too identifies many of these characteristics(Fig. 5). Thus, *apan java, puran java, padam and aax* are concurrent to *fork, lake, hook and island*, respectively, of modern fingerprint discipline.
It is quite obvious that the author of *Samudra Shastra* would not have studied such minor details directly from the fingers, for the invention of lens came much later. This means that he must have developed a method to record the finger impressions on a suitable surface. This also means that he would have designed a version of modern day stamp pad.

Samudra Rishi researched fingerprints from the point of view of astrology and not criminology. However, it is hard to believe that a person who had probed in details, not only the outer pattern but also the inner characteristics of fingerprints, had not realized their uniqueness. However, he did not make an attempt to correlate the ridge pattern with the identity of individuals because in those good old days there was no crime in India. On the other hand, the handprints/fingerprints impressed by Indian rulers on legal documents during the middle ages had nothing to do with astrology. They were a mark of individuality.

**Herschel’s Delusion**

We are not sure whether Herschel was aware of the handprinted documents of medieval rulers or of *Samudra Shastra*. Perhaps he was not. Nevertheless, he asserts that the true essence of handprints/fingerprints lies in identification. He further states that neither
the custom of tep-sai – the practice followed by illiterates in Bengal to wet the tip of finger by ink and press it on a document – nor the convention followed by Chinese bankers to put their thumb impressions on currency notes had anything to do with identification’.

Herschel thus believed that by recording Konai’s handprint, he was the first to hit upon the idea of identification by fingerprints. So sure was Herschel about his innovation that in October 1917, he sent the following note to the Secretary, Government of Bengal for favour of placement in the archives records:

I have the honour to send you by this mail a copy of the pamphlet which I have lately published on the ‘Origin of Finger-printing’, which I request you to lay before His Excellency the Governor for favourable consideration of the purpose I have in view: which is to place on record in the archives of his Government the story of what I may now with perfect confidence call ‘the Discovery’ of the peculiar value of finger prints by a member of the Bengal Civil Service.

I recall these facts as necessary to fill up the record of my share in what has grown to be a world-wide and powerful instrument for the security of society in various ways, all tending, I venture to think, to realize the hope I had expressed in 1877 that ‘its general use would be a substantial contribution towards public morality’. Looking back now, forty years after my retirement, I wish that I had rather said ‘towards confidence between man and man’.

Herschel advocates in his book that most authors have failed to realize the force of the word ‘identification’ in the fingerprint system:

It (identification) means that if a man can be indicated whose fingerprint agrees with that on a document, he is identified with the man who put that one there. That is all we want. But it will be seen that there must be two impressions at least, that will bear comparison, to constitute ‘identification’.

Most of the handprinted documents of medieval India represented a formally concluded and ratified proclamation between the rulers. As is customary, a copy of such an agreement would have been kept by all those who were party to it. This very well satisfies the criteria which, according to Herschel, is necessary to constitute identification.

We once again refer to the handprint-bearing treaty which Shahuji Bhosle solicited from Shah Jahan. Normally the victorious ruler dictates the conditions of the treaty. But here is a case where a king, who is at a receiving end, lays down the terms for peace. By asking for a handprinted document, Bhosle was trying to ensure that the covenant be re-
spected by the descendants of the warring factions. What was special about the handprint, save it being a mode of identification?

Moreover, regarding Mughal farmans, Hasan writes:

The procedure in drafting the farmans was very elaborate. Having regard to the conditions of the age in which the Mughals ruled, every necessary precaution was taken to safeguard against frauds in this connection.

The fact that handprint was used as an ultimate safeguard against fraud clearly indicates its utility as a means of identification.

Herschel concludes his book by stating:

....It is hard to believe that a system so practically useful as this could have been known in the great lands of the East for generations past, without arresting the notice of Western statesmen, merchants, travelers and students. Yet the knowledge never reached us.

Puri believes that many foreign visitors to India did notice the practice of handprinting, but took it as a superstitious custom of the natives. Moreover, Hasan states:

The mark of the royal hand was the highest distinction (on a farman)...

I have not found any case in which it (handprint) was put on a farman to any royal servant...

Thus the hand impression signatures were put only on those official documents that were sent to individuals of status. These were generally rulers of other provinces so that they may recognize the sovereignty (read individuality) of the sender. Hence such deeds were outside the purview of commoners.

Nevertheless, there were some enterprising westerners who unearthed such documents for academic exercises. However, these investigators were neither civil servants nor scientists, but mainly historians. One such historian was E.B. Havell from whose text, A Handbook to Agra and the Taj, we have reprinted the hand impression of Shah Jahan (Fig. 2, reference 5). Havell was an Englishman who came to India to research the Mughal history, but finally settled in this country. W.E. Begley who, along with Z.A. Desai, translated Shah Jahan's biography, Badshah Nama, from Persian to English, is an American historian. He too has referred to the handprinted documents of the Mughal era.

Going by their professional training, however, such researchers were interested in the contents of treaties and not in the symbols of identification.
Acknowledgements

The authors are grateful to Indian National Science Academy, New Delhi for sanctioning a project on history of science of which the present work is a part. Thanks are due to National Archives of India, New Delhi for providing Home Department Records for survey. We also wish to thank Maharaja Ranjit Singh Museum, Amritsar, for providing the photograph of Ranjit Singh’s handprint (Plate 2).

References
6 Hasan I, *The Central Structure of the Mughal Empire*, (Oxford University Press, Delhi), 1936, 92.
8 *Tuzuk-i-Jahangiri*, p. 134.
13 Home Department Proceedings No. 96(B), Police Branch, June 1918.