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FORENSIC ODOROLOGY AND THE COGNITION OF NATURAL SCIENCE

I. Introduction

Criminalistics – as a criminal method – is an inter or rather codisciplinary science, which uses scientific substantiated means in valid legal aspects and it labors process for the investigation, the taking of evidence and of course for the crime prevention alike. In everyday, the user of the above mentioned means is the criminalist investigator, the criminal technician, the prosecutor, the judge and everybody who searches for the answer for the seven main questions of criminalistics which correlated to specific crime. The basic questions namely are *quis* (who?), *quid* (what?), *ubi* (where?), *quibus auxiliis* (with whom?), *cur* (why?), *quomodo* (how?), *quando* (when?) doing [1, pp. 26.]?

During my criminalistics' studies I knew many conceptions, thesis and statements, which were used in everyday legal language. However, it is still questionable if we know the deeper meaning (scientifically content) of the exact word (catchword)? Aught, as a practiced layman and enforcement body, do we need to know and recognize the results of other fields of science which are used

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by jurisdiction? Same doubt can rise about the results of forensic science in expert witness 'opinions.

Conceptions as stereomicroscope, DNA, minutiae, festering, mobile cell position, likelihood ratio (LR) are known by us, but in the exact case, it generates shallow knowledge. The prosecution, the judge can meet on a weekly basis the expert opinions: firearm and ballistic, DNA, dactiloscropy, forensic medicine, telecommunications etc. and of course it contains results based on statistical probability calculation. Do they know that the above mentioned scientific expressions and what they mean? Do we need to know the answers or it is enough to get answer for some simple questions, like «is it the same or not?», «can it happen this way or not?», «is it excluded or not?». At best, he asks the expert witness at trial to explain or state in simple words his/her opinions.

«The general problems of society will be affairs, which are waiting for solutions in the fields of law. Affirmation of law is necessary to appear of natural science's results in nowadays. Legislative authority and enforcement also know a comprehensive knowledge in favour of the mentioned parts.»[2, pp. 4.] In this study, I look for an answer – about the fields of odorology – to my questions, nominated that: what cases will examination of criminalistics process and expert opinions be doing a critical and when can the enforcement body delimit for the expert (in-) competencies?

II. Some thoughts from criminalistics and special knowledge

In connection with the definition of the criminalistics the Hungarian reference is homogeneous in this question, that the starting point to define criminalistics is based on László VISKI' s definition [3, pp. 13.]. The first sentence of VISKI's formule said, that the investigation is the subject of the science of criminalistics. Define as the aims of criminalistics alike: *«drew up procedures and methods in legal environment, which help to uncover and*

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interfere crimes and prepared crimes as well and it also helps to investigate crimes already committed and their perpetrators can be identified and after hold them responsible at the Court.» Consequently from the above mentioned aims: *«it is the studying of the exact types of natural sciences, technical means and process, regulations and statements determined by practical methods during the performing of investigation actions, and last, but not least the questions of methodical and practical utilization of means and methods which are appropriate to investigate the exact types of crimes.»*

On the contrary from the (starting) definition, the criminalistics: *«providing good knowledge not only for the criminal jurisdiction. Important parts of legislation are describing as validation of effects related to the past. So the clarification of the civil legal actions, aspects of family law, labour law action and examining of infringements are.»* [4, pp. 11.] The source of criminalistics research is in the doctrine of investigation. Nowadays, there are some intense ambitions in favour of broadening of criminalistics for the accusation and judicial proceedings [5, 6].

Disposing a wider coverage of criminalistics – according to Géza KATONA among others – the subject is: *«the enlivening and practicing methods which are useful to investigate and declare act or relevant legal event.»*[7, pp. 47.]

Authority employs experts who have «special knowledge».² Regarding to the special knowledge, the Act XIX of Criminal Proceedings (hereinafter: CP) has cogent rule; however the authority gets a discretion in question that the special knowledge is really necessary to clarify the facts fully. Section 99 (1) *An expert shall be employed if the establishment or evaluation of a fact to be proven requires special knowledge.* The exceptions apply when the

² See: Criminal Proceedings Act, Section 99 (1) and the Section 177 (1) of Code of Civil Procedure (Act III of 1952).

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employing of the expert is obligatory. *Section 99 (2) It is statutory to employ an expert if a)138 if the fact to be proven or the issue to be decided on is the mental disability of a person or the addiction of a person to alcohol or narcotic substances, b) if the fact to be proven or the issue to be decided on is involuntary medical treatment or the necessity thereof, c) if the identification is performed by way of biological tests, d) upon the exhumation of a deceased person. (3) Experts may be employed the court, the prosecutor and – with the exception of the cases set forth in subsection (2) a) and b) – by the investigating authority.*

There is no standard standpoint between the authors in the legal literature on the definition of special knowledge, therefore the definition's clarification – apart from the significance of dogmatic – can important practical effects for the employment of experts by authorities, and for the efficiency of verification. Some of the authors say [8]: some knowledge belong to this field, which exceeds the general knowledge level of citizens. Accordingly, it follows that, the employment of the expert is necessary if the case consists occurrences, which are estimated over general learning. In this case, when the practice – accepted this sights – «adopts for standpoint to the educational materials of elementary school, the working of law enforcement agencies will be paralyzed, because of the formal employment of experts.»[9, pp. 9.] Speaking in a general way, the investigation of crimes, collecting and estimating of evidence demand a great preparation besides the legal knowledge and these are special compared to the level of general learning of citizens. Operability and practicality requires the considation of knowledge of the acting authority when the special knowledge's border will be setting out. It is the basic standpoint according to the other parts of authors [10] who think that the knowledge of experts is special compared with the level of general skills of criminalists' in the broad sense (investigators, prosecutors, judges). As a result, the involvement of experts will be reasonable

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if the knowledge of law enforcement's authority is too general for the questions to be answered. This latest thesis – namely if we start from the point of the expertise's level of the authority – poses the following problem: the authority have to employ experts if it declared that the law enforcement bodies personally has the above special knowledge – based on his/her qualification, previous job or pleasure. When the sections of civil proceedings allowed in this case the ignorance of the expert, the CP cannot allow it. Because it would result in that the criminalists are answering the questions related to the professional's competencies, «*they combine with themselves.*»[9, pp. 14.] And this possibility is irreconcilable with the principle of contradictory and the law of defence. So in the judgement of special knowledge in criminal cases it is never the personal knowledge of the member of the authority that is relevant, but «*the skills what every criminalists should have, because it appears as teaching guides.*»[11, pp. 21.]

III. Odorology and scent identification line-up

In every crime scene, the perpetrator left behind his/her unique scent. The scent identification dog is able to compare and identify the perpetrator's scent from the suspect's scent. The crime scene sample and sample scents are the bases of this process. Serial crimes also defined with this method. Storage of the scents in glass jars allows preserving the human scent for a long time and hereby the latest identification process after the committing of crime. The scent identification line-up is similar technically to the police line-up [12]. Pursuant to this statement, under the scent identification line-up, the similar time, place and circumstances have to secure during the collecting of other scents (decoy scents). These conditions guarantee the independence of the procedure. Scent identification line-up has no European standard method [13]. The admissibility of scent line-ups – like evidence – is also changed in the United States by states

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before the Courts. In Hungary, the result of scent identification line-up is indirect and soft evidence [14, pp. 181.]. The problems with this method and these factors results the different judicial practice, that we do not know exactly what the dogs are doing under the identification, which are the exact compounds of human scent and which are the discriminative factors between the humans. It is important to highlight that the scent identification line-up is an investigation tool during the criminal procedure in Hungary. The results are suitable to confirm or degrade the versions, but based on only these results the excluding or highlighting version of others, is objectionable.

3.1. Legal environment

In Hungary, the procedure is strictly regulated at national level. Regulations cover the collecting, preserving and storing method of scent trace (crime scene scent) and scent samples. In Hungary the 22/2008 Directive of National Police Headquarter regulates the method. The 17/2009 Directive of National Police Headquarter regulates the application of police horses and police dogs. The Act XIX of 1998 on Criminal Proceedings in the Chapter VII, where the evidence was regulated. Highlighting two main sections, which are correlated with the scent traces and the scent identification line-up.

Section 76 (1) Means of evidence shall be the testimony of the witness, the expert opinion, physical evidence, documents and the pleading of the defendant.

Evaluation of evidence: Section 78 (1) In the course of criminal proceedings, all means of evidence specified by law and all evidentiary procedures may be used without restriction. However, the use of certain means of evidence may also be statutory. (2) Neither the means of evidence nor proofs have a legally prescribed probative force. (3) The court and the prosecutor shall freely weigh each piece of evidence separately and collectively and establish the conclusion of evidence based on their belief thus formed. (4) Facts derived

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means of evidence obtained by the court, the prosecutor or the investigating authority by way of committing a criminal action, by other illicit methods or by the substantial restriction of the procedural rights of the participants may not be admitted as evidence.

In the Criminal Proceedings Act do not regulated directly the scent and the scent identification line-up, but per analogue the scent trace is physical evidence and the scent identification line-up is an evidentiary procedure, which similar de iure with the presentation for identification. It is correlating with the 23/2003 regulations of the investigated acts and the detailed regulations of the authorities under the ministry for home affairs. Section 54 to 56, where the scent identification line-up is nominated as another evidentiary procedure. The 22/2008 directive declared that the scent identification line-up must be performed under the regulations of present identification (police parade).

In the Hungarian case-law, the scent identification line-up is not enough to adjudge the final outcome of the criminal procedure for the sake of the feature of indirect evidence. According to Tremmel [14, pp. 181.] it is an «assistant evidence», which only helps the investigation versions (confirm or exclude the version) [12]. That means, that the expertise (not expert) opinion (in most of cases, it is the dog-handler or kynologist), could not been categorical, but also probability. Certain country using the scent identification line-up, but the judicial admissibility is different. Not considering for the difference among the legal systems, there is a basic expectation: jurisdiction has to using just like criminal technique means and taking evidence – in context this is the scent identification line-up –, which was tested by examinations with natural science and appropriating for the legal certainty [15]. The subjective elements participating, the different judicial procedure must to minimalize during the criminal procedure. To declare that where the place of scent identification line-up is in the criminal jurisdiction, we have to gain an appropriate level of

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knowledge about the topic. The following part highlights only *one* major aspect of scent identification line-up. All interpretations need highly skilled in the practice.

3.2. The result of the scent identification line-up

There are two possible results of the scent identification line-up. In the case of identifying (positive match) and non-identifying (negative match) situation there are various interpretation possibilities. The next table shows the possible explanations.

+ match	- match
Perpetrator is the suspect person	Perpetrator is not the suspect person
Suspect was at the crime scene, but he is not the perpetrator	The crime scene sample scent does not contain human scent
Dog is wrong	The crime scene sample does not contain <i>enough</i> human scent
(Suspect's scent is attractive)	Dog is wrong

3.2.1. Explanations of positive matches

When the dog signs positive matching, the first possibility that is the perpetrator and the suspect person are the same. The scent was left behind at the crime scene and the sample scent was collected from the suspect and contains common volatile organic compounds. The dog recognizes this common source. The difference between the two samples is the quantity of human scent. The two

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samples contain different quality of the questionable person's odour, because the sample scent is fresher than the crime scene sample and does not contain other scents (for example the scent of objects at the crime scene). Therefore, in the practice this is one of the reasons that the starting scent is usually the sample scent from the suspect. The dog feels definitely the human scent in huge quantity.

The second positive matching situation is that the suspect person is not the same with the perpetrator. Such as every material residuum and clues, the human scent residuum testifies that the suspect person was at the crime scene but we do not know when. If there is other evidence like witness testimony, or if the suspect denies that he was at the crime scene, the clues and material residuum confirm each other and help the way of criminal versions. Very important that the jury has to evaluate them totally, so if there is a number of evidence which «only» testify that the defendant was at the crime scene the likelihood of his culpability will grow.

The third cause of the positive matching when the scent identification dog is wrong. In consideration of the dogs' ability of sense of smell (including the anatomical specialities) this possibility is very minimal.

The last positive matching situation could exclude with the control trials before the real trial.

3.2.2. Explanations of negative matches

Negative matches have raised a number of interesting points. The first possibility is obvious for the first sight. The scent identification dog did not find any common human volatile organic compounds in the samples at the row. In this case, during the detection this result confirms other versions (other suspect) and rules out the current version. Therefore, this part of the decision-making is also very important in the evaluation process. The result of scent identification line-up is also one of the other evidence, so if this result is the only one, which

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can stand against the version of suspect person, the law enforcement could not exclude this version finally. The cause connects with the possibility of the dog being wrong.

The second opportunity means that the crime scene sample did not contain human scent. Maybe the theoretical reconstruction was wrong, or the surface was inconvenient. The time frame also influences the success of identification process. For example, after 4-5 hours later, the human scent is evaporating and the questionable surface (crime scene) does not contain the perpetrator's scent.

The third possibility connects with the second explanations. During the identification method, the scent identification dog may feel the common scent in the samples but it was not sure in his mind (for the little amount of scent) therefore he gave negative match. The good dog handler got a sight of this confusion and evaluated based on the experiment. (Maybe he repeats the trial or postpones the method.)

Finally, the last potential is when the dog is wrong. The control and zero trials also secure to estimate the day condition of scent identification dog. The above establishment about the false «answer» from the dog is relevant alike. (However, dogs are also not infallible.)

3.3. Scientific background

The classical odorology is an interdisciplinary branch of science, which deals with scents and the smell, the recognizing ability of scents, scent identification keens of dogs. Forensic application includes the usage of veterinary science and the fields of biology and chemistry during the criminal procedure. Scent identification line-ups, tracking, searching people based on the human unique scent, as biological evidence. We have a little knowledge of the origin of human scent. It is well-known, that the epidermis are always changing (epithelial cells' lifetime is 36 hours), the dead cells and parts of cells reject in

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the environment. The skin surface contains approximately 2 billion cells. These dead cells are in the environment, and they have 4-5 bacterial cells (catalyzed by bacteria and body fluids) which (could) have connection with them [16]. This triad could be specific for the individual. So the human scent including 3 compounds: fluids of glands (eccrin and apocrine), loose epithelial cells and the flore of bacteria [17, pp. 91.]. The unique human scent is sourced from these compounds' combination and elimination. Certain circumstances determine the unique human scent. The components of complex human scent, distinguished: (1) primary odours, which are stable and genetically determined, (2) secondary odours, which are influenced by diet, and diseases and (3) tertiary odours, which contains the external chemicals (smoking, perfumes etc.) [18]. Primary odors are stable over our life, so these scents are the most important for the «unique human scent map».

Dogs were used for patrol, tracking and military purposes from the ancient times. General police application started in the late of nineteenth century. During criminal investigation, tracking and detection tasks were establish by police dogs. The excellent ability of smell of canines is well known for a long time ago. Recognizing that the dogs are able to distinguish the human scents was a huge milestone in the application of police dogs. The physiological difference (the olfactory system compared to human's organ also) proved that detection, identification dogs are not replaced with reliable instrument, which is able to compare and detect concrete substances. Dogs are living their life with their nose. They have 125-300 million olfactory receptors, while humans have only 5 million of them [19].³ In the Cold War (1965), soviet authors published [20, pp. 123-124.] that every human has unique scent, which is come into contact with the environment; it appears on, apart from our will. This

³ Smelling is a very complex task; it is proved with Nobel-prize in 2004, when two American researchers got this acknowledgement.

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publication meant the starting point of scientific research of scent identification line-ups.

Thanks to the criminal technique development in the last decades, the examination of micro trace materials is also possible. On the score of odorology, the aim of modern analytical researches is to detect the exact human volatile organic compounds (VOCs). The human perspiration is a combination from VOCs, with hydrocarbonates, ketones, aldehydes and carboxyl acids [21]. The detection of VOCs executed by Headspace–Solid Phase Microextraction–Gas Chromatography–Mass Spectrometry (SPME GC/MS) in most cases [22]. Number over a hundred compounds were shown for today. It is point out the future's method, where each human scent compounds will examine in laboratory environment, and it will be adapted to expectation of forensic science against the current method, where the reproduction and verification are absent principally.

Csaba FENYVESI – in his latest monograph – deals with the Criminalistic Pyramid among others. The basic of the pyramid are the seven main questions (what, where, when etc.), the second station of the pyramid consists the mediators (trace, material residuum, documents and confession), whom helps to reach to the peak: the identification. Scent as biological trace evidence also suits in the model, as a mediator for identification [22].

IV. Doubts and questions from the law enforcement bodies

When the detective, the prosecution, the judge are waiting for an answer for a question which requires special knowledge, they are on moorland and misty ground. It is misty because they see through by heavily and it is marshy because they do not know exactly which the right way is. The nomenclature could be also hard for them, – thinking about the expert fields of entomological, cytological and toxicological etc. – the asking of questions could reflect their incompetence, and they could have doubts about the aims of examination. The

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facts contain some highlighted parts from the case, not fact. In certain cases, the assigned order would look like this with Morse code: ti ti ti ta ta ta ti ti ti.

The expert opinion arrived, and it contains (findings, examination method etc.) terminology, details of methods and means, diagnosis, Bayes theorem. After that, the exact answers would be in the part of merit. At the trial, the expert repeats shortly the findings and after he/she interprets fully what he/she wrote in his/her opinions. Few questions later – at first sight – put everything in its place.

However, the issues – in my opinion – are not so easy. Can we know that the examination method used by the expert is admissible scientifically? Is it appropriate for the present state of scientific knowledge? Are there any or would be any alternative way? What can we now about the records of material examined? The investigating authority collected the evidence rightfully?

If the examination method was appropriated in principle, it was performed in quality assurance circumstances (in an accredited laboratory)? What does the word accreditation mean exactly and why is it so important? What do we know about international expectation from the similar examination? The national forensic practice will have to appropriate for the guidelines of international forensic organizations? In addition, the opinion consists of the inferences which drawn from the part of findings and examination? What was the way that was used by the expert? The logical way (induction, deduction), the statistical method of calculation of opinions will be controlling by the authority bodies? Is there any methodological support in this field of expert and what does it contain? Can it be compared to the expert's opinions by a layman? The investigator, the prosecutor and the judge are able to see through and adjudge the expert's opinions after some pages later? In the end, do they realise if the expert drew wrong interferes from good and modern statement of fact?

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If all these questions depose in field of odorology, with the following things to face: can we know exactly that the he criminal technicians collected at the crime scene, is it (human) scent? The method of collecting these scents performed in a correct way? What does the dog identify? Is it identification? What do we know about the keen of smell of dogs? What do we know about the performance of exact dog? What do we know about the dog-handler? Dog-handler influences the dog's working in given circumstances? Why it is not performed in certain Europe and other countries? For how long the scent can be store in a glass jar? Is there any Hungarian methodological support? Is it appropriate for the international suggests?

In my opinion, the recognition of past is hard and responsible task. However – connected with the expert's opinions of natural science – we have to persuade the expert's identity (asking their cards), the creditable of examination method, the validation, the international scientific appropriation, the logical way of opinions and its correctness.

V. Conclusions

1. In contempt of technical development and lab research, at now the special trained dogs with the help of dog-handler able to compare the crime scene scent (perpetrator left behind) with the sample scent (law enforcement collect the suspect's scent).
2. For the incensement of efficiency and reliability, more lab research and empirical study will be necessary.
3. Analyzing the compounds of human scent will permit to establish a new, police and criminal proceeding regulation and it will be all of a piece with present conception.
4. Numerous fields of criminalistics have to be necessary to create procedure protocol, and methodological support.

5. In my judgement the legal claim of the society (in this case the jurisdiction) will be set off in due measure and valid way, the enforcement bodies have to know the above mentioned natural science and criminalistics knowledge.

6. In the legal education, the forensic science and criminalistics as subject will be a role part.

7. Research of the last decades, the latest tendencies of criminalistics established possibilities with which the action of past would be seen easily. Seeing, but not necessarily recognizing. The synthetic mind makes it good and knowable for the law. And this is the task and responsibility of the authority (principally the judge).

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Хорват Орсоля

Судова одорологія і пізнання у природничих науках

Криміналістика – як метод виявлення та попередження злочинності – це міждисциплінарна наука, яка використовує результати технічних розробок. У 21-му столітті завдання ефективного правозастосування передбачають застосування наукових розробок, тому всі методи і прикладні наукові результати мають важливе значення. У пропонованій статті відображено проблемні питання наукового пізнання, які впливають на результат кримінального судочинства. На даний час, є загальні очікування щодо правозастосовчих органів (слідчих, прокурорів, суддів), щоб вони розуміли сучасні методи криміналістики і мали загальні знання з досягнень природничих наук і могли ставити питання при необхідності. Проте, чи дійсно вони мають базові знання, і чи можуть правильно формулювати питання експертам, і найголовніше: чи розуміють вони відповідь? У цій статті проаналізовано загальні засади пізнання та застосування ідентифікації запахів в цьому контексті. Ціллю публікації є глибше пізнання цієї частини криміналістики, і презентація її ролі у судовій ідентифікації запаху людини як одного з біологічних доказів.

Ключові слова: наукове пізнання, одорологія, людський запах, поліцейська собака.

Хорват Орсоля

Судебная одорология и познание в естественных науках

Криминалистика – как метод выявления и предупреждения преступности – это междисциплинарная наука, которая использует результаты технических разработок. В 21-м веке задачи эффективного правоприменения предусматривают применение научных разработок, поэтому все методы и прикладные научные результаты имеют важное

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значение. В данной статье отражены проблемные вопросы научного познания, которые влияют на результат уголовного судопроизводства. В настоящее время, есть общие ожидания относительно правоприменительных органов (следователей, прокуроров, судей), чтобы они понимали современные методы криминалистики и имели общие знания из достижений естественных наук и могли задавать вопросы при необходимости. Однако, действительно ли они имеют базовые знания, и могут ли правильно формулировать вопросы экспертам, и самое главное: понимают ли они ответ? В этой статье проанализированы общие принципы познания и применения идентификации запахов в этом контексте. Целью публикации является глубокое познание этой части криминалистики, и презентация ее роли в судебной идентификации запаха человека как одного из биологических доказательств.

Ключевые слова: научное познание, одорология, человеческий запах, полицейская собака.

Orsolya Horváth

Forensic Odorology And The Cognition Of Natural Science

Criminalistics – as a method of detection and crime prevention – is an interdisciplinary science, which is using the results of technical developments. In the 21st century the aims of effective law enforcement is to keep up with scientific developments, therefore the latest methods and scientific results applications are also essential. This paper presents the problematic questions from fields of scientific cognition, which influence the outcome of criminal procedure. Nowadays, there is a general expectation from parts of law enforcement (investigator, prosecutor, judge) to understand the modern method of criminalistics and have a general knowledge from the result of natural science and asking their questions if it necessary. However, do they really have the

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background knowledge and they are able to put questions to experts, and the most important: do they understand the answer? After the introduction of cognition, paper deals the application of scent identification line-up in this context. Aims are deeper cognition of this little part of criminalistics, and presenting its role in the forensic identification of the human scent as biological evidence.

Key words: scientific cognition, odorology, human scent, police dog.

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