

# Forensic Medicine in Germany

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## Introduction

The Federal Republic of Germany has about 82 million inhabitants living on an area of 357.092 km<sup>2</sup>. According to the constitution the Federal Republic consists of 16 federal states with own governments and in part own legislation (table 1, fig. 1). While most laws, especially criminal and civil law, are regulated nationwide some parts of the legislation regarding sanitary law fall into the competence of the federal states (e. g. law of the disposal of the dead). Therefore the 16 German federal states have somewhat different laws concerning areas of medico-legal interest, e. g. disposal of the dead, external examination, death certificates etc.

*Table 1 Federal States of Germany*

Country	Area	Inhabitants total no.	Inhabitants/km <sup>2</sup>	Institutes of Forensic Medicine	
	km <sup>2</sup>	1.000	number	University	Other
<b>Reference date</b>	<b>31.12.2005</b>				
<b>Baden-Württemberg</b>	35.751,65	10.736	300	4	
<b>Bayern</b>	70.551,57	12.469	177	3	
<b>Berlin</b>	891,85	3.395	3.807	1	1
<b>Brandenburg</b>	29.478,61	2.559	87	0	1
<b>Bremen</b>	404,28	663	1.641	0	1
<b>Hamburg</b>	755,16	1.744	2.309	1	
<b>Hessen</b>	21.114,79	6.092	289	2	
<b>Mecklenburg-Vorpommern</b>	23.180,14	1.707	74	2	
<b>Niedersachsen</b>	47.624,20	7.994	168	2	
<b>Nordrhein-Westfalen</b>	34.085,29	18.058	530	5	2
<b>Rheinland-Pfalz</b>	19.853,36	4.059	204	1	
<b>Saarland</b>	2.568,70	1.050	409	1	
<b>Sachsen</b>	18.415,51	4.274	232	2	
<b>Sachsen-Anhalt</b>	20.446,31	2.470	121	2	
<b>Schleswig-Holstein</b>	15.799,38	2.833	179	1	
<b>Thüringen</b>	16.172,10	2.335	144	1	
<b>Germany</b>	<b>357.092,90</b>	82.438	231	28	5



**Fig. 1** States of the Federal Republic of Germany

Regarding the area the greatest federal state is Bavaria, the smallest Bremen (table 1). Regarding inhabitants, the greatest country is North-Rhine-Westphalia, the smallest again Bremen. Table 1 gives also the number of institutes of forensic medicine per country.

Most routine case-work in forensic medicine is carried out today by the university institutes of forensic medicine. Since Brandenburg and Bremen do not have universities with medical faculties,

they do not have a university institute of forensic medicine but a municipal or state institute respectively.

Most other countries have at least one university institute. However, in comparison to e. g. Finland the number of university institutes is low (for instance in North-Rhine-Westphalia). Finland has with 5.3 million inhabitants as many university institutes as North-Rhine-Westphalia with 18 millions.

From the data in table 1 it becomes evident that one university institute is responsible for appr. 2-3 million inhabitants.

## History of forensic medicine in Germany

The Constitutio Criminalis Carolina from 1532 is often addressed as the time of birth of forensic medicine since in this criminal law and code of criminal procedure medical experts are mentioned for the first time. They should investigate cases of posttraumatic death, when the causality between

injury and death was obscure or cases of medical malpractice. Already in the 17<sup>th</sup> century books on legal medicine were published by professors lecturing at universities in Middle Germany, e. g. Johannes Bohn (20.7.1640 – 19.2.1718) in Leipzig. He published, influenced by Paolo Zacchias, two major books on forensic medicine (*De renuntiatione vulnerum, seu vulnerum lethaliu[m] examen, Leipzig 1689; De officio medici duplici, clinici nimirum ac forensis, Leipzig 1704*). Another early work on forensic medicine in Germany was the book of Gottfried Welsch *Rationale vulnerum lethaliu[m] iudicium*, published in Leipzig in 1684. Beside Bohn Gottfried Welsch (1618-1690) and Paul Ammann (1634-1691) were also teaching in Leipzig and the Leipzig medical faculty was very important for the development of forensic medicine at that time.

Welsch was the first recommending already in the first edition of his book *Rationale vulnerum lethaliu[m] iudicium* (1660) forensic autopsies, even if no signs of external violence were visible. Especially in cases of intoxication forensic autopsies should be carried out. Autopsies should be performed by examined doctors with experience in postmortem dissection. However, after this first bloom of forensic medicine in the 17<sup>th</sup> century it took some time before own professorships or even institutes of forensic medicine were founded. In the 19<sup>th</sup> century at most universities forensic medicine was taught by professors who were mainly responsible for another medical discipline. For instance at the University of Bonn (founded 1818) either gynaecologists or pharmacologists were teaching forensic medicine. The German surgeon Theodor Billroth (1826-1894) for instance wrote in a book on teaching and learning medicine in German-speaking universities (1876) that there is no need to teach forensic medicine at universities since it is not a science on its own but rather a compilation of other independent sciences and the knowledge of these sciences is just used for practical purposes, e.g. judicial questions. This reproach of Billroth is not only wrong but also long living. Resistance against independent institutes of forensic medicine was rendered by pathologists, in Prussia by Rudolf Virchow, in Austria by Carl von Rokitansky and professors of other clinical disciplines who feared to loose case material for their own routine casework.

In Berlin a professorship of forensic medicine was installed in 1820, however, the institute of forensic medicine (Unterrichtsanstalt für Staat-sarzneikunde) was founded as late as 1886. Most institutes of forensic medicine were founded between 1911 and 1930 and 1960 to 1980 due to teaching necessities (table 2). In 1924 forensic medicine became a compulsory discipline in medical exams. This was the real breakthrough since institutes

**Table 2** *Founding of Professorships / Institutes of Forensic Medicine*

<b>Place</b>	<b>Professorship</b>	<b>Institute</b>	<b>Closed, merged, professorship not occupied</b>
Wien	1805	1818	
Prag	1807	1820	
Berlin (F. W. University)	1820	1886	closed 2005
Bern	1855	1927	
Graz	1863	1863	
Kiel	1867	1889	merged with Lübeck 2005,
Innsbruck	1869	1893	
Breslau	1887	1908	
Greifswald	1888	1924	professorship not occupied 2005
Basel	1890	1925	
München	1890	1907	
Königsberg	1891	1905	
Zürich	1895	1906	
Leipzig	1897	1900	
Würzburg	1897	1926	
Halle	1901	1928	
Bonn	1901	1922	
Marburg	1902	1922	closed 1999
Göttingen	1904	1904	
Jena	1907	1919	
Erlangen	1912	1912	
Hamburg	1919	1942	
Münster	1924	1925	
Düsseldorf	1925	1925	
Heidelberg	1927	1927	
Frankfurt	1927	1927	
Köln	1957	1936	
Mainz	1946	1946	
Berlin (F. U.)	1949	1949	
Freiburg	1954	1954	
Rostock	1958	1958	
Dresden	1964	1964	
Gießen	1964	1964	
Tübingen	1964	1964	
Salzburg	1967	1967	
Aachen	1968	1969	closed 2003
Homburg	1968	1968	
St. Gallen	1969	1969	
Lübeck	1971	1971	merged with Kiel,
Magdeburg	1971	1972	
Essen	1972	1972	
Erfurt	1974	1978	closed 1993
Hannover	1977	1977	
Ulm	1980	1980	

had to be founded for teaching and the professors for forensic medicine had the opportunity to carry out own research.

In the 19<sup>th</sup> century the medico-legal autopsies were mainly performed by district medical officers. In the different German states (e. g. Prussia, Bavaria) standard procedures for autopsies were developed and published; in Prussia the clinical pathologist Rudolf Virchow (1821-1901) wrote a book on autopsy technique with a special regard to medico-legal practice (“Die Sektions-Technik im Leichenhause des Charité-Krankenhauses mit besonderer Rücksicht auf gerichtsarztliche Praxis”). The autopsy stipulations had several regulations on who had to perform an autopsy, which instruments had to be available, how the autopsy had to be performed, what had to be taken into account at the autopsy of newborns etc. The autopsy regulations in the German countries were reformed from time to time and are an early attempt to standardize medico-legal autopsies and to allow quality control.

The autopsy reports were reviewed by appropriate boards. Even in the 19<sup>th</sup> century medico-legal autopsies in Prussia had to be performed by two doctors. According to paragraph 87 of the code of criminal procedure medico-legal autopsies have to be performed by two doctors, one of them has to be the head of an institute of forensic medicine or a deputy with medico-legal experience. In times of the 3<sup>rd</sup> Reich (1933-1945) most forensic pathologists were influenced by and involved in National Socialism, one was even involved in war crimes. After the Second World War several professors lost their chairs and had to leave university. The history of forensic medicine during the Nazi period has recently been addressed in detail.

## **German Society of Forensic Medicine**

The German Society of Legal Medicine was founded 1904 in Breslau by a motion from Professor Puppe (Königsberg). Already in the early 19<sup>th</sup> century federal associations for Staatsarzneikunde were founded, e. g. the association of Badische Medical Officers or the foundation of the Association for Staatsarzneikunde in the Kingdom of Saxony (table 3). These local federal associations already had own journals.

In 1822 the association of “Deutsche Naturforscher und Ärzte” (“German Naturalists and Physicians”) was founded in Leipzig on a national basis. Legal medicine became the 25<sup>th</sup> section of the Society of German Naturalists and Physicians and this remained its status until 1904. The German Society of Legal Medicine was founded at the meeting in Breslau. The founding committee comprised the professors Ipsen (Innsbruck), Kratter (Graz),

**Table 3**

<b>Historical development of forensic medicine in Germany</b>	
1532	Constitutio Criminalis Carolina Expert evidence and expert witness mentioned
1835	Association of Badische Medical Offices for the advancement of Staatsarzneikunde
1840	Association for Staatsarzneikunde in the kingdom Saxony
1868	Foundation of the section "Official Health Service and Staatsarzneikunde" of the Society of German Naturalists and Doctors (Dresden)
1886	Foundation of an independent section "Forensic Medicine" of the Society of German Naturalists and Doctors (Berlin)
1904	Decision to found the German Society of Forensic Medicine (Breslau)
1924	Forensic Medicine belongs to the compulsory disciplines in examination
1956	Specialist in Forensic Medicine (GDR)
1968	Change of the discipline's name from Gerichtsmedizin to Rechtsmedizin
1976	Specialist in Forensic Medicine (FRG)

Lesser (Breslau), Puppe (Königsberg), Strassmann (Berlin) and Ungar (Bonn). The Societies aim should be to "build a centre for mutual scientific work and to contribute to the personal association of the subject comrades". The statutes of the new founded Society were passed by the assembly at the first meeting of the German Society of Forensic Medicine in Meran at 2 pm on 25<sup>th</sup> September 1905. The founding members addressed a note to their "dear colleagues" at the first meeting in Meran: "The purpose of this Society should be to create a focus of joined scientific studies and to contribute to a personal association of specialists....The German Society of Forensic Medicine should be a centre for all those who are keenly interested in this science that is so extremely important for the public good." As first president of the Society the Berlin professor and head of the "Unterrichtsanstalt für Staatsarzneikunde" Fritz Strassmann (1858 – 1940) was elected. Since 1905 the annual meetings of the German Society of Forensic Medicine are always held in September, in 2007 the 86<sup>th</sup> annual meeting. The meetings were interrupted by the First and Second World War. After the First World War the next meeting was held in 1920 and after the Second World War the next meeting took place in 1951 in Berlin. Since the colleagues from Austria and Switzerland, although being organized in own national societies, visit and contribute very much to the scientific meetings of the German Society of Forensic Medicine, every third meeting is held either in Switzerland or in Austria. Today the president of the German Society of Forensic Medicine is elected for three years, the congress president is usually elected

two years prior to his congress to have enough time for preparation. The homepage of the Society can be found at: <http://www.dgrm.de/>.

The Society has several working groups, one of the most important and efficient being the working group responsible for stain analysis. This working group organises the annual DNA blind trial (GEDNAP) and has contributed much to statements of the DNA-commission of the International Society for Forensic Genetics. There are also other working groups of the Society (forensic gerontology, forensic psychopathology, blood stain pattern analysis, forensic paediatric pathology) which are, however, not as active as the working group on stains.

While the annual meeting of the German Society of Forensic Medicine is always held in autumn there are regional meetings in spring. Currently there are three regional areas: northern Germany, southern Germany together with Austria and parts of Switzerland and the upper Rhine area. While the meetings of the northern German area have already the character of national congresses, the meetings of the upper Rhine area have a more familiar character.

Sister societies of the German Society of Legal Medicine which also work on areas of medico legal interest are the *Deutsche Gesellschaft für Verkehrsmedizin (German Society for Traffic Medicine)* which was founded 50 years ago (1957) and the *Gesellschaft für Toxikologische und Forensische Chemie (Society for toxicological and forensic Chemistry)*. Together with the German Society of Legal Medicine the other two societies publish important recommendations concerning the field of alcohol, drugs and traffic safety. Both, the German Society of Traffic Medicine ([http://www.med.uni-heidelberg.de/rechtmed/rmed-vm/vm\\_start.htm](http://www.med.uni-heidelberg.de/rechtmed/rmed-vm/vm_start.htm)) and the Society for Toxicological and Forensic Chemistry (<http://www.gtfc.org/>) have their scientific meetings every two years.

## **Main scientists**

A lot of personalities in the field of forensic medicine in the last 150 years have contributed remarkably to the progress of forensic medicine either in doctrine, science or structure. Biographies of nearly all full professors of forensic medicine in Germany until 1996 can be found in the monograph of Mallach and in the book on the 100<sup>th</sup> anniversary of the German Society of Legal Medicine. However, in this article only a few scientists can be mentioned who's life and career was more or less symptomatic for their contemporaries.

### **Johann Ludwig Casper (1796-1864)**

One of the most remarkable experts in forensic medicine in the 19<sup>th</sup> century was Johann Ludwig Casper (fig. 2), the founder of modern forensic medicine in Prussia. He was born in Berlin in 1796 and died there in 1864. Casper studied medicine in Berlin, Göttingen and Halle and became medical doctor in 1819. Already in 1824 he got his postdoctoral lecture qualification for pathology and judicial medicine. After his graduation he studied private and state institutions for public health in England and France for one year. Already in 1825 he was appointed private council and member of the Royal Medical Council of Brandenburg. From 1834 on he was senior private council of medicine and member of the scientific deputation for health care.



*Fig. 2 Johann Ludwig Casper (1796-1864)*

In 1839 he was appointed professor and medico-legal officer for Berlin. In 1850 he was appointed director of the Institute of Forensic Medicine, at that time called “Unterrichtsanstalt für Staatsarzneikunde”. Casper published more than 170 papers, at the beginning of his career also on medical statistics. He published on mortality and life expectancy with regard to different countries, sex and business. The mean life expectancy at his time was e. g. in England 38.5 years, in Russia only 21.3 years. The mean life expectancy for theologians was 65.1 years, for medical doctors only 50.8 years. In 1852 Casper founded the quarterly journal of forensic and public medicine, in 1857 the first edition of his practical handbook of forensic medicine was published. His practical handbook was revolutionary since its content was based on own observations. His motto was: “Non hypotheses condo, non opiones vendito, quod vidi scripsi”. His practical handbook was edited in 8 editions. Casper also published an atlas of forensic medicine.

### **Emil Ungar (1849-1934)**

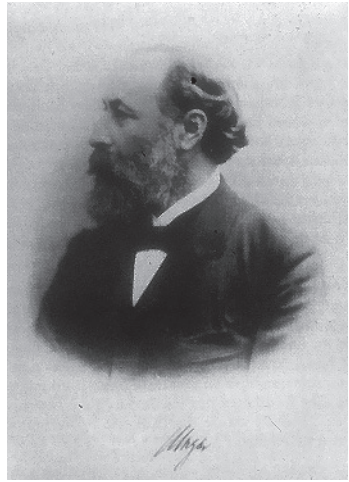
The life and academic career of Emil Ungar (fig. 3) may be symptomatic for others who served as medical officers and taught forensic medicine at universities in an era before university departments were founded. Emil Ungar was born in Bonn in September 1849 where he started to study medicine in 1868. After two terms in Würzburg he obtained the doctor degree in

Bonn in 1874. In the same year he published his first scientific paper and was awarded a price by the medical faculty. In 1875 he got the license as a physician for the German Empire, 3 years later he received the licence as a forensic physician and in 1880 he was appointed district medical officer for the district of Bonn. In 1882 he applied for postdoctoral lecture qualification in the subjects Staatsarzneikunde and internal medicine and presented two papers:

“Could the lungs of neonates after breathing get atelectatic again?” and

“About the importance of the Leydens crystals for the understanding of bronchial asthma”. His inaugural lecture dealt with the subject “About the developing importance of forensic medicine”.

In 1885 he was nominated associate professor of forensic medicine. In addition to his position as associate professor of forensic medicine he was also the head of the clinic of paediatrics at the university hospital. He made substantial contributions to the establishment and expansion of the clinic of paediatrics. In forensic medicine Ungar mostly worked in the field of so-called life tests of neonates (lung test). In 1920 he was appointed full professor at the university of Bonn, however, he never had an own institute. A few months later he retired. His successor was the first full professor of forensic medicine with an own institute. Ungar died in 1934 after a short period of illness at the age of 84. In 1888 he presented an impressive and important paper on the state of forensic medicine in German universities which is still worth reading today.



**Fig. 3** *Emil Ungar*  
(1849-1934)

### **Fritz Strassmann (1858-1940)**

Fritz Strassmann (fig. 4) was born in 1858 in Berlin. He studied medicine in Berlin, Heidelberg and Leipzig and finished his studies in 1879. In 1880 he received the licence as physician. After a first position at the university hospital of internal medicine he started to work in pathology in 1883. In 1884 he definitely turned to forensic medicine and received his training at the institute of Staatsarzneikunde in his hometown Berlin. In 1889 he got the postdoctoral lecture qualification for Staatsarzneikunde, his inaugural lecture was about cadvaveric phenomena of bodies found in water. After the



**Fig. 4** *Fritz Strassmann*  
(1858-1940)

death of his teacher Strassmann became the provisional head of the institute at the age of 33. In 1894 he was appointed professor. In 1895 his textbook of forensic medicine was published. In 1921 he was appointed full professor and held this position until his retirement in 1927/1928. Strassmann mainly concentrated his scientific research on toxicology and gynaecology as well as infanticide. Three of his pupils (Georg Puppe, Kurt Strauch and Paul Fraenckel) were appointed as university lecturers and associate professors or full professor of forensic medicine respectively. Together with his son George Strassmann, who had also specialised in forensic medicine, he published a second edition of his textbook in 1931. Fritz Strassmann was the first president of the German Society of Forensic Medicine. Fritz Strassmann was Jewish. His evening of life was clouded over by the death of his wife and the political circumstances and reprisals against Jewish people. He died on 1<sup>st</sup> January 1940, but in spite of his great merits there was no obituary in the newspapers. The institute of forensic medicine in Berlin at the Charité hospital was named after him Fritz Strassmann house.

#### **Berthold Mueller (1898-1976)**

Berthold Mueller was born in 1898 in Memel and studied medicine in Königsberg where he received his MD in 1922. He started his training in clinical pathology at the institute of pathology at the university of Königsberg in 1921. In 1925 he turned to forensic medicine, at first at the university of Königsberg, later in Greifswald. He habilitated in 1931 in Halle/Saale. His inaugural lecture was about alcohol delinquency and the present and future penal law from a medical legal point of view. After further positions in Munich he was appointed full professor of forensic medicine at the university of Göttingen in 1934. In 1937 he changed to Heidelberg and in 1941 to Königsberg. In 1938 he published together with Karl Walcher (director of the institute of forensic medicine in Würzburg) a textbook on legal and social medicine. In the foreword of the first edition, the authors state that they thought it was necessary "...to present a book to students and physicians, that brings the use of the national socialist pan-germanic Reich in

relation to the medical fields of the subject.” This book is in its legal parts full of Nazi phrases. Therefore Mueller had to wait after the Second World War until 1948 to be again appointed professor of forensic medicine at the university of Heidelberg. He published more than 150 scientific papers, many on shotgun wounds and drowning. In 1953 his famous textbook on forensic medicine was published; this was estimated to be the first reference work in German on forensic medicine since the last edition of the textbook of Hofmann/Haberda (1923). Mueller’s textbook, originally a one-author work, was published in a second edition – now as a multi-author textbook – in 1975. Mueller contributed very much to the scientific consolidation of forensic medicine in Germany after the Second World War.

### **Otto Prokop (born 1921)**

Prokop was born in 1921 in St. Pölten, Austria. He studied medicine in Vienna and Bonn where he completed also his MD thesis about homicide with animal hairs. His habilitation followed in 1953, also in Bonn as a pupil of Professor Herbert Elbel (1907-1986). Since 1948 he was assistant at the institute of forensic medicine at the university of Bonn. Already in Bonn he mainly worked in the field of serology and haemogenetics. In 1957 he was appointed professor and head of the department of forensic medicine at the Humboldt University in Berlin (East Germany). Together with his Berlin position he led the institutes of forensic medicine at the universities of Leipzig and of Halle for some years. Prokop played an eminent role for the high quality of forensic medicine in the GDR. His main working fields were beside classical forensic medicine especially serology and haemogenetics. He published more than 60 monographs and over 600 papers. Famous is his textbook on forensic medicine, published in the first edition in 1960 and in the third edition in 1976. He is honorary member of numerous medical societies and received the honorary doctor degree of several universities. 25 of his pupils qualified as lecturers of forensic medicine and were appointed professor.

### **Steffen Berg (born 1921)**

Steffen Berg was born in Düsseldorf in 1921 as the son of the professor of forensic medicine Carl Berg. He studied medicine and biology in Munich and was assistant at the institute of forensic medicine at the university of Munich from 1946 to 1950. Afterwards he worked at the Bavarian state office of criminal investigation. In 1964 he habilitated at the university of Munich and was appointed professor of forensic medicine at the university of Göttingen in 1966. Berg made very valuable contributions to the field of wound age es-

timation, thanatology, anthropology and archaeology. He published a student textbook of forensic medicine which was published in 12 editions between 1950 and 1980. Other important monographs were on sex crimes (1963) and unexpected death in clinic and practice. Together with archaeologists he published a book on archaeology and death, archaeology and forensic medicine. He also edited a book series “Working methods of medical and natural scientific criminalistics” together with Schmidt-Römhild Publisher. Furthermore he was the medical editor of the archive of criminology, also published by Schmidt-Römhild Publisher. It was at his institute in Göttingen where his pupil Wolfgang Bonte (1939-2000) performed his internationally renowned investigations on congeners of alcoholic beverages.

Several more names could of course be addressed. A biography and hints on main working areas of most German professors of forensic medicine can be found in the monograph of Mallach and the commemorative publication of the 100<sup>th</sup> Anniversary of the German Society of Legal Medicine.

## Journals

The main German journals in forensic medicine are *Rechtsmedizin* (Legal Medicine), *Archiv für Kriminologie* (Archive of Criminology) and *Blutalkohol* (Blood Alcohol, Alcohol, Drugs and Traffic Safety). The Journal Legal Medicine is also the official organ of the German Society of Forensic Medicine. The predecessor of this Journal was already launched in 1852 by Johann Ludwig Casper as *Vierteljahresschrift für Gerichtliche und öffentliche Medizin* (Quarterly Journal for Legal and Public Medicine). This Journal ceased publication in 1921. In continuation the German Journal for Comprehensive Legal Medicine (*Deutsche Zeitschrift für die gesamte gerichtliche Medizin*) was founded. A special section subtitled “Referate” was established in 1928 summarizing the recent literature. The name of the Journal changed several times in accordance with the name of the German Society of Legal Medicine. Since 1990 the Journal is called *Rechtsmedizin* (Legal Medicine). Most articles in this journal are published in German but it is possible – as in the former Journal of Legal Medicine – to submit English papers as well. The Journal covers the whole field of forensic medicine from thanatology, pathology, haemogenetics, toxicology over medical malpractice to medical law. Since a few years the journal contains a separate section on continuous medical education (CME). Another special section is a review of recent legislation. In the last years the abstracts of the annual meetings of the German Society of Forensic Medicine have been published in Legal Medicine and several special issues devoted to one topic have been edited. Since 1990 the former Journal of Legal Medicine

(*Zeitschrift für Rechtsmedizin*) has been continued as *International Journal of Legal Medicine*. Both, *Rechtsmedizin* and *International Journal of Legal Medicine* are published by Springer Publisher. The *International Journal* is also the official organ of the International Academy of Legal Medicine.

The Archive of Criminology was founded in 1898 as *Archiv für Kriminalanthropologie und Kriminalistik* (Archive of criminal anthropology and criminalistics), it is probably one of the oldest still existing scientific journals of its kind worldwide. In this journal mostly case reports on rare or interesting cases are published.

The Journal *Blutalkohol* (Blood Alcohol or Alcohol, Drugs and Traffic Safety respectively) is the official Journal of the German Society of Traffic Medicine. The Journal is edited by the Union against Alcohol and Drugs in Traffic. The Journal is not only distributed among specialists in forensic and traffic medicine but also among lawyers since it contains a great section with recent legislation concerning alcohol and drugs. Not only forensic scientists but also lawyers, some of the supreme court, publish in this journal.

In the GDR an own journal named *Kriminalistik und Forensische Wissenschaften* (Criminalistics and Forensic Sciences) was founded in 1967. The journal ceased publication in 1996 with issue 85.

In Austria the Vienna professor of forensic medicine Alexander Kolisko who held the chair of forensic medicine from 1898 until 1916 started publishing a periodical under the name *Beiträge zur Gerichtlichen Medizin* (Contributions to Forensic Medicine). By choosing this name Kolisko referred to a series of books founded by Joseph Bernd, one of his predecessors, who held the chair in forensic medicine in Vienna from 1830 to 1842. Bernd had already edited a series of books called *Beiträge zur Gerichtlichen Arzneikunde für Ärzte, Wundärzte und Rechtsgelehrte* (Contributions to Forensic Medicine for Physicians, Surgeons and Lawyers). This new series *Beiträge zur Gerichtlichen Medizin* was edited by the heads of the institute of forensic medicine in Vienna. Since 1968 the written versions of the papers presented at the annual meetings of the German Society of Forensic Medicine were published in the Contributions to Forensic Medicine. In 1992 the Journal ceased publication for financial reasons.

## **Textbooks on Legal Medicine**

Famous books were already published in the 17<sup>th</sup> century by the Leipzig professors Bohn, Ammann and Welsch. The titles of their books were in Latin (e. g. Bohn's textbook *De renuntiatione vulnerum seu vulnerum lethali*

*examen* or Ammann *Praxis vulnerum lethalium ex Decadibus Historiarum Rariorum, ud Plurimum Traumaticarum cum Cribationibus Singularibus Adornata*). Johannes Nicolaus Pfeizer, district medical officer in the Holy Imperial City of Nuremberg, is supposed to have written the first textbook on legal medicine in German. It was published as second edition in 1635 with the title *Vernünftiges Wundurteil, wie man Nämlich von allen Wunden des menschlichen Leibs gründlichen Bericht, ob solche gefährlich, tödlich oder nicht, vor Gericht und anderswo urteilen möge* (Reasonable judgement of wounds, how to give a thorough report on all wounds of the human body at court and elsewhere to classify them as dangerous, lethal or not).

Famous books at the beginning of the 19<sup>th</sup> century were published by professor Adolph Henke of Erlangen *Lehrbuch der Gerichtlichen Medizin* in 1812 and Johann Ludwig Mende *Ausführliches Handbuch der Gerichtlichen Medizin*. A new kind of book mainly based on personal experience was the textbook of Johann Ludwig Casper *Praktisches Handbuch der Gerichtlichen Medizin* (Practical Textbook of Legal Medicine) with its first edition in 1857. Casper's textbook was later edited by his nephew and successor Karl Liman. The book had two volumes and Casper published an atlas of forensic medicine as well. A 9<sup>th</sup> edition of Casper's textbook was edited by R. Schmidtman as a three volume *Handbuch Gerichtliche Medizin. 9. Auflage des Casper-Liman'schen Handbuchs*, Berlin 1905. In 1895 Fritz Strassmann the first president of the German Society of Legal medicine and professor of forensic medicine at the University of Berlin published his own textbook on legal medicine. A second edition was edited together with his son Georg Strassmann in 1931.

One of the worldwide leading textbooks was that of Eduard von Hofmann. His *Lehrbuch der Gerichtlichen Medizin* (Textbook of Legal Medicine) was edited in a first edition in 1878, the last edition was edited by his pupil Albin Haberda in 1923. In 1898 E. von Hofmann published also an Atlas of Forensic Medicine (*Atlas der Gerichtlichen Medizin*) with several drawings by the painter A. Schmitson.

In the 20<sup>th</sup> century several textbooks on the specialist as well as student level were published. Just a few shall be mentioned.

In 1950 the professor of forensic medicine in Münster Albert Ponsold published the first edition of his *Lehrbuch der Gerichtlichen Medizin* which run trough three editions (third edition 1967). The textbook of Ponsold became famous due to its didactically impressive drawings which were copied in several textbooks worldwide. In 1953 the professor of forensic medicine in Heidelberg Berthold Mueller published the first edition of his

textbook *Gerichtliche Medizin*, a second edition as a two-volume textbook, now written by numerous authors, was published in 1975.

A further leading textbook was edited by Otto Prokop called *Forensische Medizin*. The third edition was edited by Prokop and Göhler in 1975.

The leading students' textbooks for many years was the Compendium of Legal Medicine (*Grundriss der Rechtsmedizin*) by Professor Steffen Berg in Göttingen. This book was published in a first edition in 1950, the 12<sup>th</sup> edition was published in 1984. Another students' textbook running through several editions was *Rechtsmedizin*, edited by Professor Wolfgang Schwerd from Würzburg.

At the beginning of the 21<sup>st</sup> century several new textbooks both on a specialist and student level have been edited. The two-volume *Handbuch Gerichtliche Medizin* (Handbook of Forensic Medicine) was edited 2003 and 2004 by Brinkmann and Madea. This handbook is a continuation of Muellers two-volume *Gerichtliche Medizin*, edited in a second edition 1975. Also published by Springer Publisher is *Praxis Rechtsmedizin* (Practice of Forensic Medicine) edited 2003 in a first and 2007 in a second edition by B. Madea. A small students' textbook *Basiswissen Rechtsmedizin* (Basics of Forensic Medicine) has just been published also by Springer, written by B. Madea and R. Dettmeyer.

Beside textbooks on the topic on specialist or student level the publisher Schmidt-Römhild in Lübeck is editing two series of monographs dedicated to the field of forensic medicine. One is the *Arbeitsmethoden der Medizinischen und Naturwissenschaftlichen Kriminalistik* (Methods of Medical and Natural Scientific Criminalistics). More than 20 volumes of this series have meanwhile been published. The titles are often the leading books in the field, devoted to different topics (shot range determination, ballistics, estimation of the time since death, wound age estimation etc.). Another series is *Research in Legal Medicine* with over 30 volumes. The present book is part of this series.

## **Education**

### **Undergraduate teaching**

Forensic medicine is a compulsory discipline in undergraduate teaching for medical students. Contents of undergraduate teaching are thanatology (external examination of a body, autopsy legislation, transplantation, identification), traumatology and violent death (criminology, traumatomechanism, vital reactions and wound age estimation, mechanical injuries, sharp

force injuries, asphyxiation, thermal injuries, electrical injuries, starvation, infanticide, abortion, autoerotic death), sudden and unexpected natural death in adults and children, clinical forensic medicine (rape, self inflicted wounds, sexual abuse of children, bodily damage, age estimation in livings), forensic psychiatry, toxicology, traffic medicine (alcohol, drugs and traffic safety, diseases and suitability for driving, traffic injuries), forensic haemogenetics, medical law and insurance medicine.

The content of the discipline is taught either as a lecture, in seminars and especially in small groups concerning external examination of a body. Beside medical students most institutes are also lecturing at the faculty of law. The undergraduate teaching of law students is comparable to that of medical students. Additionally special parts of the discipline (e. g. toxicology) are lectured at other faculties (e. g. toxicology for students of natural sciences).

Medical students as well as students of natural sciences (biologists, biochemists, chemists) can prepare their doctoral thesis at institutes of forensic medicine. The practical laboratory work in natural sciences takes mainly 3-4 years before the thesis can be completed.

### **Postgraduate studies**

Postgraduate specialisation in forensic medicine takes at least five years (60 months) according to the teaching regulations of the medical chambers. From these 60 months 6 have to be spent in clinical pathology, 6 in psychiatry or forensic psychiatry. 6 further months can be spent either in pathology or public health, pharmacology, toxicology or psychiatry. 3.5 years have to be spent in forensic medicine. According to the regulations of the medical councils at least 400 complete external examinations of bodies with detailed description have to be carried out. 25 crime scene investigations have to be done. At least 300 forensic autopsies have to be performed with special emphasize on the relation between morphological findings and traumatomechanism. Furthermore 2000 histological investigations are mandatory. In 200 cases an oral or written report for court has to be prepared. In at least 10 cases stains have to be analysed. Additionally 25 forensic osteological and odontological investigations are necessary. When a postgraduate trainee has completed his further education an examination will be carried out at the local medical council by two experts in forensic medicine and one physician of the medical chamber. The oral exam lasts at least half an hour, before the physician of the medical chamber and the board of examiners examine the written reports the candidate has to present at the examination.

Toxicologists can qualify also at institutes of forensic medicine as forensic toxicologists according to the regulations of the Gesellschaft für Toxikologische und Forensische Chemie (GTFCh) (Society of Forensic and Toxicological Chemistry).

## Present situation

At the present time most routine casework in forensic medicine is carried out by the university institutes of forensic medicine (table 4). For the practical and scientific evolution of forensic medicine it was necessary that the practical work was done in the institutes to overcome the unnatural and scientifically counterproductive separation of teaching and routine casework. Currently there are 28 university institutes of forensic medicine in Germany with about 350 academics. There are 6 state or municipal institutes with about 40-50 employed academics, however, 2 institutes have only 1 full-time academic. Additionally there are four private institutes working mainly in the field of haemogenetics (paternity testing, stains).

**Table 4**

<b>Working fields for specialists in forensic medicine (according to information of the German Society of Forensic Medicine Supplement to Vol. 52, July 2003)</b>		
Working fields	Number	Academics working in the Institutes
University Institutes	28	appr. 350
State or municipal Institutes*	6	40-50
Private Institutes**	4	
Doctors working at court (in Bavaria only, just specialists in forensic medicine counted)	appr. 12	
Working in own praxis	appr. 5	

\* two institutes with only one fulltime academic

\*\* working fields are mainly hemogenetics (paternity testing)

In Bavaria some doctors are attached to a court; they have to do the routine casework for prosecution and court. They may be specialised either as psychiatrist or in forensic medicine. In the latter case they perform forensic autopsies as well. Meanwhile about 5-6 doctors who had been trained at university institutes are working in their own private practice.

At the university departments the whole spectrum of routine casework in forensic medicine is carried out (table 5) comprising

- forensic autopsies,
- clinical forensic medicine,
- forensic toxicology,
- drugs and driving,
- clinical toxicology,
- blood alcohol determinations,
- forensic haemogenetics (paternity testing, stains).

**Table 5**

<b>Competence fields for specialists in forensic medicine</b>
Investigation at the scene of crime <sup>a</sup>
External examination
External examination before cremation <sup>b</sup>
Estimation of the time since death <sup>a</sup>
Identification <sup>a</sup>
Forensic anthropology <sup>b</sup>
Legal autopsies <sup>a</sup>
Clinical forensic medicine especially the examination of injuries in living <sup>b</sup>
Analysis for alcohol and drugs <sup>b</sup>
Forensic toxicology <sup>a</sup>
Clinical toxicology <sup>b</sup>
Expert opinion on the ability to drive <sup>a</sup>
Expert opinion on the suitability for driving <sup>b</sup>
Expert evidence on legal responsibilities <sup>b</sup>
Haemogenetic <sup>b</sup> <ul style="list-style-type: none"> <li>● Paternity diagnostics</li> <li>● Stain analysis</li> </ul>
Coroners autopsies <sup>b</sup>
Expert opinions in court <sup>b</sup>

<sup>a</sup> Services just offered by forensic medicine, <sup>b</sup> Services concentrated in forensic medicine

The autopsy rate in Germany has decreased over the years. Today only in 5% of all deaths an autopsy is performed, 2% are forensic autopsies, 3% clinical autopsies. The autopsy rate varies between the institutes. A few institutes have high autopsy rates with about 2000 autopsies per year, other institutes have only 200 forensic autopsies per year. These different autopsy rates are based on several reasons, one being the area for which an institute of forensic medicine is responsible. Furthermore the public prosecutor is free in his decision to order an autopsy.

In the institutes of forensic medicine not only the postmortem toxicology samples are investigated, but some institutes are also performing clinical toxicological investigations for their own university hospital and surrounding hospitals. Most institutes are performing furthermore blood alcohol determinations and toxicological investigations on blood samples concerning driving under the influence. Blood alcohol determinations and toxicological investigation concerning driving under the influence may account for a few thousand investigations per institute per year.

Only a few German universities have own independent chairs of forensic psychiatry (f.i. Berlin, Essen, Munich, Tuebingen). In cases of homicide or other criminal offences mostly forensic psychiatrists give evidence regarding the criminal responsibility.

In cases of alcohol or drug intoxication, however, mostly specialists in forensic medicine have to assess the criminal responsibility of the accused.

Concerning the field of forensic odontology most institutes of forensic medicine engage odontologists qualified in this field on a case-by-case basis.

The aspect of quality assurance has gained relevance in all routine areas of forensic medicine. In addition to internal quality assurance the participation in external proficiency testing exercises is mandatory for all laboratory investigations in forensic medicine. Most institutes of forensic medicine have started accreditation according to ISO DIN 17025 for forensic purposes, several institutes are already accredited in the whole width of the discipline (forensic medicine, forensic toxicology, forensic haemogenetics).

Most of the 16 German federal states dispose of specialized police laboratories for routine casework on stains, especially in cases of mass testing. Additionally these laboratories carry out further analyses as shot range determination, trace analysis after arson, determination of drug contents etc.

At regional state level as well as at federal level DNA databases are established by these police laboratories.

Partly the stain analyses are also carried out by the institutes of forensic medicine. The data are registered and compared to the DNA database at the responsible police laboratory.

## **Financing**

The university institutes are financed by the Ministries of Education. Therefore the university institutes of forensic medicine get their money by the universities. Institutes which take part in clinical treatment (e. g. clinical toxicology) get additional money from the university hospitals.

The work for police, prosecution and court is paid either directly to the university hospital or to the institute, however, the fees do not cover the costs. This is mainly due to a special law (JVEG) in which the fees for expert evidence are regulated nationwide. Other institutes (municipal institutes, federal state institutes) are either financed by the Ministry of the Interior or Health.

Since most medico-legal services are carried out by the university institutes of forensic medicine and due to the underfinancing of the universities there are at the present moment attempts to delete forensic medicine as an independent university discipline or to abandon it completely from medical faculties. Forensic Medicine is criticised as an academic discipline mainly for two reasons:

- to be insufficient as an academic discipline and
- not to contribute anything to our current medical knowledge.

Parameters for scientific insufficiency are criteria like impact factors and research funds. However, these criteria are of course no hard criteria since external funds do not say very much about the quality of research and different disciplines have of course different suppositions to receive external funds. Due to the applied character of research in forensic medicine publications or scientific reports are restricted to journals in the field with a low or even no impact factor.

However, in the present situation these bogus criteria are used to abandon forensic medicine from the medical faculties in order to use the money spent for forensic medicine for other disciplines.

In Germany in the last years several institutes of forensic medicine have been closed, among them the oldest one in Berlin (fig. 5). In some of the German federal states the responsible ministers of science have installed structure commissions which should give recommendations to the Ministry regarding the further evolution of the medical faculties. In most German federal states the recommendations of these commissions regarding forensic medicine was that forensic medicine is not necessary at each university for research purposes. However, this view based on an insufficient reception of tasks of forensic medicine in daily casework and research. The areas of research of forensic medicine (f.i. estimation of postmortem interval, postmortem changes, wound age estimation, haemogenetics, postmortem toxicology etc.) are not familiar to clinicians and even scientific studies on the highest level are of interest only to professionals working in this particular field.



**Fig. 5** *Institute of forensic medicine at the Charité, formerly Humboldt-University Berlin. Built from 1884 to 1886, closed 2005*

In a system like Germany where forensic medicine is financed by the ministries of education high quality of research is an essential supposition to survive as academic discipline.

However, in the future – as in other European countries – other ministries (justice, interior) should also contribute to the financing of forensic medicine. Otherwise the high standard of medicolegal service, teaching, research and especially the efficient working of the legal system can not be guaranteed.

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