

Session: Current Issues and Trends in the Crime Laboratory - Developments in the Last Ten Years - New Challenges for the Trace Examiner

Trace evidence: A European perspective

Abstract

The aim of this paper is to highlight and summarize the development in the discipline of trace evidence in Europe over the last ten years.

In order to understand the special situation in Europe during this reporting period a general description of the background of the European Union and the dramatic changes will be sketched in the first part. This is followed by an overview of the development of the European forensic institution, the European Network of Forensic Science Institutes (ENFSI). Moreover, details on relevant expert working groups will be given with a focus on the core activities of the particular working groups. Trends in the application of several instrumental analytical techniques or the establishment of certain databases in the field of trace evidence will be highlighted.

Introduction

It should be stated that there are no unambiguous geographical or geological definitions of Europe. Generally accepted is a geographical definition of Philip Johan von Strahlenberg (*1676-1747), a Swedish officer and geographer. He defined the border between Europe and Asia to lie at the Ural Mountains and north of the Caucasus. By this definition, which is also the INTERPOL definition, the western part of Russia is part of Europe.

At present Europe comprises 46 independent states, from which at present 27 are members of the European Union (EU).

First steps towards the development of a European organization started in the 1950ies. The European Union in its present form exists since 1992. The Maastricht treaty signed that year strengthened the institutions of the EU by transferring more competence from the member states to the EU.

The fall of the Berlin Wall in 1989 and the collapse of the Eastern German regime followed by the reunification of Germany in 1990 highlight drastic changes happening in the heart of Europe.

With the collapse of the Soviet Union in 1991, many middle and eastern European countries, which for decades were part of the communist Warschaw pact, seek independence and EU membership.

In the mid 90ies 15 countries wished to join the EU: Former eastern block countries (Bulgaria, Czech Republic, Hungary, Poland, Rumania, Slovakia), three Baltic states, former parts of the Soviet Union (Estonia, Latvia, Lithuania), and two Mediterranean countries (Malta, and Cypress). In 2002 it was decided in Copenhagen to allow ten new countries entry into the EU in 2004, changing the total number of member states from 15 to 25. In 2007 Rumania and Bulgaria entered the EU, now comprising 27 member states with 454 Mio inhabitants.

It is evident that this dramatic (and ongoing) transformation in Europe had an impact on the European forensic institutions, too.

ENFSI

The most relevant European organization concerning forensic sciences is the European Network of Forensic Science Institutes (ENFSI) – therefore all other bi-national or multi-national forensic organization in Europe will not be discussed here.

The European Network of Forensic Science Institutes (ENFSI) was formally founded in 1995. In 1997 – at the beginning of this reporting period (and the year of the last Trace Conference in San Antonio) ENFSI had 29 members from 20 countries in Europe – most of them from EU member states. In 2007 ENFSI has 53 member institutes from 31 countries¹. This reflects the changing environment that has a direct impact on the work ENFSI.

¹ The 53 laboratories come from 31 countries, including: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovenia, Slovakia, Spain, Sweden, Switzerland, Turkey, Ukraine and the United Kingdom.

ENFSI is subdivided into 16 fields of expertise, the so-called expert working groups. The Expert Working Groups are the backbone of ENFSI in terms of scientific knowledge and interests. In these groups the experts in the respective fields are active, and therefore the EWG can be compared to the Scientific Working Groups. Different to SWG, the Expert Working Groups are not funded by a central organization.

Based on the significant political changes during the last 15 years (as described above) central issues for the EWG are the following:

Transfer of knowledge from more developed forensic institutions to new members

Encouragement for all ENFSI laboratories to comply with best practice and international standards for quality and competence assurance and implementation of a quality management system such as ISO 17025

Harmonization of methods and procedures across Europe

More information on ENFSI and the Expert Working Groups can be found at: <http://www.enfsi.org/> and <http://www.enfsi.eu/>.

The following ENFSI expert working groups that are active in the field of trace evidence have been selected for further discussion:

European Paint & Glass Working Group; European Fibres Group; EWG Marks

European Fibres Group

The initiative to establish the European Fibres Group (EFG) [¹,²] came from the Metropolitan Police Forensic Science Laboratory, London, England (which merged with the Forensic Science Service in 1996) and the former US Army Crime Laboratory, Frankfurt, Germany, which closed in 1996.

The European Fibres Group was established in November 1993 during the first meeting in The Hague, The Netherlands. It was attended by 21 scientists from 17 laboratories in 12 European countries.

It was agreed at the first meeting that there should be a Chairman to initiate, coordinate and control the activities of the group and Ken Wiggins filled this position. Subsequently the role of General Secretary was introduced and Mike Grieve took on these duties until his sudden death in September 2003 [³]. With the group expanding and its activities increasing it was in 2001 that the EFG decided that it needed a committee to support the Chairman and General Secretary and to bring more structure to the group. Representatives from England, Germany, North Ireland, Sweden, Finland, The Netherlands, Slovenia, Poland and the Czech Republic fill these positions. The business meetings are held annually and the host country provides a secretary for the meeting whose responsibility it is to arrange all local organizational matters. The position of meeting chairperson is now generally shared by the EFG representative of the host country and the EFG Chairman.

The first European 'target fibre' study was completed and subsequently published in 1997 [⁴] and involved scientists from 38 laboratories in 21 countries. It was organized by Walter Brueschweiler, Zurich, Switzerland and Mike Grieve, BKA, Wiesbaden, Germany. A project of this complexity would not have been possible without international co-operation. The findings have important implications when assessing evidential value.

Another paper published in 2001 [⁵] is the outcome of a comparative survey relating to textile fibre examination and analysis in North America and across Europe. The paper gave an insight into the experience of fibre examiners, equipment availability and usage and the range of analyses carried out in over 130 laboratories. It has helped to educate the smaller laboratories about these and many other

aspects of fibres work. Finally, it will enable managers to judge whether their particular laboratory is performing adequately in the field of textile fibre examination or could be improved. This project was jointly organized by Terri Santamaria of the Georgia Bureau of Investigation, Georgia, USA, and Ken Wiggins of the FSS, Metropolitan Laboratory, London, UK, on behalf of SWGMAT and the EFG respectively. This information could not have been obtained without the co-operation of many American and European laboratories.

One of the greatest achievements was the “Manual of Best Practice”. The European Fibres Group Committee was awarded with the ENFSI Working Group Award in Istanbul 2003.

The EFG was aware of a tendency to understate the value of fibre evidence and this was emphasized by Mike Grieve [6,7] in 2000. These papers resulted from surveys carried out among fibre examiners in laboratories represented in the EFG and SWGMAT.

Another important area of activities is the organization of collaborative exercises. The European Fibres Group started to prepare collaborative exercises at an early stage of its activities. The first trial was prepared in 1994. Since then 14 collaborative exercises have been carried out by the EFG.

Another noticeable development within the EFG is the implementation of “Young Persons Fibre Workshops”, now renamed “Young Scientist Fibre Workshops”. This two-dayworkshop is aimed at young forensic practioniers who are trained practically and theoretically by several experienced experts during a two-day workshop. The first workshop of this kind took place in 2004 in Prague, Czech Republic. Due to its success “Young Scientist Fibre Development Workshop” will be carried out for the third time in 2007.

At present the European Fibres Group has a Chairman, a General Secretary and nine Steering Committee members together with members from 27 different countries.

The group can be contacted at:

Kornelia Nehse (Chairperson EFG); Landeskriminalamt Berlin, Kompetenzzentrum Kriminaltechnik, LKA KT – Tempelhofer Damm 12; 12101 Berlin; Germany; email: kornelia.nehse@polizei.verwalt-berlin.de

or Pavel Kolar (General Secretary EFG); Police of Czech Republic; Institute of Criminalistics

Prague, P.O.Box 62/KUP, Strojnicka 27, 17089 Prague 7, Czech Republic, email: kolarkup@mvcz.cz

European Paint and Glass Group

The first meeting of the European Paint Group (EPG) took place at the BKA in Wiesbaden/Germany in October 1995. 28 scientists from forensic institutes in Belgium, England, Northern Ireland, Finland, France, the Republic of Ireland, Italy, the Netherlands, Austria, Russia, Sweden, Switzerland, Slovenia, Spain and Germany (Bavaria, Berlin, Saxony, and BKA) took part in this meeting.

The emphasis during the meeting was on the following topics, which were also defined as the main activities of the EPG:

- The establishment of European Paint Collection
- The establishment of a combined data base on paint
- The performance of collaborative exercise on a European level
- The recommendation of standard operating procedures for the examination of paint
- An exchange of the most up to date information in the area of paint analysis including case work
- The co-ordination of combined research projects

At the first meeting it was decided to work towards the establishment of a European Paint Collection and a combined data base on automotive paint samples. Based on the German Collection of Automotive Paints which was established in 1983, the European Collection of Automotive Paints (EUCAP) was founded in 1997. In order to participate in the EUCAP database an approval of the directors of the particular forensic science institutes in the form of a “Declaration concerning

cooperation in the development and use of a European Automotive Paint Collection“ is required. As a result of this mutual effort the European Collection of Automotive Paints (EUCAP) is one of the core activities of the EPG. Currently more than 31 European forensic institutes are participating in EUCAP.

More than 25 000 automotive paint samples, product information, and analytical data for clear coats, top coats of solid and effect paints, first primer, primer surfacer from 23 different European and Japanese Companies are included in the EUCAP database. The RCMP/PDQ is acting as the co-operation partner for Northern America.

Another important part of the EPG is the organization of collaborative exercises. With very few exceptions collaborative exercises in the area of paint are been carried out on an annual basis.

In order to increase the evidential power of paint examinations it is aimed at using alternative techniques beside microscopy and FT-IR spectroscopy. The group focuses on the application of RAMAN spectroscopy and pyrolysis-gaschromatography-mass spectrometry (py-GC-MS) for the analysis of paint. The application of RAMAN spectroscopy – a method is used more and more nowadays [8]- is focused on the establishment of a spectral database for pigments and dyes.

Subgroups

In 1999 a glass subgroup was formed as part of the EPG. It was later decided by the ENFSI board not to split these groups into two separate working groups. The Paint and Glass Group also addresses issues in the area of tape analysis and security dyes. A group dealing with these materials was established in 2005. At present the Paint and Glass Group can be regarded as a material science group dealing with three areas of interest: paint, glass, and tapes and security dyes.

Glass subgroup

The main focus of the work is the performance of annual collaborative exercises for glass either for refractive index measurements, or for the elemental analysis of glass. Almost on an annual basis a collaborative exercise for the determination of the refractive index has been carried out. The special

focus of the particular collaborative exercise varies from year to year (i.e. interpretation/annealing). Since 2000 four collaborative exercises dedicated to the quantitative analysis of glass have been carried out. In 2006 a training course on the quantitative analysis of glass fragments was held in Prague, Czech Republic. The aim of the training course was to improve the understanding and competence of European examiners in the field. The training course was divided into a theoretical part and a practical part which was carried out at the laboratories of the Institute of Criminalistics/Prague. The training course was attended by 32 forensic scientists from 18 European countries. The main topics regarding quantification were addressed and discussed. The results of the upcoming collaborative exercise will demonstrate the degree of development. Until the next EPG meeting in September 2007 a set of Best Practice Guidelines for glass analysis will be forwarded to the group for final voting.

Tape subgroup

In 2005 the ENFSI-EPG decided to form a subgroup “Tapes and Security dyes“ dealing with materials such as adhesive tapes, plastics, and security inks.

Based on the “Adhesive Tape Database” of the BKA that was established in 2001, a European Tape Collection was founded in 2004. By surveying the tape manufacturers, importers and wholesalers a very comprehensive overview on this material type was achieved. The tapes in the database are pictured in their original packing and basically described by their manufacturer, brand and type (masking tape, office tape, packing tape, etc). Basic properties such as width, thickness, texture and color impression are measured and listed. The color is furthermore characterized by means of the $L^*a^*b^*$ color space. Backing and adhesive layer are analyzed by IR-spectroscopy. The tape database is linked to a commercially available IR-software so that IR-spectra from casework can be searched in order to find the corresponding tape. In addition, for the class of duct tapes (power tapes), the fabric was isolated and pictured as a close-up image.

A special focus was laid on country-specific tape samples and domestic producers so that the database now contains more than 2.000 different tapes from different European markets.

In 2007 a Collaborative Exercise on tapes was organized by the BKA on behalf of the EPG-subgroup „Tapes and Security Dyes“. The task which had to be performed was to identify and assign a duct tape sample.

The paint and glass group can be contacted at:

Knut Endre Sjastad (chairman EPG Group); National Criminal Investigation Service, Brynsalleen 6, PO Box 8163, Dep; 0034 Oslo; Norway knut.endre.sjastad@politiet.no

Stephan Milet (chairman paint subgroup) vhc.ircgcn@gendarmerie.defense.gouv.fr; Direction generale de la gendarmerie nationale; CTGN-IRCGN; Fort de Rosny-1, bd Th.-Sueur; 93111 Rosny Sous Bois Cedex; France

Dr. Thomas Schäfer (chairman tape subgroup); Forensic Science Institute; KT 14; Bundeskriminalamt 65173 Wiesbaden, Germany; email: Thomas.schaefer@bka.bund.de

Marks WG

Even though the area of expertise of this working group does not strictly pertain to what is usually defined as trace evidence it is included here due to its relevance. This working group covers examinations in a wide range of disciplines including toolmark examinations, lock and key examinations, manufacturing marks, restoration of erased numbers, footwear marks, tyre marks, glove marks, foot prints and other related topics (but not fingerprint/dactyloscopy related topics).

Aims of the Expert Working Group Marks

The general aims of the Working Group Marks are

- To raise the level of expertise in marks examiners

- To promote best Quality Assurance practises in the fields of expertise covered by the Working Group.

The first European meeting for shoeprint and toolmark examiners was arranged and hosted by the National Bureau of Investigation of Finland in 1995. Since then an educational meeting for shoeprint and toolmark examiners has been organized every two years (SPTM conferences).

The Marks Working Group has been publishing a newsletter for the members since November 1995.

The main purpose for the Information Bulletin for Shoeprint/Toolmark Examiners (IBSTE) is to deliver information of interest to the marks examiners. This can be information about special techniques, information on interesting cases, etc. Selected abstracts from forensic meetings are also provided. The first issue of the Bulletin was published in the fall of 1995 and since then, the Bulletin has established its position as a permanent publication. 12 volumes can be accessed at

<http://www.intermin.fi/intermin/hankkeet/wgm/home.nsf>.

An important focus of the working group was the implementation of a conclusion scale for the interpretation of casework and collaborative exercises. A six-Level-Conclusion-Scale was developed by the ENFSI WG Marks [⁹, ¹⁰].

The working group can be contacted at:

David Baldwin (chairman); Forensic Science Service; 109 Lambeth Road; London SE1 7LP / United Kingdom; e-mail: David.Baldwin@fss.pnn.police.uk

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