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# I. BENDRIEJI KRIMINALISTIKOS TEORIJOS KLAUSIMAI*

## DEVELOPMENT TENDENCIES AND PERSPECTIVES OF FORENSIC SCIENCE**

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Summary

It appears that the differences between the continental and Anglo-Saxon legal systems also extend to Criminalistics, a field based mainly on natural sciences. The authors showed that criminalistics never took hold in the United Kingdom as a scientific concept. The concept of forensic science was partly identified with continental criminal technology. The literature of the field used the terms 'forensic' and 'scientific' interchangeably.

The kinds of skills used in the course of investigating and solving crimes were not considered to be a part of 'forensic science'. Until very recently British literature of the field understood the scientific examination or investigation of crimes in terms of natural scientific methods.

In the United States the use of the phrase 'forensic science' has been in use for many decades. Under the heading of 'forensic science' we typically find the kinds of scientific knowledge used for the investigation, examination and assessment of physical evidence. Its main branches are criminalistics and forensic medicine.

In addition to the classic fields of forensic biology, chemistry, ballistics and photography, we can add the recently-arrived fields of forensic computer technology (including, for example, the computerised examination of the human voice and intonation, and DNA testing of cells, furthermore computer-printer writing), anthropology (with emphasis on archaeological references), geology, entomology, molecular genetics and biology, analysis of evidence (includes the use of mathematics-based Bayes analysis in identification tests), forensic nursing, engineering failure, fire science and the investigation of explosions, personality profiling, safety management, all of which are the legal responsibility of the experts.

Current tendencies in the fields of forensic science (criminalistics) in this century (in summarised form)

1. Primate of the criminal-technology
2. Microscopic investigations

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** Užsienio šalių autorių straipsnių kalba netaisyta.

3. Internationalism (ENFSI-FITEH, EDNAP, EAFS-EFTA, etc.)
4. Computerisation
5. Qualitative speciality of criminal stuffs
6. Privatisation.

## Conceptual definition of forensic science (respectively) criminalistics in international terms

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## Development tendencies and perspectives of forensic science

The title has been carefully phrased to avoid using the term 'criminalistics', a word which differs in its meaning and usage as a technical term around the world. In the English-speaking world - especially the United States - 'criminalistics' is used to describe the procedure of detective investigation carried out at the scene of a crime (the search for clues and subsequent collection, collation and examination of evidence, etc.) As such it is considered to be merely a branch of forensics - the science of detection and criminal investigation. In continental countries, on the other hand, the term 'criminalistics' has greater scope, and is used to cover all the techniques, tactics, methods and strategies of criminal investigation.

Both conceptual systems agree that criminal investigation is an area of science which covers a vast area and which touches on both the disciplines of natural- and social sciences (including, in the latter case, behavioural sciences). It can be used together with scientific theories and analytical methods in the resolution of legal and social conflicts.

The growth of the science of criminal investigation and its acceptance by the legal system proves firstly that developed societies are prepared to make use of science and technology in the effort to solve crimes - in contrast to the unscientific and superstitious practice of past centuries - and secondly, that there is a concomitant belief that hard, physical evidence and the expert opinion which frequently accompanies it provide stronger proof than any other form of evidence or testimony.

At this point we reach the first and perhaps most important characteristic of the science of criminal investigation, namely the pre-eminence of crime-solving techniques, a trend which first became clear at the beginning of this century and which is set to be the overriding tendency of the science of criminal investigation (forensic science) over the following decades and the next century.

## 1. The pre-eminence of crime-solving techniques

**a)** According to traditional, internationally-accepted conventions of categorisation regarding the science of criminal investigation, crime-solving techniques can be placed alongside crime-solving tactics and crime-solving strategies as sub-categories of crime-solving methodology. The latter explores the characteristics of investigation and specialised methodology used in cases of criminal investigation, and has as its basis crime-solving techniques and crime-solving tactics. Given that crime-solving strategies - the newest pillar of the discipline - covers all areas in connection with the planning and implementation of crime-reduction initiatives, crime-solving politics can be regarded as providing it with its fundamental direction. The plans and considerations of crime-solving politics embrace both repressive and preventative action taken in the interest of investigating and reducing crime, while also supposing – and precipitating - a high degree of co-operation between the various branches of the discipline. We are now in a position to define the science of criminal investigation succinctly as the sum of the technical and tactical methods and instruments which are applied both to provide protection against crime and to supply concrete data about it. As such, while crime-solving strategies explore the sum of the concepts connected to an event (methodology, meanwhile looks at a group of crimes), crime-solving techniques and crime-solving tactics concentrate on the possibilities for detective-investigatory procedures in connection with individual cases.

**b)** The science of criminal investigation has had a special place among the system of criminal sciences since its appearance at the start of the twentieth century. For one, it is a highly practical and application-oriented science, the precise range and scope of which has been constantly debated over the last hundred years or so; furthermore the knowledge-basis of the branch is growing as fast as it diversifies. This change is most clearly seen in the case of crime-solving techniques, the principles of which are based on natural sciences, the basis of which is itself changing on practically a daily basis. Such a rate of progress and 'revolution' is not evident in crime-solving tactics, whose basis is provided by the science of behaviour and communication, nor is it likely to occur in the future, given the fundamental nature of the sciences in question. At the same time it is important to note that internationally it is increasingly common to find that the validity of data gathered using crime-solving tactics – its sources, means of acquisition and likelihood - is rendered uncertain or opened up to question during the course of the criminal investigation. Consider, for example, the most widely-endorsed method of interrogation and the resultant testimonies, be they made either at the scene or during subsequent confrontation. The American tendency has been to cast doubts on the validity of confessions extracted from those in custody on principle and also to question the extent to which such statements can be used effectively as evidence in a court of law. Another cause for concern is the testimony given by witnesses subject to all manner of psychological (or even physical) persuasion, given that there is no obligation for them to tell the truth. Both research and practice have repeatedly shown that witnesses (and sometimes suspects) who have first been interviewed using the methods of crime-solving tactics and who then assist in identity parades or even take active part in verification exercises are unwittingly prone to err and also likely to state that which is objectively improbable. This is to say nothing of the large number of people (from the ranks of both the witnesses and the accused) who give false testimony deliberately. In the English-speaking nations confrontation is unknown as an interview method and as such is not used: the quest for the truth is carried out using other – often technical – techniques, such as polygraph testing.

If we continue to review the recommendations and procedures for applying crime-solving tactics, another phenomenon becomes apparent as the picture nears completion, namely, that these days the said procedures are based largely on techniques of crime-solving but certainly also on technical features.

First of all it is important to state that just as in life, the professional, twenty-first century crime-scene investigation has a wide-ranging technical basis, and a system of instruments and methodology concerning the recording, securing and examining of clues and material remains connected to the investigation (some of which are invisible to the naked eye). The same is true of modern house searches, in which investigators have the latest search devices and technical

appliances (detectors, wall-piercing monitors, UV lights, etc.) at their disposal to assist in the search for particular objects (gold, weapons made of metal, drugs, uranium, counterfeit money, etc.) or people (fugitives or people in hiding). Here we might also mention reconstructions, in which the most important factor of success is always the extent to which the crime scene can be re-created in a state that is as similar as possible to that of the actual crime, which in ideal circumstances would mean the rendering of identical conditions. This is in actual fact a technical question, and it is only on the back of this that we can expect some kind of crime-solving tactics. As for today, there are many unheralded technical apparatus at work in the relatively new fields of crime profiling and crime analysis in the areas of effective data storage and computerised record-keeping.

It is almost the case that the only true methodology of crime-solving tactics is that which – presumably – can never be inter-changed with techniques, but which can at best help (e.g. in a computer-assisted capacity) with the planning, organisation, direction, collation of data, analysis, synthesis and deliberation connected to the investigation. Moreover, on a pleasing note, it brings excitement to the practice of this branch of science, intuition, empathy, hunches and suspicion all contain a mystique and bring the fullness of passions and human emotions to criminal investigation.

**c)** By the beginning of this century it had become apparent that organised crime represents the greatest challenge to criminal investigation. Its scope extends to practically all areas of everyday life. It plays a key role in drug trafficking, prostitution, art dealing and weapons trading as well as in the carrying out of acts of terrorism. It should also be noted that at the same time the parties involved remain sketchy figures hidden amongst the vast ranks of mankind on the planet, reducing the possibilities for implementing elements of crime-solving tactics. Organised crime, as its name suggests, is well organised, well developed, technically-speaking fully up-to-date and capable of a high standard of operations. Effective prevention and detection can only be achieved in tandem with cutting-edge technical equipment, which for the most part means surveillance instruments. These systems - capable of scanning the world to identify and record certain buildings and people via satellite tracking systems - are all of the highest technical standard and are indispensable to modern criminal investigation.

**d)** The courtroom is the making or breaking of the science of criminal investigation and is where it receives its ultimate verdict. Experience shows that in developed societies all over the world the trump cards of criminal investigation and the most important kinds of evidence are provided by 'unbribeable' witnesses, physical evidence and the verification and of clues and material remains through scientifically-based procedures. These for their part are based on features of the natural sciences, on unheralded specialised knowledge of a kind that is developing dynamically, on research findings and on systems of scientific criteria. Developments that occur in the basic branches of the natural sciences (biology, physics, chemistry, mathematics, etc. and their sub-branches) are mirrored - with an ever-shortening delay that is currently a few years – in the branches of applied sciences that deal with the science of criminal investigation (including criminology). Experience has also demonstrated that such development is to be expected more readily in the case of the natural sciences and less so in the case of the social sciences.

It would appear that those tried on criminal charges are aware of this 'seismograph' of justice internationally, seeing as they are increasingly only prepared to plead guilty when faced with evidence that is based on natural scientific facts and which is presented with the assistance of experts from the field, rendering all other (subjective) facts questionable and inconclusive. Experience suggests that their actions are well-informed.

## 2. Minutiae (the microscopic and the miniature)

It is in keeping with the points made in the first section to state that criminal investigation in the broader sense is increasingly recognising the significance of the role played by clues and material remains connected to the crime and its perpetrators. In my opinion there is a world-wide trend by which the ever-increasing sophistication of crime-solving technology is in inverse proportion to the amount and quality of clues and material remains left at the scene by those responsible for carrying out the crime. That is to say, the advances in crime-solving techniques have been matched by an improvement in the methods of criminal activity. It is a regrettable fact that the fight against crime is, as its name suggests, a fight, and one in which reactive behaviour is – by necessity – implied. The representatives of the science of criminal investigation are always a step behind those they are pursuing. The methods of crime-solving techniques are likewise held in check by the standard of

criminal methods. Put another way, it has so far been the case that the methods of the criminals have been superior to those used by the investigators.

From this we see that simultaneously there is an expansion of the instruments of crime-solving techniques but a decreasing number of crime-related clues and material remains. From the point of view of the justice system (as a wider interpretation of crime investigation) we might say that there is an abundance of instruments but a shortage of evidence. Given this paucity of evidence the role of invisible, microscopic clues and material remains increases to the extent that they can even decide the outcome of a trial. The importance attached to such minutiae, invisible to the human eye but rendered visible by a microscope and added to the criminal investigation following due research, recording and identification, has increased – and is set to increase even further. By way of example I could mention the DNA content of drops of saliva or blood left at the crime scene.

### 3. Internationalisation

In the 21st century we are in no doubt that the field of criminal activity has long since extended beyond national borders, even beyond continental borders. Mirroring the economy as a whole, crime has also undergone a process of globalisation. Accordingly, crime investigators know that they too must globalise in the interests of effectiveness. There is therefore need of co-operation between states (continents and nationalities). Again, crime investigators find themselves playing catch-up. Criminals began to establish international networks well before the investigators. Theoretically at least, improved international co-operation is in the interests of all nations, both in regard to crime investigation and the science which governs it. The former refers to a flow of data and sharing of information, the latter to the development of standardised methods and procedures to cover each aspect of detective investigation. This can only be achieved with a broad-based framework of co-operation between nations. The results of basic investigation need to be pooled together with records of experiments with technical applications and microscopic evidence (whether it be samples of weapons, gunpowder, shoe soles, car tyres, car paint or varnish, typed script, voice- or dialect recording or DNA) and co-ordinated on a global scale. Further use also needs to be made of international organisations, e.g. ENFSI (European Network of Forensic Science Institutions), Association of European DNA Laboratories, EDNAP (European DNA Profiling) and EAFS (European Academy of Forensic Science), etc.

### 4. Computerisation

The arrival and spread of computers has had two effects. Firstly, computers are used with increasing regularity as the instruments or objects of criminal activity. Computers are used to commit truly “border-free” fraud while computers (programs and chips) are also prone to have their intended functions and settings sabotaged. Furthermore computers are becoming the world’s only means of writing, while at the same time hand-written script is set to join the typewriter among the ranks of the arcane. Printed script and electronic writing are features of the current century. It is the task of the science of criminal investigation to accommodate computerised crimes by developing a methodology of crime-solving techniques for identifying computer printers, and investigating cases of forgery of electronic script and signatures.

On the other hand, computers are also used as tools of criminal investigation and detection. They are instruments both in basic investigations but also in the appliance of methods of crime--solving techniques (e.g. AFIS, the identification of clues, material remains, individuals and voices.) At the same time computers also represent a system of data storage and analysis, as huge data banks are maintained to track the extent of domestic and international crime. The success of any criminal investigation is determined by the amount of data at its disposal. Ultimately, data will only be valuable to the extent that they have quality and relevance, meaning that the data stored on computers must also be made useful through analysis, selection and demonstration of relations. The paradox mentioned above is also evident here: despite the great size of general data banks, special cases often suffer from a paucity of relevant data.

Here again a process of internationalisation must also occur in which the data banks of various nations are unified. This has to be continuously widened and intensified. Concrete examples of this can be seen within the framework of Interpol, Europol, EuroJust, Eurodac and Schengen. In the case of the latter the so-called Schengen Information System (SIS) is also at the disposal of investigators,

allowing the rapid exchange of data in connection with pursued individuals, objects (e.g. automobiles).

The most pressing problem for nations with differing legal, statistical and technological bases is finding a way of comparing data. Bearing in mind the considerable differences in systems of criminal investigation between nations, an overarching homogenisation is unlikely to be achieved in the near future, but at the same time in the case of individual crimes – and in the case of organised crime in particular – a model for Europe-wide co-operation is beginning to emerge and is certainly set to develop further.

Advances in computer technology have enabled the emergence of the discipline of so-called crime-mapping, which is widely-used in the United States and is also referred to as GIS (Geological Information System – Geographisches Informationsystem). It analyses and finds connections between pieces of information taken from separate data banks. The result is a pictorial image of the location and type of crime committed. It enables 'hot spots' to be identified, that is, the identification of small areas with a high concentration of crime together with the modelling of the types and effects of the crimes committed there. The advantage of the system is that the picture of the crime scene emerges at the same time as the criminal actions occur, not after the event. In this way both repressive and preventative action can be taken.

The emphasis of crime mapping in the future will be on completely computerised systems that are capable of near-autonomous analysis resulting in automatic forecasts of likely developments. Noting changes in certain 'hot spots' for example, can enable predictions to be made about the probability and whereabouts of potential new 'hot spots.' As the power of computers continues to grow, so too will the effectiveness of artificial intelligence within the system.

### 5. Qualitative specialisation

Over the last century of the science of criminal investigation has created so many sub-disciplines that it is by no means an exaggeration to state that there is no-one who could claim to know or be familiar with all the methods of crime-solving techniques and tactics used. Just as in medical science – another applied science in which dynamic developments are taking place – there is no such thing as a mere 'doctor' anymore, so in the science of criminal investigation the phrase 'criminologist' covers a variety areas. For the most part we are talking about someone with a grounding and expertise in one or more of these areas. In the science of criminal investigation such areas might be:

*trasology:* dealing with fingers, feet, lips, forehead, ears, teeth, shoes, metals, metal imprints, means of transportation, other instruments, car tyre tracks;

*material remains:* scent, hair, fur, textile, blood, urine (serology), semen, other human remains, animal remains, paint, glass, soil, plastic, metal, candles, powder, drugs (and sub-groups of drug chemistry) minerals (forensic geology), insects (forensic entomology), DNA profiling;

*other methods of crime-solving techniques:* questioned documents, handwriting, typed script, signatures, printed script, graphology, painting, weapons, gunpowder, explosives, fire, voice identification, individual identification, polygraph testing, computerised identification, computer hacking, computer viruses, dactyloscopy, photo-video identification, criminal anthropology, engineering failure;

*crime-solving tactics:* crime analysis, criminal profiling, behavioural science, forensic nursing.

From the list above it is apparent that a specialisation of knowledge is required by each of the disciplines that makes up the main body of knowledge, according to which the practitioners of criminal investigation deal with, research and possess expertise in just a few of the areas connected to the subject of the inquiry or its procedures. Given the strict demands of today's requirements, the higher the level of the investigation and the higher the level of expertise required concerning the scientific principles and methods of any given sub-discipline, the narrower the safe remit of the individual investigator. The overall quality of the output of a single investigator is, however, on the rise. The continuing tendency is one in which the minimal unit of one is approached. Increasingly, the expert practitioners of the criminal investigation are working in ever-narrower areas, but within those areas on a wide scale and with great precision, producing concrete answers to the main questions of the investigation.

In the world's most developed countries ongoing professional training is assisted by the research laboratories and scientific programmes of universities which carry out basic research (legal science at higher education level.)

In the United States, where significant successes in the science of criminal investigation have been recorded, there are more than 600 legal institutions offering training in forensic science and more than 20 colleges and universities offering bachelors, masters and doctoral courses. Furthermore, courses in forensics have been taught at high school level with the backing of local universities since the nineteen-eighties. Here, in the first two years the students learn general biology, chemistry, physics, organic chemistry, biochemistry, physical chemistry and mathematics, while in the second two years they study courtroom procedures, technical sciences and criminological principles. In the final two semesters they take serology, ballistics, photography, toxicology, light-microscoping analysis and glass analysis. Postgraduate study also includes analytical chemistry, genetics, immunology, legal medical science, document analysis, fingerprinting, using different varieties of light-microscoping, electron-microscoping, print comparison, projectile identification, comparative analysis of basic fibres, optical crystalography, (optical mineralogy) fusion (quantative) microscoping, examination of arsonists' methods, collection and analysis of physical evidence, identification of various substances (paper, paint, ink, wood, pollen, soil, etc,) fundamentals of legal medical science, polygraph techniques and voice identification. These studies are rounded off with a certain amount of individual research work, the results of which are often published as a thesis. Above and beyond this are advanced-level courses as well as those courses which result in the awarding of scientific titles

We can assert with some confidence that the opinion of experts who received their training according to the system described above and who carry out their work within the confines of one 'field' is more reliable than that of the earlier 'polymaths.'

### 6. Privatisation

Specialisation is partly responsible for the phenomenon by which more and more representatives of the private sector have begun to appear in some of the narrow areas of the science of criminal investigation. Here we can mention the appearance all over the world of security firms. Their role is largely proactive and in the interests of crime prevention (patrols, armed guard, wide-ranging closed-circuit TV monitoring) but is occasionally reactive, for example in the case of investigations carried out by a private detective. There are also private specialists of the various areas of expertise, who are contracted by their clients to use the equipment at their disposal and specialised knowledge; they can be found operating in all of the 'fields' listed above.

The 'security' provided by trained professionals exists as a product in the context of the market economy. On occasion, and it seems increasingly common, marketing wars are fought for market share. It is up to each state to determine the extent to which the private sector can take part in criminal investigation –which, after all, is essentially the responsibility of the state. It can be clearly seen, however, that most developed nations have recognised that help is needed in the fight against an ever-growing and increasingly-organised criminal element. The protection of citizens is a matter for public concern and one which the state apparatus is not able to carry out with optimal efficiency. The representatives of the private sector, then, appear in day-to-day life as an 'extension' to the arm of the state's will. More and more of them are appearing, for that matter. Just as they play a role in maintaining public areas, they appear in the research of various questions connected to the science of criminal investigation, but mostly concerning its implementation. In most cases the defence (accused, defendant) takes the chance that is legally upheld in many places to employ at their own expense a so-called 'guest' or 'defence expert' to respond to relevant questions about a given case on the basis of principles of the science of criminal investigation. This person becomes a rival to the state's experts, but the rivalry creates a healthy kind of competition, in which the range of opinions can only help to bring about a fast and successful investigation, with justice delivered in the end. This is in the interest of everyone.

## Closing thought

The list of trends quoted above is not intended to be exhaustive, but it nevertheless contains the basic tendencies of this century. Among them countless links and connections can be seen.

Primarily, it can be seen that advances in technology both provide the basis and reap the benefits of advancements in all the other areas. The computer is an invention which has provided an opportunity for the pre-eminence of technology, internationalism, and the specialisation of quality, and it is also greatly in evidence in the work of the private sector as well.

Besides such links, connections and mutual benefits, it can also be seen that the focus of their aims and progress is the same. An increase in the quantity and – in particular - quality of crime prevention and investigation tools creates a safer world. We can only support such an endeavour.

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## *„Teismo mokslų“ (kriminalistikos) raidos tendencijos ir perspektyvos*

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***Pagrindinės sąvokos:*** *kriminalistikos samprata, kriminalistikos raida, kriminalistikos struktūriniai elementai.*

### *SANTRAUKA*

*Straipsnyje autorius pabrėžia, kad tiek kontinentinė, tiek anglosaksų teisinės sistemos vieningai sutaria, jog nusikaltimų tyrimas – tai labai platus ir įvairiapusiškas mokslas, apimantis įvairius gamtos ir socialinius mokslus. Tačiau tam tikri skirtumai, esantys tarp kontinentinės ir anglosaksų teisinių sistemų, turi įtakos ir kriminalistikos mokslo apibūdinimui. Straipsnyje autorius atkreipia dėmesį į tai, jog Jungtinėje Karalystėje kriminalistika niekada nebuvo išskiriama kaip atskiras mokslas. „Teismo mokslų“ koncepcija iš dalies buvo tapatinama su kontinentiniais nusikaltimų tyrimo techniniais ir taikomaisiais mokslais. Literatūroje vartojami terminai „teisminis“ ir „mokslinis“ neretai turi tą pačią reikšmę ir dažnai yra vartojami vietoje vienas kito. Patirtis ir įgūdžiai, naudojami tiriant ir atskleidžiant nusikalstamas veikas, nebuvo vertinami kaip „teisminio mokslo“ dalis. Tik visiškai neseniai teisinėje britų literatūroje „mokslinis tyrimas“ ir „nusikaltimų tyrimas“ buvo pradėti suvokti taikant gamtos mokslų metodus. Tuo tarpu Jungtinėse Valstijose terminas „teisminis mokslas“ vartojamas jau keletą dešimtmečių. Šis terminas apima mokslo žinias, vartojamas tiriant ir atskleidžiant nusikaltimus bei vertinant įrodymus. Pagrindinės šių žinių šakos yra kriminalistika ir teismo medicina.*

*Papildant klasikinius mokslus, tokius kaip biologija, chemija, balistika ir fotografija, galima pridėti naujas mokslo sritis, tokias kaip teismo kompiuterinės technologijos (apimančios, pvz., žmogaus balso ir intonacijos kompiuterinį atpažinimą, DNR ląstelių tyrimą, taip pat kompiuterinio spausdinimo tyrimą), antropologija, geologija, entomologija, molekulinė genetika ir biologija, įrodymų tyrimas (apimantis matematinę identifikacinių tyrimų analizę), teisminė slauga, inžineriniai gedimai, gaisro mokslas ir sprogimų tyrimas, asmenybių apibūdinimas, saugumo valdymas, – visos jos yra ekspertų kompetencija.*

*Autorius išskiria šias pagrindines šio amžiaus „teismo mokslų“ (kriminalistikos) raidos tendencijas: 1) kriminalistinių technologijų kūrimas; 2) mikroskopiniai tyrimai; 3) globalizacija; 4) kompiuterizacija; 5) įvairių medžiagų kokybinės analizės metodo platus taikymas; 6) privatizacija. Pabrėžiama, jog šių kriminalistikos mokslo tendencijų sąrašas anaiptol nėra baigtinis ir ateityje, be abejonės, bus atskleista daugiau naujų kriminalistikos mokslo raidos tendencijų ir perspektyvų.*