

Forensic Anthropology in Europe: an assessment of current status and application

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Summary - *Forensic anthropology is the discipline that traditionally deals with the examination of human remains for legal purposes and it derives from the fields of anatomy, physical anthropology and forensic medicine. For more than a century, forensic anthropologists in the United States have been offering their services in the court of law complementing the medico-legal investigation of other forensic professionals. The current status in European countries is presented here. The development of forensic anthropology varies significantly among the countries of Europe. Whereas some countries show a long history of research activity in the forensic sciences, including forensic anthropology (i.e. France, Germany and Spain), others are exhibiting a recent, rapid development (i.e. United Kingdom). In some cases, forensic anthropologists are employed within the academic realm (i.e. U.K., Denmark, Portugal, Turkey), forensic institutions (Netherlands) or government organizations (Spain, Hungary), although the vast majority of them remain limited to freelance activities on a sporadic basis. Often, European scientists that deal with skeletal remains come from nonphysical anthropology disciplines such as archaeology, forensic medicine and biology. In many cases they do not have adequate training equivalent to the forensic anthropologists in the USA. Naturally, without common training and a common legal system, an accreditation system for Europe will be difficult to implement.*

Keywords - *Forensic anthropology, Europe, Professional status, Accreditation.*

Introduction

The term Anthropology derives from the Greek words *άνθρωπος* (anthropos) = human + *λόγος* (logos) = science, and it is the study of the human biological, cultural and linguistic conditions. The field of anthropology can be divided in two main branches: social (or cultural) and physical anthropology. The first sub-discipline deals with ethnographic concerns while the latter focuses on human biological characteristics with special interest on human evolution and human variation. An additional subdivision of physical anthropology

is the recently popular forensic anthropology. Initially, forensic anthropology was defined as "that branch of physical anthropology which, for forensic purposes, deals with the identification of more or less skeletonized remains known to be, or suspected of being, human" (Stewart, 1979, p.ix). A current definition for forensic anthropology can be found on the American Board of Forensic Anthropology web site, "Forensic anthropology is the application of the science of physical or biological anthropology to the legal process. Physical or biological anthropologists who specialize in forensics primarily focus their studies on the human skeleton" (<http://www.aafs.org/>).



Fig. 1 - Male skeletal remains from west Texas.

Traditionally, forensic anthropology deals with the analysis of fully or semi skeletonised human remains (Fig. 1). In many occasions remains are comingled, fragmentary or even charred, and the forensic anthropologist is called to decide whether they are of human origin as well as to assess the biological characteristics, thus assisting in positive identification. Additionally, post-mortem interval, ante-mortem pathology and trauma, as well as post-mortem artefacts associated to the scene are determined. The main objective of most forensic anthropological investigation is to assist in a positive identification of the decedent and this may include an assessment specific to the cause and the manner of death (Krogman & İşcan, 1986; Schmitt *et al.*, 2007). The contribution of forensic anthropology is often essential during the investigation and the interpretation of decomposing human remains (Komar & Buikstra, 2008).

Mass disasters caused by plane crash, terroristic attack, natural phenomena (tsunamis or earthquakes) and physical catastrophic destruction of buildings can often result in numerous victims, mutilated, commingled, charred and in varying state of decomposition (Fig. 2). Forensic anthropologists often form members of the Disaster Victim Identification units assisting in the recovery and identification of the victims.

The investigation of human right violations and war crimes is another aspect of forensic anthropological work since evidence associated with mass graves often involves both soft and hard human tissue material to work with. Much of this work can be traced back to the efforts of Snow and the various teams of researchers that he has organized over the years (Snow *et al.*, 1984).

Recent developments place forensic anthropology in a wider criminal investigation context, forensic anthropologists are even asked to aid in the identification of living individuals. The 20th century forensic anthropologist maybe called to identify criminals from video surveillance cameras (e.g. armed assaults or burglaries), to estimate age for presumed under-aged juvenile perpetrators or victims of pedo-pornography (Cattaneo, 2007; Cunha & Cattaneo, 2007).

Despite the general acknowledgement of the significance of forensic anthropology worldwide, there seem to be considerable differences in many aspects of education, training, professional status, research activities and job opportunities globally. The aim of this work is to give an overview of the differences among 18 European countries and to contrast the general profile of the European forensic anthropologist with the US standards. A second but not less significant goal is to provide information on potential students and professionals in the field on what the options for forensic anthropology research and education are in European countries.

Forensic Anthropology in the US

The history of forensic anthropology as it is practiced in the United States has been well documented by Stewart (1979), Ubelaker (1996),

Kennedy (2000) and Komar & Buikstra (2008). The history of early case work and the formation of skeletal collections that have provided the standards by which this work has been done is also well documented (Stewart, 1978; DiBennardo & Taylor, 1982; İşcan & Miller-Shaivitz, 1984; Berrizbeitia, 1989; Holman & Bennett, 1991; Ubelaker & Volk, 2002; Brickley & Ferllini, 2007; Brown *et al.*, 2007; Case & Ross, 2007; Albanese *et al.*, 2008).

The official incorporation of forensic anthropology as a supplement to the practice of forensic medicine dates to 1972 with the foundation of the section of physical anthropology as the discipline acknowledged by the American Academy of Forensic Sciences (Güleç & İşcan, 1994; Kennedy, 2000). As Komar & Buikstra (2008) have recently stated, a PhD in anthropology is normally required to practice forensic anthropology in the USA.

According to the American Academy of Forensic Sciences (AAFS) web site there are 384 members of the physical anthropology section (<http://www.aafs.org/>). Not all of these individuals have obtained a PhD in anthropology and therefore may not be practicing forensic anthropology in the USA legal system (Tab. 1). For example, 137 of these individuals are student members of the organization.

We reviewed the AAFS membership list of 2008 and have found that there are 103 forensic anthropologists living in the USA that meet the criteria of having a PhD and having a status with AAFS as either an Associate Member, Member or Fellow (AAFS directory, 2008). There are an additional 18 forensic anthropologists with this criteria working from the The Joint POW/MIA Accounting Command (JPAC CIL) located at the Hickman Air Force Base, Hawaii.

The State by State distribution of forensic anthropologists working in the USA is very uneven. There are thirteen States (26%) without forensic anthropologists working or living there. These States are New Hampshire, Vermont, Connecticut, New Jersey, Nebraska, Delaware, South Dakota, Utah, Iowa, Missouri, West Virginia, and Alaska. As the AAFS membership list shows 50.5% (52/103) of the forensic anthropologists working in the USA are found in only seven States (Tab. 2).



Fig. 2 - A decomposing male body from west Texas. Forensic anthropologists are just as likely asked to work on this type of case as they are to work on skeletal remains.

The situation has begun to change lately with the incorporation of forensic anthropologists into the medical examiners' offices. In big cities like New York, San Antonio, or Vancouver, anthropologists are recruited for field and laboratory work. The AAFS membership list show at least 10 forensic anthropologists (with a PhD and AM, M or F status with the AAFS organization) working for Medical Examiner office. Although it is uncommon for crime scene investigation to be performed by anthropologists, they actively participate in the casework and they provide reports concerning the findings of the examination in cases where skeletal material is involved (Komar & Buikstra, 2008). Critically, there have been court cases in which the expert witness testimony of a forensic anthropologist was considered indispensable. In order to fulfil these requirements, anthropologists are committed to continuous training and specialization in forensic anthropology, and an accreditation system run by the American Board of Forensic Anthropologists (ABFA) has been developed in the United States in order to certify their capacity to express a professional opinion in legal cases. The American Board of Forensic Anthropology was created in 1977. As of February 2010, 82 forensic anthropologists have been board certified by this organization. Certification is based upon the candidate's personal and professional

Tab. 1 - Physical Anthropology Section demographics from the AAFS organization, as of April 2, 2009, <http://www.aafs.org/>.

| MEMBERSHIP STATUS | NUMBER |
|-------------------------|------------|
| Applicants | 8 |
| Associate Members | 78 |
| Fellows | 91 |
| Members | 45 |
| Retired Fellows | 9 |
| Retired Members | 1 |
| Student Affiliates | 137 |
| Trainee Affiliates | 15 |
| Total Membership | 384 |

Tab. 2 - List of States with a considerable number of Forensic Anthropologists, data comes from AAFS 2008 membership list.

| STATE | NUMBER OF FA |
|----------------|--------------|
| New York | 7 |
| North Carolina | 7 |
| Arizona | 9 |
| Texas | 8 |
| California | 9 |
| Florida | 7 |
| Tennessee | 5 |

record of education and training, experience and achievement, as well as on results of formal examinations.

The ABFA requires a re-certification of all board-certified anthropologists in order to maintain their status. To achieve that, every diplomat has to fulfil several requirements, such as providing evidence of maintenance of the knowledge and the skills to practice forensic anthropology, keeping updated according to the current methods applied in forensic anthropology, and providing service to the community with respect to the ethical laws of the ABFA. Since its formation, the ABFA has improved its standards through the years. The annual update was created in 1984. The ethics policy was approved in 2001 and added to the re-certification process in 2003, along with an expanded section on continuing education. In 2002 ABFA applied for membership on the Forensic Sciences Accreditation Board

and membership was granted in 2003. With this membership, the ABFA signals its ongoing commitment to the highest professional standards of practice and its intention to continue working to refine and improve the re-certification process.

Lately the Federal Bureau of Investigations (FBI) in collaboration with and the Department of Defense Central Identification Laboratory (DOD CIL) cosponsored the creation of the Scientific Working Group for Forensic Anthropology or SWGANTH (see www.swganth.org). This is a group of 20 professionals from the forensic anthropological community that were brought together to give recommendations and to produce guidelines for the “best practice” in the discipline. Drafted versions of several guidelines (e.g. age, sex estimation, medicolegal significance of skeletal remains, trauma analysis, and qualifications of the anthropologists) can be found in the website and are available to the scientific community for productive criticism and feedback to SWGFA.

Forensic Anthropology in Europe

United Kingdom

The recent interest in forensic specialties has been attributed both to “the court’s insistence on greater precision” (Black, 2003) and to the sudden “symptom of popularity” deriving from the media (Black, 2003; Vanezis, 2004; Black, 2008). Numerous TV shows from the United Kingdom and the Americas are based on the work of forensic experts. Unfortunately, these shows depict forensic scientists doing the impossible as they solve every criminal case in forty-five minutes or less. Among the appealing forensic expertise, the role of forensic anthropologists is due to the television viewing audience (*i.e.* “Bones”).

In the United Kingdom, forensic anthropology is practiced by a large variety of professionals. Some have a background in osteoarchaeology, others are anatomists or forensic pathologists. The training system is complicated since the Archaeology department of some universities may include forensic anthropology as a sub-discipline. Other colleges are not organized this way. While

some universities with departments of anatomy, include forensic anthropology/archaeology training (*i.e.* Dundee). Several universities also have the option of postgraduate courses or Master's degrees on the subject (*e.g.* Bradford, Bournemouth, Cranfield, and Edinburgh). These programs are attracting numerous students. As a result, it has been suggested that there may be a saturation and accumulation of forensic archaeology students in this discipline (Black, 2003).

Regardless of how program offerings are organized, forensic anthropological research has been well developed by UK anthropologists, specifically in the task of positive identification (*e.g.* Thompson, 2004; Berry *et al.*, 2008; Thompson & Black, 2006), sex determination (Robinson *et al.*, 2008) and age estimation (Buckberry & Chamberlain, 2002; Liversidge *et al.*, 2003).

Nevertheless, the use of forensic anthropologists in case work is considered limited in the UK (Cox, personal communication). This is a general remark, since each district/county has its own autonomous practice and the participation of anthropologists in crime scene investigation often depends on the Officer in charge. As a result forensic anthropology is not a routine procedure in some counties. According to data extracted from a questionnaire, 98% of the British police force personnel stated that they had never used a forensic anthropologist as they investigated a death scene (Black, 2000). It is underlined that forensic cases concerning skeletal remains are primarily undertaken by pathologists. Hunter & Cox (2005) reported 30 forensic archaeologists in the UK, of which only 10 were called to crime scenes and only a few were requested in court (Cox, personal communication). The difference between forensic anthropologists and osteoarchaeologists working in the U.K. is not as apparent as it is in other countries (Cunha & Cattaneo, 2007). The two fields are considered in most cases synonymous by law enforcement and similar work (forensic cases, Disaster Victim Id, mass graves identification) is undertaken by both disciplines. We have managed to locate about 38 persons working as FA in the UK including osteoarchaeologists, anatomists and forensic artists. 18 of them have a PhD in FA (Tab. 3).

An additional issue for much of Europe and specifically to the UK is the accreditation of the practising professional forensic anthropologists. An attempt to solve this issue started with an approach of the Chief executive of the Council for Registration of Forensic Practitioners (CRFP) that was operating since 1999. For the first time the UK has developed an accreditation system which allows forensic anthropologists to undergo an evaluation process and register in one of the 4 forensic anthropology sub-specialties (general forensic anthropology, osteology, modelling and computed-based facial anthropology). Black (FASE triannual meeting, Edinburgh, UK, 2008) reported less than 10 board-certified forensic anthropologists in the UK in 2008. Still, there appears to be an increased interest of graduate students to work as a forensic anthropologist. On March 2009, however, CRFP ceased operating and along with it the Forensic Anthropology accreditation system ended. Lately, there has been an effort from the practising anthropologists to establish new regulations and accreditation rules for the discipline and a meeting was held during the month of April, 2010 to discuss these issues.

Ireland

Forensic Anthropology in Ireland has a recent history and it is separated into those anthropologists who do case work and those who do research in the area. Forensic cases, including forensic anthropological cases, are investigated by the State Pathologist's Office in Dublin (Department of Justice, Equality and Law Reform). There is one State Pathologist, two Deputy State Pathologists and one Assistant State Pathologist covering the Republic of Ireland. In most cases the experts are called by the Police (Garda Siochana) to identify human from non-human skeletal remains. Once skeletal remains are identified as human, the Coroner decides who will undertake the case (Last *et al.*, 2005) and usually assigns it to the State Pathologists. When skeletal remains are involved the State Pathologist's Office calls on a freelance osteoarchaeologist with many years of experience working for commercial archaeological companies to assist in the examination.

Tab. 3 - Number of Europe forensic anthropologists listed by AAFS, 2008 and other sources.

| EUROPEAN COUNTRY | NUMBER OF FA ACCORDING TO AAFS | FA LISTED BY OTHER SOURCES* | POSTGRADUATE COURSES INCLUDING MODULES IN FA/WORKSHOPS | MSC | PHD | SKELETAL EVALUATIONS DONE BY ^A |
|------------------|--------------------------------|-----------------------------|--|-----|-----|---|
| UK | 4 | 18 ¹ | yes | yes | yes | AR, AN, PA |
| Ireland | 0 | 3 ¹ | yes | no | yes | AN, AR |
| Sweden | 1 | 2 ¹ | no | no | no | AR |
| Norway | 0 | 1 ¹ | no | no | no | FP |
| Denmark | 0 | 2-3 ² | no | no | no | AN |
| Finland | 0 | 0 ¹ | yes | no | no | FP |
| Germany | 0 | 4 ¹ | yes | no | yes | FP, AN |
| Austria | 0 | 2 ¹ | yes | no | yes | FP |
| Netherlands | 0 | 2 ⁴ | yes | no | yes | AN |
| Greece | 1 | 1 ¹ | yes | no | yes | FP |
| Portugal | 1 | 1 ¹ | yes | yes | yes | PA, FP |
| Iceland | 1 | 0 ¹ | ? | ? | ? | ? |
| France | 1 | 50 ⁵ | yes | no | yes | FP |
| Spain | 1 | 10 ¹ | yes | yes | yes | FP |
| Italy | 0 | 2 ³ | yes | no | yes | FP |
| Turkey | 0 | 1 ¹ | yes | yes | yes | FP |
| Russia | 0 | ? | ? | ? | ? | FP |
| Balkan Peninsula | 0 | 0 ¹ | ? | ? | ? | ? |
| Total | 11 | ? | | | | |

¹Our assessment (we counted those that have a Ph.D. in physical or forensic anthropology)

²N. Lynnerup

³FASE website (2006)

⁴Netherlands Forensic Institute (R. Gerretsen)

⁵Baccino (2008)

^AAN: Anatomists, AR: Archaeologists, FP: Forensic Pathologists, PA: Physical Anthropologists

A small unit at University College Dublin (UCD) covers the research aspect of forensic anthropology. In 2003 a Forensic Anthropology Study and Research Group (FASRG) was established in the Department of Human Anatomy of UCD and consists of four members. The unit has been involved in the examination of historical skeletal remains since 2001 and all members of the group are qualified to doctoral level. With the move to the main Belfield campus the FASRG has become part of the UCD School of Medicine and Medical Science. Currently, the anatomy section of UCD has an osteology laboratory where research activities are taking place. The members of the FASRG are teaching

undergraduate modules and supervise postgraduate research in anatomy, physical and forensic anthropology. Forensic anthropology research has increased with the recent completion of two doctoral dissertations: one on age determination from the fusion stages of the knee (O'Connor *et al.*, 2008) and one on the sexual dimorphism of the foramen magnum region (Gapert *et al.*, 2009a,b).

Sweden

According to the AAFS there is only one forensic anthropologist from Sweden in this organization. Still, we found several others working in Sweden, one works out of Stockholm

University and another is part of the Finnish Forensic Expert Team (FFET).

Despite a tradition in osteology training, Sweden has no organised teaching modules in forensic anthropology. All casework in forensic pathology, forensic chemistry, forensic genetics and diagnostic forensic psychiatry in Sweden is operated by the Swedish National Board of Forensic Medicine (SNBFM), under governmental control, where all specialists and trainees in forensic medicine are employed (Thid *et al.*, 2004). There is no permanent forensic anthropologist with the SNBFM however, some osteologists are occasionally consulted (Druid, personal communication).

Norway

In Norway there is no specific tradition in physical anthropology teaching or research. According to Juhl (2005) there are only two physical anthropologists working in the country. Norway has only four forensic units connected with the academic departments of Oslo, Bergen, Trondheim and Tromsø (Thid *et al.*, 2004). The autopsies are carried out by medical doctors (Thid *et al.*, 2004). Subsequently, forensic expertises other than pathologists are limited. Norway has 4.5 million habitants and about 30–40 cases per year needing the expertise of a forensic anthropologist. Most of the cases deal with photo analyses for possible false passports and partly with the examination of skeletal remains (Holck, personal communication). By our assessment there appears to be only one forensic anthropologist in Norway who has a medical background and international training (personal communication, Department of Forensic Sciences in Oslo). Currently there are no postgraduate opportunities in forensic anthropology in Norway which has been attributed to the lack of interest from the students to specialise in this field; raising significant concerns on the future of the discipline in the country (Holck, personal communication).

Denmark

The appearance of forensic anthropology studies and research in Denmark derived from the anatomy and forensic sciences departments. The

Institute of Forensic Medicine of the University of Copenhagen, has the only active forensic anthropology unit in Denmark. The unit consists of 2–3 professionals who participate in medico-legal investigations (in collaboration with the forensic pathologists) and are called by the police or the archaeologist when skeletal remains are recovered (Lynnerup, personal communication). For every case they submit a report and are brought to court for testimony whenever it is necessary. Another very important activity of the unit is the image analysis of video surveillance systems, as for instance in bank robberies (Lynnerup, personal communication). Despite its small size, it exhibits increasing research activities with several articles on sex (Norén *et al.*, 2005) and age (Lynnerup *et al.*, 2006; Lynnerup *et al.*, 2008) estimation, skeletal trauma (Jacobsen *et al.*, 2009) and the innovative gait analysis through video surveillance systems (Larsen *et al.*, 2008).

Forensic anthropology appears not to be taught in the undergraduate and, postgraduate levels. The Masters program of the Department of Forensic Medicine of the University of Copenhagen entitled as “Research program in Forensics and Anthropology” does have a section of biological anthropology, 3D image and gait analyses. However, an effort is made to fill this gap, and a number of international workshops are going to be organized in the following years (*i.e.* FASE workshop 2010, Lynnerup, personal communication).

Finland

Forensic anthropology in Finland is a recent specialty that comes from forensic pathology and osteoarchaeology points of origin. Finland has a government-based medico-legal system where the regional authorities collaborate with the four university departments to conduct forensic autopsies (Thid *et al.*, 2004). As of 2004 there was no forensic anthropologist registered among the 28 forensic specialists working on autopsies (Thid *et al.*, 2004). However, the Disaster Victim Identification (DVI) team at the National Bureau of Investigation (NBI), operating since 1991, participated in the excavation of mass graves in Bosnia-Herzegovina, Kosovo (Rainio *et al.*, 2001), Iraq and Peru.

According to the Finnish Association of Forensic Archaeologists, the first contribution of archaeology in forensic investigations in Finland was recorded in 2006-2007. The study was carried out in 2006-2007 as a co-operation between the Department of Archaeology and the Department of Forensic Medicine, the University of Helsinki. Research aimed at clarifying the widespread rumours of illegal executions of Finnish soldiers during the World War II. They resolved this issue by investigating mass graves found at the site of Lappeenranta Huhtiniemi (Wessman, 2009).

There are no courses of forensic anthropology at a postgraduate level in Finland but there is a report of one workshop in 2006, organised by the Department of Forensic Medicine of the University of Helsinki in collaboration with Finnish Societies of Forensic Medicine and Odontology that cover the topic of forensic anthropology. The workshop was offered mainly to residents in forensic medicine and odontology. The theme of the workshop appears to have reflected a general belief that anthropological examinations in Finland are considered part of the duties of the forensic pathologist.

Germany

Since the beginning of the 19th century, German scientists collected data on cranial shape and size along with soft tissue depths for the "plastic" 3D facial reconstruction. Nafté (2009) mentions several early works in which scientists used stick blades and pins as a means to determined tissue depths in cadavers. The purpose of this work was to set soft tissue thickness standards to be used in facial reconstruction. According to Schiwy-Bochat *et al.* (2004), Helmer was the first to introduce facial reconstruction on the basis of recorded soft tissue thicknesses, in Germany (Helmer *et al.*, 1993). He was also one of the founding members of the "International Association for Craniofacial Identification" (IACI) formed in 1987 (<http://www.forensicartist.com/IACI/index.html>).

In recent decades, forensic anthropology in Germany has exhibited increased research activity regarding age and sex estimation methods (Leopold, 1978; Graw *et al.*, 1999; Graw *et al.*,

2003), the use of image processing techniques (Riepert *et al.*, 1996; Riepert *et al.*, 2001) and age estimation methods on living individuals (Schmeling *et al.*, 2000, 2003). An extensive review of the research achievements of distinguished German scientists in forensic anthropology is provided by Schiwy-Bochat *et al.*, (2004).

Currently, most of the departments of forensic medicine in Germany do not have separate units of forensic anthropology. Some exceptions to this were found (e.g. Ulm campus). Madea & Saukko (2007) list forensic anthropology among the "services concentrated in Forensic Medicine" suggesting that anthropological examinations fall into the duties of the forensic pathologist. Forensic pathologists deal with all forensic cases, including both the examination of skeletal remains and that of living individuals, as for instance the cases requiring age estimation of alleged juvenile criminals (e.g. forensic offices located in Berlin, Düsseldorf, and Hamburg). Although the value of forensic anthropology is highly recognised the current structure of the forensic departments does not support an establishment of FA degree granting programs.

The Identification Commission of the German Federal Office of Criminal Investigation Operations (IDKO) in collaboration with the Working Group German for Forensic Anthropology (*Gesellschaft für Forensische Anthropologie*) have established eligibility criteria for the anthropologists that want to participate in such operations (Ramsthaler *et al.*, 2009). The basic professional qualification required is a degree in physical anthropology with additional knowledge in forensic osteology and a participation to a minimum of 30 cases or a medical degree with a specialty in forensic pathology and expertise in forensic osteology. In both cases there are 4 additional special qualifications:

- 1) Participation in courses or workshops that provide certification in FA (e.g. FASE workshops),
- 2) Experience in autopsy techniques and tissue preparation and preservation techniques,
- 3) Regular participation in advanced and continuous training in FA,

4) Membership to AGFA (German society for FA) or FASE, IALM, ABFA.

Desirable qualification include training and experience on excavation and exhumation techniques, skeletal trauma identification and academic activities in forensic anthropology (e.g. posters and publications).

Despite the well defined eligibility criteria for the forensic anthropologists the IDKO employs exclusively forensic pathologists and odontologists. Within the GfA there is a section Agfa (<http://www.gfanet.de/node/10>), which covers skeletal id only. This section is completely open; no expert lists exist. As an independent group there is the Agib (<http://www.bildidentifikation.de/>) with a list of accepted experts which deal with facial image id only. And thirdly there is a group within the Gesellschaft für Rechtsmedizin, Agfad (<http://agfad.uni-muenster.de/german/start.htm>), which covers age diagnostics of living humans, mostly juvenile offenders (Rösing, personal communication). We found 2 non-medical forensic anthropologists in Germany and several forensic pathologists focusing on FA casework.

Austria

Modern forensic medicine in Austria relies on DNA methods for identification of victims in mass disasters while ordinary cases of identification are handled by forensic pathologists.

The use of virtual autopsy has gained attention lately since it allows non invasive forensic examination of a decedent. The Department of Anthropology at the University of Vienna is currently developing some research projects with the employment of virtual tools and geometric morphometrics for forensic applications (e.g. Coquerelle *et al.*, 2009). One of them deals with the development of virtual procedures for reconstruction of severely fragmented crania making facial approximation possible (Senck, personal communication).

France

The French school of anthropology rose with the foundation of the *Société de Anthropologie de Paris* in 1859 by Paul Broca. An overview of the contributions of the French scientists

(anthropologists and medical doctors) to the field of forensic anthropology is presented by İşcan & Quatrehomme (1999). A recent accomplishment of the French school of anthropology is the development of the Lamendin technique used in age estimation (Lamendin, 1978). The method was improved upon in 1992 by Lamendin *et al.*, (1992). Other important contributions include additional methods specific to age assessment (Schmitt *et al.*, 2002; de la Grandmaison *et al.*, 2003; Martrille *et al.*, 2007; Rougé-Maillart *et al.*, 2007; Dedouit *et al.*, 2008; Dorandeu *et al.*, 2008; Ferrant *et al.*, 2009; Martrille *et al.*, 2009) and sex determination (Veyre-Goulet *et al.*, 2008; du Jardin *et al.*, 2009) .

There are approximately 50 forensic scientists, mostly pathologists, who deal with routine anthropological cases in France (Baccino, 2009). However, it is not clear how many of these forensic scientists have a PhD in forensic anthropology. The training of the potential professional forensic anthropologists is limited to international workshops. There is no French university that offers specific graduate or post-graduate courses in forensic anthropology. Also, there is still no official national recognition of forensic anthropology as an academic specialty in France (Baccino, 2008). As İşcan & Quatrehomme (1999) pointed out and Baccino (2009) reinforced, forensic anthropology is still considered to be part of the duty of forensic pathologists.

Netherlands

In Netherlands, forensic investigations are assisted by the Netherlands Forensic Institute (NFI). This organization has been operating since 1941. The NFI is a division of the Ministry of Justice that provides assistance to the Public Prosecution Service, the police and the judiciary to solve crimes. Often, forensic experts of the NFI are called as expert witnesses in court. The emerging need for anatomical assistance in forensic cases gave reason for them to develop their own form of the discipline of forensic anthropology, in 1976 (Maat, 2001). During the first 10-15 years of forensic anthropological work, consultations were

concerned mostly the identification of animal and human bones however human identification of decomposed bodies, the assessment of skeletal remains and an assessment of living individuals has become part of their task as forensic anthropologists (Maat, 2001). Currently, there is only one forensic anthropologist working at the NFI. The NFI had 595 FA cases between 2005 and 2009 with a mean of 119 cases per year (Gerretsen, personal communication).

A very important step to the development of FA in Netherlands is the foundation of the Barge's Anthropologica organization in 1996, housed at the Department of Anatomy of the Leiden University Medical Centre. The department offers regular anatomy courses to undergraduates as well as physical anthropology intensive courses for undergraduate, graduate students and Police officers. The "Introduction to physical anthropology" summer course started with 16 students, mostly with archaeological backgrounds and recently has reached a number of 177 students coming from different disciplines like medicine, archaeology, and police academy (2008 Annual report of the Barge's Anthropologica). There are some courses in Forensic Sciences in Netherlands that include modules in forensic anthropology (*i.e.* University of Amsterdam) however they do not offer an MSc degree in forensic anthropology. Currently, the department of anatomy of the Leiden University offers though the possibility for a PhD in forensic anthropology and we found a record of one student (British Association For Human Identification).

Research focuses on the study of burials and on forensic methods such as histological age assessments, radiological age assessments of asylum seekers (Meijerman *et al.*, 2007a), identifications from combusted remains and cremations, and development of biometric markers for the identification of the living (Maat, 2001; Lynn *et al.*, 2004; van der Lugt *et al.*, 2005; Meijerman *et al.*, 2007b).

Hungary

Since the 1960's Hungary's anthropological programs have produced a number of important

physical anthropologists including Nemeskeri, Harsaniy, Fazekas and Kosa (Susa, 2007). With the establishment of a democratic government in 1989, an increase in the number of forensic investigations has begun along with the opportunity for forensic anthropologists to apply their skills as they work with death investigators. Most of these investigations have focused on the identification of victims of past political violence. As a result, anthropologists have been involved in the many exhumations. Most of the victims recovered were killed during a period between 1945 and 1962. It is important to note that political and war crimes in Hungary do not lapse and thus, upon positive identification of an individual, the family may claim compensation from the state. So far, seventy-one individuals who had died during the country's political struggles have been positively identified (Susa, 2007).

Currently, those individuals practicing forensic anthropology in Hungary have a background in either archaeology or medicine; or they have obtained a MSc in biological sciences after a three-year training (Susa, 2007). It is not clear though what is the actual number of professionals actually working in that field in Hungary. According to Susa (2007) anthropologists in Hungary are often asked by the police to contribute to forensic cases concerning identification of skeletal remains, excavation of mass graves and they even help in identification of the living. Age determination of individuals involved in pornographic videos or of refugees that illegally enter the country are the primary reasons that forensic anthropologists are asked to assess living individuals (Susa, 2007).

Russia

Currently, the "Russian centre of forensic medical expertise", founded in 1996, is where most forensic work takes place. This centre is a union of two forensic establishments, the Forensic Science Investigations Institute, and Main Office of Forensic Expertise. This centre provides training in many different expertises (e.g. forensic chemistry, DNA and immunologic analysis) including classical skeletal identification

and positive identification with computed tomography and radiography. Several postgraduate courses are offered every year for forensic professionals in different forensic institutions (e.g. Altay State Medical University in Barnaul, Izhevsk State Medical Academy, and Moscow Medical Academy). It seems that Russian forensic pathologists are trained in general tasks related to conducting forensic anthropology.

Italy

Currently, the Institute of Legal Medicine in Milan, perform approximately 800 autopsies each year from the Milan area. From this region, average 50 cases, per year require an anthropological or odontological assessment used to provide a biological profile and positive identification. About five cases each year require the presence of a forensic anthropologist at the crime scene (Cattaneo, 2009). The need for estimation of post-mortem interval and ancestry of recovered skeletal remains has also emerged in some cases (Cattaneo & Baccino, 2002). However the training system is quite poor since only the University of Milan offers postgraduate and Master courses in Forensic Anthropology, while some universities include modules of Forensic Anthropology in other forensic courses (Cattaneo, 2009) or they are limited in a few workshops (Cunha & Cattaneo, 2007). One of us (RRP), recently (2006) provided such a workshop at the University of Rome, "La Sapienza" campus. The workshop focused on histological examination of bone and only anthropology faculty and students attended the workshop.

Research activity has increased over the years with several papers on sex and stature estimation (Introna *et al.*, 1993a,b; Di Vella *et al.*, 1994; Introna *et al.*, 1997; Campobasso *et al.*, 1998; Introna *et al.*, 1998; Cameriere *et al.*, 2005; 2006; Gualdi-Russo, 2007; Benazzi *et al.*, 2008; Cattaneo *et al.*, 2010a,b). Still, the implication of forensic anthropologists in medico-legal routine is limited. Most forensic anthropology cases are handled by pathologists who hold some experience on the examination of skeletal remains (Rome, Bari, and Milan), with a few exceptions in which biologists and physical anthropologists

are brought abroad (Bari, Bologna) (Cunha & Cattaneo, 2006). One of us (RRP) has consulted on several skeletal cases from Rome, Italy.

Spain

The modern period of forensic anthropology in Spain is marked by the foundation of the Laboratory of Forensic Anthropology and Paleopathology in the Madrid Legal Medicine School (Reverte, 1991, in Prieto, 2008). The first book in Spanish entitled Forensic Anthropology introduced the current techniques used in the United States to forensic professionals, and anthropological skills were required from forensic pathologists in order to practice. In 2006 the "*Asociación Española de Antropología y Odontología Forenses*" (AEAOF) was founded in Madrid and in 2008 the first congress took place in the Universidad Camilo José Cela (Madrid). Currently AEAOF counts 39 members including 10 forensic anthropologists (Tab. 3).

Lately, some laboratories were incorporated in routine forensic cases in order to assist in the identification of skeletal remains. Currently, there are nine such laboratories in Spain. They handle about 200 cases each year. Forensic pathologists continue to handle skeletal remains but anthropological reports are supplementary to their forensic assessments (Prieto, 2008). Furthermore, the teaching of anthropology in Spain now forms part of the forensic medicine training and is also offered in universities as undergraduate and postgraduate courses, master's and Ph.D. degrees (e.g. University of Complutense, Madrid, and University of Granada).

Research in forensic anthropology is limited due to the lack of reference collections. Much of the ongoing activity takes places in institutions affiliated with forensic medicine departments. Some recent contributions are listed here (Trancho *et al.*, 1997; Safont *et al.*, 2000; Barrio *et al.*, 2006; Rissech & Malgosa, 2007; Ríos *et al.*, 2008; Rissech *et al.*, 2008; Piga *et al.*, 2009). Unfortunately, state grants that fund forensic medicine or forensic anthropology are also quite limited, impeding significantly the development of the discipline.

Portugal

Anthropological cases are normally handled by forensic scientists working out of the Forensic Medicine Institutions located in the cities of Coimbra, Lisbon, and Oporto (Cunha & Pinheiro, 2007).

Even though forensic anthropology did exist early on (1903-1927), the establishment of the discipline in its current form did not take place until 1990 with the foundation of the National Institution of Legal Medicine (NILM). NILM is an autonomous administrative entity that answers directly to the Ministry of Justice and resulted from the fusion of three autonomous forensic institutes of Coimbra, Lisbon, and Oporto (Cunha & Pinheiro, 2007). Despite the fact that no department of anthropology officially exists in the NILM, all cases concerning decomposed and skeletal remains are undertaken by anthropologists that collaborate with the Forensic Pathology Department housed at one of these three locations (Cunha & Pinheiro, 2007). Anthropologists are also called at times by regional forensic units (medico-legal offices) in cases that require their assistance. With a total mortality rate of 105,000 individuals per year, the number of cases that require anthropological assessment were 30 during 2004. As in the USA, only a forensic pathologist can legally sign a death certificate. In these situations the anthropological report supplements the findings by the forensic pathologist. If asked, anthropologists do provide testimony in court (Cunha, personal communication).

Recently, there seems to have been an increase in forensic anthropology research activity (De Mendonça, 2000; Hugo, 2006; Rissech *et al.*, 2006; Cardoso & Saunders, 2008; Cameriere *et al.*, 2009; Cardoso, 2009; Codinha, 2009; Cordeiro *et al.*, 2009; Rougé-Maillart *et al.*, 2009). Associated with this is an increase in the establishment of postgraduate courses at universities (Coimbra and Lisboa). The involvement of forensic anthropologists in crime scene investigation is also more frequent. Rural case work appears to be handled by medical personal who often are not trained in anthropological skills (Pinheiro, personal communication).

Balkan Peninsula

The Balkan area has constantly suffered political instability, wars and catastrophes that have negatively affected the living conditions of the people and the development of the region for centuries. The recent wars in Croatia-Serbia, Bosnia-Herzegovina and Kosovo are examples of the region's instability, which resulted in numerous war victims including citizens and soldiers of the neighbouring countries. Executions, mass burials of civilians along with military personnel and a large number of missing persons are common characteristics in all war conflicts of the Balkan region (Šlaus *et al.*, 2007). Obviously, the need for identification of the victims and repatriation has emerged. In some countries like Croatia special teams were formed (commission of imprisoned and missing individuals) to proceed with the identification of the skeletal remains exhumed from such mass burials. More specifically, forensic anthropologists of the Croatian Academy of Sciences and Arts and the Department of Forensic Sciences in Zagreb together with US experts collaborated to carry out the identification process (Šlaus *et al.*, 2007).

The pressing demand for identification has brought many professionals to this region to contribute their expertise in handling mass grave excavation and human identification. This resulted in the formation of multidisciplinary teams from many parts of the world cooperating with the local authorities in the identification of the remains. Since there is a lack of ante-mortem records the identification process requires anthropological techniques. The recovered skeletal remains from the Balkan area have provided a considerable amount of information on the skeletal characteristics of the local populations. Existing databases have now been enhanced with the addition of skeletal data from these collections. Research focused on craniofacial characteristics of different ethnic groups (Ross, 2004), postcranial elements for sex (Šlaus *et al.*, 2003; Šlaus & Tomičić, 2005) and stature estimation (Ross & Konigsberg, 2002; Petrovecki *et al.*, 2007; Jantz *et al.*, 2008). Forensic anthropology

methods were applied successfully in a large number of cases (Brkić *et al.*, 2004; Šlaus *et al.*, 2007). Much of the Balkan region seems to lack osteometric data for the local populations. Some research has been presented on various occasions to the meetings of the Balkan Academy of Forensic Sciences, which indicates a potential initial step towards the development of a localized discipline of forensic anthropology.

Turkey

In Turkey, distinguished pioneers in physical anthropology, such as Sevket A. Kansu and Muzaffer S. Senyürek, focused on the skeletal biology of the historic and prehistoric inhabitants of Anatolia (Güleç & İşcan, 1994). The development of forensic medicine created the need for anthropological contribution to case-work especially in establishing biological profiles and positive identification. The need for forensic anthropology is acknowledged in the aid of medico-legal cases. As a result, Turkish professionals have adopted techniques developed in Europe and America (Güleç & İşcan, 1994). The foundation of the *Adli Tıp Dergisi* (Turkish Journal of Forensic Sciences) in 1985 has brought together many forensic professionals and increased the interaction between traditional anthropologists and osteologists and forensic pathologists. Around the same time (1988) forensic anthropology was officially introduced to the Department of Forensic Medicine of the Institute of Legal Medicine and Forensic Sciences of Istanbul University with the incorporation of forensic osteology courses to the existing master's and PhD programs (Güleç & İşcan, 1994).

In the following years the interest in the field increased significantly, with a large number of scientific contributions to international journals (Cöloğlu *et al.*, 1998; Yavuz *et al.*, 1998; Günay & Altinkök, 2000; Ozaslan *et al.*, 2003; Ozden *et al.*, 2005; Pelin *et al.*, 2005; Uysal *et al.*, 2005; Celbis & Agritmis, 2006; Sağır, 2006; Büken *et al.*, 2007; Akansel *et al.*, 2008; Hatipoğlu *et al.*, 2008). Today, research programs are under way in the Institute of Forensic Medicine in Istanbul and the Department of Physical Anthropology

in Ankara to include the collection of data on modern Turks (Güleç & İşcan, 1994). A number of research projects dealing for example with the development of age and sex determination standards for the Turkish population and other aspects of forensic anthropology are in progress. In addition, this field has attracted several graduate students (from medicine, biology and archaeology) who are seeking careers in forensic anthropology. However, accreditation remains an issue since the potential forensic anthropologists rely on individual training or the limited workshops organized in Turkey without any official professional association, as seen in the majority of the non-U.S. countries.

Greece

The history of anthropology in Greece is described in detail by Agelarakis (1995) in his article entitled as "*An Anthology of Greeks involved in the field of Physical Anthropology*".

The initiative point for the development of forensic anthropology in Greece occurred with the opening of a forensic anthropology laboratory, in the Department of Forensic Medicine and Toxicology of the University of Athens. The foundation of the laboratory dates to 1999, and it has been operating since then. The laboratory is able to deal with mass disasters, forensic and archaeological cases, possesses the equipment for maceration and examination of skeletal material (*e.g.* stereomicroscope) and undertakes the training of graduate and postgraduate students in forensic anthropology as well as training forensic pathology residents (Moraitis, personal communication).

A positive step towards the development of Forensic Anthropology in Greece was the formation of the Athens osteological collection. This collection was completed in 2003 (Eliopoulos *et al.*, 2007). It has been used in several FA studies (Fox *et al.*, 2003; Manolis *et al.*, 2009). Around the same time authorization was given to the Department of Forensic Sciences of the University of Crete to analyze a certain number of skeletons from two cemeteries in Heraklion, Crete, forming the Cretan osteological collection

(Kranioti, 2009). The Department of Forensic Sciences in Crete has been using this collection to develop sex estimation methods for biological profiling (Kranioti *et al.*, 2008; Steyn & İşcan, 2008; Kranioti, 2009; Kranioti *et al.*, 2009a,b; Kranioti & Michalodimitrakis, 2009).

Academic training is entirely absent. No training opportunities exist for postgraduate students in the form of a Master's degree while PhDs are offered only in a few universities (*e.g.* University of Crete) at the moment. Most of the physical anthropologists are biologists trained outside the country. They are bioarchaeologist who mostly deal with archaeological material. The medico-legal system does not involve anthropologists in investigation since osteological examination. This work is considered within the duties of the forensic pathologist (Michalodimitrakis *et al.*, 2007; Vougiouklakis, 2008). An exception to the general rule is the training system in the Department of Forensic Sciences in Crete which has a long collaboration with expert forensic anthropologists and odontologists from Turkey. They are involved training residents (Michalodimitrakis *et al.*, 2007) and participation in research (İşcan *et al.*, 2007).

Cyprus

Cyprus is slow in the development of Forensic Medicine research and applied work. In fact, until the end of the 1980s, examination and analysis of forensic criminal cases were undertaken by foreign experts brought in especially for this purpose (mainly from Greece and the UK) (Vanezis, 2008). The increasing number of criminal cases related to tourist deaths, as well as the need for identifying approximately 1680 cases of missing people from both the Greek Cypriot and Turkish Cypriot communities found in a number of accidentally discovered mass burials, has reinforced the cry for a more systematic approach towards identifying the dead. As a result the Cypriot government established a national service of forensic experts and equipped laboratories (Vanezis, 2008).

The lack of specialized expertise in forensic anthropology as well as human osteoarchaeology lies in the fact that the study of human remains

from Cyprus has never been the primary focus of any archaeological work undertaken on the island. A long standing issue of the related to identifying 1619 missing persons from the 1974 war has focused the need for forensic work in the country. As a result of this specific problem, the Committee on Missing Persons (CPM), a tripartite inter-communal committee which operates under the auspices of the United Nations was formed. The group is comprised of one representative from the following: Greek Cypriot community, Turkish Cypriot community and the International Committee of the Red Cross (ICRC). Forensic Anthropology in Cyprus revolves mainly around DNA analysis undertaken by the DNA Identification Laboratory, part of the Cyprus Institute of Neurology and Genetics (Nicosia). This lab has been in operation since 1990. Although still very new, the forensic laboratory is a very promising research centre with numerous international publications (Cariolou *et al.*, 1998; Bashiardes *et al.*, 2001; Cariolou *et al.*, 2006).

The limiting prospects of developing forensic anthropology research and case work in Cyprus is reinforced by the absence of university departments in this field.

Discussion

The interdisciplinary efforts to resolve the problems related to sorting out remains from mass disasters, war crimes and other death scene events has provided work and research opportunities for European forensic anthropologists. Still, in the majority of the European countries forensic anthropology case work and research is carried out by forensic pathologists. Some of this work is done by individuals with only a Master's degree in physical anthropology or forensic archaeology. In other cases archaeologists or osteoarchaeologists with no forensic anthropology background are asked by law enforcement to undertake forensic work. It appears that physical anthropologists (with Ph.D.'s) and specifically trained in forensic case work are still rare in some European

locations. When they are available it appears they are underutilized by law enforcement.

The work done in the United Kingdom might be the exception to this. Postgraduate courses related to forensic anthropology are more common while in other countries (e.g. Denmark, Finland, France, Greece) there is a lack of postgraduate offering. This point may be a key to how forensic anthropology is and will be used in Europe.

A more common situation dealing with forensic anthropology in case work and in educational training appears in countries like Spain, Hungary and Portugal. Here there are some postgraduate courses which combine a focus on both physical and forensic anthropology (e.g. University of Granada, Complutense University of Madrid, University of Coimbra)

As a result of the need for forensic anthropology experts in Europe, European scientists working on death scene case decided to form the Forensic Anthropology Society in Europe (FASE) in September 2003. FASE is an official subdivision of the International Academy of Legal Medicine. Its aim consists of bringing together anthropologists, forensic pathologists, odontologists, geneticists and other experts in the fields of forensic medicine and forensic science in the scientific and academic promotion and development of the discipline of forensic anthropology across Europe. Its main objectives, are "*to encourage the study of, to promote the practice of, to establish and enhance the standards for forensic anthropology and to promote training and create a board of trained professionals*" (Cattaneo & Baccino, 2002).

In its first three years, FASE had nearly 50 members. Currently there are approximately 100 members (Cunha, personal communication). The FASE organization promoted forensic workshops, intensive courses and conferences which were used to educate and to attract scientists to the organization. Distinguished forensic anthropologists from the USA such as Ubelaker and Symes have helped in this effort. In doing so, they have collaborated with experienced forensic professionals from Europe. These individuals

have undertaken intensive training courses in forensic anthropology in several topics from basic identification methods up to specific methods of trauma analysis and cremated remains. Thus far, 6 workshops were organised by the FASE in several European countries (Germany, Hungary, Spain, UK and Portugal). According to the FASE board the group attendance has been growing with each workshop offered.

In some countries the significance of adding an anthropologist to the forensic team is well recognised. Still, it remains a difficult task to establish permanent positions in the academic and state forensic departments for forensic anthropologists especially in locations that employ medical doctors (e.g. Portugal). Economical problems are also a limiting factor (e.g. Germany).

A lack of an accreditation system for the forensic anthropologist in Europe is an issue of concern. This is certainly a difficult task especially due to the differences in the academic and medicolegal systems among European countries. In some countries for instance, a crime has no legal implications after 15 years (e.g. Greece, Portugal) while in others it has even after 70 years or forever (e.g. Netherlands) (Cunha & Cattaneo, 2007).

In Europe a Ph.D. degree in anthropology follows a different system in each country; in some cases the students can obtain the degree in less than 3 years without publishing in international peer-reviewed journals (e.g. Balkan countries, France, U.K. while in other cases they need minimum 4 publications (e.g. Scandinavian countries) in ISI journals. Further, 3 years of experience in a small department can result in very few cases concerning skeletal remains while in a larger forensic centre or in humanitarian mission for the recovery of human remains from mass graves this period could account for hundreds of cases. Obviously, building up an accreditation system with restrictions is a difficult task and it is constantly discussed at several FASE meetings. At this point no clear solutions have emerged so the Society has focused on increasing their numbers and to improve the quality of training opportunities of forensic anthropology.

Conclusion

Literature and research in FA is growing significantly across Europe; training opportunities are available in some academic institutions located in several European countries (Tab. 3). However, in the vast majority of the European countries the task of forensic anthropology falls still within the forensic pathologists duties (Tab. 3). It will take work to convince the authorities to add anthropologists as part of the death scene investigation unit. It appears that Europe is struggling to follow the US achievements in forensic anthropology; however the lack of harmonisation of the legal and training systems among the different countries constitutes a severe obstacle in reaching a goal of accreditation. The formation of FASE and the organisation of international training activities is encouraging, yet the future of the forensic anthropology discipline relies on the development of a unified accreditation system applied throughout Europe. As a result of the lack of any accreditation system in Europe, we know of eleven forensic anthropologists that have turned to the USA system of accreditation and FS membership. These scientists' have joined the American Academy of Forensic Sciences organization in order to show they are able to perform case work with appropriate standards of conduct and ability. This may not necessarily be the ideal solution, but until there is a means for standardization among the European forensic community, we encourage European forensic scientists to view this as an excellent option.

Acknowledgements

EFK would like to thank all listed forensic experts who kindly provided information and references on the legal system and the current status of forensic medicine and anthropology and archaeology in their countries: Eric Baccino, Sue Black, Diane Bolsch, Cristina Cattaneo, Margaret Cox, Eugenia Cunha, Henrik Druid, René Gabert, Reza Gerretzen, Per Holck, Wolfgang Huckenbeck, Mehmet Yaşar İçsan, Xenia-Paula Kyriakou, George Maat, Manolis Michalodimitrakis, Niels Lynnerup, Kostantinos

Moraitis, João Pibneiro, Jose Prieto, Torleiv Ole Rognum, Friedrich W. Rösing, Fernando Serrulla Rech, Peter Vanezis and Theodoros Vougiouklakis. We would also like to thank Megan Murphy and Markus Bastir; they provided editorial comments for this manuscript.

Info on the web

www.aafs.org/
agfad.uni-muenster.de/german/start.htm

www.bildidentifikation.de/
www.forensicartist.com/IACI/index.html

www.gfanet.de/node/10
www.inis.gov.ie/en/JELR/Pages/State_Pathologist's_Office

www.swganth.org
agfad.uni-muenster.de/german/start.htm

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