Poroscopy in Personal Identification
Authenticity and Acceptance

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Introduction

Authenticity of Fingerprint Evidence

Fingerprints have a long history as the tool for identification for both civil and forensic purposes. Their reliability is proverbial and are often used as yardstick and reference mode for (new) forensic techniques mainly to profit from widespread image. Papillary ridges can help in identification even when the epidermis gets eroded or damaged due to burns or long-term submergence in water. A partially submerged body was discovered in March, 2004 in Prince Rupert, British Columbia, Canada. The cadaver was identified by impressions of dermal ridges by BC AFIS Department. Identification in such complicated cases certainly compliments the established science of fingerprint identification, which not only re-assures the world about Sir Francis Galton’s theory based on twin factors, uniqueness and permanence.

There have been constant attacks even on validity of fingerprint identification as science. In January 2002, Louis Pollak, a federal judge in Pennsylvania, decided that fingerprint evidence is unreliable. This is the first ruling in the American courts, although fingerprint evidence has been open to challenges for years. Traditionally, latent print examiners have presented identification testimony in courts with an explanation of identification or with a charted enlargement of matching and latent prints. Most often the subjective nature of the opinion of individualization comes under attack by lawyer in the courts of law. Fingerprint examiners do not possess uniform objective standards to guide them in their comparisons. To the contrary, there is complete disagreement amongst the fingerprint examiners as to what points of comparisons are necessary to make an identification, and many examiners now take the position that there should be no objective standards at all. Perhaps, scientists have started giving suggestion for the incorporation of more than one aspect in fingerprint i.e., poroscopy, edgecopy, etc. Prior to 1973, different States (regions) of India had no uniformity on minimum number of identical points for giving opinion on fingerprints, it ranged from 5-17. In 1973, the first All India FP Conference held at Srinagar (Jammu and Kashmir) adopted the following resolution:

“The minimum number of points for establishing the identity beyond doubt in case of fingerprint examination has been fixed at eight. However, where there are six or more points of identity, a qualified opinion can be offered by the expert on his responsibility.”

In 1970, the International Association of Identification had formed a Standardization Committee for the purpose of determining the minimum number of ridge characteristics for establishing positive identification. The resolution stated that no valid basis exists at this time for requiring that a predetermined minimum number of friction ridge characteristics must be present in two impressions in order to establish positive identity. Ne’urim Declaration (Israel) in 1995 had stated that no specific basis existed for requiring that a
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Abstract

Sir Francis Galton proved that papillary ridges are persistent from birth until they are decomposed and destroyed after death. Dr. Harris Hawthorne Wilder studied morphology, the methodology of plantar & palmar dermatoglyphics, and along with Bert Wentworth re-authenticated that friction ridges are formed on the hands of fetuses from the fourth month of intrauterine life. The Science of Personal Identification using ridge characteristics is based on two primary factors, uniqueness and predetermined number of friction ridge features must be present in two impressions, in order to establish positive identification.

All those who do not have thorough knowledge of fingerprint science, try to raise the issue of lack of uniformity in establishing the identity on the basis of point system, for nullifying this science as unreliable, which is absolutely false, mischievous and disastrous.

Pores: Integral Part of Friction Ridge Evidence

The scientific foundation of friction ridge identification originates from various doctors, scientists and progressive thinkers, many playing a distinctive role in formulating the foundation of the science without ever recognizing its potential. Both Nehemiah Grew, M.D. in his report (1684) for the Royal Society of London, and the anatomist Gouard Bidloo from Holland in his book on human anatomy in 1685, discussed and illustrated their recognition of the friction ridges and pores within these ridges. Over 200 years ago, JCA Mayer in 1788 stated that the "arrangements of skin ridges is never duplicated in two persons." To ignore sweat pores and edge shapes when they are present is to ignore part of the valid information in the total image. This is by no means to suggest that an expert should ignore the minutiae points and concentrate on the pores and edge shapes. It is simply to say that one must consider all of the information present in both the latent print (or mark) and the inked print. Traditional minutiae points are still the backbone of most comparisons.

Discussion

Third Level Details and Poroscopy

Third level details are small shapes on the ridges, the relative location of pores, and small details contained in accidental damage to friction ridges. The small intrinsic details of friction ridges have tremendous individualizing power. In the past, there was a general feeling that poroscopy had little

Figure No. 1: Marking of Ridge Characteristics for Comparison
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Figure No. 2: Pores on friction ridges

practical value due to the minuteness of its detail and the failure of pore structure to be reproduced consistently in crime scene and inked friction ridge prints. The relevancy of friction ridge clarity, third level detail, and quantitative-qualitative analysis were not understood by the friction ridge identification theory and ignored in practice the majority of research done in field.

Pores: Integral Part of Friction Ridge Evidence

Porocopy is a method of personal identification through the comparison of the impressions of sweat pores (present on friction ridges of palmar and plantar surfaces). The method was discovered and developed by Dr. Edmond Locard in 1912, and applied his newly developed technique of porocopy in Bouet & Simonin Case, which was widely acclaimed. Pores were not examined in detail until Dr. Edmond Locard of Lyons, France, published a paper in 1912. Locard used Porocopy as an independent method of identification, and also as an aid to reinforce identifications using the ridge characteristic method when the numbers of ridge characteristics were low.

Locard published his research into porocopy in "Les pores et l’identification des criminels," Biological, vol. 2, pp. 357-365, 1912. He arrived at following conclusion:

- The sweat pores present the triple characteristic of perpetuity, immutability, and variety, which establishes them as a means of identification of primary importance.
- Identification by comparison of pores in a striking manner confirms the evidence from fingerprints, by adding to the determination of ridge details that the visible sweat pores, the number of which is often many hundreds.
- In most cases in which the digital or palmar impression is too fragmentary for an absolute identification by the dactyloscopic method, which requires minimum of twelve characteristic points (then in France), the comparison of pores, providing these are discernable, will permit the attainment of positive identification.

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Practical Difficulties in Accepting Poroscopy for Individualization

- Lack of sufficient and systematic data about various aspects of sweat pores such as shape, size, position, interspacing, and frequency, etc., and
- The sweat pores may not always appear in inked/latent impressions and their microscopic nature restricts the fingerprint experts to give proper attention to examine their details and to use them for identification purposes. In case of chance prints or latents it is found that fingers are not pressed too hard on to the surface of object touched.

Remedial Measure for Practical Problems

Some suggestions have been made by pioneers like David R. Ashbaugh of RCPM Manitoba, Canada and Professor O.P. Jasuja of Punjabi University Patiala, India, on the shortcomings or practical difficulties which deter our identification experts from using poroscopy as means of individualization are as under:

- Powder lift: Careful cleaning of the developed fingerprint, and use of good quality powder with no moisture contaminates.
- Use of pre-inked fingerprint strips increases the clarity of inked impressions; proper training and practice in inking the slab would improve results. Practice on correct pressure while fingerprinting will also be an asset.

- A microscope of 50x magnification is sufficient for in-depth study of pores: Dr. O.P. Jasuja has done a lot of research under 50x magnifications in Department of Forensic Science. Prof. Jasuja has successfully estimated number of pores/unit area, interspacing, size of pores, shapes of pores, and positions of pores.

- Knowledge of poroscopy will allow us to add strength to low ridge count identifications, assist in evaluating ridge characteristics and, on occasion, make identifications on prints we previously considered unidentifiable. Therefore, the piece of fingerprint which is considered unidentifiable, due to lack of sufficient ridge characteristics, but displays ample pore structure, may be worth collecting anyway.

- Learning the basics of poroscopy is not at all time-consuming as the material required is minimal. Identification experts would not find it difficult at all to learn poroscopy.

Efforts of Contemporary Scientists

Two prominent names which are synonymous with Poroscopy are that of Mr. David R. Ashbaugh and Prof. O.P Jasuja. After Locard, no one in particular has taken enough interest to popularize poroscopy in practical terms, except for these two scientists.

Dr. Jasuja, Professor in Forensic Science, Punjabi University Patiala, India using 50x magnifications, observed that pores of different size might be present on the same ridge. There is very large variation in size of pores; unlike Locard he has defined pores as minute, medium, and large. He did not measure the pore size but did a comparative study. It was found that large pores might be lying with one or more minute pores on the same friction ridge. No systematic management of pores in this regard was found. In his study, Prof. Jasuja observed that the medium sized pores were found most frequently in all areas of print, 50-72%, followed by minute sized pores, 21-31%.

The frequency of large pores was found least, which was found absent even in interdigital areas in same prints where minute types of pores were found maximum, 72%. He has studied shapes and positions of sweat pores. He also developed latent prints on both porous and non-porous surfaces.
using various powders and other chemical methods; the developed prints were studied for the effectiveness of method used in terms of visibility of pores, to compare the findings with inked impressions for the same features. Ninhydrin was found to be the best chemical method amongst all used for developing latents paper, but the same method could not produce desired results in terms of clarity on non-porous surfaces like glass, glazed metal sheets, etc.

David R. Ashbaugh counted and examined various rolled inked impressions and came to conclusion that the size of pores varied within the fingerprint to a degree, and occasionally encountered extra large pores. He found the shapes of pores usually to be round, oblong, triangular and other shaped which he has not defined. According to him, positions of pores were random; there was no rhyme or reason for pattern associated with location.

Analysis and Suggestions

I have conducted study in the laboratory at Central Finger Print Bureau, using binocular microscope of 50x magnification with attached electric light source (focused light). I made comparisons between impressions developed following traditional method in printer’s ink, with those recorded with fingerprint pads imported from a vendor in the United States. In terms of clarity of pores, the prints developed with printers ink were many times superior.

Marking Presentation of Evidence in Courts

If poroscopy is studied and applied in day-to-day work in our identification work, certainly it is going to make an impact in terms of increase in number of convictions made on the basis of fingerprint evidence.

If in our identification work, certainly it is going to make an impact in terms of increase in number of convictions made on the basis of fingerprint evidence. But in the absence of set guidelines, fingerprint examiners avoid making use of vital pieces of information present on the ridges, the pores. Here, I have proposed a methodology which can be followed for marking, and comparison of prints to convince the Court.

One method can be making enlargements, and marking the counted pores with dots with a fountain or other non-washable fine tip ink pen, per unit area. Ashbaugh, in his experiments,
enlarged fingerprints to 5”X7” and dotted the pores with fountain pen so that he knew which of the pores had been already counted. After the count, another question comes to our mind, that whether it is possible to compute any mathematical method as a guide to a minimum of pores that should be examined before an opinion can be formed. Answer is in affirmative. This number, of course, would be a guide only as fingerprint identification, in fact, is a physical match. Ashbaugh has supported Dr. Locard that 20-40 pores in agreement were sufficient for giving opinion.

Another way of presenting friction ridge evidence using poroscopy can be by drawing straight lines from the centre of one pore to the centre of adjacent pore on the same ridge. This will form a unique pattern to make the judiciary understand the intricacies of poroscopy.

We can also form bridges by drawing straight lines across, from the centre of one pore on one ridge to the centre of another pore on another ridge running parallel, as shown in the figure below.

Opinion Based on Poroscopy

On validity of pores being means of personal identification, Ashbaugh is in conformity with Edmond Locard. He affirms that poroscopy is a positive method of identification, and this science is extremely valuable tool for identification by experts.

Professor Jasuja of Punjabi University, Patiala, in his studies, also concludes that in spite of difficulties poroscopy can be of great help in personal identification, if taken into consideration seriously.

It is the considered view of author that we should start giving due respect to this unique tool of individualization, and put it into practice for extending positive opinion in the courts of law. Identification professionals must observe meticulously and pay attention also to pores present on the ridges. In ridgeology, it is the expert who has to determine relative weight or value of each feature i.e. minutiae, pores, or edge characteristics, present in an impression.

Figure No. 4: Making bridges across adjacent ridges.
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5) United States V. Byron Mitchell, Memorandum of law in support of Mr. Mitchell’s motion to exclude the government’s fingerprint identification evidence (preliminary statement), In the US Court of Eastern District of Pennsylvania, criminal number 96-407-1.


