

Scientific Racism faced by Indian Fingerprint Scientists during Colonial Rule: Need to correct a Historical Wrong

G. S. SODHI¹ AND JASJEET KAUR^{2*}

¹Forensic Science Unit, S.G.T.B. Khalsa College, University of Delhi
Delhi-110007

²Department of Chemistry, Shaheed Rajguru College of Applied Sciences
for Women (University of Delhi) Vasundhara Enclave Delhi-110096

*E-mail: jasjeet.kaur@rajguru.du.ac.in

ABSTRACT

In the last decade of the nineteenth century, two Indian officers of the Bengal Police, Sub-Inspectors Azizul Haque and Hem Chandra Bose worked out a mathematical formula for classifying fingerprints. This formula was soon adopted by all the nations across the globe for cataloguing criminal records. It is still being used worldwide. Unfortunately, due to the imperialist policies of the colonial rulers, the Indian policemen were sidelined and their English officer, Sir Edward Richard Henry shrewdly gave his name to the classification methodology.

The world's first fingerprint bureau was set up at Calcutta (now Kolkata) in 1897 mainly by the efforts of Haque and Bose. In addition, Bose invented the telegraphic code system for fingerprints and published it in 1916. Sir Charles Stockley Collins of Scotland Yard, who is worldwide recognised as the originator of the fingerprint telegraphic technique, published his findings in 1921 — five years after Bose's publication. Likewise, Bose devised the single-digit fingerprint classification system three years prior to Harry Battley who stole the credit for this invention. The then British government reciprocated the sagaciousness of Haque and Bose by awarding each of them an honorarium of Rs 5000/- and by conferring the titles of Khan Bahadur and Rai Bahadur, respectively on them.

(After India became free these decorations were rendered meaningless, for all titles were abolished under an Act of the Constitution). However, this is not enough. Justice has been denied to Haque and Bose. Now that the colonial clouds have dispersed, it is pertinent to highlight the contribution of these

police officers so that they may officially be recognised as pioneers of the science of fingerprinting.

Keywords: Azizul Haque, Bengal Bureau, Classification system, Fingerprints, Hem Chandra Bose, Henry system, Telegraphic code.

Introduction

It may be asserted that there is no more effective deterrent to crime than the certainty of detection. Equally true is that there is no surer way to establish identity than by fingerprints. The detection of fingerprints at the scene of the crime is therefore one of the most powerful tools available in casework investigations (Lambourne, 1984).

The science of fingerprinting originated in India. Indians were not only aware of the importance of this discipline but were also quite passionate to take it to great heights. It was this passion which brought about the metamorphosis of fingerprinting from a mere curiosity stage to a more sophisticated stage where it replaced all other trivial systems of identification (Sodhi & Kaur, 2013).

In the last decade of the nineteenth century, two Indian officers of the Bengal Police, Sub-Inspectors Azizul Haque and Hem Chandra Bose worked out a mathematical formula for classifying fingerprints. This formula was soon adopted by all the nations across the globe for cataloguing criminal records. Unfortunately, due to the imperialist policies of the colonial rulers, the Indian policemen were sidelined and their English officer, Sir Edward Richard Henry shrewdly gave his name to the classification methodology. Subsequently, Bose invented a system of communicating fingerprints from one bureau to another through telegrams but was hoodwinked by another English officer, Charles Stockley Collins who is now recognised as the official inventor of the telegraphic technique.

This paper was first presented in the International conference on the “Role of Indian Science in Freedom Movement (RISFreM 2022)”, organised by JNU in collaboration with VijnanaBharati, CSIR-NIScPR, and VigyanPrasar on 28 February 2022 and 1 March 2022.

This communication endeavours to give due credit to the Indian police officers who faced scientific racism during the colonial era and never got the recognition they deserved, despite their pioneering and innovative work on fingerprints.

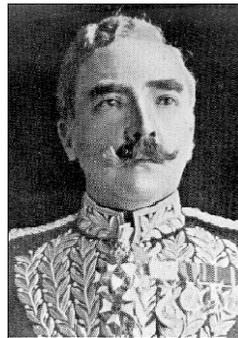
Classification System for Cataloguing Criminal Records

In 1897, the world's first fingerprint bureau was set up in Calcutta (now Kolkata). Christened, Bengal Fingerprint Bureau, it was housed in the Writers' Building (Figure 1).



Figure 1: Writers' Building during British times

It was at the Bengal bureau that a fingerprint classification formula was worked out. This system was named as *Henry System of Fingerprint Classification*, after Sir Edward Richard Henry, Inspector General of Police, Lower Provinces, Bengal. Today, nearly all the nations of the world follow Henry's method for maintaining criminal records (Berry, 1991).

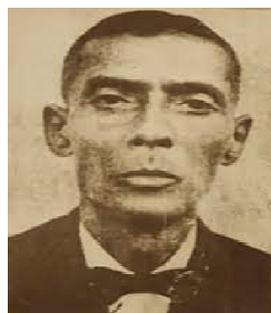


Sir Edward Richard Henry

Records at Indian National Archives, and several other references in literature, however, reveal that the system was actually invented by Sub Inspectors Azizul Haque and Hem Chandra Bose, while Henry, being their superior and being an English officer, shrewdly gave his name to it.



Azizul Haque



Hem Chandra Bose

It is alleged that Haque and Bose used to tell their confidants that Henry could not even understand the system when it was patiently explained to him. They could not have done anything beyond that. In 1900, native Sub Inspectors of Police had no channel of reprisal against a British Inspector General. Nor would a high official doubt that a junior, and that too an Indian, could file a representation against him (Haylock, 1979). However, in the early 1920s, Haque did represent his case to the government, although the way he did can hardly be called a representation. The whole issue arose when in 1924 Haque received the title of “Khan Bahadur” and Henry, while congratulating him, remarked, “I wish they had at the same time given you a jagir (a piece of land)”. On his retirement as Deputy Superintendent of Police and Honorary Magistrate, Haque wrote an application dated 3 March 1925 to the Governor of Bihar and Orissa (Home Department Proceedings, 1925):

Your humble memorialist’s prayer is that in consideration of his loyal services, especially in the matter of the adaptation of the Finger Print System to practical use....Your Excellency’s benign Government may consider your humble memorialist’s case with a view to the grant of jagir.

The Government of Bihar and Orissa, where Haque served his last posting, considered the application sympathetically. However, in these provinces, there was no land which the government could have possibly donated to Haque. Hence it forwarded the letter to the Government of India, stating that Haque deserved to be adequately rewarded and that in place of a jagir, he may be awarded an honorarium from the central fund. J.D. Sifton, Esq., C.I.E., I.C.S., Officiating Chief Secretary to the Government of Bihar and Orissa further wrote (letter No. 761 PR, dated June 15, 1925):

Azizul Haque was....allowed to start research work upon a method of classifying finger prints, and after months of experiment *he evolved his primary classification* which convinced Sir E.R. Henry that the problem of providing an effective method of classifying fingerprints could be solved. Thereafter the secondary and other classifications were evolved and the Khan Bahadur played an important role in their conception (italics ours).

When this letter was referred to D. Petrice, Director, Intelligence Bureau, it created an element of doubt. On 13 July 1925, Petrice wrote:

There can be no doubt whatever that the present system of classification of finger-prints was a scientific discovery of great value and has been adopted all over the world. Whether Khan Bahadur Azizul Haque took as prominent a part in evolving it as is claimed for him is, however, a matter on which I have no information. He is not mentioned in Sir Edward Henry's own book, and in the history of the fingerprint system as given in the Encyclopedia Britannica, Sir E. Henry is quoted as the inventor....

It also created an element of surprise for Petrice further wrote:

If the Khan Bahadur rendered as valuable services as are alleged as long ago as 1893, it is curious that his claims to special recognition should have been so belatedly represented.

This situation arose because so long Henry was in India he did not speak or write a word about the contribution of Indian

officers to the fingerprint classification system. It, therefore, suggested that the case may be referred to Henry himself. Henry, in turn, endorsed the grant of honorarium to Haque. In a letter dated 10 May 1926, he wrote to P.H. Dumbel, the then Secretary of the Services and General Department, India Office:

...I wish to make clear that, in my opinion, he (Haque) contributed more than any other member of my staff and contributed in a conspicuous degree to bringing about the perfecting of a system of classification that has stood the test of time and has been accepted by most countries. As in most research enquires, results were achieved by teamwork.

One wonders why Henry, after a lapse of 30 years, became considerate towards Haque. It is commonly believed that two factors were responsible for change in Henry's attitude. Firstly, Haque (and Bose too) had risen to the rank of Deputy Superintendent of Police and could, therefore, assert himself. Secondly, by the 1920s, the colonial grip was becoming loose. This may be true. However, there was another reason for Henry turning soft and, we feel, that this was more important. Four years earlier, Henry had spoken of Haque's contribution to F.W. Duke, an officer at India Office, Whitehall. Duke, in turn, wrote a letter on 25 January 1922, to Sir Havilland Le Mesurier, Acting Governor of Bihar and Orissa in which he stated:

Azizul Haque devised the classification which is now in force not only in India but practically throughout the civilized world. It may have required no exceptional talent; if not done by him, the same, or an equivalent, might have been done later by someone else, but the fact remains that it was devised by him, has not been superseded and its use is world-wide (italics ours).

When Henry was consulted on Haque's honorarium, a copy of this letter was also sent to him. It was now not possible for Henry to retrace his steps.

At the time of final approval of the honorarium, the Home Department noted:

It appears from the information now received that he (Haque) was Sir Edward Henry's principal helper in

perfecting the scheme and that he actually *himself* devised the method of classification which is in universal use. *He thus contributed most materially* to a discovery which is of world-wide importance and has brought a great credit to the police of India (italics ours).

Four years later Henry acknowledged the contribution of Hem Chandra Bose to the classification system and wrote (Home Department Proceedings, 1929):

The Rai Bahadur (Bose)...has devoted the whole of his official life to perfecting the methods by which search is facilitated and as his labours have contributed materially to the success achieved he is entitled to great credit.

The contribution of Bose to the science of fingerprinting, however, is best summed up in a communication (No. 650 PI, dated February 5, 1929) from the Government of Bengal to the Government of India, Home Department. It stated:

During his long service in the Bengal Bureau he (Bose) acquired unique knowledge of the science and introduced various improvements in the methods of sub-classifying finger impressions of which the following are deserving of special mention:

- 1 The method of comparing imperfect impressions containing only a few naked ridges.
- 2 The sub-classification by the numerical method.
- 3 The method of estimating the probability of fixing identity by the ridge characteristics.
- 4 The sub-classification of the accidental type.
- 5 The improved system of indexing.
- 6 The introduction of a telegraphic code for finger impressions (Home Department Proceedings, 1917).
- 7 The classification system for a single-digit impression (Bose, 1927).

Going by this communication it is evident that Bose contributed more to the subject of fingerprints than Haque. This has also been indicated in a note dated 28 February 1929, recorded by P.C. Bamford of the Intelligence Bureau:

I know Rai Hem Chandra Basu (Bose) Bahadur very well, and it would be impossible to find a stronger protagonist of the fingerprint system. His open idea was to make it a success....Hem Chandra Basu (Bose) not only *did his share in the original introduction of the fingerprint system* all over India, but continued, throughout his whole service, to devote himself to this particular work, and for this reason I consider that his case for an honorarium is better than that of Khan Bahadur Azizul Haque....(italics ours).

By saying so Bamford was merely corroborating the recommendations of the Government of Bengal:

The Khan Bahadur, it is understood, was associated with this work only for a period of five years when the system was in its infancy. The Rai Bahadur has, on the other hand, been upgrudging in placing on record in his books *the result of his long experience which has contributed much to the advancement of the science* and the Governor in Council considers that an honorarium of Rs 10,000/- might appropriately be granted to him by the Government of India. In making this recommendation His Excellency in Council is influenced by the consideration that the *officer rendered exceptional service to police administration generally, not only in India as a whole but elsewhere* (italics ours).

This recommendation was, however, turned down by the Government of India on the ground that Henry had said that Haque contributed more than any other member of his staff to perfecting the system of fingerprint classification. Hence the honorarium granted to any other officer had to be less than or equal to that awarded to Haque.

Had Haque not applied for the award, his efforts towards evolving the classification formula would have gone unrecognised. And had Haque not got the honorarium, even Bose would not have been rewarded. Bose received the honorarium not because he applied for it, but because Haque's case had set a precedent.

How the fingerprints are classified

Haque and Bose realised observed that fingerprint patterns fall into three broad groups: Arches, loops and whorls. On analyzing the patterns of several thousand persons, the police officers found that nearly 5% of fingers have an arch pattern, 60% have a loop pattern and 35% have a whorl pattern (Figure 2).

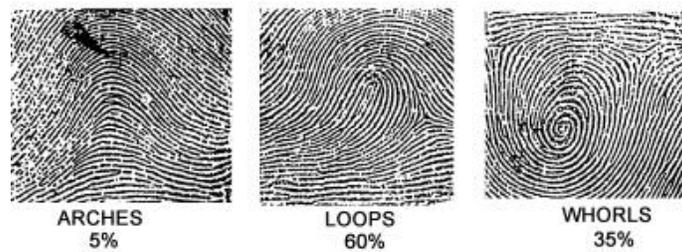


Figure 2: Fingerprint patterns fall into three broad types: Arches, loops and whorls

Since statistically, too few fingers have arch design, this pattern is combined with loops. Now there are two categories of finger ridges.

Loops (including arches): L

Whorls: W

Next, the ten fingers are grouped into five pairs (Figure 3).

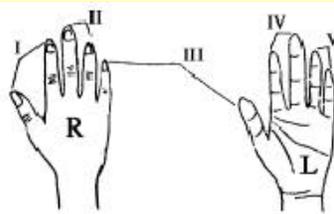


Figure 3: For the purpose of classification, the ten fingers are grouped in five pairs

The right hand (R) is placed left with palm down, while the left hand (L) is placed right with palm up. The pairs are arranged in the following fraction forms (Figure 4).

I	II	III	IV	V
<u>Right index</u>	<u>Right ring</u>	<u>Left thumb</u>	<u>Left middle</u>	<u>Left little</u>
Right thumb	Right middle	Right little	Left index	Left ring

Figure 4: The pairs are arranged in fraction forms

In the first pair, consisting of the right index and right thumb, there are four possibilities.

- a. Right index is L, right thumb is W.
- b. Right index is W, right thumb is L.
- c. Both are L.
- d. Both are W.

These four possibilities exist in all the other pairs as well. Therefore, the total number of possibilities is,

$$4 \times 4 \times 4 \times 4 \times 4 = 1024$$

The figure 1024 is the square of 32, that is,

$$32 \times 32 = 1024$$

The criminal record room has 32 cabinets (numbered 1 to 32) and each cabinet contains 32 files (numbered 1 to 32).

Whorls occurring in the 1st, 2nd, 3rd, 4th and 5th pairs are accorded a value of 16, 8, 4, 2 and 1, respectively. Loops (including arches) are assigned a value of zero, irrespective of the pair in which they occur.

We now take the representative example of a convict whose right thumb and left little fingers have whorl patterns (W), and the remaining have loop patterns (L). The filing formula may be worked out as shown in Figure 5.

	I	II	III	IV	V
	<u>Right index</u>	<u>Right ring</u>	<u>Left thumb</u>	<u>Left middle</u>	<u>Left little</u>
	Right thumb	Right middle	Right little	Left index	Left ring
W	16	8	4	2	1
L	0	0	0	0	0
Representative example: Right thumb and left little = W; rest = L					
	$\frac{0}{16}$	$\frac{0}{8}$	$\frac{0}{4}$	$\frac{0}{2}$	$\frac{1}{1}$

Figure 5: Working out the classification formula

In the example given above, we add the numerators and denominators separately.

We get $1/16$.

Adding 1 to the numerator and denominator gives $2/17$.

The fingerprints of this person would be found in the 2^{nd} file of the 17^{th} cabinet.

The unit increase in the numerator and the denominator has been done to file the record of a person whose all ten fingers have loop patterns. In such a case, the formula would work out to be $0/0$. This would not find a place in the record room, for the cabinets and the files are numbered from 1 to 32. By adding one to the numerator and the denominator, the fraction becomes $1/1$ and the fingerprint record of this person can be located in the 1^{st} file of the 1^{st} cabinet.

Telegraphic Code System for Fingerprints

Besides inventing the fingerprint classification formula, Hem Chandra Bose also worked out a telegraphic code system for fingerprints, which was later adopted by Scotland Yard, without acknowledging the contribution of the original innovator.

The telegraphic code served to communicate the fingerprints of a suspect from one crime record office to another at a rapid pace (Figure 6).

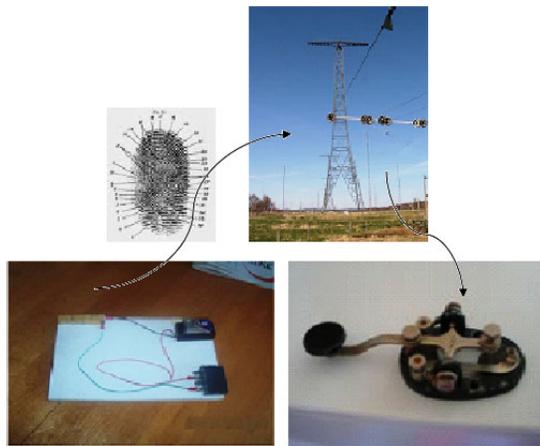


Figure 6: Telegraphic code system for transmitting fingerprints

Bose described the system in a book entitled, *Hints on Finger-Prints with a Telegraphic Code for Finger Impressions*, published by Messers Thacker Spink and Company in 1916, as far as we are aware, this is the first book on the telegraphic code system for fingerprints (Bose, 1916). Part II of the text deals with the telegraphic code system as applied to fingerprints. Concerning this section Bose writes:

Part II, which is a novelty in this book, deals with a method by which the details of a man's finger impressions can be *telegraphed* to any Finger-Print Bureau for search, thus avoiding the delay inseparable from the method of awaiting the arrival of the actual finger-prints through the post, a delay which would be considerable in the case of a reference to Scotland Yard or a Colonial Bureau (*italics original*).

Home Department Records reveal that Bose's publisher sent a copy of the book to the Chief Secretary to the Government of India along with a covering letter, dated 14 September 1917, which read as follows (Home Department Proceedings, 1917):

The author has asked us to solicit the patronage of your Government for the book should you consider it of value. We may mention that the Government of Bengal have included it in the list of "Works of Utility" and it is having a very large sale.

The Chief Secretary replied to the publisher on 23 October 1917:

The book is brief and simple and should be useful to beginners...but I do not see how the Home Department can patronize it. That may be left, I think, to local governments and police officers.

The Chief Secretary's refusal to patronize the book seems reasonable. However, it is clear that he did go through the text. He finds no objection to Bose's statement that Part II is a novelty. It is also reasonable to conclude that the Government of Bengal included the text in the list of "Works of Utility" because it dealt with the telegraphic code system. Otherwise, by that time, there were quite a few books on conventional aspects of fingerprint technique.

The method devised by Bose was cost-effective, as he states in the foreword (Bose, 1917):

It is with a view to reducing as far as possible (this) inevitable delay before the antecedents of strangers and suspicious characters can be known after their finger impressions have been taken, that this code for telegraphing details of finger impressions at a cost which is not prohibitive has been compiled.

The first English officer to recognise the utility of telegraphic code for fingerprinting was Sir Charles Stockley Collins, Detective Superintendent, Scotland Yard. His book, *A Telegraphic Code for Fingerprint Formulae*, was published in 1921 — five years after Bose's publication (Lambourne, 1984). This was stated by P.C. Bamford of the Intelligence Bureau while recommending the honorarium for Bose. In a note dated 28 February 1929, he wrote (Home Department Proceedings, 1929):

Hem Chandra Basu (Bose) published his code in 1916, and ... it has been used in the Bengal Bureau since 1917. Mr. Collins of Scotland Yard published a telegraphic code in 1921, and, in his preface, mentioned that his treatise was originally written some seven years previously. Since he did not publish it till 1921, I think that Rai Hem Chandra Basu Bahadur can claim to be the first in the field with a practical finger print telegraphic code.

Once the government cleared the honorarium for Bose, a request was made to the Standing Finance Committee to release the grant. S.N. Roy, Esq., I.C.S., Deputy Secretary, Home Department, in a note dated 8 July 1929, wrote (Home Department Proceedings, 1929):

This (telegraphic code) was a work involving arduous labour and although Scotland Yard published a similar telegraphic code in 1921 it is noteworthy that the Rai Bahadur's work was the first of its kind.

After the publication of Collins book, Scotland Yard adopted the new system. In 1924, it solved the first case using the telegraphic code method. Thereafter, many other cases must have been solved by the application of the code system.

However, no one remembered or gave credit to, Bose — the original inventor of the technique.

Single Digit Fingerprint Classification System

The idea of fingerprint code system was to transmit, at a very fast pace, the finger impressions of an alleged criminal from one bureau to another. However, it was not practical to telegraph all ten-finger impressions of the person in question. Therefore, Hem Chandra Bose modified the existing fingerprint classification formula, which was based on the ridge pattern of all ten digits. Against this, he devised a classification formula based on single-finger impressions.

At Scotland Yard, Harry Battley, the then Head, Fingerprint Department, worked on the same problem and his findings were published by HMSO in 1930 in a book entitled, *Single Fingerprints* (Lambourne, 1984). Battley perhaps did not realise that he had already been superseded in this endeavour by Bose, who had not only worked out the single-digit classification formula much earlier but had also got it published.

In an Intelligence Bureau note dated 28 February 1929, P.C. Bamford wrote (Home Department Proceedings, 1929):

I place below my own copy of the “Finger Print Companion”, which I believe to be his (Bose’s) latest work. The interesting portion(s) of this book relate(s) to the classification of single-digit impressions.....

Finger Print Companion was published by Gaudiya Printing Works, Calcutta in 1927 — three years before Battley’s publication. Bose’s earlier book, *Hints on Finger-Prints with a Telegraphic Code for Finger Impressions*, had become so popular that there was a persistent demand to bring out its 2nd edition. In *Finger Print Companion*, Bose incorporated both the newly discovered system of single-digit classification and the reprinted version of *Hints on Finger-Prints with a Telegraphic Code for Finger Impressions*. He believed that the combined text would serve as a ready reference on fingerprints. In the preface, Bose (1927) writes:

I regret the delay in meeting the demands for my *Hints on Finger Prints* by getting up a fresh edition

earlier, as I was engaged for some time in making researches in connection with the classification of a single digit or *chance* impression for the purpose of identifying persons who may have unknowingly left any impression when handling various articles, such as, glass, paper, polished wood, china ware &c. It is impossible to express adequately my appreciation of the generous support by Courts, Lawyers and the Police...I trust this new book...will answer the purpose of a ready book of reference (*italics original*).

Bamford further wrote (Home Department Proceedings, 1929):

The value of a single print classification is immense from the point of view of the detection of a crime in which only the prints of one or two fingers have been left by the criminal, and I understand that the Bengal Bureau have, for some time past, been classifying finger prints by this method.

In the opinion column of his book, Bose (1927) solicited comments from a few English police officers. Most noteworthy is that of J.E. Armstrong, Deputy Inspector General of Police, Bengal, who wrote:

If the Rai Bahadur has indeed made this new discovery in the science of identification by fingerprints, as I believe he has, it will be one more triumph for him and perhaps his greatest.

While sanctioning the honorarium for Bose, the Standing Finance Committee, during its proceedings of 6 August 1929, recorded (Home Department Proceedings, 1929):

During his long service in the Bengal Finger Print Bureau he (Bose) acquired a unique knowledge of the science and introduced various improvements which had been of great use to the police administration not only in India but throughout the world. Particular mention might be made of the system of classification for a single digit impression which had been acknowledged to be a master piece of finger print work by many experts in Europe....

J.R. Blair, Esq., I.C.S., Deputy Secretary to the Government of Bengal, while making a case for rewarding Bose, wrote (vide letter No. 650PI, dated 5 February 1929) to the Secretary, Government of India (Home Department Proceedings, 1929):

The utility of the system of classifying single digit impressions is obvious as it answers to all the conventional standards of proof held by experts as essential for identification. The system has been put to practical test in the Finger Print Bureau and has been found to be reliable. This achievement has been acknowledged to be a master piece of finger print work by many European experts and a reference was made to it in the "International Public Safety" dated the 30th September 1925, the official journal of the International Police Commission of Europe.

The journal, *International Public Safety*, a publication of the International Criminal Police Commission, in its 30 September 1925 issue, reviewed the proceedings of the International Police Exhibition, held in June 1925 at Karlsruhe, Baden (Germany). Regarding Bose, the Government Councillor of Germany's Ministry of Interior wrote (Government Councillor, 1925):

Rai Bahadur Hem Chandra Bose... recently published a new method for the classification of a single digit impression which, it seems to me, is worth of special attention....Although it was not possible to present the new method at the International Police Exhibition arranged at Karlsruhe in June last, yet the closer connection formed on the occasion of this exhibition between the police administration of India and Baden offered an opportunity of acquainting wider circles of experts with his method.

A part of the reprint of *International Public Safety*, highlighting the contribution of Bose, is reproduced in Figure 7.

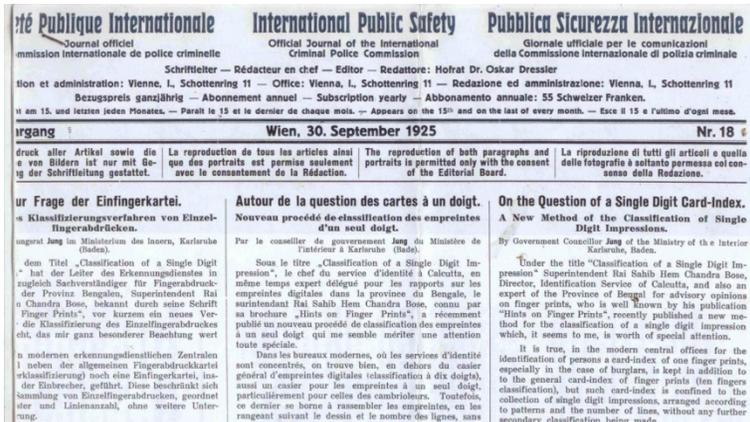


Figure 7: The 30 September 1925 issue of *International Public Safety* highlighted Bose's endeavour in working out a single print classification method (Courtesy: INTERPOL, Lyon, France)

Bose was nominated as Honorary Member of the Police Exhibition Committee. It was during this event that many European experts came to know about the single-digit classification method. It is quite obvious that Scotland Yard would have been represented at the exhibition. Its officers would have got a tip-off on the classification method which, in turn, would have guided Battley to devise the single-digit classification method.

Thus while Battley was struggling to invent the single-digit fingerprint classification formula, Bose had smartly accomplished the job. The system innovated by Bose had been tested in casework investigations, had been published in a book and had been held creditable by an international journal. Why then Bose was not recognised as the inventor of the system? We fail to understand!

Conclusion

With the coming of several advanced tools of information technology, fingerprint telegraphic code and the single-digit classification system have paled into insignificance. However, the ten-digit classification formula is as relevant today as it was when Haque and Bose invented it. The criminal record bureaus all around the world classify fingerprint cards based on this formula. The imperial rulers did award an honorarium of

Rs 5000/- each to Haque and Bose, and also conferred the titles of Khan Bahadur and Rai Bahadur respectively on them.

However, the true award for a scientist, who has served a global cause, is neither monetary benefit in form of honorarium, nor emblazonment by way of memorabilia, but tagging of his name with his invention. We suggest that as a step towards correcting a historical wrong, the method of cataloguing criminal records be renamed as *Henry-Haque-Bose System of Fingerprint Classification*.

Acknowledgements

The authors are grateful to the Indian National Science Academy, New Delhi, for sanctioning a research project on the history of science of which the present work is a part. Thanks are due to Indian National Archives, New Delhi, for providing Home Department records for the survey.

References

- 1 Berry, J. (1991). History of Fingerprints. In H. C. Lee & R. E. Gaensslen (Eds.), *Advances in Fingerprint Technology* (pp. 1-38). New York: Elsevier.
- 2 Bose, H.C. (1916). *Hints on Finger-Prints with a Telegraphic Code for Finger Impressions*. Calcutta: Thacker Spink & Company.
- 3 Bose, H.C. (1927). *Finger Print Companion*. Calcutta: Gaudiya Printing Works.
- 4 Government Councillor (1925, September 30). On the question of a single digit card-index. *International Public Safety*. Baden: International Criminal Police Commission.
- 5 Haylock, S. E. (1979). Khan Bahadur Azizul Haque. *Fingerprint Whorld*, 5(17), 28-29.
- 6 Home Department Proceedings No. F. 112/25, Police Branch, 1925.
- 7 Home Department Proceedings No. 141-142(B), Police Branch, October 1917.
- 8 Home Department Proceedings No. F. 14/29, Police Branch, 1929.
- 9 Lambourne, G. (1984). *The Fingerprint Story* (pp. 1; 60-64; 95-101) London: Harrap.
- 10 Sodhi, G.S. & Kaur, J. (2013). *Indian Civilization and the Science of Fingerprinting* (pp.1-3). New Delhi: Publication Division.