Collection of lip prints as a forensic evidence at the crime scene – an insight

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Abstract

Identification is a matter of paramount importance in any crime investigation. Cheiloscopy is a forensic investigation technique that deals with identification of humans based on lips traces. The pattern of wrinkles on the lips has individual characteristics as fingerprints. Although Lip Print identification may appear in the field literature there is very little science or research to support the theory that Lip Prints are individual, or to support a methodology, for the collection and comparison of Lip Prints, which has become accepted within the forensic community.

The lip crease pattern is on the vermilion border of the lip, which is quite mobile and Lip Prints may vary in appearance according to the pressure, direction and method used in making the print. The present article is reviewed in an intention of providing various methods of recording and collection of the Lip prints at the crime scene with an emphasis on development of the latent lip Prints.

Key words: Cheiloscopy; Lip Prints; Latent Lip Prints.

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Introduction
Identification is a matter of paramount importance in any crime investigation. It means determination of the individuality of a person based on certain physical characteristics in living or dead persons, decomposed bodies, mutilated bodies and skeleton.

Cheiloscopy is a forensic investigation technique that deals with identification of humans based on lips traces. The pattern of wrinkles on the lips has individual characteristics as fingerprints.

Since 1950, the Japanese have carried out extensive research in the matter of Cheiloscopy. Tsuchihashi in Japan studied Lip Print impressions called “ko shimon” (mouth fingerprints) in Japanese. Based upon the research done by Suzuki and Tsuchihashi (1968 – 71) (1), it was established that the arrangement of lines on the red part of human lips is individual and unique for each human being. This statement led to the conclusion that there is a possibility of using the arrangement of furrows on lips for the identification of a person.

The Lip Prints being uniform throughout the life and characteristics of person, can be used to verify the presence or absence of a person from the crime (2), provided there has been consumption of beverages, drinks, usage of cloth, tissues or napkin etc. at the crime scene.

Although Lip Print identification may appear in the field of literature, there is very little science or research to support Suzuki’s theory that Lip Prints are individual, or to support a methodology, for the collection and comparison of Lip Prints, which has become accepted within the forensic community.

The lip crease pattern is on the vermillion border of the lip, which is quite mobile and Lip Prints may vary in appearance according to the pressure, direction and method used in making the print. If lip stick is used as a recording medium the amount applied may also affect the print. A traditional or conventional lipstick produces a print that is initially identifiable and can been seen with the naked eye. These are called as visible prints. However, the cosmetics industry has developed long-lasting Lip Prints that often do not leave visible prints and can thus be overlooked at the crime scene. Invisible prints are called latent prints.

Collection of the Lip Prints with a suitable transferring and recording media is important. Various methods have been followed till today for recording the Lip Prints.

The present article reviews various methods of collection or recording the Lip prints with an emphasis on development of the latent lip Prints.

Recording lip prints
Lip Prints can be recorded in a number of ways.
1. Photographing the suspect’s lips (3).
2. On a non-porous flat surface such as a mirror they can be photographed, enlarged and overlay tracings made of the grooves (1).
3. Applying lipstick, lip rouge, or other suitable transfer mediums to the lips and then having the individual press his or her lips to a piece of paper or cellophane tape or similar surface (3-6) (Figure 1)

Figure 1: Lip Prints acquired using Cellophane Tape
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4. Using a finger printer, preferably a roller finger printer (4, 7).
5. By having the subject impress his or her lips (without lipstick or other recording medium) against a suitable surface and then processing these prints with either conventional fingerprint developing powder or with a magna brush and magnetic powder (3). (Figure 2)

![Figure 2: Developed latent lip print using conventional white powder](image)

**Photography**

When the lips are photographed, proper lighting should be focused on the lips at an angle that accentuates the contrast between the white and dark areas. The resulting Lip Print photographs should be of approximate natural size. This can be accomplished by placing a measuring device, ideally an ABFO scale No.2, or a ruler so that it will show in the photograph (3). Suzuki and Tsuchihashi (4, 7), in their study, obtained half sized negative film taken by Medical Nikkor (f 200 mm, lens f: 5.6) and used for a contact print after enlarging to double size to get life size photographs. The photographic method involves photographing the Lip Print (either direct or latent and subsequently developed), and comparing it with photographs of the lips of the suspects or photograph of the Lip Print of the suspects. Photographing of the lips can often be very tricky and subject to errors as the central area of the lips and the angles of the lips are never in the same plane which leads to focusing errors resulting in unsharp or blurred or partial images of the lips. This invariably calls for recording the Lip Print and then photographing them and then comparing the two photographs. Thus in spite of being a reliable method in other areas of forensics, in the recording of Lip Print images it adds to the cost but does not enhance the clarity in the same rising proportions. With the advent of digital photography, the trend is to record direct digital imaging using digital camera.

Several courts particularly those in U.K. reject the evidence if the very first photograph is a direct digital image. On the grounds that there is no proof that the digital image has not been previously manipulated using any of the available digital imaging software including Adobe Photoshop. The court in U.K. insists on having the primary records based on conventional photographs and a willing to accept digital analysis of such photographs.

**Recording Lip Prints using lip stick or other transferring medium**

Williams (3) suggest that after lipstick is applied to the lip, multiple records or several “sets” of Lip Prints should be taken. A “set” consists of prints taken with the mouth in a particular position, such as pursed. Each “set” is taken by applying a large amount of the transfer medium, and then having the individual press his or her lips against the recording medium (paper, glossy cards, piece of glass, etc.) in a series of Lip Prints until all of the transfer medium is exhausted. To ensure that all parts of the lips are recorded, several “sets” of prints should be taken. This technique would be the same as collecting finger prints by pressing inked fingers on to special paper, which was used early on, and the images then observed through a magnifying glass and traced onto cellophane (4).

Sivapathasundharam (8) collected the material for study by applying a thin
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layer of lipstick stain on the lips of the subjects. After about two minute, a lip impression was made on a strip of cellophane tape on the glued surface, which was then stuck to a white paper, which served as a permanent record. The impression was subsequently visualized with the use of the magnifying lens.

There are two recognized methods of recording Lip Prints. In the first method (9), Lipstick is applied with a single motion, evenly on the lips. The subject is then asked to rub his/her lips together to spread the lipstick uniformly. The folded piece of white bond paper is placed between the lips, and the person is asked to press their lips gently against the paper. Care is taken to avoid sliding of the lips, to prevent smudging of the print. The paper is removed and the print is labeled. In the second method, (9-11) after application of the lipstick, the subject is asked to rub his/her lips together to spread the lipstick uniformly. Prints are taken on a bond paper, well supported by a flat cardboard piece. The centre portion of the lips are dabbed first by the paper and then pressing it uniformly to the right and left corners of the lips. Care is taken to avoid sliding of the lips to prevent smudging of the print. After obtaining the Lip Prints of the subjects, each of them are assigned with respective name of the subject and other details.

The prints are studied carefully under a magnifying lens to analyze the lip patterns quadrant wise, denoting the type according to Suzuki’s classification.

Using a finger printer

Suzuki and Tsuchihashi (4, 7) in their study, used a "Roller Finger Printer" (made by the Hollister Co., U.S.A.) to collect Lip Prints. This was a popular method for recording finger prints because it can be used to take finger prints clearly and simply without staining the fingers. This method was therefore adopted to obtain Lip Print records. The special paper rolled on to the roller finger printer was applied directly to the lips to record the pattern of the Lip Print. The Lip Prints obtained by these methods were traced onto cellophane paper and examined with a magnifying glass. The traces of Lip print can be obtained using fingerprinting roller as described by Kasprzak (12) in the following manner: The examined person covered the mouth with a thin layer of skin care cream. After about 3 minutes, a strip of paper 120 mm long and 45 mm wide mounted on a specially profiled roller (made from fingerprinting roller) was lightly pressed to the lips. The impression was subsequently visualized with the use of ferromagnetic powder used in developing latent fingerprints, and then fixed on a transparent foil.

The Lip Prints are on the ruddy part, or the zone of transition, of the lips, which are extremely mobile, so smudging of the prints can occur because of excessive or uneven pressure usually noticed in subjects with prominent upper and / or lower lip when other methods like using a cellophane tape or paper roller, roller printer or dabbing of the lips against the paper is used to collect upper and lower Lip Print together.

When the subject is asked to press his or her lips against the folded paper there is a possibility of only the central area coming in contact with the paper and in doing so the rest or the relaxed position of the lips is not achieved which invariably leads to distortion of the prints.

Processing and Developing of the Lip Prints

Provided the Lip Print is left on a suitable medium it can be developed using a number of different powders (13, 14) or cyanoacrylate and photographed. The powders used are the same as for fingerprint development and the latent Lip Prints must be dry (12).

Basic Latent Print Dusting

For many crime scene investigators, more than half of the powder they use is
regular, nonmagnetic powder. It can be used on windows, counter-tops, television sets and many other items moved or touched at residential burglary scenes. At commercial burglary scenes, it can be used on metal file cabinets, painted doors, broken glass and metal window frames (15).

Regular powders are available in colors such as black, silver/gray, Bichromatic™ and white. Proper color is chosen to provide sufficient contrast with the background surface if a clear photograph of the latent print has to be obtained.

**Developing the Latent Lip Prints**

To record Lip Prints using the magna brush method, the person should impress his or her lips against a glossy porous surface or a smooth nonporous surface. These Lip Prints should then be subjected to a heat source until they solidify or should be allowed to air dry. These prints should then be powdered using a magna brush and magnetic powder.

Conventional powder methods are usually unsuitable for powdering Lip Prints, inasmuch as the brush tends to smear or leave streak marks on the print. These streaks may then be interpreted as false characteristics by the comparer. As with the previously described method, several “sets” should be taken. Williams (3) suggests powdering method using magna brush and magnetic powder. These magnetic powders and magna brush are costly as compared to that of conventional powders.

A traditional or conventional lipstick produces a print that is initially identifiable. However, the cosmetics industry has developed long-lasting Lip Prints that often do not leave visible prints and can thus be overlooked at the crime scene. Different lipsticks have different compositions. During the manufacture of long-lasting lipstick, the oil content is reduced to a minimum. Thus, development using conventional powders and reagents becomes more difficult (13).

Alvarez et al (14), conducted a study on latent Lip Prints produced by four persistent lipsticks. They concluded by stating that the developing method is no different from that used in the case of fingerprints, so no special equipment is needed for such a search.

When the effectiveness of several fingerprint powders and reagents on lipstick prints was analyzed by a study (14) red (Dragon’s Red), fingerprint black, and silver metallic powders were found to be the most effective. It was also determined that sublimated iodine does not produce development. Thus, it is necessary to find other development methods that are more sensitive to oils and more easily applied to locate and develop the prints.

A study conducted in 2002 (13), analyzed the effectiveness of three reagents that are generically called lysochromes (Sudan III, Oil Red O, and Sudan black) to the fingerprint red (Dragon’s Red), black, and silver metallic powders as well as to ninhydrin in developing recent as well as older latent Lip Prints from long-lasting lipsticks on porous paper and cloth surfaces.

Lysochrome is a generic term for compounds that have the ability to dye fatty acids. Their molecule contains a portion that dissolves in contact with fat (lyso) and another that is responsible for color (chrome). Lysochromes have an advantage over a chemical agent because they react with fats and physical reagents (13). Following procedures were followed for developing a latent Lip Print using fingerprint powders (2): Using a brush, a small quantity of powder was carefully applied on the surface where the attempt was being made to locate the latent Lip. Application continued and extended until the print could be seen clearly. When using powder lysochromes, very little reagent was used, but sufficient time was provided to allow it to work.

It was concluded from the above study that lysochromes are a highly useful group of...
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compounds for locating and developing recent as well as older latent Lip Prints.

**Classification of the Lip Prints**

Suzuki and Tsuchihashi (4, 16) named the grooves existing on the labiorum rubrorum as “sulci labiorum rubrorum”, and the Lip Prints consisting of these grooves, as “Figura linearum labiorum rubrorum”, i.e. in general “Lip Print” and evolved a classification of Lip Prints. Lip Prints were classified into six types according to the shape and course of the grooves. (Table 1)

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Kasprzak (12) gave a classification that has been proven in practice in which he determined the pattern based on the numerical superiority of properties of the lines on the fragment and after the patterns of lines had been established, a first catalogue of individual features was prepared, 23 types of individual properties were differentiated (12, 17) (Table 2). As the basis for classification, the middle part of the lower lip, 10 mm wide, was taken since this fragment is almost visible in the trace (8, 12).

**Lip print in court**

The actual use of Lip Prints in court is rare and its acceptance debatable. Professor Jay Siegel (Professor of Forensic Science and Associate Director of the School of Criminal Justice, Michigan State...
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University) considers Lip Print evidence to be admissible in court but the FBI has used Lip Prints as a means of positive identification only once (1).

Conclusions

The possibilities to use the red part of lips to identify a human being are wider than it is commonly thought. A trace of this kind can only be revealed at the point of direct, physical contact of a perpetrator's lips with an object at the scene of the crime. Today, however, investigations can also rely on Lip Prints to identify possible suspects or to support evidence gained in specific investigations.

Collection of the visible as well as latent Lip Prints with a suitable transferring and recording media is important for its consideration as positive forensic evidence.

Thus one can conclude that identity can be established by a combination of methods which makes the identification process relatively flawless.

References