



CHEILOSCOPY: SCOPE IN FORENSICS, CLASSIFICATION SYSTEMS AND LIMITATIONS

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Abstract: Establishing the identity of an individual has become a major task in criminal investigations. Identification of an individual is based on the theory that all individuals are unique. It is not unusual for the existence of minute evidences or sources of clue to be left by the suspect at a crime scenario. Cosmetic evidence in the form of traces of lipstick is one among them and their recovery from a crime scene can link a suspect to a victim or to a crime scene and therefore needs careful and thorough attention. The forensic investigation technique that deals with the identification of humans based on lip traces is referred to as cheiloscropy. The present article is intended at foretelling the role of cheiloscropy in forensic investigations, the various classification systems on groove patterns of lip and its possible limitations.

Keywords: Forensic investigation, Crime scenario, Cosmetic evidence, Cheiloscropy,

INTRODUCTION:

Cheiloscropy is a forensic investigation technique that deals with the identification of humans based on lip traces.¹The importance of cheiloscropy is linked to the fact that lip prints are unique to an individual except in monozygotic twins.^{2, 3}Also, many studies in the past had revealed the immense role of lip prints in determining the gender.⁴Moreover, lip patterns remain the same throughout life and are uninfluenced by environmental changes, diseases and trauma.⁵

Cosmetic evidence in the form of lipstick traces recovered from a crime scene can link a suspect to a victim or to a crime scene and therefore needs careful and thorough attention. The traces evident at a crime scenario can be either visible which can be directly examined or in latent form which are initially developed using various dyes and subsequently examined.

Different classification systems have been proposed to interpret the lip print patterns which were then compared with those of the suspects to aid in identification.

Role of lip prints in crime detection:

Searching for prints at a crime scene is one of the most important features of a criminal investigation.⁶ A lip print found at the crime scene can serve as a source for drawing conclusions as to the character of the event, the number of people involved, their gender, cosmetics used, habits, occupational traits and the pathological changes of lips themselves.^{7, 8, 9} There has been increasing awareness among the criminals about the modern techniques of crime detection and this has alerted them to take necessary precautions while attempting the crimes. In such circumstances, even accurate detection methods like fingerprint analysis also fail to establish their positive identity. Cheiloscropy can serve as supportive evidence in such situations.⁷

Comparison of lip prints from the crime scene and those obtained from suspects may be useful for identification or narrowing down the investigation. Thus, forensic analysis of lip stick and the prints left by them will be crucial in criminal investigation case.¹⁰It is an

established fact that the patterns of lip grooves are highly individualistic i.e. they are unique to an individual and hence they behold the potential for personal identification and sex determination as well.¹

Conventional lip prints refers to the lipstick smears that are often left as trace evidence and can link a suspect to a crime scene. In recent years, lipsticks have been developed that do not leave any visible traces after coming in contact with various surfaces. Such prints are referred to as latent lip prints. They are characterized by their permanence and hence are also called as persistent lip prints.⁷

Latent lip prints would be available at all crime scenes as the vermilion border of lips have minor salivary glands and sebaceous glands with latter being principally present around the edges of lips in association with hair follicles amidst the sweat glands and secreting oils. It is because of these secretions and also due to the continuous moisturizing of lips by the tongue, there are chances for the existence of latent lip prints.^{2, 11}

A range of chemical compositions from natural powder to lysochrome dyes have been explored to develop latent lip prints.¹² These lip prints can be obtained upto 30 days after being produced.¹

Classification systems:

Many classifications schemes have been proposed by various authors to characterize the patterns on the lip. The following are the various classifications reported in the literature.

Marty n Santos Classification: (1967)²

He categorized the grooves on the lips as simple and compound types

Table 1: **Marty n Santos Classification**

Straight line	(R-1)
A Curve	(C-2)
An Angular form	(A-3)
Sinusoidal	(S-4)

Suzuki and Tsuchihashi Classification: (1971)²

They considered six different types of grooves and classified them accordingly as follows

Table 2: **Suzuki and Tsuchihashi Classification**

Type I	Complete vertical (Fig 1)
Type I	Incomplete vertical (Fig 1)
Type II	Branched (Fig 1)
Type III	Intersected (Fig 1)
Type IV	Reticular pattern (Fig 1)
Type V	Irregular(Fig 1)

Kasprzak's classification: (1990)²

He gave a classification in which he determined the patterns based on the numerical superiority of properties of the lines on the fragment. His classification, based on the dominant pattern is as follows

Table 3: **Kasprzak's Classification**

Lines are dominant	Linear (Fig 2)	L
Bifurcation is dominant	Bifurcate (Fig 2)	R
Crossed lines	Dubbed reticular (Fig 2)	S
Superiority cannot be established	Undetermined (Fig 2)	N

Reynaud classification: (2007)²

A French scientist, Reynaud, studied 4000 prints of the lips and found that all were different except in case of uniovular twins and accordingly he gave the classification.²This is probably the most complete classification. The lips are studied under right and left halves and each groove is assigned with a number based on its form.

Table 4: **Reynaud Classification**

A	Complete vertical (Fig 3)
B	Incomplete vertical (Fig 3)
C	Complete bifurcated (Fig 3)
D	Incomplete bifurcated (Fig 3)
E	Complete branched (Fig 3)
F	Incomplete branched (Fig 3)
G	Reticular pattern (Fig 3)
H	X or Comma form (Fig 3)
I	Horizontal (Fig 3)

A formula is then elaborated which consists of a capital letter and a small letter. In the upper lip, the capital letter is used to represent the side i.e. right/left and the small letter represents the groove type. It is done in the opposite way with respect to the lower lip.

Afchar – Bayat Classification: (2007)²

This classification dated from 1979, is based on a six type groove organization.

Table 4: **Afchar – Bayat Classification**

A1	Vertical and straight grooves covering the entire lip
A2	Same as the former, but they do not cover the entire lip
B1	Straight branched grooves
C	Converging grooves
D	Reticular pattern grooves
E	Other grooves

Each classification has its own merits and demerits. However, the most commonly adopted classification system was that given by Suzuki and Tsuchihashi (1971)

Limitations of Cheiloscopy:

Lip prints are produced by a substantially mobile portion of the lip. Hence the same person can produce different shaped lip prints according to the amount of pressure, direction and the method adopted for taking the print.²Lip prints are affected by the type of lipstick used. The red or brown non glossy, non metallic lipstick convey clear lip print while the glossy or the metallic lipsticks produce good prints but their photographs are luminous and not clear for examination. Persistent lip sticks do not leave visible smears or marks when they come in contact with different items.²

Existence of pathological conditions like lymphangiomas, congenital lip fistula, scleroderma of lip, Merkelson-Rosenthal syndrome, syphilis, lip chelitis etc can invalidate the cheiloscopy study.²

Lip prints from cadavers may get affected with post-mortem changes. As quoted by **Datta P et al, Utsuno et al (2005)** studied these changes and concluded that a satisfactory identification rate was achieved. However, the study was carried out under laboratory environment conditions and the possible changes that might take place in the prints obtained from the cadavers that were exposed to natural environment is not known still²

Due to lack of maintenance of ante mortem data on lip prints, it is difficult to perform a comparative study where necroidentification is concerned. Therefore, the only use of cheiloscopy will be to relate lip prints to the lips that produced them.²

The habits of people in different localities should be respected in analyzing lip prints as it could affect the shape of the print. In areas where males usually have moustache, it is occasionally difficult to determine the philtrum in male prints. This would be a character in the print that could help in identifying a person²

It is observed that the position of the lips while developing the prints will influence the patterns. The prints developed with the lips in contact i.e, closed mouth position will exhibit well defined grooves and are easy to interpret which is not the case with the open position of lips.¹³ Loss of anterior teeth particularly the upper teeth might lead to difficulty in developing

the prints.¹³.

CONCLUSION:

Cheiloscopy is a forensic investigation technique that deals with identification of humans based on lip traces. They are considered to be the most important forms of transfer evidence. Traces of lip prints, visible or invisible, located on various surfaces are encountered in a majority of the crime scenarios. Hence, searching for lip prints at a crime scene constitutes an important aspect of a forensic crime investigation. This review enlightens on the potential role of cheiloscopy in forensic crime investigations along with a brief note on a range of classification systems proposed by various authors which have been proved to be of potential use in establishing the identity of an individual. Moreover, every technique has its own limitations or drawbacks and the possible limitations of cheiloscopy have also been mentioned in this article.

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FIGURES

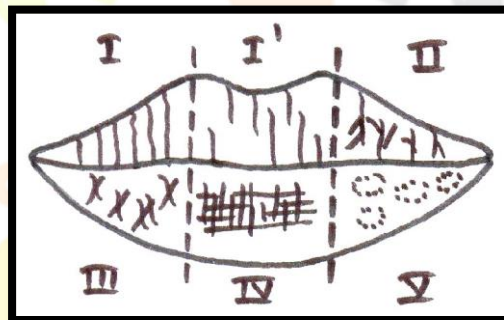


Fig 1: Suzuki and Tsuchihashi Classification

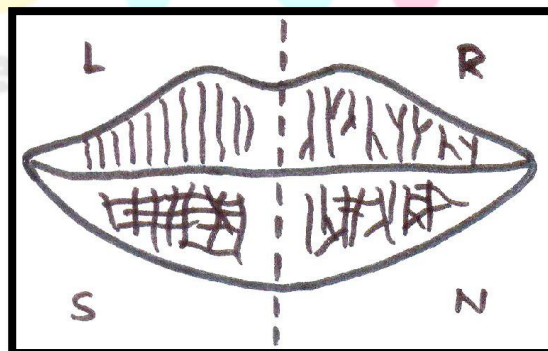


Fig 2: Kasprzak's classification

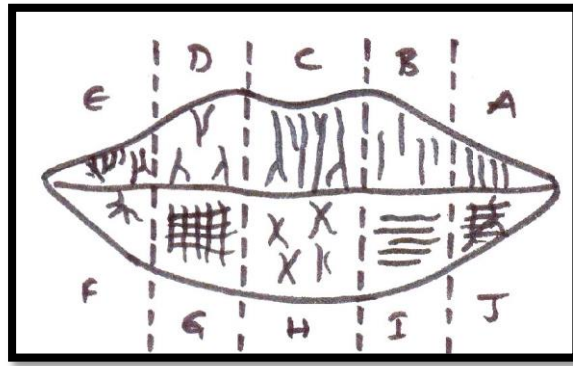


Fig 3: Reynaud classification

