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AN UPDATED REVIEW ON CHEILOSCOPY

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ABSTRACT

Cheiloscopy, the study of lip prints, is an upcoming tool for the identification of persons. The lip print of every person is unique and can be used to fix personal identity. Human identification is one of the most challenging subjects that man has been confronted with. It is a universal process based on scientific principles. The concept of 'identity' is a set of physical characteristics, functional or psychic, normal or pathological - that defines an individual. In forensic identification, lip print patterns can lead us to important information and help in person's identification. The grooves present on the human lips (sulci labiorum) are unique to each person and can be used to determine identity. The study of these grooves or furrows present at the zone of transition of outer skin and inner labial mucosa is known as cheiloscopy. This is considered unique to an individual and analogous to fingerprinting.

KEYWORDS: cheiloscopy, lip prints, sex determination, personal identification.

INTRODUCTION

Cheiloscopy is the study of lip prints, which can be used for identification much like finger-prints. The biological phenomenon of system of furrows on the red part of human lips was first noted by anthropologists. Fisher was the first to describe it in 1902. It is possible to identify lip patterns as early as the sixth week of intra uterine life. This identification technique is applicable in identification among family members, twins and also in evaluating the permanence of lip prints. The grooves present on the human lips are unique to each person and can be used to determine identity. Lip prints remain the same throughout life and are uninfluenced by injuries, diseases or environmental changes.

Palatoscopy is the name given to the study of palatal rugae in order to establish people identify. Palatal rugae are anatomical folders called "plica palatine" the irregular connective tissue located on the incisive papilla. As they are stable landmarks, once formed do not undergo any change except in length and remain in position throughout person's life.

It is well established fact that rugae retains its shape throughout life and resist decomposition. Personal identification is based on the rugae pattern since the palate would remain intact when most other anatomical structures are destroyed, burned or dehydrated and also in situations where there are no finger prints.

No two individuals in the world look alike and are unique and this concept of uniqueness is utilized in the human identification procedures. Although DNA profiling, finger prints, anthropometric data, dental records can be used as standard methods, sometimes it becomes obvious to employ some of the least and unusually used ancilliary methods like cheiloscopy, palatoscopy and other odontometric measurements that are capable of giving comparatively reliable results when performed systematically.

DEFINITIONS

Lip Print: Lip Print may be revealed as a stratified surface trace with visible elements of lines (furrows).

Long Vertical Grooves: Long Vertical Grooves (Type I) is one of five basic types of lip prints wherein the characteristic patterns present long vertical grooves that run across the lip.

Short Vertical Grooves: Short Vertical Grooves (Type I') is one of five basic types of lip prints wherein the characteristic patterns present short vertical grooves that run across the lip.

Branching Grooves: Branching Grooves (Type II) is one of five basic types of lip prints wherein the characteristic patterns present both vertical and horizontal grooves that run across the lip.

Intersected Grooves: Intersected Grooves (Type III) is one of five basic types of lip prints wherein the characteristic patterns present diamond-shaped grooves in the lip.

Reticular Grooves: Reticular Grooves (Type IV) is one of five basic types of lip prints wherein the characteristic patterns present grooves on the lip resembling a net-like design.

HISTORY

The biological phenomenon of systems of furrows on the red part of human lips was first noted by R. Fischer in 1902. Since 1950 the Japanese have carried out extensive research in the matter. In the period 1968 - 1971 two Japanese scientists, Y. Tsuchihashi and T. Suzuki examined 1364 persons at the Department of Forensic Odontology at Tokyo University. Based upon that research 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 the possibility of using the arrangement of furrows (on a trace, in a linear form) on lips for the identification of a person. In further research the Japanese scientists examined the principles of the heredity of furrows on the red part of lips. Cheiloscopic research was also carried out by specialists in anthropology**,** odontology, forensic medicine and forensic science, in Brasil, Iran, Hungary, France, Germany, Italy, United Kingdom, the Soviet Union and Czechoslovakia. The results of this research constitute the proof of lip-print individuality and also of its usefulness for criminalistic identification**.**

In1982**,** in the Forensic Institute of Warsaw University Criminal Law Department, in cooperation with the former Forensic Institute of Militia in Warsaw conducted a study on lip prints. The material for study was collected in the former Military Training Center at Minsk Mazowiecki. Lip prints were collected from 1500 persons (including 107 women), coming from various locations around the country. The age of the volunteers varied from 5 to 60 years. Altogether more than 7000 traces of the red part of the lips were examined. As a result of the examination the individuality of lines in the red part of lips and their unchangeability within the limits practicable for identification was proven. The examination determined methods for revealing and securing the traces of the lips, methods of acquiring the comparative material, and, more importantly, detailed methods of cheiloscopic expertise. The possibilities of registration of traces of the red part of lips were also examined, and a file comprising 1500 individuals was organized on a laboratory scale.

Since 1985**,** in Poland, the methods of finding and recovery of lip traces, recovering comparative to carry out that expertise have been introduced into casework of the Fingerprint Department, of the Central Forensic Laboratory of Police in Warsaw. During the years 1985-1997, cheiloscopic techniques have been used in 85 cases, including 65 burglary cases, 15 cases of homicide, and five cases of assault. In 34 cases the identification was positive, which means that cheilo-scopic techniques were equal in value to other types of forensic evidence. It has also been included in evidence for presentation in court.

It was during the period 2000 - 2012 that the study was carried out by several researchers from other countries and also in India. Different aspect of lip prints like stability, morphological patterns and sex determination among different groups of population. So all this research suggesting that the cheiloscopy can be used as an adjuvant technique in identification.

Applications of Cheiloscopy in Modern Science

- Cheiloscopy: A deterministic aid for forensic sex determination
- Cheiloscopy: A tool in crime investigation
- Cheiloscopy: An aid for personal identification
- Cheiloscopy and palatoscopy: aid for human identification

Forensic odontology is a valuable component of forensic investigation in many countries. Cheiloscopy is analogous to finger print analysis, and is a genuine subspecialty of forensic odontology. Lip prints bring added evidence to a crime scene that can be valuable especially in cases of lacking other evidence, like finger prints. Lip prints can be a factor in many different kinds of crimes, such as tape when a person has been bound or gagged, prints on a glass that a person drank from, prints on a cigarette butt, and prints a glass/window if they were pressed up against it. All of these are potential places where lip prints may be found and used in the investigation of a crime. However, the use of lip prints in criminal cases is limited because the credibility of lip print has not been firmly established in the court system.

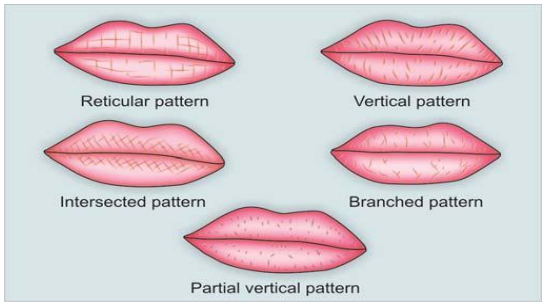
Scope of Cheiloscopy

It is difficult to place the lip prints in the general system of traces. The unique properties of the lip print help in identifying a human being spatially when it is revealed as a stratified surface trace with visible elements of lines.

In the case where the lines are not clear, individual identification of a human being based on this trace is extremely difficult unless the trace contains more individual characteristics, e.g. scars, and often identification ends with group identification. In these cases, it is possible to examine the substance which constitutes the trace, e.g. saliva, as a biological trace and to determine the blood group in the ABO system. There is a huge potential for DNA typing from the lip print. This process has not yet been attempted. When a lip print is found at the scene of a crime, the character of the event, the number of the people involved, sexes, cosmetics used, habits, occupational traits, and the pathological changes of lips can be concluded.

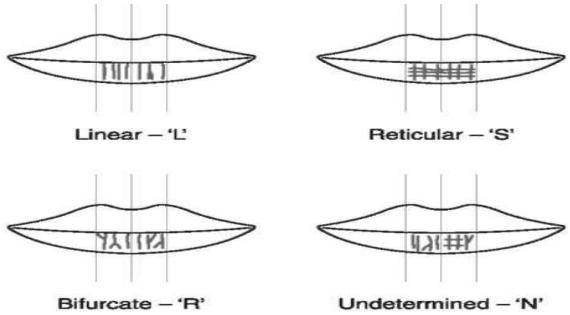
Classification of pattern of lines on the lips given by Tsuchihai and Suzuki.

1. Type I: Clear cut vertical grooves that run across the entire lips
2. Type I: Similar to type I but that do not run across the entire lip
3. Type II: Branched groove
4. Type III: Intersected grooves
5. Type IV: Reticular groove
6. Type V: Undetermined



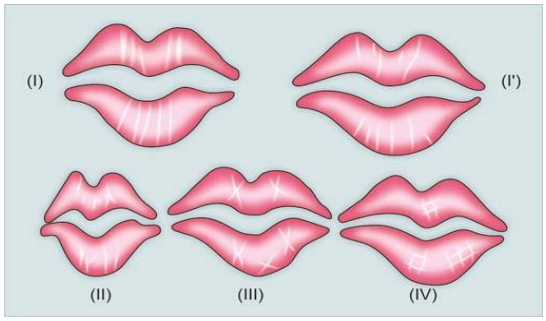
Fig; various lip print patterns

If the lines prevail, the pattern is described as linear, 'L'. If the bifurcation is dominant, it is called bifurcate, 'R'. If the lines cross, the pattern is dubbed reticular, 'S'. In the case when no superiority can be established, the pattern is named undetermined, 'N'.



The sex of the individual was determined as given Vahanwala et al.

1. Type I and I' Pattern dominant: Female
2. Type I and II pattern dominant: Female
3. Type III pattern dominant: Male
4. Type IV pattern: Male
5. Type V varied patterns: Male



Fig; Suzuki's classification

Lip print patterns did not simply comprise of one type alone, but appeared as a mixture of varying types. Comparison of lip prints among family members and twins also showed different individual patterns although a few similar grooves could be recognized suggesting a genetic inheritance.

The lip patterns remain unchanged during an individual's life time and confirm the permanence of lip prints. Even if environmental factors and pathologies affecting the lips could bring about changes in lip patterns, it has been observed that the lip prints reassume their former pattern on recovery.

Fig; Lip print of a male subject

Fig; Lip print of a female subject

Both cheiloscopy and palatoscopy are applicable in human identification. Palatal rugae, in addition to being unique to an individual, are protected from trauma by their internal position in the head and insulated from heat by the tongue and buccal fat pads. Once formed, they do not undergo any changes except in length, due to normal growth, remaining in the same position throughout an entire person's life. Even diseases, chemical aggression or trauma do not seem to be able to change the palatal rugae form.

PRACTICAL APPLICATION

Suzuki and Tsuchihashi reported two cases where lip prints have proven useful in identification of the criminal. In first case while the lip prints were identified on an envelope and with those of the suspects, the second case lip prints were noted on the undergarments and were studied with the help of colour teat and ultraviolet rays. In 1987, FBI had successfully identified a male bank robber who used female disguises including lipstick. The FBI submitted the photographs and lifts of the lip prints that robber had left on the glass door while robbing a bank, which were identified to match with that of suspected robber. LeMoyne Snyder in his book *Homicide Investigation* written as early as 1950 mentions the possible use of lip prints in the identification of individuals. He describes a very good case in which a woman was struck by an automobile striking her face on the left front fender of a car. The owner of the car denied that he had hit that woman. A lip print was lifted from the left front fender of the car. The print was matched with that of the woman and it was proved beyond any doubt that it was indeed the lip print of the woman who was hit. Thus it was proved that the

car in question had indeed hit the woman! Really a remarkable case in which lip prints helped the crime scientists in an unusual way. These cases suggest that lip print study can definitely be used for criminal identification

CONCLUSION

- All lip prints shows different patterns. The lip prints did not consist simply of one type of groove alone, but appeared as a mixture of varying types.
- Cheiloscopy is a relatively new field among the large number of identification tools available to the forensic expert. Work on this subject has already elicited useful information, such as that lip prints are unique to an individual and can be used to fix the identity of a person; that they remain stable over time and that lip prints show gender differences. Further work on the subject can help to make cheiloscopy a practical reality at the ground level of the forensic identification process.
- Cheiloscopy is useful to identify the living, palatoscopy has been successfully used in necro identification.

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