Jurisprudencija, 2005, t. 66(58); 106–109

FORENSIC OTOSCOPY – NEW METHOD OF HUMAN IDENTIFICATION

Prof. Habil. Dr. Jerzy Kasprzak

Department of Criminal Procedure Faculty of Law and Administration
Warmia and Mazury University
In Olsztyn, Poland
05-300 Miński Mazowiecki –1, P.O.B. 73
Phone: +48 501 162 653

Keywords: ears traces, criminalistic technique, person identification, crime investigation.

Summary

The contemporary forensic science more and more often makes use of lip, face and ear prints. So-called, forensic otoscopy deals with identification of humans based on ear impressions. This article presents results of 10-year Polish research project in that area. The study material encompassed 9000 ear impressions obtained from 1500 person (590 women and 910 men) aged from 15 to 60 years. From each person, 3 prints of left and right ear were collected with pressure of 1 kG, 2 kG and 3 kG, measured with an otometer.

Examination of gathered material confirmed the uniqueness and invariability of morphological features of ear auricle. These finding form the foundation for forensic identification of ear prints.

During the examination, the following shapes of ear auricle were distinguished: oval, round, triangle, rhomboidal and multi-angular. Each ear print was divided into 24 fields and individual characteristics were denoted in each field. Subsequently, by means of statistical calculations, the characteristics were systemised according to frequency of their occurrence. In practise, that enabled specifying precise criteria for issuing a forensic statement. It was assumed that a categorical opinion stating that an evidential ear mark came from a given suspect required demonstrating conformity of at least 6 fields (out of a catalogue comprising 24). Consistence of other characteristics such as skin structure, scars or peculiar (non-catalogue) elements of morphology has been implemented in Polish forensic practice.

An otoscopic forensic opinion has a status of scientific evidence and, as such, it is admitted by Polish Courts.

Otoscopy is a relatively new area in the forensic science. It deals with identification of humans based on ear auricle print.

In Poland, forensic otoscopic opinions have been issued since the beginning of the 1990-ies. Originally, the applied procedure was based on those followed in fingerprint identification and cheiloscopy. In 1992, first studies were undertaken in order to create standards for such expertise. The research project embraced a period of 10 years and study material included a population of 1500 persons (910 males and 590 females). A total number of 9000 marks were examined. The researchers made use of Dutch experiences and studies with an intention to create a system tailored to the needs of Polish law and penal proceedings.

Results of Polish research confirmed that an ear auricle is unique in every human being and it remains unaltered in time and resistant to injuries within the limits enabling identification.

For the needs of the project a special device for collecting ear prints with controlled pressure was developed. That device, called “otometer”, was manufactured by “Transfarm” company and

subsequently distributed by the Central Forensic Laboratory of the Polish Police to all major police forensic units in Poland.

The fundamental principle of Polish otoscopic identification system is compiling a catalogue of identification characteristics. Until recently, attempts to create such a catalogue had been unsuccessful. In professional literature most Authors provided descriptions limited to general appearances of prints and created something like a typology of patterns. Additionally, individual components of ear auricle morphology were discussed, usually supported by anthropological classifications. It might have seemed that the great number of those elements and their varying shapes caused a situation where attempts to introduce detailed classification were abandoned almost as if examiners admitted that it was impossible. Just demonstrating the variety of patterns is not enough to create a coherent system of identification characteristics. However, if forensic otoscopy is to be considered in terms of identification potential, it has to become a clear and coherent system analogical to fingerprint examination and it should be supported with a statistical justification.

In general, forensic identification is dichotomously divided into "group" and "individual" examinations, so we can also talk about "individual" and "group" identification characteristics. Such a division has proven itself in several areas of forensic science. However, as far as ear auricle prints are concerned, certain difficulties arise at an attempt to determine whether a given element, with its size, location and shape, constitutes a group characteristic and when it becomes an individual characteristic. The traditional two-level division of identification does not provide a solution to that problem). Therefore, the Polish otoscopic identification system involves three following levels:

Level I – classification of ear auricle types depending on overall shapes with consideration of basic dimensions. Measurements of ear impressions are not very distinctive because they often show variation in one individual depending on value of exerted pressure. However, types of ear auricle are highly discriminating. The following ear auricle types have been defined:

1. Oval type – width of impression measured at tragus level is smaller than ½ ear auricle length and side edges of the print are rounded. This is the most common type of ear auricle (found in 61,7 percent of cases)

2. Round type – width of impression measured at tragus level exceeds ½ of its length and both side edges of the impression are rounded to relatively equal degree (found in 9,3 percent of cases)

3. Triangular type – shape of the impression is similar to a triangle – with an apparently wider part in the upper area of helix, and narrowing towards the lobula (found in 14,7 percent of cases)

4. Rhomboidal type – shape of the impression is similar to a rhomb the widths at the level of upper helix and lobula are approximately equal (found in 6 percent of cases)

5. Polygonal type – the outline of the impression has acute angles and a polygonal shape, with maximum width in the middle part (found in 8,3 percent of cases).

Level II – finding of "general identification characteristics". The surface of ear auricle has been divided into 24 fields where distinctive features classified into a few types are found. Each field, its characteristics and their types have been catalogued and subsequently counted in 9000 earprints collected from 1.500 persons. Results have been statistically processed and compiled in a catalogue consisting of 24 charts (a chart for each field). This catalogue serves as a "guide" for forensic experts in otoscopy. Examination of the evidential and comparative print proceeds from field number 1 through all fields to number 24. In each field kinds and types of characteristics have to be determined. It is advisable to record them in specially designed forms, with use of special codes denoting individual characteristics. The form can be used both in phase of comparative examinations or during the pre-processing before computerised recording of marks. Every field comprises a unique set of characteristics. With a theoretical assumption that all examined fields are legible enough for all characteristics and their types to be distinguished, the system will give 24^{40} (twenty-four to a power of 40) possible combinations. In practice, evidential ear impressions usually reflect only fragments of an ear auricle. It has been found that for carrying out individual identification on a given mark, 6 fields out of 24 have to be fully legible. By using a catalogue of charts and calculating frequency indices calculated for characteristics and their types in each field, it is possible to determine a hypothetical probability of repeated occurrence of a given pattern in two different persons. This is helpful in answering possible questions from defence attorneys.

Level III Detailed identification characteristics. They include unusual morphological peculiarities, scars, non-friction structure of skin, flexion creases and traces of worn jewellery such as earrings.

The three levels can be summarised, as follows: Level I involves group identification. Level II is based on general identification characteristics. When a mark is poorly legible and only fragments of some fields are visible, level II also leads to group identification. The more fields can be distinguished in examined prints, the further individualisation process can proceed, and an individual identification may be accomplished. When 6 fields are legible, with use of the catalogue system and calculation of frequencies of characteristics it is possible to carry out an individual identification. Characteristics considered within level III are highly specific. Their presence significantly enhances identification potential. Characteristics at this level cannot be catalogued due to their great variety.

The presented system has provided the basis for creating procedures for forensic otoscopic examination aiming at issuing expert statements.

According to Polish methodology, otoscopic examination is performed in six phases:

1. Assessment of evidential and comparative print suitability for identification. The critical parameters include correct legal and technical recovery of an evidential print, as well as legibility of individual fields described in the catalogue.

In practice, an interesting phenomenon can be observed: while poorly legible auricle prints are not suitable for positive identification, they still allow exclusion of non-matching suspects.

2. Group identification – the aim of that phase is a preliminary elimination of false suspects. This phase is relatively straightforward and concentrates on measurements of evidential and comparative prints as well as ear auricle types.

3. Coding of characteristics – if a given comparative print has not been excluded in phases 1 and 2, coding of characteristics on evidential and comparative prints is carried out according to the catalogue of general characteristics and with use of the specially designed form. Coding proceeds from field 1 to field 24. Any encountered discrepancies between coding of evidential and comparative prints indicate that the evidential print does not come from the donor of comparative print. If the prints are found consistent throughout the coding process, it is possible to calculate the probability of repeating a given set of characteristics basing on characteristic frequency indices from the charts. With determining full compliance of coding for several fields (when dealing with an impression of good quality), identification is almost completed and additional methods are be applied solely for confirmation purposes.

4. Contour technique. Technically, the contour method is close to Dutch technique of foil superimposition. A sheet of transparent foil is placed flat the print of better quality. The contour of the print is traced with a dotted line. The foil is then transferred to the other print. For a match, outlines of both prints should be compliant with the contour on foil.

5. Determination of common identification characteristics. In this phase, photographs of evidential and comparative prints are already available. The previously determined 24 fields are analysed sequentially. Both exemplary general characteristics and detailed characteristics such as uneven edge, peculiar hollows or protuberances are pinpointed. The key point of this phase is demonstrating that each field comprises characteristic features enabling identification. Distinguished characteristics are highlighted in photographs of evidential and comparative prints in order to facilitate subsequent demonstration. Usually, from 10 to 15 details are marked.

6. Analysis of results, statistical evaluation and recording the course of examinations. Following completion of all phases their results should be interpreted, in order to formulate a conclusion and write an expert report.

If any of subsequent examination phases has resulted in exclusion of comparative prints, a negative categorical opinion is issued, that is, it is concluded that the evidential print does not come from the donor of the comparative prints. However, when a match between the comparative and evidential prints is confirmed, the degree of similarity should be given. That value will indicate whether the expert can issue a positive categorical opinion or a statement within certain limits of probability.

The method I have presented is practically applied in casework and incorporated in the curriculum of forensic expert training in Poland.

♦ ♦ ♦

LITERATURE

1. **Iannarelli A. V.** Ear identification, Forensic Identification Series, Paramount Publishing Company, Fremont California 1989.
2. **Kasprzak J.** Identification o ear impression in Polish Forensic Practice, "Z Zagadnień Nauk Sądowych", XLVII, Institute of Forensic Expertise, Cracow.
3. **Kasprzak J.** Otoskopia kryminalistyczna, System identyfikacji, Zagadnienia dowodowe" (*Forensic otoscopy, identification system, evidential issues)*, Publishing house of Warmia and Mazury University, Olsztyn 2003.
4. **Lugt C van der**. Earprint Identification, Elsevier Bedrijfsinfornatie, Gravenhage 2001.

♦ ♦ ♦

Kriminalistinė otoskopija – naujas žmogaus identifikavimo metodas

Prof. habil. dr. Jerzy Kasprzak
Varmijos-Mozurijos universiteto Teisės ir administracijos fakulteto
Baudžiamojo proceso katedra, Lenkija

Pagrindinės sąvokos: *ausų pėdsakai, kriminalistikos technika, žmogaus identifikavimas, nusikaltimų tyrimas*

SANTRAUKA

Vis dažniau į nusikaltimų tyrimo praktiką patenka netradiciniai žmogaus pėdsakai: lūpų, veido ir ausų. Autorius siūlo ausų pėdsakus kriminalistikoje vadinti otoskopiniais pėdsakais.

Straipsnyje autorius pateikia savo atliktų ausų pėdsakų tyrimų, kurių metu buvo ištirta 1500 asmenų (590 moterų ir 910 vyrų, kurių amžius buvo nuo 15 iki 60 metų) 9000 ausų pėdsakai, rezultatus.

Tiriant surinktą medžiagą buvo patvirtintas ausų išorinės sandaros unikalumas ir morfologinių požymių nekintamumas. Šių tyrimų rezultatais ir buvo pagrįsta ausų identifikacijos galimybė.

Tyrimo metu ausys pagal jų formą buvo suskirstytos į grupes. Kiekvienas ausies pėdsakas buvo suskirstytas į 24 sritis. Kiekvienoje srityje buvo išskirti požymiai. Remiantis statistiniais apskaičiavimais pagal jų pasikartojimo dažnumą, šie požymiai buvo susisteminti ir klasifikuoti. Atlikto tyrimo metu buvo pagrįstas ir požymių pakankamumas identifikuojant ausį.

Otoskopinius tyrimus, kaip mokslinį įrodymą, pripažįsta Lenkijos teismas.