

1 History of Forensic Medicine – a brief introduction

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Definitions

According to Sydney Smith (1951) forensic medicine may be defined briefly as consisting essentially of that body of medical and paramedical scientific knowledge which may be used for the purposes of administration of the law.

Alfred Swaine Taylor has defined medical jurisprudence as “that science, which teaches the application of every branch of medical knowledge to the purpose of the law.” According to a German definition by Schmidtman, the last editor of the famous Handbook of Forensic Medicine of Johann Ludwig Casper, forensic medicine is a cross sectional discipline of medicine and natural sciences dealing with all medical evidence that is relevant for law. It deals with medical evidence not only in practice but also in research and furthermore all legal essentials in health care especially for doctors are part of teaching, training and research.

Apart from forensic pathology being the essential branch in the development of forensic medicine, in the last 40 years clinical forensic medicine has developed as an own field of expertise. Clinical forensic medicine is that discipline of medicine, which involves an interaction between law, judiciary and police dealing generally with living persons.

There is of course no special date at which forensic medicine emerged as a recognisable separate scientific discipline. Several steps in the development of forensic medicine can be distinguished (table 1): at a first step the use of medical knowledge for legal and public purposes, secondly the compulsory medical testimony for the guidance of judges in special cases and thirdly the professionalisation as an own discipline.

Characteristic topics which are dealt with in forensic medicine are summarised in table 2. Forensic medicine as a speciality how we experience it at the beginning of the 21st century developed since the 19th century. Of course, forensic medicine has much older roots. Often the famous criminal code of Emperor Charles V, the *Constitutio Criminalis Carolina*, promulgated in 1532, was called a landmark of the first importance in the history of legal medicine (fig. 1).

P. Brittain wrote: “It has commonly been considered as the true start of legal medicine, and hence Germany has been hailed as the country which gave birth to the discipline. It has been said that it caused medical men to be called in legal matters for the first time. This is not strictly true. They had been called on before as earlier enactments show. Without in any way minimising the advance the Carolina represented, it would be wrong to consider it as a phenomenon which occurred without logical antecedents, and as implying the legal medicine arose by a kind of spontaneous generation.”



Fig. 1: Constitutio Criminalis Carolina (criminal code of Emperor Charles V.)

Indeed the Bamberg Criminal Code was a model for the *Constitutio Criminalis Carolina*. However, there are roots on the relationship between medicine and law dating back much earlier. These roots can be found in the studies of nature, violation of law and its relation to medicine (injuries, violent death, pregnancy, stillbirth, rape, poisoning), the need of experts to assist the law or a court, defining the constitution of forensic medicine as a scientific discipline with the publication of monographs, subjects of special instructions and own research (table 3).

Tab. 1 Development of Forensic Medicine

Step 1

Medical knowledge is used for legal or public purposes

dependent on point of achievement both in law and medicine

- knowledge of medical plants, botany
- knowledge of injuries
- educational standards in medicine
- standards of competency
- legislation concerning disposal of the dead
- legislation concerning injuries
- compensation for injuries and deaths

Step 2

Expert medical testimony must be obtained for the guidance of judges in cases of murder, wounding, poisoning, hanging, drowning, infanticide, abortion, malpractice.

Step 3

Further professionalisation:

- medicolegal examination
 - giving evidence at court / medical expertise required at court
 - publication of monographs
 - teaching
 - systematic research (decrease of the domain of magic and sorcery)
 - knowledge gained by own practice replaces textbook knowledge (J. L. Casper)
 - foundation of professorships
 - foundation of own institutes
 - foundation of societies.
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The development and existence of a speciality of forensic medicine depends essentially on two factors: on a sufficiently high development of the law and on a sufficiently high development of medicine. As Ackerknecht has outlined, in very highly developed civilisations with sophisticated legal regulations there is no evidence that judges consult medical persons in assessing crime. On the other hand, despite high development of a rational medical art, no document exists that provides evidence for the use of medical experts in ancient Greece.

Tab. 2 History of characteristic topics in Forensic Medicine (E. Fischer-Homberger)

Responsibility

- age
- gender
- mental diseases, melancholia
- simulation
- disease or malice

Sexuality and reproduction

- marriage, family
- impotence, infertility
- virginity
- conception and pregnancy
- duration of pregnancy
- superfoetatio
- abortion
- infanticide
 - “hydrostatic tests” of lungs
- rape

Injuries and violent deaths

- injuries
 - prognosis of injuries and their locations
 - lethality of wounds, grades of lethality
 - relative fatality of wounds in different parts of the body
- suffocation
- poisoning

Role of medicine for the public

- specialised medical profession
 - educational standards
 - standards of competency
 - ethical standards
 - malpractice
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Tab. 3 History of Forensic Medicine – Time Table
(according to Payne-James, Bonte and Smith)

3000 BC	China	Writings about pharmacology, pharmacognosy
220 BC	China	Bamboo with information on the rules and regulations for the examination of injuries
2200 BC	Babylon	Codex Hammurabi rights and duties of physicians including medical malpractice
10 BC	India	Law of Manu competence of witnesses at court
	Egypt	Detailed laws concerning the medical profession, forensic medical investigation, stab wounds were categorized, closed head injuries with head fractures were described
	Persia	Official code for medical fees, penalties for medical malpractice, classification of injuries, abortion classified as crime
	Greece	autopsies on human bodies were not permitted, use of physicians as expert witnesses was loose and ill defined
449 BC	Rome	Lex duodecimo tabularum length of gestation (for the determination of legitimacy), disposal of the dead, poisoning, punishment depending on the degree of injury
460 – 355 BC	Hippocrates of Kos	Lethality of wounds, Hippocratic oath as basis of medical ethics
384 – 322 BC	Aristoteles	Soul enters the body 40 days after conception
ancient Rome	Numa Pompilius	Advocated cutting open the bodies of pregnant women after death to deliver the baby (Caesarian section)
572 BC	Lex Aquillia	Lethality of wounds, “novus actus intervenium”, break in causation
138 – 78 BC	Lex Cornelia (sulla)	If a physician had caused the death of his patient he should be exiled or executed, prostitution and confinements supervised
100 – 44 BC	Gaius Julius Caesar	His body was examined after murder by the physician Antistius who discovered 23 stab wounds and declared only one to be fatal.
23 – 79 BC	Plinius the Elder	Complaints that laws punishing incompetent or ignorant physicians were missing, drowning
131 – 200	Galen	Dealt with gladiators and their wounds, anatomic features, differences between neonates and adults lungs, stillbirths: Rubra, gravis, densa substantia carnis pulmonum, Alba, Levis, rara substantia carnis pulmonum in livebirths
483 – 565	Justinian	Digest “physician are not ordinary witnesses, but give judgement rather testimony” (Medici non sunt proprie testes sed maius est iudicium quam testimonium), proofs of pregnancy, sterility, hermaphrodism, simulation of diseases

Tab. 3 (cont.) History of Forensic Medicine – Time Table

5 th – 10 th century	Leges barbarorum Lex Euricianus Lex Visigothorum Lex Burgun- dionum Pactus Legis salicae Pactus Legis riduarie Edictus rothari Pactus Legis alla manorum	Goths, Visigoths, Vandals, when medical experts have to be called, “Wergeld” (blood money) had to be paid to the victim by the perpetrator or to relatives of the decedents, description of wounds
742 – 814	Charlemagne	Capitularies: expert medical testimony required in cases of wounding, abortion, rape, incest, infanticide, suicide
1140	Roger II of Sicily Frederic II	Physicians required to have an examination prior to commencing their practice Public examination of physicians, strict criteria for medical practice, versed in the teaching of Hippocrates and Galen, requirements for ordination as a doctor, at least 21 years of age, be legitimately born, have studied logic for three years, have studied medicine for five years, served a year of apprenticeship, on qualification had to swear an oath, - had to treat the poor free - visit each of his patients twice by day and once by night as required A human body should be dissected in public once every five years
1100	Assizes of Jerusalem Godfrey de Bouillon	In cases of alleged illness or murder three experts were sent
1209	Pope Innocent III	Appointment of physicians to the courts
1234	Pope Gregory IX	Compilatio decretalium: collection of all decisions and edicts related to medicolegal matters
1507		Bamberg penal code, medical evidence necessary in certain cases

Tab. 3 (cont.) History of Forensic Medicine – Time Table

1532	Charles V	Constitutio criminalis Carolina, legal medicine originated as an own speciality, requirement of a medical opinion in cases of murder, wounding, poisoning, hanging, drowning, infanticide, abortion
1575	Ambroise Pare (1510-1590)	Book on medicolegal reports, death from lightning, ante- vs. postmortem injuries, - poisoning by carbon-monoxide
1597	Giovanni Battista Codronchi (1547-1628)	Methodus testificandi
1602	Fortunatus Fidelis (1550-1630)	De relationibus medicorum
	Paulus Zacchia (1584-1659)	Quaestiones medicolegales

Civilizations of the Near East and China

Of course forensic medicine developed in relation to law and it was often legal requirements which pushed forward improvements in forensic medicine. Forensic medicine as a scientific discipline developed, when the domain of magic and sorcery was overcome. The early literate civilizations of the Near East and China had definite systems of law relating not only to crime but also to property, marriage and other civil matters. For instance in Egypt practice of medicine was subject to legal restrictions. The right to practice was restricted to members of a certain class with the intention that physicians had to study the precepts laid down by their predecessors in certain ancient books (Smith 1951). Since physicians strictly had to adhere to the knowledge of ancient books, experiments and originality were not incurred; instead, witchcraft, magic and sorcery became dominant. As a result good treatment was characterised by observing the authoritative “canon”, with the result that bad treatment or even malpractice originated from not properly observing the authoritative “canon”.

In China at the beginning of the 14th Century a noteworthy volume entitled “*Hsi Yüan Lu (The washing away of wrongs)*” was compiled on the procedure to be followed in investigating deaths, especially those under suspicious or obviously criminal circumstances. Sydney Smith who has studied a comparatively modern edition (1843) of this book describes his impression as follows: “ *I have not seen a translation of a really ancient copy of this book, but even from a comparatively modern edition (1843) one*

certainly gets the impression that there was a comprehensiveness in the scope of medicolegal procedure in ancient China that was not to be found in mediaeval Europe. The importance of a satisfactory examination of the wounds on a body is stressed, among other reasons, in order to check the validity of a confession or other statement. The sites where wounding is likely to prove mortal are indicated. The preparations necessary for the examination of a body are described, and the examiner is warned not to be deterred by the unpleasant state of the corpse, but to make a systematic examination from the head downwards in every case. The difficulties caused by decomposition are clearly recognized, and the examiner is advised on the subject of counterfeited wounds. Sections are devoted to wounds caused by different agencies, such as blows from the fist or kicking, by various types of weapon, etc.; and to asphyxial deaths – f.i. by strangulation and drowning. The possibility of homicidal strangulation being passed off as suicide is discussed, also the means for distinguishing between the bodies of drowned persons and those thrown in after death. The possible confusion between ante-mortem and post-mortem burning is recognized, and poisoning is given considerable attention. The examiner is advised on the possible importance of examining the locus, and is warned that at an inquest nothing should be regarded as unimportant. . . . Altogether it is a remarkable document, and, although some of the methods and tests described are fantastic, there is no doubt that the real nature of the problems involved was clearly appreciated. As I have suggested, it is unfortunate that I cannot with certainty sort out the genuinely ancient from the more modern interpolations, but I am left with the conviction that in mediaeval times Chinese forensic medicine was far in advance of contemporary European practice.” (S. Smith, 1951)

Justinian enactments

The Justinian enactments between 529 and 564 represent according to Sydney Smith the highest point of achievement in the way of defined forensic medicine in the ancient world. Amongst many other things the Justinian Code provided guidelines for the regulation of the practice of medicine, surgery, and midwifery; for the proof of competence by means of examinations; for the classes of physicians that were to be recognised; for the limitation of the number of physicians in each town; and for the penalties to be imposed for malpractice. The Justinian laws clearly recognised and defined an integrated medical profession, with required educational standards and standards of competency, in a way that had never previously been achieved. The medical expert, defined as follows: “*Medici non sunt proprie testes, sed majus est judicium quam testimonium*” is not an ordinary witness, appearing for one side or for the other side, but he assists the judiciary by impartial interpretation. The Justinian Code enjoined the cooperation of medical experts in a broad field of legal problems, f. i. in the determination of the existence of pregnancy, in cases involving sterility or impotence or legitimacy, in cases of rape, in cases of poisoning, in cases involving the problem of survivorship, in cases which were complicated by the question of mental disease, and in other comparable circumstances (S. Smith, 1951). According to S. Smith the Justinian enactments represent the highest point of achievement in

forensic medicine in the ancient world. However, this highest point was achieved in the era of the decline and later dissolution of the Roman Empire.

Further development (Italian town charters)

Already in the 12th century physicians were used as experts in cases of alleged illness or injuries. In the so called Assizes of Jerusalem from 1100 it was determined, that if, because of alleged illness, a vassal could not appear before the lords court to plead his case, the lord must send to this man's house three office men to decide on the issue, a physician, an apothecary and a surgeon. In cases of murder these three experts were also sent, and they must say what is the matter with him (the body) and where he has been injured and with what instrument it seems to them that the injuries had been inflicted. Similar regulations existed at the same time in Antioch: knights could only excuse their non-attendance before the court when medical experts confirmed the alleged illness (Bonte).

Tab.4 Foundation of Universities

Parma	1066
Bologna	1119
Modena	1175
Perugia	1200
Padua	1222
Naples	1224
Siena	1240
Paris	1211
Montpellier	1289
Prague	1348
Heidelberg	1386
Cologne	1388
Leipzig	1409

The Italian town charters played an important role from the 11th to the 13th Century. Obviously the town charters were qualified with the help of the faculties of law of the newly established universities (table 4). F.i., in the town of Bologna Hugo de Lucca was appointed expert of the magistrate of the city. It is likely that he was the first to perform legal autopsies between 1266 and 1275. Most of the Italian town

charters determined that two experts, generally a physician and a surgeon, were responsible for postmortem examinations. An example for such an early report by medical experts is:

Bologna 1289

Master Albertus Maledova and Master Amoretus, physicians, who, on the injunction of Albertus of Gandino, judge, have seen and examined Jacobus Rustighelli in the Church of St. Catherine of Saracocia, wounded and dead, state in concordance, after having seen and examined, to have found the following:

in the thorax: seven deadly wounds
in the neck: one deadly wound
in the middle of the forehead: two deadly wounds
in the occiput: one deadly wound
in the upper jaw: one non-fatal wound

Sworn to be true on Saturday, February 12th

In Bologna, according to the town charter a medical expert must be at least 40 years of age and a citizen of Bologna for at least 10 years. The first documented legal autopsy report of Bologna was signed by Bartolomeo da Virignana in 1302. The right of performing an autopsy was given to medical faculties, f.i. the faculty of medicine of the University of Montpellier in 1374. As in Italy, in France and Germany forensic medicine developed with the foundation of universities and medical faculties. Medical faculties even discussed and criticised court decisions.

In 1478 the University of Cologne gave the following advice: *"It is useful and necessary that those who die unexpectedly – good forbid this but unfortunately it happens so often – are opened and dissected immediately in order to examine the organs and find the cause of death or the lethal disease."* The physicians knew the limitations of just an examination of a body, they were aware of their responsibility. Especially in the 17th Century it was recognized that autopsies are necessary to definitely clear the cause of death, even if no signs of external violence were visible. Gottfried Welsch (1618-1690) was the first recommending already in the first edition of his book *Rationale Vulnerum Lethalium Judicium* (1660) forensic autopsies, especially in cases of intoxications. Autopsies should be performed by examined doctors with experience in postmortem dissection.

Forensic medicine as a book science

The period from the late 16th to the 18st century was characterized by books published on forensic medicine (table 5). In 1575 Ambroise Paré (1510-1590) published a book which dealt with medicolegal reports in "Death from wounds or impotence or loss of any member". He discussed abortion, infanticide, death by lightning, hanging,

drowning, feigned diseases and the differentiation of ante- and postmortem wounds – all topics which belong still today to the field of forensic medicine. He dealt already with poisoning by carbon monoxide. An example of a report of Ambroise Paré on an abdominal wound resulting in abortion is as follows:

I, Ambroise Paré, have come on the order of the great Provost to the Rue St. Houbré, to the house of Mr. M., where I have found a lady called Margaret in bed with a high fever, convulsions, and haemorrhage from her natural parts, as consequence of a wound that she has received in the lower abdomen situated three fingers below the umbilicus, in the right part, which has penetrated into the cavity, wounded and penetrated the uterus. She has therefore delivered before term a male infant, dead, well formed in all its limbs, which infant has also received a wound in its head, penetrating into the substance of the brain. Therefore the above-mentioned lady will soon die. Certified this to be true in putting my signature, etc.

In 1597 Codronchius, a physician of Imola, published his *Methodus testificandi*, which was of great importance at his time. He dealt with wounds, poisoning and sexual matters and gave models of reports. Another opus magnum was the work by Fortunatus Fidelis of Palermo entitled *De relationibus medicorum* which was the first great systematic general treatise on legal medicine. In this systematic treatise he deals firstly with matters of public health, secondly with wounds, simulated diseases, medical errors, next with virginity, impotence, pregnancy, viability of the fetus and finally with life and death, mortality of wounds, suffocation, death by lightning and poisoning. The greatest work in this early period was the *Questiones medico legales* of Paolo Zacchia (1584-1659), the principal physician to Pope Innocence X. and Alexander VII. and an expert before the Rota Romana, the papal court of appeal (fig. 2). He published his monumental work between 1621 and 1635 at Rome with two additional books published at Amsterdam in 1666 (fig. 3). The books are divided into parts and these in turn into specific questions dealing with the following subjects: age, pregnancy, superfetation and moles, death during delivery, life-birth and legitimacy, similarity and dissimilarity of children to their parents, dementia and insanity, poison and poisoning, impotence, feigned diseases, the plague and contagion, miracles, virginity and rape, fasting, wounds, mutilation, the salubrity of the air, water and places. Thus by the end of the 16th century there was already a grown literature on this subject and the subject itself recognised as an entity. In the 17th and early 18th century it were mainly professors at universities in Mid-Germany (Leipzig, Halle) who contributed to the development of forensic medicine. In 1660 Welsch (1618-1690) (Leipzig) wrote a book on wounds, dealing with their vitality. 10 years later Ammann (1634-1691) (also from Leipzig) produced a manuscript dealing with false believes in forensic medicine and in 1690 a more important contribution, his treatise on fatal wounding. Johannes Bohn (1640-1718) of Leipzig in 1689 published his work named *De renunciatione vulnerum* which was of great importance at his time. It distinguished ante- and postmortem wounds and wounds deadly per se (*per se seu absolute lethalia*) from accidental factors (*ca accidenc lethalia*). He was in favour of complete medicolegal autopsies instead of wound inspection and described already procedures to be followed. According to



Fig. 2: Paolo Zacchia (1584-1659), called “Father of forensic medicine”

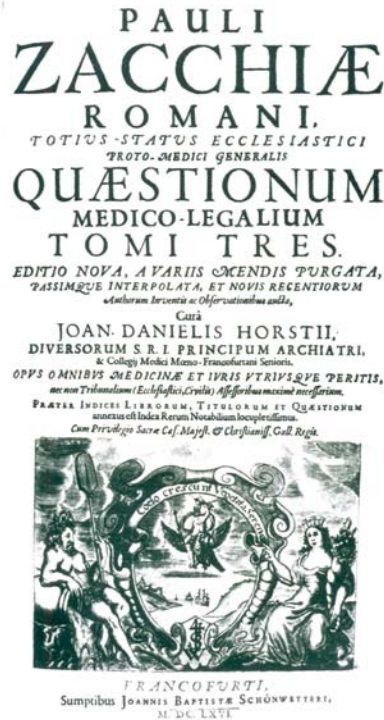


Fig. 3: Title cover of Paolo Zacchia’s book “Quæstiones medico-legales”

Bohn in Germany there was during the 18th century an almost uninterrupted production of treatises on legal medicine. However, in the 18th century forensic medicine was a “book science”. It was the 19th century during which this book knowledge was replaced by own experiences. Johann Ludwig Casper (1796 – 1864) worked for nearly 40 years in the area of forensic medicine in Berlin. He transformed forensic medicine into a useful speciality based upon practical experiences and personal observations. His classic textbook “Praktisches Handbuch der Gerichtlichen Medizin” (1856) was based on his extensive practical experience. Centres of legal medicine when becoming a modern science in the 19th century were located in Berlin, Vienna, Paris, Glasgow, Edinburgh and London.

Tab.5 Important books in the history of forensic medicine (17th to 18th century)

ALBERTI, Michael: *Systema jurisprudentiae medicae . . . cum praefatione CHRISTIANI THOMASII*, Halae: Orphanotropheu 1725 (I. Band); *Tomus alter* Schneebergae: Fulda 1729

AMMANNUS, Paulus: *Medicina critica*. Erfurti: Ohler; Hertz (Drucker) 1670. – *Praxis vulnerum lethaliū*. Francofurti: Gleditsch 1690

- BOHN, Johannes: De renunciatione vulnerum, seu vulnerum lethalium examen. Lipsiae: Gleditsch; Fleischer (Drucker) 1689. 2. Aufl. Amsterdam 1710.
- De officio medici duplici, clinici nimirum ac forensis. Lipsiae: Gleditsch 1704
- CARDANUS, Hieronymus: De venensis libri tres. In: Opera omnia, 10 t. Lugduni: Huguetan & Ravaud 1663, t. 7, S. 275-355
- CASTRO, Rodericus A.: Medicus-politicus. Sive de officiis medico-politicis tractatus. Hamburgi: Frobenius 1614
- CODRONCHIUS, Baptista: - De morbis veneficis ac veneficijs. Venetiis: De Franciscis 1595.
- Methodus testificandi. In: De vitiis vocis, libri duo. Francofurti: Wechel 1597, S. 148-232
- FAHNER, Johann Christoph: Vollständiges System der gerichtlichen Arzneykunde. Ein Handbuch für Richter und gerichtliche Ärzte. 2 Bde., Stendal: Franzen und Grosse 1795; 1797
- FIDELIS, Fortunatus: De relationibus medicorum libri quatuor, In quibus ea omnia, quae in forensibus, ac publicis causis, medici referre solent, plenissime traduntur. Hrsg. v. Paul AMMAN, Lipsiae: Tarnov 1674. (1. Ausg. Palermo 1602)
- FRANK, Johann Peter: System einer vollständigen medicinischen Polizey. 4 Bde.; Bd. I in 2. Aufl., Mannheim: Schwan 1784, Bde. 2 – 4 in 1. Aufl., Mannheim: Schwan 1780 – 1788; Bd. 5 Tübingen: Cotta 1813 (1. Auflage des I. Bandes 1779; ein Band 6 in 3 Abteilungen folgte Wien 1817 – 1819; Die Reihe der Supplementbände war erst 1827 abgeschlossen.
- HALLER, Albrecht von: Vorlesungen über die gerichtliche Arzneywissenschaft. Aus einer nachgelassenen lateinischen Handschrift übersetzt. 2 Bde., Bern: Neue typographische Gesellschaft 1782; 1784. (2. Band in 2 Teilen)
- MENDE, Ludwig Julius Caspar: Kurze Geschichte der gerichtlichen Medizin. In: Ausführliches Handbuch der gerichtlichen Medizin; 1. Teil, Leipzig: Dyk 1819, S. 1-474
- METZGER, Johann Daniel: Kurzgefasstes System der gerichtlichen Arzneywissenschaft. Königsberg/Leipzig: Hartung 1793
- PLATNER, Ernst: Untersuchungen über einige Hauptcapitel der gerichtlichen Arzney-Wissenschaft durch beigefügt zahlreiche Gutachten der Leipziger medicinischen facultät erläutert. Aus dem Lateinischen übers. u. hrsg. v. C.E. HEDRICH. Leipzig: Kupper 1820
- PLENK, Josephus Jacobus: Anfangsgründe der gerichtlichen Arzneywissenschaft und Wundarzneykunst. Aus dem Lat. übers. v. F. August von WASSERBERG. Wien: Gräffer 1782
- PLOUCQUET, Wilhelm Gottfried: Abhandlung über die gewaltsame Todesarten, nebst einem Anhang von dem geflissentlichen Missgebühren. Als ein Beytrag zu der medicinischen Rechtsgelahrtheit. Tübingen: Berger o.J.
- PYL, Johann Theodor (Hrsg.): Aufsätze und Beobachtungen aus der gerichtlichen Arzneywissenschaft. Sammlungen 1 – 8, Berlin: Mylius 1783-1793
- SUEVUS, Bernhardus: Tractatus de inspectione vulnerum lethalium et sanabilium praecipuarum partium corporis humani. Variis cum veterum, tum recentium medicorum observationibus, exemplis atque controversiis illustratus, non minus iurisconsultis quam medicis utilis atque necessarius. Marpurgi: Chemlin 1629

TEICHMEYERUS, Hermannus Fridericus: Institutiones medicinae legalis vel forensis. Ienae: Bielke 1723 (2. Auflage ebenda 1731)

WELSCH, Gottfried: Rationale vulnere lethali iudicium, in quo de vulnere lethali natura, et causis; legitima item eorundem inspectione, ac aliis circa hanc materiam scitu dignis juxta, quam necessariis, agitur. Lipsiae: Ritzsche 1660

ZACCHIAS, Paulus: Quaestiones medico-legales. In quibus eae materiae medicae, quae ad legales facultates videntur pertinere, proponuntur, pertractantur, resolvuntur. Opus, iurisperitis apprimè necessarium, medicis perutile, caeteris non injucundum. Et. tertia, Amstelaedami: Blaeu, 1651. (1. Ausg. Rom Bd. 1: 1621; Bd. 2: 1625; Bd. 3-4: 1628; Bd. 5: 1630; Bd. 6: 1634; Bd. 7: 1635.



Fig. 4: Mathieu-Joseph Bonaventura-Orfila (1786-1853)

Forensic medicine as an experimental science

France

According to Bertrand Ludes modern forensic medicine was borne in France during the French revolution with the closure of old universities and the creation of three

new faculties of medicine in Paris, Strasbourg and Montpellier. Medical studies were reorganized in 1794 and professorships of forensic medicine were established in the new faculties. F.i., in 1789 Francois Emanuele Fodéré (1764-1835) published his legislation enlightened by physical sciences, or treatises of forensic medicine in public health which represented the first French publication with forensic medicine in its title. Fodéré distinguished between civil forensic medicine, criminal forensic medicine, administrative forensic medicine or public health, and health and medicine policing. He held the chair of forensic medicine and public health in Strasbourg where he published in 1830 a new edition of this treatise. He defined forensic medicine as follows: "By forensic medicine one means the application of physical, natural and medical knowledge to the legislation of the people, the administering of justice, local government, the maintenance of public health." New horizons were opened for forensic medicine with the development of pathological anatomy and analytical toxicology which was promoted very much by Mathieu-Joseph Bonaventura-Orfila (1786-1853) (fig. 4). He was one of the most influential men in the development of scientific forensic medicine in France. As a born Spaniard Orfila was physician of Luis XVIII. and dean of the Paris faculty from 1830-1848. He published famous books f.i. his *Traité de Toxicologie* of 1813 or his *Leçons de Médecine Légale* 1823. He did experimental work both in toxicology and classical forensic medicine, f.i. on putrefaction and postmortem wounds. By 1840 Orfila was able to use a test that has almost reined a whole branch of crime: the arsenic test of J. Marsh (1795-1846) of 1836. According to Brouardel there was a dramatic decline of poisoning trials in the decade 1830-1840 due to the Marsh test. Orfila was not only a brilliant scientist and teacher but also a "courtroom star". Further famous forensic scientists were Alphonse Devergie (1798-1879) author of a monumental treatise in 1853, P.C.H. Brouardel (1837-1902) and Ambroise Auguste Tardieu (1818-1879), who was a pupil of Orfila and like his master a courtroom star. They no longer produced "treatises", but special monographs on particular issues such as hanging, abortion, poisoning, wounds etc. Tardieu wrote the first book on sexual abuse on children and on battered children. Subpleural haemorrhages are named after him. Brouardel held the chair of forensic medicine in Paris between 1879 and 1896 and also became dean of the faculty of medicine. In Lyon forensic medicine was developed by Alexandre Lacassagne (1843-1924), who hold the chair of forensic medicine in the faculty of medicine in Lyon for over 30 years (1880-1913).

Prussia

One of the most remarkable experts in forensic medicine in the 19th century was Johann Ludwig Casper (1796-1864) the founder of modern forensic medicine in Prussia (fig. 5). He was born in Berlin in 1796 and died there in 1864. Casper studied medicine in Berlin, Göttingen and Halle and became a medical doctor in 1819. Already at the age of 24 he received his postdoctoral lecture qualification for pathology and legal medicine. After his graduation he studied private and state institutions for public

health in England and France for one year. It was already in 1825 when he was appointed a private counsel and member of the Royal Medical Council of Brandenburg. From 1834 on he was senior private counsel of medicine and member of the scientific deputation for health care.



Fig. 5: Johann Ludwig Casper (1796-1864), founder of modern forensic medicine in Prussia

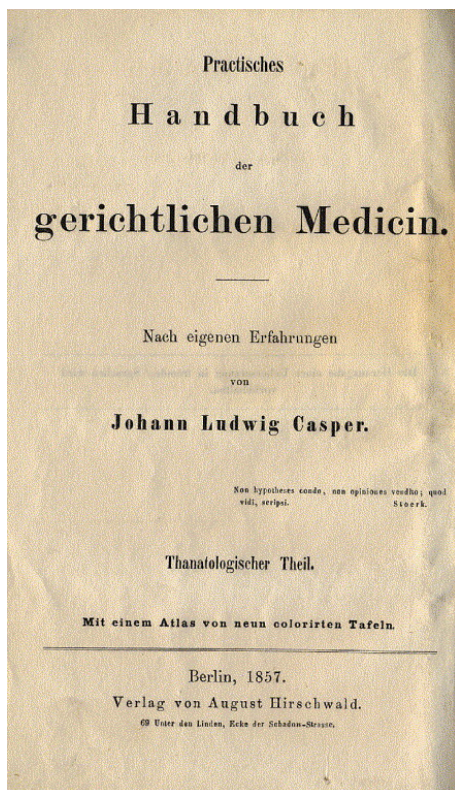


Fig. 6: Johann Ludwig Casper, Handbuch der Gerichtlichen Medizin (Handbook on Forensic Medicine), 1st Edition, published in 1857

In 1839 he was appointed professor and medicolegal officer for Berlin. In 1850 he was appointed director of the Institute of Forensic Medicine, at that time called "Unterrichtsanstalt für Staatsarzneykunde" (school for state medicine). Casper published more than 170 papers, at the beginning of his career also on medical statistics. He published on mortality and life expectancy with regards to different countries, gender and business. The mean life expectancy at this time was f.i. in England 38.5 years, in Russia only 21.3 years. The mean life expectancy for theologians was 65.1 years, for medical doctors 50.8 years only. In 1852 Casper founded the quarterly journal of forensic and public medicine and in 1857 the first edition of his practical handbook of forensic medicine was published (fig. 6). His practical handbook which was also translated into English was revolutionary since its content was based on own obser-

uations. His motto was: “Non hypotheses condo, non optiones vendito, quod vidi scripsi”! In the preface of his handbook he wrote:

“In this book as in all my lectures in the last thirty-six years I have striven especially against the prime failing of most authors on forensic medicine, viz., the separation of it from general medicine, and have endeavoured to purify it from all irrelevant rubbish, which has been so copiously accumulated in it by tradition, want of experience in forensic matters, and therefore ignorance of the proper relation which the medical jurist bears to the judge, as well as mistaken ideas as to the practical object of the science. ...”

“The correct appreciation of a simple dogma, which is unquestionably correct as it is to be unalterably maintained, leads of itself to the necessary reform in treating of juridical medicine. I mean the dogma that a medical jurist is – a *physician* – nothing more, nothing less, nothing else, and, as this simple dogma has been grossly misunderstood, to make it still more plain, I again repeat, he is a *physician*, and not a lawyer etc. Just as a technologist, artist, or any other craftsman must hold his knowledge or experience in his art or trade at the service of justice in the interest of the common need, so must the physician, and nothing else is required of him. ...”

“This erroneous blending of medical and legal ideas and objects is also combined with another greater and more consequential error in the practice of forensic medicine. I mean the tendency to endeavour to obtain strict apodictical proof, such as was required by the practice of the older penal courts. ... I demand in what other branch of general medical diagnosis, of which the forensic is but a part, is such indubitable certainty required, or where can it be attained?”

Johann Ludwig Casper

(Preface to the 3rd edition of his textbook, 1860)

His practical handbook achieved 8 editions, the last of them published by Schmidtman in 1905. Casper also published an Atlas of Forensic Medicine. His son in law also being his successor as head of the Unterrichtsanstalt für Staatsarzneikunde, built in Berlin the famous institute of forensic medicine at the Charité from 1884 to 1886 (fig. 7). Before Liman had visited the Paris morgue and the plans for the institute in Berlin were based on the building in Paris. Some famous textbooks in Forensic Medicine of the 19th and early 20th century are listed in table 6.

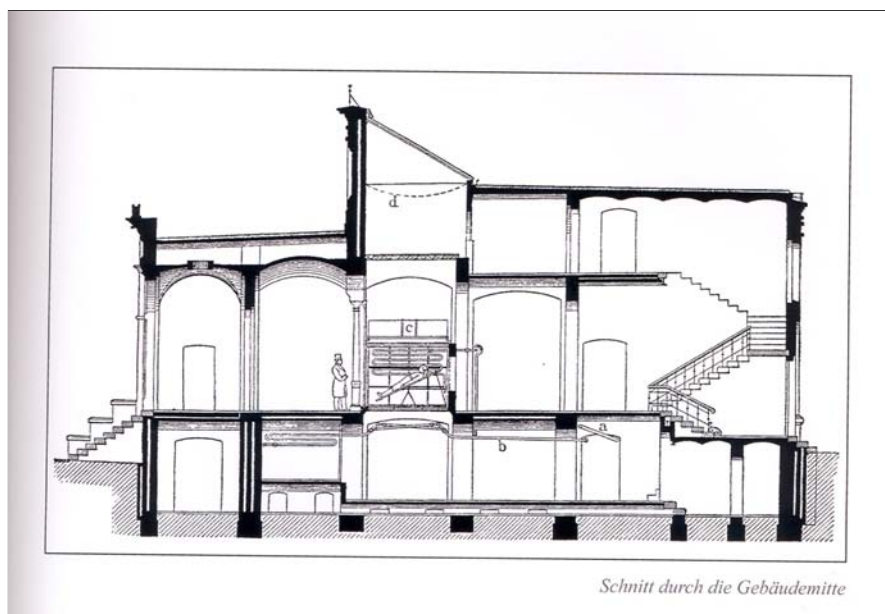


Fig. 7: Cut through the institute of forensic medicine at the University of Berlin (built from 1884 to 1886). The institute served also as a morgue where unidentified deceased were exhibited for public viewing. At the first floor a man is standing in front of a glass window, behind the window bodies are exhibited in cooling cells. The Paris morgue served as a model for the construction of the morgue in Berlin

Tab.6 Famous textbooks in Forensic Medicine in the 19th and early 20th century

CASPER, Johann Ludwig: Praktisches Handbuch der Gerichtlichen Medizin, 1st ed. 1857, 9th ed. edited by R. Schmidtman 1905

VON HOFMANN, Eduard: Lehrbuch der Gerichtlichen Medizin, 1st ed. 1878, 11th ed. edited by Albin Haberda 1923

VON HOFMANN, Eduard: Atlas der Gerichtlichen Medizin, 1898

PONSOLD, Albert: Lehrbuch der Gerichtlichen Medizin, 1st ed. 1950, 3rd ed. 1967

PROKOP, Otto: Forensische Medizin, 1st ed. 1960, 3rd ed. 1975

MUELLER, Berthold: Gerichtliche Medizin, 1st ed. 1953, 2nd ed. 1975

STRASSMANN, Fritz: Lehrbuch der Gerichtlichen Medizin, 1st ed. 1895, 2nd ed. 1931

BROUARDEL, Paul: L'Infanticide, Paris, J.-B. Ballière et fils, 1897

VON HOFMANN, Eduard: Noveaux éléments de médecine légale, traduction par le Dr Emmanuel Lévy ; introduction et commentaires par P. Brouardel. Paris. J.-B. Ballière et fils, 1881

VON HOFMANN, Eduard: Atlas-manuel de médecine légale, édition française par Ch. Vilbert ; introduction par P. Brouardel. Paris. J.-B. Ballière et fils, 1899

LACASSAGNE, Alexandre: Précis de médecine judiciaire, ouvrage accompagné de 4 figures dans le texte et de 4 planches en couleur dessinées par le Dr E. Charvot. Paris, G. Masson, 1878

LACASSAGNE, Alexandre: Le Vade-mecum du médecin-expert : guide médical ou aide-mémoire de l'expert, du juge d'instruction, des officiers de police judiciaire, de l'avocat, Lyon, A. Storck, 1892

BROUARDEL, Paul: La pendaison, la strangulation, la suffocation, la submersion. Paris : J.-B. Ballière et fils éditeurs, 1897

ORFILA, Mathieu-Joseph: Leçons de médecine légale. Paris: Bechet jeune éditeur, 1828

ORFILA, Mathieu-Joseph, LESUEUR, Octave: Traité des exhumations juridiques et considérations sur les changements physiques que les cadavres éprouvent en se pourrissant dans la terre, dans l'eau , Paris, Béchet jeune, Libraire de la Faculté de médecine, 1831

SIMONIN, Camille: Médecine légale judiciaire, 3^e éd., Collection Les Précis pratiques, Paris, Maloine, 1955

TAYLOR, Alfred S.: A manual of medical jurisprudence, John Churchill London, 1844

TARDIEU, Ambroise, avec la collaboration de Z. ROUSSIN: Étude médico-légale et clinique sur l'empoisonnement, Paris, J.-B. Ballière et fils, 1867

TARDIEU, Ambroise : Étude médico-légale sur l'infanticide, Paris, J.-B. Ballière et fils, 1868

TARDIEU, Ambroise: Étude médico-légale sur la pendaison, la strangulation et la suffocation, 2^e éd., Paris, J.-B. Ballière et fils, 1879



Fig. 8: Eduard von Hofmann (1837-1887), Professor of forensic medicine in Vienna from 1875 to 1887. His time in Vienna is called the golden age of forensic medicine. He published not only a famous textbook and an atlas of forensic medicine, but numerous articles throughout the whole discipline. He had many important pupils who performed outstanding experimental research



Fig. 9: Title cover of Eduard von Hofmann's "Textbook of forensic medicine"

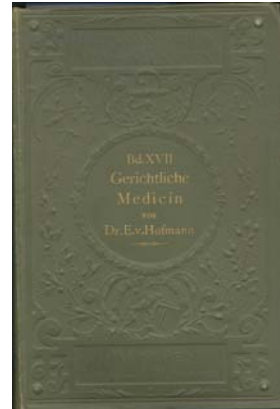


Fig. 10: Atlas of Forensic Medicine (Atlas der Gerichtlichen Medizin) by Eduard von Hofmann with numerous illustrations by the painter A. Schmitson



Fig. 11: Stab wounds of the back to illustrate Langer's Lines, from E. v. Hofmann, Atlas of Forensic Medicine

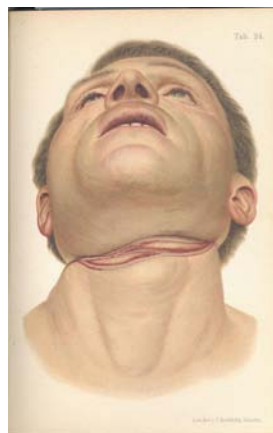


Fig. 12: Suicide by hanging, strangulation mark, from E. v. Hofmann, Atlas of Forensic Medicine

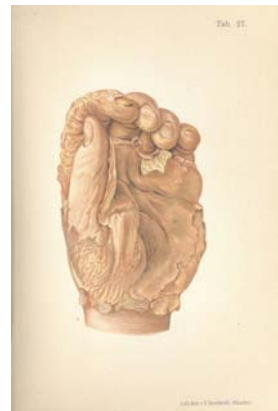


Fig. 13: Washerwoman's skin, from E. v. Hofmann, Atlas of Forensic Medicine

Austria

In Vienna already in 1804 an institute of forensic medicine was founded as institute of forensic pharmacology and medical police. The claim of a medical police goes back to Johann Peter Frank, who was appointed in 1794 professor of surgery at the university of Vienna. His most famous book was "System einer vollständigen medicinischen Polizey" (system of complete medical police). However, from 1844 to 1875 forensic autopsies were performed by pathologists, mainly by the famous pathologist Carl von Rokitansky (1804-1878). In 1875 Eduard von Hofmann (1837-1897), who was the first professor of forensic medicine at the university of Innsbruck since 1869 moved to Vienna (fig. 8). In 1878 he published his famous "Lehrbuch der Gerichtlichen Medizin" (textbook of forensic medicine), which was translated into four languages (French, Russian, Italian, Spanish; fig. 9).

The 11th edition of this famous textbook was published by his pupil Albin Haberdar (1868-1933) in 1922. He also published a famous atlas of Forensic Medicine (1898) with numerous photographs and illustrations which can be still used today (fig. 10-13). Already by Johann Peter Frank a museum of biological specimens was founded in Vienna and can still be visited today in the so called "Narrenturm". Von Hofmann unhinged the forensic preparations out of the museum of pathology and founded an own collection of forensic preparations which now comprises more than 2.000 preparations. In this museum, preparations are still exhibited which were already pictured in his own textbook and atlas of forensic medicine.

United Kingdom

In the U.K. the development of forensic medicine was delayed behind Italy, France and Germany. Obviously, this was due to differences in legal systems and practices. Apparently, the approach of roman canon law for legal decision making in contrast to English common law considerably encouraged the development of forensic medicine. According to Vanezis technical evidence by experts could be incorporated better into the roman canon proceedings because sentences were made by judges in contrast to common-law trials, where the use of juries tended to discourage testimony that could not easily be understood by lay people. However, by the end of the 18th century chairs of forensic medicine were founded in Edinburgh and Glasgow. By 1834, 37 medical schools in Great Britain provided courses of instructions in forensic medicine. The courses subjects had been made obligatory for the medical curriculum of every medical school the year before. The rise and the decline of forensic medicine in the U.K. is combined with the incorporation of forensic medicine in the medical curriculum. Already in 1944, the instruction in forensic medicine given to medical students was called excessive. Later the royal commission on medical education in 1968 did not consider the subject at all. As a consequence, universities could claim this considerable justification that provision of forensic medicine as a speciality on its own is not

concerning, particularly when money is short and virtually no research came from those who specialised in the subject.

A decline of academic forensic medicine cannot only be observed in the U.K. but also in Germany. Reasons are an inadequate financing of forensic medicine, competition on money between different medical disciplines and a scientific recognition which is based on impact factors and external funding.

United States

Through the implementation of British Common Law settlers in North America brought coroner laws to the early colonies.

The first formal acknowledgement of the need for medical training for coroners occurred in 1860, when Maryland passed legislation allowing coroners to require that a physician be present at an inquest. Massachusetts was in 1877 the first state that replaced coroners by medical examiners, who were required to be physicians. In Baltimore since 1890 physician medical examiners began to perform autopsies for coroners. In 1918, New York City instituted a medical examiner system.

Already in 1928 the National Research Council's Committee on Medical Legal Problems released a recommendation that the office of the coroner should be abolished since it is an anachronistic institution which has conclusively demonstrated its incapacity to perform the functions customarily required of it (National Research Council, Strengthening Forensic Sciences in the United States). The National Research Council has recently (2009) released very important recommendations for the reformation of forensic sciences and forensic medicine which should be noticed also in other countries.

Current problems

Forensic medicine developed as a recognizable separate scientific discipline in most European Countries in the 19th century. However, already at that time forensic medicine was questioned to be a separate academic discipline. Already more than 100 years ago the famous German surgeon Theodor Billroth (1826-1894) wrote in a book on teaching and learning medicine at 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, f.i. judicial questions. This reproach is not only wrong but also long living and has accompanied our discipline for more than 100 years now. In England and Wales the number of professorships in forensic medicine has decreased dramatically, in Germany several institutes of forensic medicine have been closed in the last 10 years.

Of course does forensic medicine have an own research profile and deals with questions and issues which are not found in other disciplines. These are f.i:

- thanatology: post mortem changes, time of death, wound age estimation, distinction between ante- und post mortem injuries, vitality of wounds;
- traumatology as a basis of reconstruction;
- post mortem toxicology;
- toxicological analysis of various body fluids;
- hair analysis;
- driving under the influence of alcohol or drugs, impaired driving ability;
- stain analysis
- identification
- forensic anthropology.

One of the best books on the history of Forensic Medicine especially the early history from the 16th to the 18th century was published 30 years ago by Esther Fischer Homberger (fig. 14). Unfortunately this book (*Medizin vor Gericht*, *Medicine at court*. On the social history of Forensic Medicine) was published only in German.

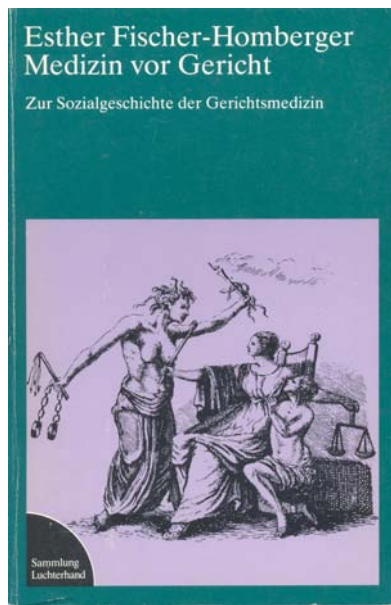


Fig. 14: Frontpage of the book on the History of Forensic Medicine by Esther Fischer Homberger "*Medizin vor Gericht*" (*Medicine at court*)

References

1. Ackerknecht EH (1950/51) Early History of Legal Medicine. Ciba Symposium 11, Nr. 7, 1286-1304, reprinted in: Burns RC (1977) Legacies in Law and Medicine. Science History Publications New York, 247-271
2. Bonte W (2000) History/Forensic Medicine. In: J. A. Siegel, P. Saukko, G. Knupfer (eds.) Encyclopedia of Forensic Sciences, Academic Press, San Diego San Francisco New York, 1064-1070
3. Brittain RP (1965) Origins of legal medicine: Constitutio Criminalis Carolina. Medico-Legal Journal 33: 124-127
4. Brittain RP (1965) Origins of legal medicine: the origin of legal medicine in Italy. Medico-Legal Journal 33: 168-173
5. Brittain RP (1966) Origins of legal medicine: Leges Barbarorum. Medico-Legal Journal 34: 21-23
6. Brittain RP (1966) Origins of legal medicine: the Assizes of Jerusalem. Medico-Legal Journal 34: 72-73
7. Brittain RP (1966) Origins of legal medicine: the origin of legal medicine in France. Medico-Legal Journal 34: 168-174
8. Brittain RP (1967) Origins of legal medicine: Roman law: Lex Duodecim Tabularum. Medico-Legal Journal 35: 71-72
9. Cattaneo C (2008) Legal Medicine in Italy. In: Madea B, Saukko P (eds.) Forensic Medicine in Europe. Schmidt-Römhild, Lübeck, 209-227
10. Camps FE (1968) Gradwohl's Legal Medicine, 2nd edn, pp. 1-14. Wright Bristol
11. Clark M, Crawford C (eds.) (1994) Legal Medicine in History. Cambridge University Press, Cambridge
12. Corbella J (2004) Historia de Medicina Legal. In: Calabuig, G. Villanueva. Medicina Legal y Toxicologia. 6th ed., Masson, Barcelona, 8-12
13. Dérobert L (1973) Histoire de la médecine légale. Zacchia 48 : 1-37, 161-192, 341-382, 533-547
14. Feola F (2007) Profilo Storico della Medicina Legale. Dalle origini alle soglie del XX. secolo. Editioni Minerva Medico, Torino
15. Fischer-Homberger E (1983) Medizin vor Gericht. Gerichtsmedizin von der Renaissance bis zur Aufklärung. Verlag Hans Huber, Bern
16. Geserick G, Vendura K, Wirth I (2005) Das Institut für Rechtsmedizin der Charité in Berlin-Mitte. Ansichten und Einblicke. Berlin, www.photobuch24.de
17. Hausner E (2008) Historische Sammlung des Instituts für gerichtliche Medizin der Universität Wien. Edition Hausner, Desktop-Publishing, Oliver Hausner, Wien
18. Herber F (2002) Gerichtsmedizin unterm Hakenkreuz. Militzke, Leipzig
19. Hunt B, Pounder D (2005) The forensic pathology initiative from Home Office pathologist to home-office pathologists? J Clin Forensic Med 12, 289-290
20. Jentzen JM (2009) Death Investigation in America. Coroners, Medical Examiners and the Pursuit of Medical Certainty. Harvard University Press, Cambridge
21. Jones AW (2007) The distribution of forensic journals, reflections on authorship practices, peer-view and role of the impact factor. For Sci Int 165, 115-128
22. Ludes B (2008) Forensic Medicine in France. In: Madea B, Saukko P (eds.) Forensic Medicine in Europe. Schmidt-Römhild, Lübeck, 113-141
23. Luna Maldonado A, Pérez-Cárceles MD (2008) Forensic Medicine in Spain. In: Madea B, Saukko P (eds.) Forensic Medicine in Europe. Schmidt-Römhild, Lübeck, 373-385
24. Madea B (2004) 100 Jahre Deutsche Gesellschaft für Gerichtliche Medizin/Rechtsmedizin. Vom Gründungsbeschluss 1904 zur Rechtsmedizin des 21. Jahrhunderts. Deutsche Gesellschaft für Rechtsmedizin 2004